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Cochipoa columna-alba
East of Cifuncho

Photo. - A.W.Craig



Tephrocactus camachoi (left)
7 km S.E. of Socaire

Tephrocactus glomeratus (right)
Photographs: A. W. Craig



Tephrocactus camachoi fruit

FINDING WHICH SORT OF TEPHROCACTUS? From C & M Sherrah

In the course of our visit to Chile in 1997 we were able to get to San Pedro de Atacama, driving a car we had hired in Antofagasta. It was on the last day of January when we were travelling along the road from Calama to San Pedro when we saw the first mound-forming Tephrocactus. We subsequently saw these same sort of clumps at various places - firstly between San Pedro and Banos de Puritama. Then we drove south from San Pedro until we were a few km to the south of Tocoanao, where we took the road leading past Talabre which eventually crosses the border into Argentina. Along this road, all the way from the turn-off to Talabre, past Talabre and beyond, these Tephrocactus were to be seen over a distance of 30 km or more. Then when we were further still to the south, going along the road via Socaire (which also goes to the border), we saw these plants for several km both before reaching Socaire as well as after that place. Further still to the east of Socaire, when we were roughly only 30 km or so from the border and were crossing the Pampa Loma Amarillo. we even found a Tephrocactus on the shoulder of the 5369m high peak (which has no name on the map).

All these plants are very common and the spine colour is very variable, some clumps having a reddish brown colour at the spine tips whilst others are more golden. There also appeared to be at least two forms in terms of segment size. At Talabre we took one segment off a plant of the small form, where the segment measured up to 30 mm in length. Also at this same place we removed a segment from the larger dark spined form and this segment measured 75 mm in length.

Along the road from Tocoanao to Socaire we came across plentiful clumps of Tephrocactus with spines of a very pale red-brown colour, which appears to be due to bleaching of the spines by the sun. In consequence clumps with new growth have an overall distinctly red-brown look, whilst those without new growth looked almost white.

.....from H.Middleditch

Accompanying this letter were several interesting slides taken in the vicinity of the Salar de Atacama, which were shown at The Chileans 1997 Weekend. These included pictures of both the larger and smaller forms of the hummock forming Tephrocacti seen near Talabre. Alongside and on the same picture as a plant of each of the two forms was a single segment which had been removed from that particular plant and laid on a lens cover, as a guide to the segment size.

.....from A.W.Craig

Prior to our 1997 visit to Chile we had been acquainted with this information from C & M Sherrah and we had also looked at the slides they had taken of these plants. In the course of our visit to Chile we also travelled along the road from Calama to San Pedro de Atacama. At a spot some 24 km to the west of San Pedro we saw some hummock forming Tephrocactus with a few yellow flowers, so we stopped to take a closer look. These plants had some nice green segments without any obvious tubercles and a single spine at each areole, directed outwards and upwards. The plants we looked at closely were sending out a surprising number of new segments, their fresh spines pointing more upwards than outwards, were such a dark red colour that they were almost black.

We were able to stop for a while at San Pedro de Atacama, which we had not previously visited. Here we found ourselves in a wide basin, the lowest part occupied by the shallow but very extensive Salar de Atacama. The town of San Pedro de Atacama lies at an altitude of 2436m some distance from the northern end of the Salar de Atacama, where the surroundings are still predominantly flat. To the north and east of San Pedro we could see the tops of the high Andes, whose lowermost slopes approach to within a few km of the town. There are signs of cultivation and husbandry at many spots in the surroundings of the town.

To the east of the Salar de Atacama the foothills of the mountains approach to within 10 or 20 km of the salt lake, with a more or less flat ground between the two. The main road along which we drove south from San Pedro de Atacama for perhaps 80 km or more was consequently pretty level. The salt lake may be seen no great distance to the west of this road and indeed in places the road does cross the margin of the Salar de Atacama, where there is nothing more than a bare white surface with no vegetation at all. Apart from the hamlet of Tocoanao there are only infrequent habitations along this road; occasionally a stand of tall green trees stood out in stark contrast with the rest of the low growing vegetation, marking the site of a small oasis. The road we were following eventually turned southeastwards and started to enter the foothills of the mountains, heading in the direction of the border with Argentina.

Shortly before reaching Socaire we saw some *Trichocereus atacamensis* in the distance. When we were about 2 or 3 km past Socaire we saw some more of these *Trichocereus*, growing on the sloping sides of a gully. We had also seen this same *Trichocereus* growing north of San Pedro de Atacama, not far from Puritama, in similar circumstances. At the stop near Socaire, they were growing only on the north facing side of the gully. At first sight these *Trichocereus* did not seem to be a great distance from the road and we did consider trekking across to get a closer look at them. But distances can be very deceptive in the clear air at this height. In addition, they are really very tall plants and can give the impression of being no great distance away when it could possibly be half an hour's walk to reach them. So we simply looked round not far from the road and then drove further on.

After travelling for another 4 or 5 km, during which we passed through Socaire, we made a further stop. Scattered around at this particular spot were a considerable number of hummocks of Tephrocacti, mostly to be seen on gently sloping ground which was patchily rough underfoot. It consisted largely of fine sand and gravel together with lumps of stone mostly up to football size but also with a sprinkling of larger rocks. There was a scattering of herbs and shrubs which rarely reached knee height, there being no grass to speak of, except

alongside the irrigation channels. There was probably more bare ground than vegetation but by comparison with the real desert it was almost lush. The *Tephrocactus* were fairly abundant here, often just two or three paces apart. Not infrequently a pair of these hummocks would be found almost touching one another. It was early November and there were buds, flowers, and fruit to be seen on a great many of these *Tephrocactus*.

Looking at one such pair of hummocks gave me the impression that they were not really entirely alike. Of this particular pair of plants, one hummock was roughly twice the height and diameter of the other. The larger of the two plants gave the impression of having longer spination which was projecting more outwards from the hummock. The spination on the smaller plant, on the other hand, appeared to be lying back against the body of the hummock. Both of these plants were carrying flowers and fruit so one segment was removed from each plant, together with a pair of flowers (one from each plant) as well as a pair of both fresh green and shrivelled up fruits. These were then laid down on the ground to be photographed, the similar pair off each plant side by side.

Having a similar component from each of these two plants laid side by side, it could then be seen that the smaller plant had thinner segments than the larger plant - possibly half as thick, but of similar length. On both segments the areoles were quite compact with areolar wool barely projecting above the surface of the segment; on the thinner of the pair of segments the areoles were not quite as large as on the thicker segment. The spination on the thicker of the two segments (from the larger hummock) was substantially straight, projecting upwards and outwards away from the segment. On the thinner segment (from the smaller hummock) the spines were of slightly shorter length, somewhat curved from the base so that they then projected mostly sideways, so that they tended to follow the contour of the surface of the hummock.

The fresh flower on the larger plant was roughly one third larger in all its parts than than the flower from the smaller plant. This larger of the pair of flowers displayed relatively insignificant scales at each areole on the tube whilst the areoles themselves were roughly twice the size of those on the smaller of the two flowers. Also on the larger of the pair of flowers, the lower floral areoles bore two or three tiny insignificant bristly spines. Only at the topmost floral areoles were spines of significant length to be seen, those at the uppermost areoles attaining roughly half the length of the petals.

The smaller of the two flowers (from the smaller hummock) had distinctive scales at each areole, these scales becoming longer and larger towards the top of the flower tube. Around the very top of the tube there was a ring of an appreciable number of scales which ranged in size and appearance from one or two scales similar to the scale on the topmost areole, to what can only be described as an outermost petal. There was no obvious sign of any bristles or spines on any of the areoles on the tube.

Even more remarkable was the difference to be seen in the fruit, although there was a difficulty here in knowing whether a fair comparison was being made between a fruit of similar age and condition off each plant. Looking at the two green fruits, one off each of the same pair of plants, that from the smaller plant was roughly 15 mm long by 10 mm thick, with a few insignificant areoles and totally lacking in bristles or spines. The fruit off the larger of the pair of plants was some 30 mm in diameter, more or less smooth globular, the upper half displaying a fair number of quite obvious areoles. From possibly a couple of dozen of the upper areoles on the larger fruit there arose almost a forest of quite strong spines, 3 or 4 per areole, attaining perhaps 15 mm in length. The pair of old, desiccated fruits were similar in that the smaller of the two fruits totally lacked spination, the larger of the two fruits having a collection of spines at the apex which were possibly between 20 and 25 mm in length. The impression was gained that the spination on the larger fruits (taken off the larger of the pair of plants) grew steadily in length for some time after the flower remains became detached from the fruit and before the fruit became detached from the plant.

.....from C.Holland

The two sorts of *Tephrocacti* found and photographed by A.W.Craig near Socaire are fascinating. The smaller of the two plants looks rather like my RMF 14. To see it growing alongside a superficially quite different plant is very interesting. I do have a plant with similar elongated cylindrical segments from San Pedro de Atacama at 3,150m as Rausch 467. But I can find no reference to this habit in the literature where all the Chilean "*Maihueniopsis*" have segments of an approximately conical shape, except perhaps Ritter's *T.grandiflora*.

.....from R.Ferryman

The copy prints taken by A.W.Craig certainly reflect the very obvious forms of *Tephrocactus* which are to be found throughout NE Chile and, I believe, NW Argentina. I take the view that the smaller clumps that bore thinner segments were simply plants under stress. There is a great deal of similarity with every thing else, it is simply scale in my opinion. These plants are in no way connected to the RMF 14 which I came across on the road leading northwards out of San Pedro de Atacama.

.....from R.Hillmann

The differences which could be seen in the set of pictures taken by A.W.Craig were very interesting. I saw hummock forming plants like this on the way from San Pedro de Atacama to the Bolivian border, abundant over a wide area. At some places, there was a plant every couple of metres. Now that I have looked at these pictures, it seems to me that between these two plants there exists only a difference in size. All other parts of the plant are the same in their physical components. So it is my personal opinion that the two forms are the same species. With *Tephrocacti* seen elsewhere, near the border with Bolivia, there is a great variation in not only the overall appearance of the plants, but also in the form and colour of the spination as well as in the flower colours. Likewise here, where the overall appearance of the two plants appears to me to be rather similar. In addition, the smaller of the two plants which are pictured, looks as if it is somewhat dried out.

.....from J.Iliff

It is really awfully difficult to reach any conclusion on the basis of photographs. The plants look to me

like ordinary *Opuntia glomerata*, but to none of them would I like to say anything definite.
.....from H.Middleditch

Discussions at The Chileans' Weekend brought out suggestions that the larger and smaller plants were either dimorphic forms of the same species, or else the smaller plants were more stressed.
.....from A.W.Craig

There was not just this solitary pair of plants which displayed the differences in their components. There were a large number of plants scattered about at this locality, the larger and the smaller plants being intermingled. It would take an unprecedented stretch of imagination to suggest that at each particular spot of (say) half a metre square on which the smaller plants with smaller components were growing, was somehow more lacking in moisture or more exposed to some greater harshness in the environment than those which displayed the larger components and were growing alongside. A similar pair of plants were to be found at a distance of less than 2 metres from the edge of an irrigation channel whose edges were bounded by an almost continual line of green grass, which had obviously been grazed by some animal.

Before making a stop at this particular location, (some 7 km or so south of Socaire) we had made a brief stop at a point some 2 to 3 km south of Socaire, where we also walked some way from the road. There were Lupins in flower here as well as a large yellow daisy-like flower, but there were no lupins at all to be seen when we made the next stop where we found the two sorts of *Tephrocacti* with the larger and the smaller components.

.....from H.Middleditch

Which might suggest that the ground conditions where the lupins grew did not suit the cacti, and *visa versa*.

.....from K.Gilmer

Very fortunately I have a seed-grown Eggli-Leuenberger 2714, *T.camachoi*, the seed originally collected at 3750m altitude to the southeast of Toconao at a spot 1 km above the side road going to Talabre Viejo; as well as a seed grown Eggli-Leuenberger 2716 *T.glomeratus*, the seed originally collected at 3680m altitude to the south east of Toconao at a spot 3 km above the side road going to Talabre Viejo.

.....from H.Middleditch

These two Eggli-Leuenberger locations fall within the stretch of road below and above Talabre where C.Sherrah took his slides of the small- and large-segmented plants, which he showed to The Chileans' Weekend. This patch lies about 30 km due north of the site where A.W.Craig found his adjacent large- and small-segmented plants, and at a comparable altitude, roughly the same distance into the hills from the eastern edge of the Salar de Atacama. This might suggest, on the basis of the Eggli identifications, that of the two plants photographed side-by-side by A.W.Craig, the one with the larger segments is *T.camachoi* and that with the smaller segments is *T.glomeratus*. The larger segmented plant has the straight spines directed half-outwards as on the 1933 Espinosa picture of *camachoi*, the smaller segmented plant has the spines slightly curved but directed outwards as if to follow the contour of the hummock, as may frequently be seen on *T.hypogaea*.

.....from U.Eggl

The small growing cushion *Opuntias* of the Andean region of Chile and Argentina pose, as you are well aware, many difficult problems, and I have no ready answers for them. The collections of mine that you mention are part of much wider gatherings on either side of the international border in connection with floristic projects in both countries. As yet, we have not started work on *Opuntias* in detail, so I am not presently able to give you an unequivocal answer about these particular plants. The identifications of my collections are tentative only, and are used for reference in comparison with other collections and "current" views.

I can certainly say that most of the collections of which your members have taken pictures are from a region which I had visited as well. Since we were specifically studying the *Opuntias* in the region, we spent several days just looking at these plants. We found that there is considerable variation to be seen in most populations, so that differences in size and spination are most probably not of systematic significance. In order to get some understanding, a population must be sampled thoroughly to document the variation present. You will also no doubt be aware of the difficulties associated with fruit characters: depending on the ripening status, fruits of many *Opuntias* change drastically in shape, size, and colour.

During our research in the area, it became clear that frequently, two taxa grow sympatrically at many localities, and that it is often extremely difficult to separate them without a detailed study of the plants involved. I would even say that it might be impossible to satisfactorily distinguish between *T.glomeratus* and *T.camachoi* without access to fruits and seeds, but this needs corroboration. Accordingly, I am not able to give a definite identification of the two plants in the photographs taken by A.W.Craig some 7 km S. of Socaire.

However, it is very possible that the smaller hummock represents *T.glomeratus*, and the larger *T.camachoi*. The plant photographed at Talabre by C.Sherrah might also represent *T.glomeratus*. The Vandenbroeck picture from Chiu-Chiu conforms to *T.camachoi* [reproduced in Chileans No.59].

The reason for using the name *camachoi* in preference to other older names is the simple fact that there is a good holotype at SGO, which allows positive identification in the field. Older names such as *O.atacamensis* have been differently interpreted by various past authors, and using them does not help because of the different concepts involved. Further research will have to tell which of the old names can be equated with certain populations in the field, and allow typification of them.

.....from H.Middleditch

It would have been very instructive to have been able to compare the seed from Eggli & Leuenberger 2714 and 2715 in order to establish whether they displayed any clear differences.

....from U.Eggli

We do happen to have a few seeds remaining here from both those collections, which I am enclosing. You will find that they are still sandwiched between the newspaper which we used in the field to absorb the surrounding juices.

.....from G.J.Swales

A couple of each of these seeds were placed in separate water-filled phials and left to soak for three days. Both the dry and the wetted seeds were then examined under the microscope.

.....from H.Middleditch

The dry seeds of Eggli & Leuenberger 2715 (*glomeratus*) displayed an appearance somewhat similar to “*Maihueniopsis*” seed originating from plants in western Argentina, which had been examined on a previous occasion. These included one sample collected by R.Kiesling at Pie de Palo, and a second sample of GC 195 from Cacheuta. Although these all gave the impression of having a surface covered with abundant dwarf trichomes, it was almost impossible to make out any precise detail.

....from G.J.Swales

It had proved very difficult to remove the last traces of newspaper which were attached to the surfaces of the seed, whilst at the same time avoiding any possible damage to the surface of the seed. After placing one wetted seed under the microscope, a tiny piece of newspaper floated free and under the microscope this displayed a distinctive pattern of fibres. A very similar pattern of fibres was observed on wetted seed of Eggli & Leuenberger 2716 which would suggest that a film of newspaper fibres still remained attached to that particular seed. It was therefore essential to ensure that it was the surface of the seed that was being examined in each case and not an extraneous attachment.

The wetted seeds were examined at 40 times magnification and instead of using the illumination integral with the microscope, an external source of illumination was utilised, positioned so that the light fell almost tangentially on to the seed surface. This enabled the actual seed surfaces to be examined more readily.

.....from H.Middleditch

By this means it was possible to see that the surface of the Eggli & Leuenberger 2715 (*glomeratus*) seed was composed of a great number of extremely fine, short hairs, as closely packed as the fur on short-haired animal or on a closely woven carpet - much closer and finer than on our dog or on our best carpet, which were both checked for comparison. At a rough guess, the trichomes on the seed may have been set at about 0.05mm apart, they may have been about 0.003mm thick and well under 1mm long. At lower magnification, the trichome covered surface of the seed presented an appearance similar to that of a well-trodden woven carpet. It might be assumed that the score of other samples of “*Maihueniopsis*” seed from western Argentina which had previously been examined, could have had a surface coating of a similar nature.

The seed of Eggli & Leuenberger 2714 (*camachoi*), even at lower magnification and under direct illumination, displayed the frizzly looking long hairs to be seen in the Buxbaum seed sketch in Chileans No.59. On the basis of this information, *T.camachoi* and *T.glomeratus* can be separated by their seed alone. Can more obvious features also be used for this same purpose?

On the photograph of the fruit of *T.camachoi*, taken by A.W.Craig in habitat near Socaire and reproduced here, it will be seen that there are few areoles on the lower half of the fruit; the lowermost of these areoles carry short, fine, almost insignificant spines, the spines becoming longer and more robust the closer the areoles come to the edge of the floral scar. These particular features compare quite well with both the exterior of the flower tube photographed by A.W.Craig at roughly the Type location for *T.camachoi* (between Calama and San Pedro de Atacama), and the ruptured fruit photographed by F.Vandenbroeck en route from Calama to Chiu-Chiu, regarded as *T.camachoi* by U.Eggli, both photographs being reproduced in Chileans No.59. The spines on the fruit photographed by F.Vandenbroeck are fairly slender and not very prominent; by comparison, the spines on the fruit photographed by A.W.Craig are fairly robust - comparable to the fruit in “*Opuntioideae*” (Eds. Hunt & Taylor, 2002) Plate 54.

.....from R.Ferryman

I did see green fruit on an appreciable number of plants of *T.camachoi* on my recent visit to northern Chile, and there is no doubt that whilst the spination is largely confined to the top half of the fruit, it can vary from quite robust to quite slender, from one fruit to another.

.....from H.Middleditch

The overall appearance of the smaller hummock in the A.W.Craig picture, seemingly a “*glomeratus*”, bears but a passing resemblance to the *T.hypogaea* from northern Argentina. The flower of the *T.glomeratus* photographed near Socaire by A.W.Craig evidently has areoles which are more or less equitably disposed over the full height of the pericarpel and tube; the slight degree of closer areole spacing going from the base to the top of the tube is much less marked than on *T.camachoi*. In addition, on the *T.glomeratus* there are no obvious signs of other than rather insignificant spines at the areoles on the flower tube. Numerous photographs taken by various cactus travellers are available of a clump of *T.glomeratus* in fruit, where little other detail of the fruit is visible below the floral scar, on account of the camera more or less facing the top of the fruit. However, careful examination of the numerous fruit carried above the spines on the *T.hypogaea* photographed by N.Wilbraham near to Tres Cruces, between Iturbe and Abra Pampa, (reproduced in Chileans No.56) would equally suggest an absence of distinct spines on the upper part of the fruit.

In “*Opuntioideae*” (Eds. Hunt & Taylor) the Plate 48 of a *T.hypogaea* also displays two fruits of similar appearance which are held proud of the cushion of segments and spines

....from U.Eggli

Eggli & Leuenberger 2715 - ... fruits when ripe exerted from cushions. Likewise for Eggli & Leuenberger 2716.

.....from W.Stuppy, Opuntioideae p.49
Maihueniopsis.

....fruits sunken into the cushion
.....from H.Middleditch

The location for *T.glomeratus* near Talabre recorded by U.Eggli, and that near Socaire as described by A.W.Craig, are both on the east side of the Salar de Atacama and so are widely separated from the parts of northern Argentina from where *T.glomeratus* have been reported - which is basically around the stretch from Abra Pampa to La Quiaca. More in the direction of the border with Chile, the existence of *T.hypogaea* has been reported from just east of San Antonio de los Cobres by K.Gilmer [Chileans No.51], and from due south of Salinas Grandes by G.Charles et al.

.....from M.Lowry

In the course of our 1999 trip to northern Argentina we made an overnight stop at La Quiaca, close to the border with Bolivia. From there, we set off westwards. A short distance beyond Tafna we came to a very dry rocky slope where there were scattered plants of *Oreocereus celsianus* to be seen. Making a stop to look round, we found *Parodia maassii* and *Lobivia longispina*, as well as largish hummocks of *T.bolivianus* and not-so-large hummocks of *T.glomeratus*. Going further to the west, the vegetation was quite sparse, until we finally came to the very northwestern corner of Argentina beyond Santa Catalina. Here we were looking down some steep rocky slopes with the upper reaches of the Rio San Juan del Oro flowing in the valley below, forming the border with Bolivia at this point. We were able to see more *Lobivia longispina* growing here, but this time in company with *Oreocereus trollii*.

Starting to retrace our tracks back towards Santa Catalina, the border was only a short way behind us when we stopped to look at some *Tephrocactus glomeratus*. On most segments only two or three of the uppermost areoles carried a solitary, sword-shaped, white spine with a dark tip, looking quite similar to other plants seen elsewhere in northern Argentina which are described as *T.hypogaea*. The segments were a good green colour and some of the plants were in bud.

Travelling south from Santa Catalina in the general direction of San Antonio de los Cobres, we passed through Coranzuli. Here again we came across some plants of *T.glomeratus*.

.....from H.Middleditch

This latter sighting in particular takes the distribution of *T.glomeratus* well to the west of other reported locations in Argentina. However, there is still quite some distance between Coranzuli and the area east of Salar de Atacama from where *T.glomeratus* has also been reported by Eggli & Leuenberger.

In the *Journal Succulentes* for 1999 (a publication of the Jardin Exotique, Monaco) there is a review by R.Kiesling of the cacti of Bolivia. This includes a very brief reference to *T.glomeratus*. The picture on the back cover is of a single large hummock of *T.glomeratus*, perhaps fifty segments or so from edge to edge, apparently growing on a perfectly flat surface of pebbles which stretches perhaps a few km to the foot of the mountain range in the background. Whereabouts might this picture have been taken in Bolivia?

.....from R.Kiesling

This particular picture was not taken in Bolivia, but between Susques and Paso de Jama, which is where the road going from Argentina to San Pedro de Atacama crosses the border with Chile. This picture is quite satisfactory for illustrating the article in this particular journal.

.....from H.Middleditch

Which is even further to the west than Coranzuli, reducing still further the gap to the *T.glomeratus* near Socaire and Talabre. The fifty or so ripe yellow fruit on the plant in this Kiesling picture are all roughly globular in shape, with the floral scar materially smaller than the diameter of the fruit, the spineless areoles fairly equitably distributed over the outer surface of the fruit. This is comparable to the fruit in the picture on p.100 in *Chileans No.56*, and would appear to be typical for the ripe fruit on *T.glomeratus*. Quite different to the fruit on *T.camachoi*.

.....from J.C.Hughes

It was time to leave Chile and return to Argentina; the regular bus took me from the coast at Antofagasta, via Calama, to San Pedro de Atacama. From there we must have travelled about 100 miles further east, to the Paso de Jama where we came to the sign that said Argentina. After a further travel of perhaps 20 km, occupying half an hour or so, we reached the Argentine passport control, in the midst of the exposed and uninhabited altiplano. Here there was only one person on duty. Besides the three coaches going east, there were lorries, cars, and another coach queuing up to go in the opposite direction. So I had nearly two and a half hours available for botanising in the surroundings.

We were here at about 3740m altitude, in the midst of a generally barren landscape, consisting mostly of a more or less level pebbly plain, stretching almost as far as the eye could see. The mountains in the far distance did give the impression of being green and there was a marshy area close to a nearby pool which supported some vegetation. There were small cushions of *Llaretia* and some sub-shrubs up to 30 cm tall, but most of the vegetation was ground hugging, requiring one to get down on hands and knees in order to examine it closely. Breaking the monotony of the stony and sandy surface of the ground, on the sloping side of one small hillock, there was a small *Tephrocactus* with barely a dozen, dark green, stout ovate shaped segments. There was a single flattened sword-shaped black-tipped whitish spine standing out more or less sideways from the two or three areoles on the topmost part of each segment. This plant stood barely a couple of inches above the surface of the ground, its overall appearance bearing a striking resemblance to the *Tephrocactus hypogaea* photographed by three or four different Chileans' members in other parts of northern Argentina.

The surroundings of the customs post looked just like a barren pebbly plain, but there might have been as many as a dozen *Tephrocactus* hummocks to be seen, dotted here and there. Walking over the flat pebbly area



Tephrocactus
hypogaea

Young plant



Cushion
40cm across
&
close-up
below



Argentine
customs post,
east of
Paso de Jama

Photographs:
J.C.Hughes

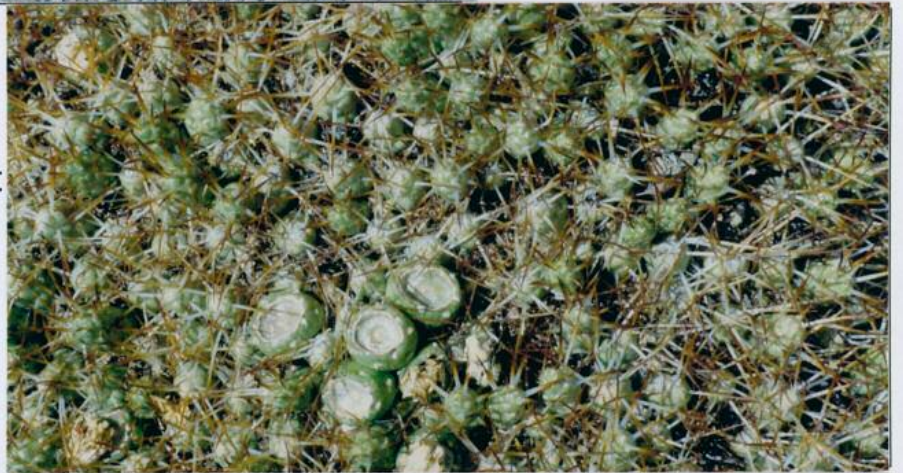


Tephrocactus glomeratus

Argentine customs post
east of Paso de Jama

Photograph: J.C.Hughes

Cushion
60cm across
&
close-up of fruit



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Succulentés spécial 1999

Photograph: R.Kiesling

towards the pool, there was a hummock of some 18 inches across and somewhat over a foot in height, very white in colour. This colour came from the great number of white spines standing out sideways from the segments, the outermost spines following the contour of the exterior of the hummock; these spines were quite long and stout but they were possibly not as broad as the sword shaped spines associated with the plants described as *T.hypogaea* by a variety of collectors.

In addition I also came across another, and somewhat larger, *Tephrocactus* hummock which was about 60cm across and over 30 cm tall, with spines of a pale cream colour that became brownish towards the tip. These spines were set at a rather acute angle to the segment and pointed outwards from the hummock. But there were also quite a few fresh green fruits which were not obscured by the spines. I was not really certain what species name should be given to these larger plants.

.....from H.Middleditch

The very small plant standing mostly only one segment high above the ground displays the one sword-shaped spine per areole, white in colour, shading into black over perhaps the outer third of its length, typical of *T.hypogaea*. Of the two rather larger hummocks, the smaller of the two, with white spines, may well be *T.glomeratus* (or *hypogaea*). Will the largest hummock be *T.camachoi*?

....from J.C.Hughes

On the largest hummock the green fruits were only partially clear of the surrounding spines so that only the upper part of the fruit could be seen clearly. The diameter of the floral scar was rather less than that of the fruit; in addition, the areoles did not appear to be bunched towards the top of the fruit and they were lacking in spines.

.....from H.Middleditch

This form of fruit would suggest that the largest hummock is *T.glomeratus*. With fruit on only the larger hummock, it might suggest that it flowers at a different time from the white-spined plant. Does the latter also carry a *glomeratus* type fruit?

....from J.C.Hughes

None were to be seen.

....from H.Middleditch

It would be difficult to accept the same name for two such dissimilar looking *Tephrocactus* growing almost side by side. From the appearance of the fruit, the larger hummock will be *T.glomeratus*, which means that the white-spined plant will have to be called *T.hypogaea*.

ECHINOPSIS EYRIESII Turpin.

Translated by H.Middleditch from Ann. de l'Inst. Roy. de Fromont Volume 2 1830

All the species described [above] cannot be related to *Echinocactus eyriesii*, of which I have the advantage of presenting here two drawings, one of a young plant and the other embellished with flowers in different stages of development; I go on to the description of this fine species.

The *Echinocactus eyriesii* is as large as the head, its form that of a melon slightly depressed at the crown and of which the ribs would be very prominent. Its roots, spreading sideways, are short, branching, whitish with a corky surface layer and very stout.

The body is globular, melon-shaped, as indicated above, divided vertically into fifteen or sixteen prominent ribs on which are located alternatively and in a spiral the equally prominent vital nodes and which produce on each rib seven or eight hemispherical areoles, woolly, whitish and armed with twelve to fifteen small straight spines, divergent from each other, hard and blackish. No leaves on the adult plant. From some of these areoles arise, from inside the rib, either a flower stalk or an aborted bud or new offsets. When it is the first that emerges, it takes on the appearance of an ovoid tassel of long silken hair, of a violet black mixed with white. From the centre of these tassels, which are 6 to 8 lines in length by 5 lines in diameter [15-20 mm long by 12 mm diam.], there arises a large white flower with anthers of a milky white colour, of 8 to 10 inches in length and a width of two inches.

This flower, of which the scent recalls that of the flower of the orange or the *Datura arborea*, consists of an inferior ovary which extends into or which is crowned by a long calical tube. The ovary and the calyx are furnished with a large number of subulate scales, blackish, appressed, terminating in a soft yellowish point, and furnished at their edges with greyish hairs, long and fine like rabbit wool, Plate II Fig 4. These scales, disposed alternatively and in a spiral, united among themselves to form the external part of the ovary and the calyx tube, become longer and larger, losing their wool, and gradually change into sepals and into white, outspread petals.

The stamens, very numerous and of the length of the calyx, are inserted at different heights along the interior wall of the tube. The greater number are free, from two thirds of the calyx; whilst the other part have their filaments adnate up to the base of the petals. They consist of a long greenish filament, terminated by a bilocular white or yellowish anther. Under the microscope the abundant pollen displays a large number of spherical vesicals, whitish, slightly granular and throwing out a considerable amount of globules, which display a clearly manifest active motion.

The style, which ascends from the top of the ovary cavity, is almost one line in diameter [2.5 mm]; it is greenish, rises almost to the height of the tube, and splits up into twelve or thirteen stigma lobes, papillate, of 3 or 4 lines in length [7 to 10 mm], outspreading and a sulphur yellow, Plate II Fig.5.

The interior of the ovary displays a unique chamber, of which the wall is furnished in the same proportion with threadlike placentas, longitudinally and adherent, like scars. From these placentas arise a large number of

small branches, Plate II Fig.6, which subdivide several times and of which the last divisions, ten to twenty in number, carry at their tip a white ovule, oblong, slightly oblique, curved and having a micropile located close to the insertion of the pedicle. These pedicles, seen under the microscope, present on one of their sides a great number of closely packed tubular hairs, blunt, silken, recumbent and erect. Do these hairs, in developing and multiplying, form the pulpy mass which fills the interior of the pericarps of this family? I think so. This aborescent disposition of the ovules which is again found in *Cactus speciosissimus*, but less compound, is reminiscent of of certain fasciculate or branching stamens like those of the *Ricinus*, or, better still, of those which form the long catkins of the *Pandanus utilis*. Fruit unknown.

History Mr. Alexander Eyries, of Havre, whose enlightened enthusiasm for everything which may be useful to science is well known to all naturalists, had the goodness not only to let me know about this new species of *Echinocactus*, but was also so extremely obliging as to furnish the information about the country of origin of this plant and about its introduction by the nurserymen of Le Havre. Not content with that, Mr. Eyries extended his generosity to the extent of sending me four young individuals, intended for, the first for the Royal Garden, the second for the Royal and Horticultural Establishment of the Institute of Fromont, the third for Mr. Fulchiron, and the fourth for myself, in order to accelerate the propagation of this fine species of cactus as much as possible.

"This cactus (says Mr.A.Eyries) originated from Buenos Aires, a captain of a French vessel having brought two stems in 1827; one of the two was given to one of his friends employed in the customs office, the other to one of his friends - a captain like himself - which he in turn entrusted to or exchanged with a gardener at Ingouville; a short while afterwards, this gardener cut his *Cactus* horizontally into two parts and sold me the upper part which, having recovered with the new roots which it developed laterally, produced flowers in abundance for me, but no offsets.

"The lower trunklike part remained in the hands of the gardener, producing not a single flower; but in return he obtained, in place of flowers, at least some thirty lateral outgrowths, which developed into as many offsets, and which he was easily able to separate or detach from the parent.

"The piece which had been passed on to the customs employee, made an impression with the magnificence of its flowers on an English gardener, who declared that he had never seen this cactus in England, made highly favourable offers in order to obtain it, and by dint of his solicitations he was given the upper part in exchange for some really fine plants which were sent to him from London. The lower part remained with Mr.Bouthiller, a capable horticulturist in Havre, where it is now producing offsets (like those of the gardener at Ingouville) but not quite as abundantly."

These offsets, of which I present the drawing of one of them, Plate II Fig.1, are of the form and size of an ordinary top, set in its point. That at the Royal Gardens, which I have just been to see, no longer has its flattened crown, it has become conical.

At the very time I am correcting the last proof of this article, I receive from Mr.Soulange Bodin the information about a work on Horticulture published in Berlin, and in which is to be found the description and the coloured drawing of a new species of *Echinocactus*, published under the name of *E.oxygonus*, by Messrs Link and Otto.

This species, which grows in Brazil and to which the authors give the specific name of *oxygonus*, has some affinity with *E.eyriesii*; but it differs essentially by its spination, three times as long and fawn-coloured, in place of black; by the scales or folioles of the calyx, which are fawn coloured or pink and barely ciliate, instead of being a blackish purple or green, and furnished abundantly with long fine greyish hairs, and finally by a pink flower with yellow anthers instead of a white flower with anthers of a milky white colour.

In the Royal Garden there are three young specimens of *Echinocactus* which have been donated by Mr.Loith under the specific name of *sulcatus*, and which could well be the young form of the *Echinocactus oxygonus* of Messrs Link & Otto.

Footnote; Whilst the result obtained through the separation of this *Echinocactus* into two parts conforms with the well known laws of vegetation, it remains no less remarkable for physiologists and horticulturalists, in that the upper part only produces floral branches and the lower part a continuance of offsets, just as Mr.Eyries so ably says.

.....from H.Middleditch

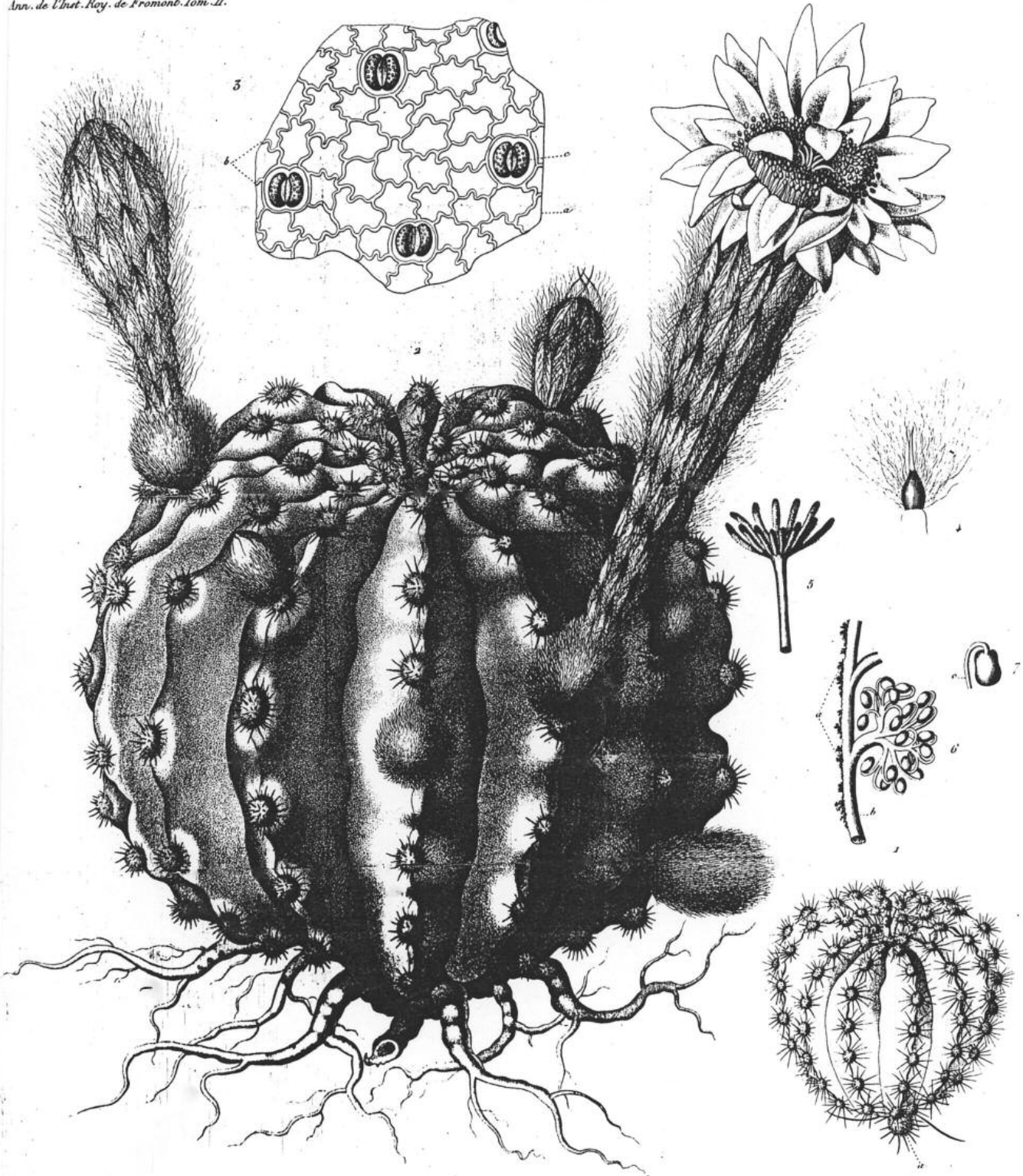
The plant which is the subject of this article is described as being from Buenos Aires. Accompanying this description is a very striking drawing of a plant complete with roots, buds, and flowers, which not only occupies the most prominent position on the Plate (the original of A3 size) but extends almost to the four corners of the page. The body of the plant is precisely what might be expected of an *Echinopsis* from Uruguay or southern Brazil. Although it is stated to have come from Buenos Aires, any shipping calling at that port would not infrequently call at Montevideo as well. Due to the rotation of the earth, the southern shore of the La Plata estuary silts up so that at the date in question, ocean going vessels had to lie at quite some distance offshore and small boats together with large-wheeled carts were the only practical conveyance from land to merchantman. From the same cause the northern shore of the estuary is conversely cleared of such deposits making it feasible to anchor close to land. Even if the ship's manifest originated in Buenos Aires, this plant is likely to have come on board at Montevideo.

Unfortunately the flowers which are shown on this Plate never grew on any *Echinopsis*. The scales are shown so long and large that they completely cover the tube. Of two buds of similar size, one is a mass of hairs completely obscuring any scales around the bud, which is typical for this sort of *Echinopsis*; the other bud is fairly liberally furnished with hairs which do not obscure the few large scales which cover the bud. Such large scales on a bud are foreign to any *Echinopsis* bud that I have seen. On the flower, the anthers are pretty evenly

1^{ère} Tribu Opuntiacées.

Ann. de l'Inst. Roy. de France. Tom. II.

Pl. 2.



ECHINOCACTUS Eyriesii. Turp.

Turpin del. f. Sept. 1829.

Boscquet sculp.

disposed in a thick ring at the throat, which would pass for an *Echinopsis* of the leucantha group, but hardly for an *Echinopsis* from Uruguay; conversely, the admirably clear description of the stamens inserted in two series makes it difficult to regard this plant as one of the leucantha group. The half-grown flower bud, like the flower, is drawn as if arising from a dense tuft of woolly hairs enveloping the pericarpel. One could easily imagine that the artist had drawn the smallish hair-covered buds from life and then added on later the fanciful representation of the flowers.

Although I know nothing of the reputation of this particular artist I fear that he has made a ghastly misrepresentation of the flowers on this particular Plate. This is in striking contrast to the microscopically fine detail in which he has drawn, on the same Plate, an area of epidermis with four or five stomata, and a bunch of ovules from the ovary. This detail is certainly in line with the mode of description of these details in the accompanying article, suggesting that the author was well versed in this form of study. There is always the possibility that Turpin did the original drawing of the plant in bud and then the travesty of the flowers was added by someone else.

.....from A.Hofacker

I think that this drawing shows a typical plant body for this species. I have met with other instances where old drawings are sometimes a little in error in regard to flower details. So I do not think we should accept this plant 100% how it is painted.

.....from R.Mottram.

In Stafleu & Cowan, *Taxonomic Literature*, Ed.2, 1986, you will find an entry for Jean Pierre Francois Turpin, 1775-1840, French Botanist and botanical artist. In addition to various other works, he is listed here as the author of the series of articles in the *Ann. Inst. Hort. Fromont* which includes the original description of *E.eyriesii*. Another of his works involved microscopic examinations of plants, which probably explains the excellence of the detail on the Plate of *E.eyriesii*. He would appear to have been a fairly well respected artist and botanist.

.....from W.Blunt, *The Art of Botanical Illustration* 1971

Pierre Jean Francois Turpin (1775-1840) was possibly the greatest natural genius of all the french botanical painters of his day. The son of a poor artisan, he learned the elements of drawing in the art school of his home town, Vire. At the age of fourteen he joined up in the batallion de Calvados, and five years later was shipped to San Domingo. Here he had the good fortune to make the acquaintance of a young botanist named Pierre-Antoine Poiteau who fired him with an enthusiasm for natural history and became his lifelong friend. After various vicissitudes, Turpin met the German naturalist and explorer von Humboldt in New York in 1801, and the following year the two men returned together to France where they were joined by Poiteau. Turpin and Poiteau collaborated in some of the most important botanical publications of the early years of the nineteenth century, notably those of von Humboldt, Bonpland, & Knuth. Another work which they illustrated jointly was Duhamel du Monceau's *Traite des Arbres Fruitiers*, one of the most splendid books on fruit ever produced. In all these drawings Turpin was the dominant force. In particular, his drawing of botanical details have rarely been surpassed.

.....from C.Lazzari

The drawing of *Echinocactus eyriesii* by Turpin is certainly a very fine piece of artistic work. But I do indeed see what you mean by the flowers being unrepresentative of what I recollect of typical *Echinopsis* flowers. If you were to put me in front of a Rembrandt I might be persuaded to tell you who painted it, but I am in no way familiar with the work of Turpin. For this reason I am not able to pass an opinion as to whether this Plate is typical of his work, nor could I say if the flowers came from the same hand as the remainder of the drawing. For what it is worth, I do get the impression that similar artistic techniques are in evidence both on the flowers and in the rest of the drawing.

.....from H.Middleditch

There are three other early drawings of *Echinopsis eyriesii* which may be consulted. These are :- Edwards Botanical Register Plate 1707, Curtis' Botanical Magazine Plate 3411, and Edwards Botanical Register Vol.24 Plate 31. Although the manner in which details are shown does vary somewhat from artist to artist, these drawings are harmonious in displaying the usual small scales on the flower tube, each with a tuft of hair in the axil, the absence of dense hairs on the pericarpel of the fully-grown flower, a body of stamens together with the stigma and style lying flopped to one side of the throat of the tube, plus a ring of stamens at the top of the tube.

It may well be imagined that the owner of the original plant of *E.eyriesii* was probably keen to see the flowers himself; if he had sent a message to Turpin that the plant was in bud, short of a carrier pigeon there would be a delay which might amount to a couple of days before any such message reached its destination. Then there would be the time involved for Turpin to travel to the plant. So it would be feasible for Turpin to catch the plant in bud, but only by chance could he be expected to be in Le Havre when it was actually in flower. So it is always possible that Turpin may have had the plant in front of him when he did the drawing of it in bud, and then added the flowers later when he was not in Le Havre, using a description that was sent to him, from where the plant was housed.

.....from R.Mottram

One of the entries under Turpin in Stafleu & Cowan refers to an article published in 1970 which is concerned with "an erroneous plate of a potato seedling by Turpin". So evidently botanical authors of the highest renown can slip occasionally. On the other hand, the detail sketch on Turpin's Plate of the receptacle scale and hairs is more or less O.K. even though those on the flower are drawn much too broad and long. My guess is that the artist drew the inset detail while the flower was in front of him, and then added the receptacle tube to the plant later.

.....from H.Middleditch

The theory that Turpin could not have seen the flowers which are depicted on his Plate is based upon the assumption that the Institut Fromont was located in Paris, which is too far from Le Havre for Turpin both to receive a message that the plant was in flower and then to reach it before the blooms wilted.

.....from R.Crooke

The Natural History Museum, London have been able to confirm that Pierre Turpin was director of the Fromont Institute on the outskirts of Paris.

.....from H.Middleditch

With the facilities then available, the time required for a message to go from Le Havre to Paris that the flower was about to open, and for the artist to travel between Paris and Le Havre, is likely to be greater than the time the flower was actually open.

ECHINOCACTUS EYRIESII From Edwards Botanical Register Vol.20 1834 Plate 1707

[From the Latin] *E.eyriesii*; body subglobose, umbilicate, 13 continuous, acute, somewhat undulating ribs, tubercles bearing wool and several short, rigid, straight spines, flower curved trumpet shape 6 inches long very fragrant indeed, with grey hairs on the outside, very pointed petals radiating starlike.

We do not find any mention of this remarkable species in the treatises of either Martius, Link & Otto, or De Candolle; but we believe it is published with a figure in the Transactions of the Prussian Horticultural Society, a work we do not happen to have at hand.

It was presented to the Horticultural Society some years since by Sir John Lubbock, who had procured it from Mexico, where the genus seems to exist in great numbers; it flowers at various seasons, and now and then forms an offset.

Independently of the large size of its flowers, which rival in dimensions those of the *Cereus* tribe of Cacti, it is remarkable for the rich delicious odour they exhale at night, at which time the glorious blossoms expand. When young they resemble long sooty-grey horns covered over with a thick shaggy hairiness, and would never be suspected to conceal a form of the utmost beauty, or a clear and delicate complexion. When the hour of perfection has arrived, and the coarse veil of hair begins to be withdrawn by the expansion of the unfolding petals, one is amazed at the unexpected loveliness which stands revealed in the form of this vegetable star, whose rays are of the softest white, while the disc is of a rich yellow formed by the stigma and the clustering anthers.

.....from H.Middleditch

The suggestion that this species originated from Mexico should occasion no surprise, since it is an error which was repeated in regard to many other species in the years following this particular publication.

This passage, with the exception of the leading description and the first paragraph of the observations, was repeated verbatim in *Allgemeine Gartenzeitung*, under the heading of "*Echinocactus eyriesii*, *Cereus eyriesii* Turpin, *Echinocactus gemmatus* Otto". It was followed by an editorial footnote whose authorship was identified solely by a capital 'O'; as the editors of the *A.G.Z.* were Otto and Dietrich, it may be assumed that this footnote was added by Otto. From the heading of this article it appears that Otto considered his *E.gemmatus* to be a synonym of *E.eyriesii*.

.....from F.Otto. *Allgemeine Gartenzeitung* 1834 No.50 p.399

[*Echinocactus eyriesii*] A good illustration and description of this fine cactus appears in Turpin's *Observ. sur la Fam. des Cact.* p.58 Plate 2. Earlier, before I knew of the publication of Herr Turpin, I named this species *Echinocactus gemmatus*. However, it is no *Echinocactus*, but a true *Cereus* and belongs to the section of the *Cereus globosi*, together with *C.oxyconus* and *denuclatus*. In addition the country of origin is not Mexico, but Buenos Aires.

.....from H.Middleditch

Evidently the writer for Edwards Botanical Register did not know about the Turpin publication of *E.eyriesii*, but to judge by the general tone of his text, he is unlikely to have been greatly troubled by his unawareness.

.....from G.J.Swales

From this same era there are even examples of authors giving a new name to a plant which had already been named at an earlier date by a previous author.

SOME NOTES ON ECHINOCACTUS EYRIESII

Translated by H.Middleditch from *Allgemeine Gartenzeitung* 3.8.1835

From **L.Pfeiffer** Under this name I know two plants which are significantly different from one another, both of which Herr nurseryman Schelhas received here from different places.

1. Since last Spring I have one specimen from the Hamburg Botanical Garden, which is now about 5 inches broad and only two inches tall, thus displaying the form of a flat cheese. This one has 12 pretty sharp ribs and on these, at intervals of four lines, tufts of short yellowish wool, out of which project only later a number of short, stiff, blackish spines, 9-11 outer and 4-6 central spines. The whole of the previous year's stem growth indeed has on each rib 2-3 yellowish areoles but only a single spine in them, away from the centre. The colour is matt pale green, and it has still displayed not a single offset. However, attention is now drawn (end of January) to new tufts of longer grey wool at some spots on the side of the plant, which certainly resemble in

their initial form the bud put out in the previous Spring, perhaps however even a young branch will be formed. That one developed up to the size of a hazelnut, then however the dried-up bud tallied with the description in this Journal (1834 No.50), according to which it should resemble, in the young state, a grey-black horn, in which respect it did not tally, as it formed a round knob furnished with coarse brownish-black hairs.

2. Herr Ober-Medical Officer Wild obtained one example originating from the garden of Prince Salm-Dyck, which displays the following features. It is glossy dark green, now has 14 blunt ribs (the last three since late last summer) and on these tufts of white wool lying almost close up against one another, in which, as soon as they move out from the centre, the full number of spines is already displayed. The plant is club-shaped, stouter above, much taller than broad, and as is frequently the case has already made a large number of lateral offsets close to the ground when it was only 1.5 inches tall. These put down roots very readily, at times when they were no larger than one line [2 mm] and grow extraordinarily rapidly. They are paler green than the parent plant, and the spines are, like those in youth, three times as long and much finer than the later ones.

Are these two plants different then, and which is the true *eyriesii*? Or can only the flower answer this question? But these can both be the same or very similar, such as is the case with *oxygonus* and *multiplex*, that differ less from one another in habit than from both these forms of *E.eyriesii*.

From **F.Otto** The correct *Cereus eyriesii* is described on p.58 and pictured on Plate 2 in Turpin's Observations on the Cactus Family, Paris, 1830. The original examples presently in this Botanical Garden [Royal Botanic Gardens Berlin - H.M.] are from Herr A.Eyries himself in Havre, who had the goodness to pass them on to me during my stay in Havre in 1830.

But even earlier we cultivated here a similar sort, which I had named *Echinocactus gemmatus*, and listed under this name in the catalogue of the cactus species in the Royal Botanic Gardens, in the Verhandlungen zur Beforderung des Gartenbaues in den Preussischen Staaten in Vol.6 p.429. As we have now accepted *Cereus eyriesii*, I believe our *gemma* is one and the same, and therefore withdraw this name and place it as a synonym to *eyriesii*.

After careful observation and comparison and having had attention drawn to it by the above discussion of Herr Dr.Pfeiffer, it follows however as quite certain that both plants are two different sorts, that are hardly to be confused with one another, so that right away one is attentive only to the distinctive characteristics. Thus the name *Cereus gemmatus* may be re-erected for the second species even though another *C.gemmatus* Zuccarini is in existence during this time, which however is synonymous with *C.acromelas* Link (*C.incrustatus* Nob. Cat. ind. ort. 1829).

In youth both sorts are very similar to one another, but when older they are readily distinguishable by the following features:-

Cereus eyriesii The body is globular, of a pale green, a colour like verdigris, with flattened and depressed crown; the ribs are regular and straight from top to bottom, wide and deep, undulatory at the edge, furnished with areoles at intervals of " inch, of which those at the crown are a yellowish white, the remainder however displaying a more grey colour. From each areole arises 6-10 short spines, which are hardly 1' lines [3 mm] long, straight and awl-shaped and of a brown colour. In some areoles there are also still quite slender bristle-like spinelets, which generally arise from the upper part of the areole and are 2-3 lines long [4-6 mm].

Cereus gemmatus The body is inverted eggshape or club-shape, dark green, with somewhat arched crown; the ribs are partially continuous, partially discontinuous, even joining together or splitting, are less deep and broad, at the edge fairly clearly wave-like, areoles set at intervals of 2 lines [4 mm] with copious white wool, yellower in the crown, in the middle of which stand 6 short spines, brownish black, 1-2 lines long [2-4 mm]; in addition there are to be found in each areole radiating marginal spines of 2-3 lines long [4-6 mm], white and translucent, thinner, and brownish at the foot and tip, about 6 or less disposed at each side.

Consequently in the above review *Cereus eyriesii* is cited under 1 and *C.gemmatus* under 2. We have moreover mentioned on several occasions that these globular cacti, such as *eyriesii*, *gemma*, *denudatus*, *oxygonus*, and also *multiplex* are no *Echinocacti*, but true *Cerei* and a separate section, making up the *Cerei globosi*.

.....from H.Middleditch

It appears that Pfeiffer, in the first set of notes, above, is talking about two sorts of *Echinopsis*, one sort from Hamburg Botanic Garden, the other from Prince Salm-Dyck's garden. On the other hand, Otto firstly makes reference to plants of *E.eyriesii* obtained from A.Eyries himself, then to a plant in the Berlin Royal Botanic Gardens which had been named *E.gemma*. Up to the point where Otto states that he puts *gemma* into synonymy with *eyriesii*, the two authors are evidently being concerned with two different pairs of plants.

However, in that part of Otto's comments which commence with the words "After careful observation and comparison, ..." my impression is that when he says "both plants are two different sorts", then he means both the plants that Pfeiffer has talked about, not both the plants that Otto has talked about himself in the first part of his comments. Otherwise Otto first says that *gemma* and *eyriesii* are the same, then that both plants are two different sorts, which would be mutually contradictory..

In the final paragraph above, Otto cites one name under number one and the second name under the number two. My interpretation of this statement is that he means the numbers one and two in Pfeiffer's review, which immediately precedes Otto's comments in this issue of *Allgemeine Gartenzeitung*.

CEREUS SCHELHASII Pfeiffer By L.Pfeiffer
Translated from Allgemeine Gartenzeitung 3.40:1835

[From the Latin] *Cereus*, globular with narrowing towards the base, crown slightly depressed, 15-18 ribs, very acute vertical ribs irregularly swollen, deep intercostal grooves (upper part acute, lower) slightly sinuous, areoles well separated, broad, often unarmed or provided with a few spines, others abundantly spiny, spines very short black very stiff with a hard sharp point [projecting] from short thick grey wool, external ones 11-13, centrals 5-7 shorter.

This plant was received by H.Schelhas from H.Parmentier under the name *Echinocactus boutillieri*. However since it clearly belongs to the group *Cereus globosi* and the old name must be changed for that reason, so I have named this cactus after H.Schelhas, in recognition of his many services to plant culture in general, as well as for his special interest and successful efforts towards rectifying the confusions prevailing up until now in the trade in cacti.

The largest specimen known to me is 7 inches broad, 7 inches tall, of the shape of an ostrich egg. It is similar in habit to *Cereus oxygonus*, *eyriesii* and *gemmatus*, differing however from all of these on account of the almost cutting sharpness of the ribs. It is easily propagated by means of offsets and the young offsets, which are so similar with *eyriesii* and *gemmatus*, have a quite different appearance on this one.

In order to make comparison easier a place must be found for a valid description of both closely related spp.-

Cereus eyriesii Turp. *Cereus*, globose or flattened-globose pale green, sunken crown, 12-15 undulating subacute vertical ribs, broad intercostal grooves, areoles well separated with pale yellow felt, later becoming grey, with very short straight stiff pointed brown spines, outers 11, centrals 4.

Cereus turbinatus Pfeif. (*Cereus gemmatus* Otto, *Echinocactus turbinatus* Hort.) *Cereus* obovate or club shaped completely green, crown almost convex, ribs irregularly obconical with thinner undulating scallops, acute intercostal grooves, areoles close together with white wool, central spines 6 black, very short, exterior spines 10-12 longer, bristle-like.

With reference to a statement in No.8 of this Journal for 1835, I note that the *Ech. turbinatus* in the Garden is identical with *C.gemmatus* Otto. Even though the latter name is older, the name *C.turbinata* ought to be retained, since we still have *Cer.gemmatus* Zuccar., which is related to *Cer.incrustatus* hort. Berol, that is quite different.

It also seems that the above named globular *Cerei* are more related to *E.tubiflorus*, which is barely distinguishable from *C.eyriesii*. The flower is unknown to me, but it certainly belongs to the *Cerei* to judge by the habit and the name.

.....from H.Middleditch

For practical purposes it would be reasonable to assume that the various *Echinopsis* names quoted by the foregoing authors in and around the 1830's, are all being applied to plants originating from Uruguay or Rio Grande do Sul. As observed above by G.J.Swales, this situation was brought about to no small extent by each author of the time generating his own name for one of these plants, quite irrespective of whether anyone else in western europe had already done so. Looking at the variation to be seen in my own fifty-odd *Echinopsis* raised from ex-habitat offsets originating from Uruguay or from Rio Grande do Sul, I can well imagine that there would be plenty of opportunity for authors of the time to generate new names for each variety.

It appears to be accepted that *E.eyriesii* is to be found in Uruguay and possibly also in Rio Grande do Sul. In more recent times various *Echinopsis* have come to light in that area as a result of field work by Gemmrich, Gerloff, Hofacker, and others. At the 1995 Chileans' Weekend a selection of slides were shown of *Echinopsis* in habitat at various locations in Rio Grande do Sul, together with a display of plants raised from propagated offsets from ex-habitat material of known origins. Very material differences were to be seen between these plants. There were short spined plants which would merit the name *eyriesii*, but it was pointed out that there was considerable difficulty in drawing a clear dividing line between these particular plants and those with spines a few mm longer. It would appear to be quite probable that a number of the names produced in the early 19th century for these *Echinopsis* could even represent variations in a single population.

WE FIND ECHINOPSIS EYRIESII From A.Hofacker

Echinopsis is a very widespread plant in Rio Grande do Sul, for we found it at almost every place where we stopped. And these plants are very variable. You find plants with white flowers or with rose-pink flowers, and every shade in between; some flowers have scent, some do not. Some plants have long spines, some have short spines. Furthermore, all transitions between the extremes may be observed and to some extent even at the same location. So I would think that it is only the one very variable species. But the plants we found a few km from Santa Maria are a little bit different (AH 227) for they have a finer and shorter spination distinguishing them from other *Echinopsis* we have seen in Rio Grande do Sul. This spot is at the southern end of the Serra Geral, at the Type location for *Notocactus purpureus*, where a steep rock face about 100m high and about as broad arises in the midst of a dense bushy thicket.

On the plateau of a high hill near Minas de Camaqua there grows a species of *Echinopsis* which is typical of those to be found in southern Brazil, which are exceedingly variable in spination and flower colour. It would appear to be a form of *E.oxygona* (Link) Zucc.

About 5km to the west of Cacapava do Sul, one finds an almost bizarre rock formation of Pedra do Segredo. Some well-known cactus spp. have their type locations here, including amongst others *Notocactus*

arachnitis Ritt., *Notocactus prolifera* (Ritt.) Theun., and *Frailea horstii*. In the immediate vicinity of this location, a species of *Rhipsalis* occurs, clambering up trees, while the almost ubiquitously represented *N.ottonis* AH 99 and an *Echinopsis* AH 98 were also found.

It was on the occasion of a later visit to Rio Grande de Sul, when I found *Echinopsis eyriesii* AH 374, growing near Dom Pedrito, which I had never seen in habitat before. There were not a great number of plants to be seen - I would guess about forty to fifty. But we did not attempt to scour the whole site and make a real survey of the numbers, this is simply what we saw in walking across it. The plants we saw were all fairly similar in appearance. As far as I am aware we were the first people to see this species in habitat.

.....from H.Middleditch

Accompanying the foregoing observation was a photograph of *Echinopsis* AH 374 from near Dom Pedrito. This plant displayed a very deep green body, almost bluish-green, with 15 very acute ribs, sharp at the apex, carrying well-spaced areoles; the spines must be very short indeed as they can scarcely be seen on most of the areoles, whilst apparently projecting a mm or two on other areoles. The plant in this photograph compares well with the drawings of *E.eyriesii* in Edwards Botanical Register plate 1707, in Curtis' Botanical Magazine plate 3441, and Turpin's plate. It could be said that the spines on AH 374 are even shorter and more insignificant than those on the early 19th century drawings! Perhaps there was some degree of variation to be seen in the habit of the various specimens seen at this site? In this locality were there a few low hummocks of outcropping rock, as appears to be often the case where cacti are to be found in this part of the world? Were these *Echinopsis* surrounded by grass alone, or did they grow in the company of some low bushes? Sufficient, in either case, to give these *Echinopsis* shade from direct sun?

.....from A.Hofacker

The plants of AH 374 were all quite similar. The plant we photographed is quite typical of those we saw. The only real difference was that smaller plants had slightly longer spines. But this feature is not unusual for this species. The epidermis was the same on all the plants. The location where we found these plants is very typical for southern Brazil. The terrain is not very steep and there is a lot of grass, with some bushes and shrubs. These *Echinopsis* mostly grow besides or even within the copse of bushes and low trees, so they are always in the shade. In addition a few plants grew away from the bushes. But this is not really unusual, because many cacti grow besides trees and shrubs. A typical example is *Notocactus herteri*, which you can only find where trees grow. On one location it even grew within a dense copse of trees.

.....from K.H.Prestle

It is simply incredible how many forms of *Echinopsis* there are in Rio Grande do Sul, and yet how little do we know about them! At each habitat location the flowers are different in shape, size, and colour. Some forms from the northern reaches of Rio Grande do Sul are very interesting, especially those to be found near Santa Maria. These forms are solitary in their growth, have broad ribs, and flower with a whitish pale pink bloom. Very rare is *Echinopsis multiplex* (Pfeiff) Zucc, which I have seen at only one single habitat location. Unfortunately these plants grow well-nigh solitary, and on account of their very long spines, one is happy to leave them undisturbed.

Echinopsis eyriesii (Turp) Zucc. likewise occurs in Rio Grande do Sul, on the hills near Santa Maria. Near Vila Clara I found them growing on a steep rock face, which had somewhat smaller bodies and grow in huge clumps, with white flowers.

In Uruguay both *E.eyriesii* and *E.turbinatus* become very large and adopt a semi-cereoid form of growth, usually solitary! Whether the white-flowering *E.eyriesii* from southern Uruguay are the same as the habitat forms to be found in Rio Grande do Sul, remains unclear even today, but then I have not concerned myself with the finer detail of this genus. In Uruguay and Rio Grande do Sul the *Echinopsis* occur on strata of different geological ages, which could be a pointer to the great variation in the many forms to be found there. Unfortunately up to the present time, the only recognised flower colours are pink, or white, and thus there are only two species, if that is the simple botany one prefers!

.....from H.Middleditch

On the original Turpin Plate of *E.eyriesii* there is, in addition to the main subject of a plant in flower, a much smaller plant. This smaller plant quite clearly has spines roughly twice the length of those on the flowering plant. Presumably this smaller plant was an established offset taken from the original decapitated plant, as described by Turpin. The comment from A.Hofacker about longer spines on smaller plants is thus reflected on the original Turpin plate.

.....from K.-H. Prestle

At Pedras Altas we came across a depressed globular *Echinopsis*, with short spines, which produced a flower of a particularly fine deep pink colour.

.....from H.Middleditch

There are two plants of *Echinopsis* HU 1090 in my collection, one from a commercial source with a head barely two inches across, with insignificant areoles and short spines. It carries over a dozen offsets ranging in size from tiny, to half the size of the main head. The second plant is darker green colour, with woolly areoles some 4mm across, from which the dark spines barely protrude. It was grown from a small offset received from N.Gerloff from his Gf426 location and is now a good 4 inches across. It has produced two minuscule offsets from near the base. Perhaps the label on one or other of these two plants is open to question?

.....from N.Gerloff

On the occasion of my fourth trip to Rio Grande do Sul in March 1974, we spent a night at Sao Vicente do Sul. From there we went to Taquarichim and thence to Jaguari. Passing through Ernesto Alves we came to the village of Unistalda. At several spots in the surroundings we found *Notocactus glaucinus* v. *gracilis* as well as *N.megapotamicus* at one place. Here on the west side of a hill we found a large form of *Notocactus*

stockingeri FS 141a. There were also numerous plants of *Echinopsis*, which were very variable. The largest plants were about 10cm across. I have recorded all the *Echinopsis* from this area as HU 1090, even when they have been collected by anyone else, and not given them a Gf number. All these *Echinopsis* produce flowers of a lilac pink colour. The plants are always short spined, but some of them offset prolifically whilst others produce fewer offsets. One of my own plants is only 8cm across and has about 200 offsets! A few km further to the west, nearer to Barragem Itu, we found more short-spined *Echinopsis* which match the description of *E.eyriesii*, at my Gf 426 location.

Here in the western part of the Serra Geral, there is much more grassland than woodland. The bushes and the trees only grow at the stream sides and on steep hillsides.

.....from H.Middleditch

It is quite astonishing to see that the habitat pictures of HU 1090 take by N.Gerloff at this location do display this different tendency to offset either prolifically, or very sparsely. In his photographs there are offsetting plants with fairly woolly areoles, whilst the one or two solitary plants have areoles carrying far less wool. Just the opposite of my own pair of HU 1090 plants!

I am also in the fortunate possession of two plants of MGH 118 grown from ex-habitat walnut-sized offsets, which are now over 3 inches across. The marked difference in spination might excuse one questioning the accuracy of the labels. One plant with 12 ribs displays spines which will be only 2 to 3mm in length arising from relatively woolly areoles; the other plant has 14 ribs and spines range between 10 to 15 mm in length.

.....from N.Gerloff

To the west of Unistalda there is a bridge over the R.Itu, from where a farm road goes off to the west. About 10 km along this road is the location for MGH 118, before reaching Canuto.

.....from A.Hofacker

This *Echinopsis* MGH 118 grows at the type location of *Notocactus stockingeri*, roughly half way between Manual Viana and Barragem Itu. An acquaintance who has visited this location says that this *Echinopsis* is not *E.eyriesii*, but a short-spined form of *E.oxygona*.

.....from N.Gerloff

It was during my second visit to Rio Grande do Sul that we passed through Jaguari. About half way between Jaguari and Ernesto Alves we stopped at Sanga de Areira. Here we came across *Notocactus ottonis* v.*acutangularis*, *N.laetivirens*, and *N.muricatus* v.*robustus*, as well as a short-spined form of *Echinopsis oxygona*.

.....from H.Middleditch

So precisely how is *E.eyriesii* to be distinguished from a short-spined form of *E.oxygona*?

.....from N.Gerloff

For myself, these plants distinguish themselves by *E.eyriesii* having a whitish flower with a scent, *E.oxygona* having flowers of a pale to deep pink colour, without scent.

.....from H.Middleditch

An *Echinopsis* originating from K.H.Prestle has now flowered; it grew from an offset taken off an ex-habitat plant from near Carmelo, Uruguay. This is a white flower, the very outermost petals having a mid stripe tinged brown. There is a definite scent to the flower for which I would be inclined to accept a description of vanilla. The spines are about 12 to 15 mm long and the general appearance of the plant bears no resemblance to the AH 374 *E.eyriesii* or to the WG *eyriesii* from Cerro Jarau.

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

Echinopsis eyriesii extends from Uruguay up to Quarai at the boundary with Rio Grande do Sul, without overlapping the distribution area of *E.oxygona* (synonym *E.multiplex*). Fig.194 is FR 1404 from 30 km north of Quarai.

.....from A.Hofacker.

It is difficult to accept Ritter's statement about where he found this species. Horst and Uebelmann have travelled extensively over this territory and they have never found *E.eyriesii*. Almost everybody who has been out to southern Brazil in search of cacti has been to the Uruguayan border at Quarai, but nobody has found *E.eyriesii*. So that I am very sceptical about Ritter's claim to have found *E.eyriesii* near Quarai.

.....from K-H.Prestle

A friend of mine who has been to the Cerro Jarau has really found nothing there, although as it later transpired, he was on the wrong mountainside. The Cerro Jarau is a solitary mountain in an otherwise only hilly area and renowned as a place where snakes occur, so that no-one has really gone to search it!

.....from N.Gerloff

At the end of 1992 the Cerro Jarao was visited by W.Gemmrich, on his own. It was there that he found some *Echinopsis*, from which he took a few offsets, the majority being planted out in the garden of our mutual friend Hamester. Early in 1993 I was able to obtain a small plant from him, then in 1995 a further offset from another plant. Of course, Gemmrich has his own ideas about allocating names to a plant.

I have not been to the Cerro Jarao myself. In 1995 I was right at the foot of this mountain, in company with Hamester, where we found *Frailea aureispina*. Hamester told me that these plants had been found there by W.Gemmrich. In 1996 Gemmrich sent me an offset from the last of the *Echinopsis* in his garden - but at that time I had no pale coloured pots and so I do not recognise the picture that I sent to you of an ex-Cerro Jarao *Echinopsis* in fruit in a pale grey square pot. That is the specimen with the greatest distance from one areole to another on one rib.

I have obtained two further *Echinopsis* from Cerro Jarao, which had been collected by Uebelmann in 1988. They both had the slender pale flower and were scented. Both had been collected near the antenna mast on top of Cerro Jarao. In addition, Uebelmann told me that there were many snakes around that particular spot.



AH374 Don Pedrito

Photograph: A.Hofacker



ex Sanga
de Areira



ex
Cerro Jarao



West of Unistalda HU1090

Photographs: N.Gerloff



Minas do Camaqua

Echinopsis HU87

Notocactus HU80

Photograph: W.Uebelmann



Photograph: N.Gerloff

Echinopsis eyriesii

For him, the Cerro Jarao is the "sake mountain".

.....from W.Gemmrich

Taking the road which leads out of Quarai to the north, about half way to the junction with the BR 290 from Alegrete to Urugaiana there is a rocky eminence on the left hand side of the road on which is erected a wireless transmission mast. According to the map, this could be the Cerro de Jarau. Here we found a *Tillandsia* sp. growing directly upon the rock, a *Cereus* sp., *Notocactus ottonis* WG 22, a large white flowering *Echinopsis* (without WG number) together with another form of *Echinopsis*. The *Echinopsis* are very variable, many specimens having no spines, others having centre spines up to 4 cm long! They have 13-16 ribs. The long-spined *Echinopsis* is probably a different species. The large, short-spined *Echinopsis* might be *Echinopsis eyriesii* (Turpin) Zuccarini FR 1404 (Ritter *Kakteen in Südamerika* Vol.1, p.240) which was found by Ritter "30 km N of Quarai" and is pictured in Ritter's book. Our stopping point at the transmission mast was 26 km north of Quarai so it quite probable that the Ritter habitat site was also on the Cerro Jarau.

.....from H.Middleditch

The photographs taken by W.Gemmrich on the Cerro Jarao leave no doubt at all that a number of the *Echinopsis* growing there are a good match for the features displayed on the Turpin Plate of *E.eyriesii*. There are equally clearly other sorts of *Echinopsis* growing at the same site, displaying spination of varying length, but all with a somewhat yellowish green body colour, as distinguishable from the rather bluish green of the body of *E.eyriesii* seen there. The writer appears to describe the plant which matches the Turpin plate as "probably a different species" and refers to the *Echinopsis* which is of superficially similar appearance but with a yellowish-green body, as *E.eyriesii*. This transposition of body colouring is rather confusing.

.....from A.Hofacker

From the information which you have sent to me about the *Echinopsis* found on the Cerro Jarao, it does now look as though the habitat location given by Ritter was correct.

.....from W.Gemmrich

My trip to Rio Grande do Sul took place October to November, when I was mostly concerned with *Notocactus*, but I kept an eye open for *Echinopsis* as well. It appears to me that there are two very convergent species of *Echinopsis* in the southern half of Rio Grande do Sul. The first species, *E.oxygona*, grows at those places where there are some rocks and stones, but no cattle. The second species is very rare in this State. I had the good fortune to find both species growing together when I paid a visit to the Cerro de Jarau. This mountain is somewhat isolated; it might be 25 km to travel all the way round it. Where these two species grew together, here, it was interesting to see that both sorts produced either clear white flowers or pink flowers, so that the colour of the flowers is not a feature for determining the species.

.....from G.R.Allcock

Looking at my *Echinopsis* from the group of *oxygona-eyriesii* in early July, many of them are in flower. I can find flowers with many petals - over 40, with fewer petals - less than 30; with broad petals or with narrow petals; with intensely pink or lilac-pink petals, or with faintly pink or lilac-pink petals; with green tubes, or green and purplish tubes, or almost white tubes. Depending upon spine length, one might be tempted to regard them as either *E.eyriesii* or *E.oxygona*, were it not that there are also many intermediate spine lengths. But it does not appear to be possible from the flowers on my own plants to attribute a particular flower colour to the short spined *eyriesii* forms.

.....from W.Gemmrich

In addition to the different flower colours, both species found growing together on Cerro Jarao are dimorphic in that they can display either very short spines - about 2 mm long - or quite long spines. It appeared to me that when the seed germinated at a spot where the growing plant lay in the shade, the seedlings then have short spines. Conversely, when the seed germinates at a spot where the growing plant is exposed to the sun, the seedlings produce long spines. The second location where both species are found growing together was at the "table-mountain" near the little town of Sao Francisco de Assis

The differences between the *E.oxygona* and the less-common species are as follows:

	<i>Echinopsis oxygona</i>	<i>Echinopsis</i> sp.
	WG 38, WG 80	WG 79
Ribs	12-16	12-15
Diameter	140mm maximum	300mm maximum
Height	280mm maximum	580mm maximum
Spines	More thick and firm	More thin and bristly

The considerable height to which the *Echinopsis* species grows here makes it look like a *Trichocereus*!

In his book "Kakteen in Südamerika" F.Ritter publishes two pictures on p.333, calling the left one (Fig.194) *E.eyriesii* and the right hand one (Fig.193) *E.oxygona f.oxygona*. That is incorrect. Both of these plants are one and the same species. The left-hand plant was collected "in Rio Grande do Sul, 30 km to the north of Quarai". This place must be the Cerro de Jarau. In my field note book I have recorded on 25.11.1992 "WG 22 *Notocactus ottonis* and WG 38 *Echinopsis ?oxygona* on a relatively high table-hill at 420 m altitude, at 27 km to the north of Quarai."

.....from H.Middleditch

The Ritter photograph Fig.194 of *E.eyriesii* is not one of which I would be especially proud if I had taken it, but nevertheless it appears to be a fairly good match for the habit of the plant displayed on the Turpin plate of *E.eyriesii*, as well as on Plate 1707 in Edwards' *Botanical Register*, and on plate 3441 of Curtis' *Botanical Magazine*.

The heights to which certain *Echinopsis* have been observed to grow in habitat, as quoted by W.Gemmrich, may well be regarded with no small degree of surprise. Indeed, half a metre tall really is somewhat *Trichocereus* like.



ex Cerro Jarao

Photograph: N.Gerloff



WG38 Cerro Jarao

Photograph: W.Gemrich



Suspiro, Rio Grande do Sul

Growing only 3 metres apart

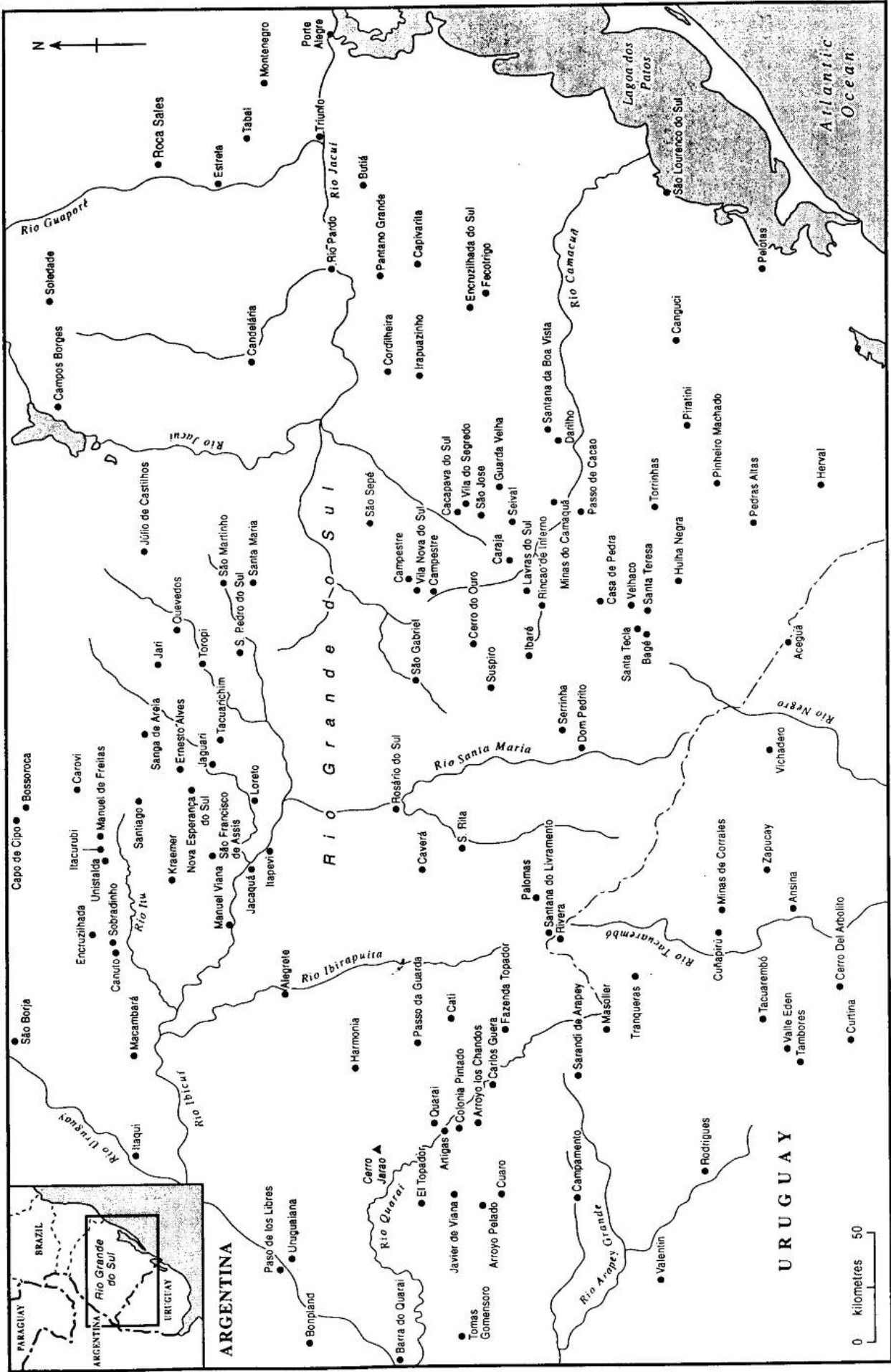
Photographs: N.Gerloff



Cerro Jarao

Photograph: W.Gemrich

Echinopsis eyriesii



.....from K.-H. Prestle

My own collected plant of PR 329 from Sao Francisco de Assis, which is spineless in old age, is 13cm in diameter but over 22cm high. A similar looking plant from Carmelo, Uruguay, which came from Schlosser in 1972, is 20cm in diameter and 32cm high. Of two well spined *Echinopsis* which also came from Schlosser in 1972, one from Sierra de Mahoma, Uruguay, is now 23cm in diameter and 35cm high, the other from Valle Eden, Uruguay, is now 17cm diameter and 45cm high.

.....from G.R.Allcock

I have noticed that if my plants which prefer a shaded situation are grown in a peat based compost, then they develop an epidermis of a darker green, as compared with the same clone in a mineral-based compost. The *Echinopsis* which were grown by Penny Jones were huge plants and luxuriantly dark green, but her plants were grown in a very peaty substrate, whereas most of my own plants are presently in an inorganic mix.

As an experiment I am growing two clones of the same *Echinopsis*, a small form of *E.eyriesii*, in two different compost mixes. The plant in the organic compost also happens to be in a very shaded location, the second plant being in an inorganic mix and by chance was raised in a sunny situation. This experiment has not been running long enough yet to see what eventually transpires. But at present the specimen in the organic mix (commercial ericaceous) has radial spines which are more robust, longer, and of a brownish-red colour. Those on the plant in the mineral compost are very short, flimsy, and poorly coloured.

.....from H.Middleditch

This difference in spination noted by G.R.Allcock would hardly have been expected, as habitat reports suggest that the *Echinopsis* growing on exposed rocky areas tend to display longer spines, and those growing in more earthy, shaded, locations, seemingly have shorter spines.

.....from A.Hofacker

One difference between *E. oxygona* and *E.eyriesii* is that *oxygona* always grows in full sun, whereas *eyriesii* grows in a shrubbery under trees and bushes.. Of course *E.eyriesii* is easy to identify, as it differs from all other *Echinopsis* in Rio Grande do Sul in having very short spines.

.....from N.Gerloff

At one and the same place near Sao Francisco de Assis, I found spined and spineless forms of *Echinopsis* growing fairly close together. A pair of *Echinopsis* growing in a very well shaded situation, having dark green bodies which were wider than they were high, were virtually spineless. Nearby there was a clump of about half a dozen well spined heads, barrel shaped and of much paler green colour, growing fully exposed to the sun.

.....from G.R.Allcock

Some years ago a rather substantial specimen of *Echinopsis* was received from H.Middleditch, which had no name. The body had 13 very sharp darkish green ribs, separated by sharp and deep intercostal furrows, the spination being short as in *E.eyriesii* and in no way to be distinguished from the typical spination of this species. When this plant eventually produced a flower, the fully opened bloom was of a length of 25 cm, and of a diameter over the outermost petals of an amazing 15 cm. And the colour was incredible. Even the innermost petals were richly coloured throughout their breadth, a sort of lilac pink inclining more towards carmine in the midrib.

.....from N.Gerloff

A small plant of *E.eyriesii* from Cerro Jarao produced two flowers for me this year. One particular characteristic distinguishes this white flowered sort from the pink-flowering *Echinopsis* - the flower smells strongly of vanilla, or so it seems to me.

.....later. Both flowers on this ex Cerro Jarao plant set fruit and now these fruit have dried out, one of them is enclosed.

.....from H.Middleditch

This fruit contained a good quantity of seed which was divided up and sent to several members who regularly grow from seed.

.....from M.Muse

Even as seedlings a couple of mm in diameter, the plants raised from ex Cerro Jarao seed are taller than they are broad. But they do show some degree of variability, in the spination for example. Some of them show the classic *Echinopsis eyriesii* spination, very dark in colour and of only a few mm in length, having the form of a carpet tack. Others have spines which are longer, finer, and of a paler colour.

The two plants which I still retain that were grown from the Cerro Jarao seed are both different. From the photographs of the *Echinopsis* seen on the Cerro Jarao it is particularly interesting to see that there appears to be some variation among the plants in habitat, even allowing for their difference in size. Is this one of those situations where a range of characteristics can be observed within a population, all within a space of a few metres? If this was the case, it would go a long way towards explaining the proliferation of early names among the Brazilian and Uruguayan *Echinopses*.

.....from G.R.Allcock

I have about a dozen plants raised from seed described as “*Echinopsis* sp. (*eyriesii*?) Cerro Jarao, habitat seed”, a number of which have been potted on and are approaching their adult form, as opposed to the bristly spination seen on all juveniles of the *eyriesii/oxygona* group. These seedlings differ among themselves in showing two different forms of spination. Most of them are long-spined - typically about 10mm long for the centrals, but there are a few whose spines do not exceed 2mm, with some so short that they are hardly to be discerned within the areolar felt. The plant bodies are of a strong green colour, and the ribs quite sharp, as might befit the greek appellation “*oxygona*”. The spines are dark-tipped and dark-based.

Another batch of seedlings have been raised from seed of “*Echinopsis* sp. 30 km. N. of Quarai, on Cerro Jarao, habitat seeds”. These are light green plants with bristly spines of 5 to 7 mm or less in length and are

quite evidently not the same as the foregoing.

.....from C.Knebel, M.f.K. 1931

I speak here of the sorts of *Echinopsis* which are usually to be found under the names of *oxygona*, *eyriesii*, *gemmata*, *tubiflora*, etc. Indeed, I believe I could even accept that the spp. sold under these names, could hardly have been supplied by pure breeding. It is only necessary to sow some seed of these sorts once, in order to find that the resultant plants consist of a whole mixture of spp., long spined and short spined, fine spined and strong spined individuals, from the one sowing. By preference I grow a quite short-spined plant (perhaps *gemmata*?) of which the parent plants display the appearance of a genuine Type, and sometimes have the ability to flower as two year old seedlings.

These parent plants which flower as two year old seedlings and now as five year olds are already large bodied, have already produced seed four times, but have still not begun to offset. On the other hand, the seedlings obtained from them appear in all possible forms of spination. Of course with the pair of parent plants the flowers already appeared in two colours, white and pink.

.....from H.Middleditch

Although Knebel may not have been absolutely certain of the original parentage of his variably spined seedlings, his progeny seem to have been comparable with the current experience of seedlings from ex-habitat seed.

.....from M.Muse

The actual rib structure of the AH 374 from Dom Pedrito appears to be different to that of the Gerloff ex-Cerro Jarao *Echinopsis* in flower. The AH 374, perhaps of comparable size to the Gerloff plant, shows ribs following a convex arc between the areoles, whereas the Gerloff plant shows a straight or (on the lower part of the ribs) even a concave edge. In addition, the inter-areolar distance on WG38 is perhaps less than half of that on the Gerloff plant, although it appears to be only marginally bigger.

.....from G.R.Allcock

In my own experience of growing *Echinopsis* from Uruguay and Rio Grande do Sul, I have found that one and the same plant can show either notched ribs, bulging out between one areole and the next, or an absence of rib undulations, depending upon the conditions under which it is grown. In consequence I would not be inclined to attach any diagnostic significance to these features.

An old and very elongated and very proliferous *Echinopsis* grown in a bedroom cactus jungle by an elderly school teacher was given to me some years ago. The areoles on the larger stems, and especially those on the principal stem, were deeply impressed into the notched rib edges, which bulged out as described above. The new growth made since I acquired the plant shows a greater stem diameter (as would be expected) and also - to my initial surprise - no notches and no inter-areolar bulges. This plant has now turned out to be indistinguishable from various proliferous seedlings grown under the name of *Echinopsis oxygona* v. *brevispina*.

You will recall that there were a number of photographs of *Echinopsis*, taken in habitat in southern Brazil, shown at the Chileans' Weekend some years ago. These pictures appeared to show that plants of the *tubiflora*-*oxygona*-*eyriesii*-*multiplex* group seem to have adapted to two somewhat different sorts of habitat, in so far as some plants are found growing on exposed rocky outcrops, whilst others are found in deep shade, smothered by leafy vegetation, some with only the open flowers projecting out of the greenery. But perhaps the leafiness of this latter vegetation may be of a more transient nature?

Be that as it may, what I have noticed, both last year and again this year, is that while some of the specimens of these sorts of *Echinopsis* are fairly resistant to strong sunshine, others suffer catastrophic burning. Those plants which have been in cultivation here for a long time all appear to be in the former category (with some exceptions) but many of my seed-grown plants have burned very badly indeed. By comparison, some plants of the same clone which were standing outdoors from dawn to dusk suffered no damage at all! I have now had to move perhaps 30 individual plants out of a sunny situation in my polythene tunnel into a less well illuminated situation. So shade is evidently necessary for some clones of this group.

.....later.

Those *Echinopsis* which had to be moved out of my polythene tunnel into a part-shaded situation at the height of summer last year, following severe scorching of many of these plants. Now they are all back in growth, showing much healthier greens, but the differences of shade among some 30 or 40 of these plants have actually become more pronounced.

.....from H.Middleditch

The authors writing in the 1830's about the *Echinopsis* from Uruguay and Rio Grande do Sul, may well have had access to specimens which displayed a degree of variation comparable to those described by the various foregoing contributors. Under such circumstances it is hardly surprising that they do not appear to have been exactly of one mind in regard to what name to give to any particular combination of body features on these plants. Amongst others, we have the names *sulcatus*, *schelhausii*, *gemmaus*, *boutillieri*, *turbinatus*, *incrustatus*, *tubiflorus*, etc. Even the name *multiplex* was only invented because the plant(s) concerned offset freely i.e. multiplied, without being decapitated.

.....from G.R.Allcock

The various *Echinopsis* such as those from Cerro Jarao, and indeed pretty well all of those from S.Brazil, Uruguay, and N.E. Argentina, are indeed apparently infinitely variable. Moreover the appearance of any given clone depends upon its state of maturity and upon the environmental circumstances in which it has grown.

.....from H.Middleditch

If we are to accept the field observation from W.Gemrich that one and the same sort of *Echinopsis* can

produce either white or pink flowers, together with the observations from G.R.Allcock regarding both change in rib edge outline as well as epidermal colour being dependant to some degree upon compost, it becomes steadily more difficult to justify all the names available for the *Echinopsis* growing in the area of Uruguay and Rio Grande do Sul. Unless it becomes accepted that certain names can be used in a notional manner to facilitate exchange of comments and observations. In this way, perhaps the name *E.eyriesii* can be attached to the short spined plants with white flowers?

AROUND ESMERALDA From R.M.Ferryman

As one leaves Chanaral to head north, the Pan American highway turns inland to take 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 ones 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 1994 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 lactiflua*, 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 - *Thelocephala 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 *Thelocephala malleolata*, displaying rather more areole wool than *T.esmeraldana*. But *Thelocephala 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 kranziana, 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 C.Pugh

On the occasion of our visit to the Guanillos valley on one of the first few days of February, I can clearly remember that there were one or two flowers on the Copiapoa longistaminea, but little in the way of buds. These plants were carrying quite a number of fruits but we had difficulty in finding any ripe fruit, all of which would suggest that we were there at the close of the flowering season for C.longistaminea.

.....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 in the Vandenbroeck picture 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 scores - if not hundreds - of 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 a point perhaps two-thirds of the way up the stem 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



Copiapoa columna-alba and Copiapoa longistaminea

Photo: F.Vandenbroeck

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. de la Cachina, east of 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.

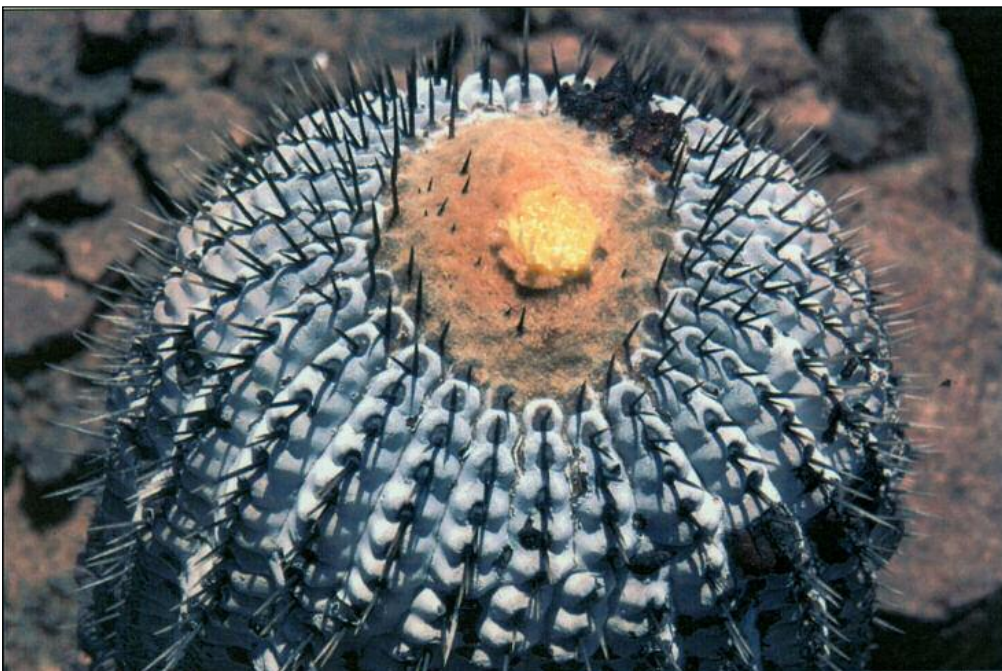
However, when we drove along the very broad beach from the mouth of the Qu. Guanillos to the mouth of the Quebrada below Esmeralda, the situation was quite different. On the higher part of the beach, that is between roughly one and two km from the shoreline itself, we saw a very considerable number of 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 multiheaded clumps of *C.longistaminea* to be seen other than in the lower part of the 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



At Esmeralda

Photograph: B.Burke



Quebrada Griton

Photograph: G.Charles

Copiapoa columna-alba

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 comparison with these plants. *Copiapoa cinerea* can be single headed or it can form small open clumps of a few heads, typical of the plants on the lower slopes which are traversed by the coast road beyond Taltal. However, I was able to walk up one or two of the small valleys between Taltal and Paposo where *C.cinerea* can be found in large, multi-headed clumps. The spination is somewhat variable and at some places there are a few totally spineless examples of *C.cinerea* to be seen, but these are only odd plants, not representative of a population. However, I have never seen a plant of *C.cinerea* in habitat with the lower part of the body both completely spineless and having a dark brown coating of scaly bark.

There was a review of *Copiapoa cinerea* by P.C.Hutchison in the C.& S.J.(US) in 1953 which was accompanied by a number of photographs of these plants taken in habitat. On the Hutchison picture taken "midway between Taltal and Breas" there are scores, if not hundreds of plants of *C.cinerea* to be seen. There are a few clumps up to perhaps ten heads at the most, but the majority of these plants are solitary or very sparsely offsetting. This is typical of the mode of growth of those *Copiapoa cinerea* which we found on a broad expanse of gently sloping ground, such as that captured in this picture. On this same picture there are a few otherwise solitary plants of *C.cinerea* which are offsetting from part-way up the stem, a feature that I have not observed on *Copiapoa columna-alba*, except when due to obvious damage to the crown.

Hutchison also 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 Vandenbroeck picture and which we have also seen in the field.

.....from F.Vandenbroeck

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 north of 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.

Now that there has been an opportunity to raise seedlings from the seed which we collected on our trip to Chile, one difference which I have observed is that the *Copiapoa columna-alba* grow very slowly from seed. So slowly, indeed, that they grow only about half as fast as the *Copiapoa cinerea*.

.....from H.Middleditch

Looking at the large-scale map of this area it would appear that when G.Charles et al. turned off north when they were roughly half way between Taltal and Cifuncho, they 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 road is marked on the map. This appears to be the most northerly coastal location for *Copiapoa columna-alba*.

A photograph taken by M.Kronlein of *Copiapoa columna-alba* growing on an extensive level area, 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 solitary. Again, all growing on a very extensive area of level ground.

If it as a question of *C.longistaminea* and *C.columna-alba* being two separate species, or two varieties of the one species, how does one go about deciding what constitutes a variety?

.....from G.J.Swales

The question as to what is a variety has exercised my mind from time to time over many years. To the best of my recollection, I am not aware of any published definition of what constitutes a variety. The practice of using the term variety perhaps started in the early nineteenth century when many botanical specimens were being brought to Europe for the very first time from various parts of the world. The recipients of these specimens may well have found themselves faced with a fresh specimen which was similar to one received previously, but not exactly the same, and decided to record one as a variety of the other. The practice of designating those forms as varieties which appear to show some degree of difference from the relevant species, has continued over the intervening years. But there does not appear to be any consensus of opinion on either the nature or the extent of difference to be expected between a species and a variety. Nor I am aware of any understanding that two varieties would be expected to be separated by some form of barrier, be it altitude, topography, or whatever.

In the specific situation raised here, there is evidently an overlap of no small significance in the distribution of *Copiapoa longistaminea* and *C.columna-alba*. In addition, the two forms would appear to display different characteristics which are not difficult to define and these two forms can evidently be seen growing literally side by side. There are no reports of any intermediates between these two forms so the supposition would then be that these two forms do have some genetic difference in their make-up. Taking these factors into account, my own inclination would be to regard these forms as two species rather than as varieties of a third species.

.....from Strasburger's Textbook of Botany 1970

The systematic botanist is repeatedly struck by the fact that there is no criterion by which varieties can be distinguished absolutely from species. Many species show no discreet systematic uniformity at all, but consist instead of an extensive aggregate of micro-species. The sharp delineation of such species from other such aggregate types of species is, moreover, often very difficult, indeed frequently hardly possible. At the same time the differences between these remarkably constant micro-species may be much smaller than between varieties. Consequently it is often a matter of 'systematic judgement', acquired through extensive experience, whether a particular plant is regarded as a species or variety.

.....from G.J.Swales

The following views may perhaps be relevant here;

Charles Darwin, "Origin of Species". No one definition has as yet satisfied all naturalists; yet every naturalist knows vaguely what he means when he speaks of a species.

W.B.Turrill, *British Plant Life*, 1948: The choice of criteria by which we decide what groups should be called 'species', 'subspecies', 'varieties', and so on, is very much a matter of convenience, even if it be scientific convenience.

Mason H.L., *Taxonomy* 1950: That which is a species to one taxonomist may be a subspecies to another.

Stace C.A., *Plant Taxonomy* 1989: There have been many attempts to define a species, none totally successful.

.....from F.Vandenbroeck

I have long been puzzled by Ritter's *Copiapoa melanoxystris*. I studied the different habitats of *Copiapoa columna-alba* and *C.melanoxystris*, which are now fortunately protected within the borders of the Pan de Azucar National Park. The *Copiapoa melanoxystris* always seems to occur at a higher altitude than *Copiapoa columna-alba*, in fact about 200m more elevated, The consequence of this is that the *C.melanoxystris* are able to obtain more moisture from the "camanchaca" and become more robust, developing thick, dense, blackish spines. Moreover, most of these plants are densely hung with different specimens of colourful lichens which give them a typical aspect. Also the accompanying herbs and bushes are prolific in these more elevated habitats. Conversely, on the whole *Copiapoa columna-alba* grows in much more barren surroundings and the plants remain distinctly smaller and have a weaker spination. I never saw the two forms together and the distance between the nearest habitats is, so I believe, no more than about 5 km. Ritter attributes species rank to *C.melanoxystris*, but I am not convinced that this is appropriate, for the two forms may be mere ecotypes.

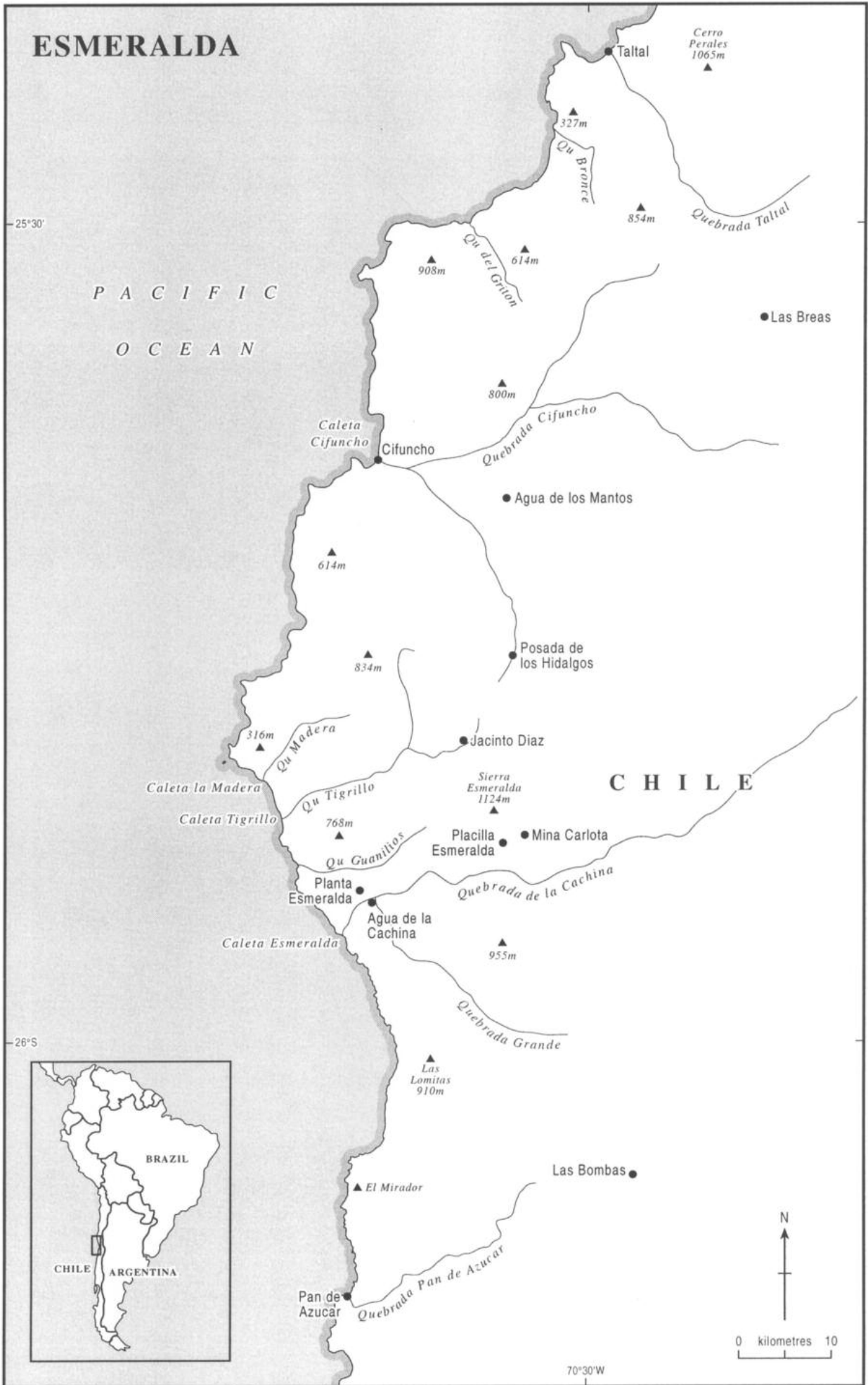
.....from H.Middleditch

For there to be two ecotypes, there should be some degree of difference in the growing conditions, be it ground water availability, soil porosity, soil pH., shade, or whatever. Could there be more moisture available at the rather more elevated locations where *C.melanoxystris* is said to grow?

.....from I.Bowman, *Desert Trails of Atacama*, 1924

To the traveller on the desert coast of Chile it is a source of constant surprise that the sky is so often overcast and the ports hidden by fog, while on every hand there are clear evidences of extreme aridity. The big desert tracts lie east of the coast range and there, except for light summer cloudiness, cloudless skies are the rule. The desert of the littoral is in many parts only a narrow fringe of dry marine terraces, quite unlike the real desert beyond, in type of weather and resources. The fog bank overhanging it forms over the Humboldt current and the upwelling cold water between the current and the shore, drifts landward with the onshore wind, and gathers on the seaward slopes of the coastal hills as the inflowing air ascends them in its journey eastwards. Sometimes it lies as fog on the surface of the land and water; more frequently it is cloud that hangs some distance above them. On many parts of the coast its characteristic position is from 2000 to 4000 feet above sea level, descending at night nearly or quite to the surface, ascending by day and sometimes all but disappearing except as rain clouds on the hills.

In Chile the coastal fog is known as camanchaca. There is much variation from place to place in its position and habits. Fog is characteristic of Antofagasta during the winter season; by contrast, it is largely absent at Iquique. On the coast at Caldera, the port for the valley of Copiapo, the fog hangs over the hills and



the bay a good part of the time. It does not sweep up the Copiapo valley, but settles down from aloft as night comes on, and in the morning the whole valley may be filled with it. It does not long survive the morning sun, and after a few hours of daylight the edge of it may be seen retreating up the slopes to the crests of the coastal hills.

.....from C.Darwin, Journal of Researches, 1860.

During the winter months, in northern Chile a uniform bank of clouds hangs, at no great height, over the Pacific. From the mountains we had a very striking view of this white and brilliant aerial-field, which sent arms up the valleys, leaving islands and promontories in the same manner as the sea does in Tierra del Fuego.

LITTLE DROPS OF WATER, LITTLE GRAINS OF SAND? From B.Schultz

A friend and I are currently researching the genus Copiapoa. We are particularly interested in the environment, cultivation, anatomy and growth requirements of the harder-bodied species. We visited northern Chile in 1994 and for every answer we obtained we found additional questions, such as why do Copiapoa have their bloom, and what is the material which makes the old tissue black on a typical *C.cinerea*. The most interesting question for me is how the Copiapoa obtain water from fog and perhaps dew. I feel that there must be another method other than absorption through the soil. Now that spines have been shown not to absorb water, it leaves only the areoles, the stomata, and wool as possible absorbing tissue. We plan to make a return trip to Chile in the not too distant future and hope to conduct some field investigations while we are there.

.....from H.Middleditch

In Chileans No.41 an outline explanation was given of the basic metabolism by which plants take in raw material and convert it to living tissue. It was noted that whereas plants which grew by the C3 or C4 method took in carbon dioxide through the stomata in the hours of daylight, plants which grew by the CAM process had their stomata open at night for absorption of carbon dioxide, then closed by day to avoid moisture loss. In the same way that moisture can transpire via stomata, there is the possibility that cacti, which operate on the CAM process, may take in moisture which is present in the air at night, via the stomata.

But in addition to the alternatives put forward above, it is possible that the cacti may adopt yet another method of obtaining moisture from the coastal fogs. During night time, when temperatures are lower than in daylight hours, the plant as a whole will lose heat. The body of the plant, having a relatively large volume in comparison with its surface area, will tend to conserve its heat. On the other hand the spines, having a comparatively large surface area for their volume, will lose heat at night time at a far more rapid rate than the loss of heat from the body of the plant. In consequence the spine temperature will fall rapidly at night time; once the air immediately adjacent to the spine has fallen below its dew point, minute droplets of water will be deposited on the surface of the spine. As these minute droplets coalesce into larger droplets, the weight of the droplet will eventually exceed the surface tension securing it in place and in consequence the droplet will either run down the spine or fall freely. Some proportion of these droplets will find their way down to the surface of the ground where they will moisten the surface layers; if the ground is very porous, this moisture may even find its way a short distance into the ground. This could, then, be the source of moisture for the roots, where rainfall is almost non-existent but high humidity and early morning fogs are prevalent.

.....from R.Ferryman

You may recollect the slide which I showed some years ago at a Chileans' Weekend of a *Eulychnia* on the coast between Pan de Azucar and Paposo, with dew droplets clearly visible on the spines. Similar shots were taken at Paposo, El Tofo, and Carrizal.

.....Drinking water from fog. New Scientist 16 Oct. 1993

75 large sheets of plastic mesh suspended along a remote hilltop in the Atacama desert of northern Chile. These plastic sheets are there to capture the moisture in fogs that roll in off the Pacific Ocean. The Atacama desert is reputedly the driest place on earth. It does not rain there for years on end. But there are fogs which drift in off the ocean and over the ridge where researchers have been perfecting their technique for harvesting the moisture. The double layered polypropylene nets, each 12 m by 4 m, are hung about 2 m off the ground and face into the wind high above the village of Chungungo. Fog droplets are tiny; about ten million of them have to accumulate on the mesh to make a single large water drop, which then runs down the mesh into a trough, and eventually flows downhill to the village. The nets provide an average daily output of between three and four litres of water per square metre of mesh.

.....from H.Middleditch

If this system of condensing droplets of moisture from the fog will provide water for domestic supply purposes, it may be reasonable to suppose that dribbles of moisture similarly condensed on to spines and dropping on to the ground besides the plant, could be sufficient to enable it to survive - or even to grow.

.....from R.Schultz

Seeing hundreds of Copiapoa like *C.columna-alba* growing on the flats at several places in Chile we were struck by the fact that they all leant in the same direction. Towards the north. The explanation has been suggested to me that it is temperature related - the sides of the stems keep cooler while the apex becomes warmer. But I am not convinced. Why is this an advantage, especially in a relatively moderate desert without temperature extremes? The temperatures measured were all within the low 40's Centigrade, which is well within the comfort zone of cacti.

.....from H.Middleditch

At The Chileans' 1995 Weekend we were shown quite a number of slides of Copiapoa such as *C.columna-alba* and *C.dealbata* covering a wide and level sandy valley floor, with individual plants standing

roughly a couple of yards apart from each other. Every single plant had the same degree of lean in the same direction. The generally held view was that these plants all leant towards the north i.e. towards the sun, although there was not entire unanimity on the point. By adopting this attitude there will be the minimum area of plant body exposed to the heating - and desiccating - effect of the noonday sun. Is this form of growth adopted as a measure of moisture conservation? There are many instances on record of *C.columna-alba* growing more or less vertically upright, but with a crown set on the slant. On these plants, does the crown face the sun? As on the leaning plants which do not have a slanting crown? What advantage is really gained by this mode of growth?

At the close of that particular discussion, a slide was put on the screen by R.Ferryman, taken only a few hundred yards from the sea shore, of some Copiapoa leaning away from the camera, which bore on their backs a considerable amount of greenery, either moss or lichen. If this was a west facing shoreline, then these plants would appear to be leaning towards the east.

.....from K.Preston-Mafham

Certainly I did see a great many Copiapoa with a copious amounts of lichen growing on them, but only in the populations near Esmeralda. This lichen often extended all round the plant, whilst some plants were almost completely covered with a coat of this green lichen.

.....from R.Ferryman

With the Copiapoa *columna-alba* seen on the high coastal plain at Esmeralda, the coastal side of all these plants is covered by moss, similar to the spanish moss one sees draped over the telephone lines in Argentina.

.....from H.Middleditch

Presumably this lichen or moss will also survive on the droplets of moisture condensed out of the fog which usually occurs during the overnight to early morning period of the day.

It is hardly surprising that those plants of *columna-alba* type which are to be seen growing at the rather higher elevations, in the persistent mist zone, with a better supply of dew from the mist, might have a habit not altogether identical with those growing at lower altitudes under somewhat more harsh conditions. It would be reasonable to ask if such a difference justifies separate species status. What precisely is the difference between *C.columna-alba* and *C.melanohystrix*? A quick check on the Ritter descriptions for these two names (without doing a feature by feature detail comparison) does not reveal any obvious point of distinction. For the moment, it would appear that the thought put forward by F.Vandenbroeck, that these are two ecological variations, may well be justifiable.

The occurrence of *C.longistaminea* at the lowermost altitudes not far above sea level, where the mist is not only unreliable but, when it does occur, normally disperses shortly after dawn, would suggest that these Copiapoa have to rely less on the dew from the mist and rather more on ground water from some way - several inches - below the surface. To tide over the intermittent supply of moisture, a water storage tap root is required, and to get down to available ground water, an elongated tap root is required. Further inland, in the zone of regular mist, shaded much of the time from the heat of the sun which would otherwise evaporate surface moisture originating from the dew, the Copiapoa *columna-alba* growing there will enjoy a far more reliable supply of surface moisture, which requires a set of fine rootlets to maximise water take up from near the surface. At lower altitudes, below the level of the persistent mist zone, the frequency and intensity of the mist does vary appreciably and there is no rigid dividing line between the more adequate and the less adequate supply of dew. It is under these circumstances that *C.columna alba* and *C.longistaminea* both manage to survive literally side by side.

It would appear that Copiapoa *columna-alba* not only grows almost throughout the altitude range of the persistent mist zone, but also manages to survive under more arid conditions below the altitude normally occupied by the persistent mist. The rather slow-growing *C.columna-alba* described by G.Charles was evidently grown from seed collected from plants found below the level of the persistent mist, which would grow in a relatively harsher environment. Will seedlings of *C.columna-alba* raised from seed collected well up into the persistent mist zone display a faster rate of growth?

.....from G.Charles

We did examine a plant of *C.longistaminea* and it did indeed have a thickened rootstock, in comparison with the *C.columna-alba*, which relies on a set of fibrous roots which do not go a long way down into the ground.

LOOKING ROUND THE COPIAPOA From P.Hoxey

In the course of a visit to Chile made in February 2001, in company with A.Lau, we travelled from the Pan American highway, down the Quebrada de la Cachina towards Planta Esmeralda. When we were perhaps four or five km from the shore, we stopped in a broad, flat valley which was dotted with thousands of Copiapoa *columna-alba*, growing in grit. Apart from an odd Eulychnia or two, there was very little other vegetation here. I think that this terrain could be regarded as a typical habitat for Copiapoa *columna-alba*. Plants of all ages were to be seen here, from small seedlings to large adults, in excellent condition, and many of them in flower.

From the Esmeralda valley we crossed a ridge to look round in the Quebrada Guanillos. We were fortunate enough to find a population of Copiapoa *laui*, displaying many large clumps of tiny heads, in flat gritty areas. The individual heads barely projected above the surface of the ground. The new heads had a typical covering of dense white wool. There were neither flowers nor any evidence of flowering.

After camping overnight near the mouth of the Guanillos valley, we drove back up the valley to a point

close to our previous day's stop, from where we walked for about half an hour up a narrow side valley. Again we found specimens of *Copiapoa laui*, also occasional examples of *Copiapoa esmeraldana*, clumps of *Copiapoa grandiflora* with as many as up to 30 heads, *Copiapoa longistaminea* as plants ranging from seedlings to large many headed clumps, as well as a few scattered plants of *Thelocephala esmeraldana* and *Neochilenia taltalensis*. There were also occasional *Trichocereus*, branching from the base, making untidy clumps, as well as a few *Eulychnias*. Finally we came to a point in this side valley where we came across a few *Copiapoa columna-alba* growing on a stretch of sloping hillside, which was made up mostly of grit and stones with occasional rocks - and it was not a gentle slope. All these plants were solitary. It was an entirely different habitat compared with the wide, flat expanse where we had seen these same *columna-alba* growing below *Planta Esmeralda*.

Later that same day, we were a few miles down the coastal road to the south of Pan de Azucar, where once again we stopped, still within the Pan de Azucar National Park, in order to walk up a fairly small valley running inland from the road. Here the sides of the valley were too steep to ascend, even becoming cliff-like now and again. We passed an occasional *Eulychnia* on the valley floor or sides, and we also saw a few *Trichocereus* which were branching from the base, with stems up to about one metre in length. There were lots of Bromeliads, in fact they were fairly prolific. The floor of the valley was covered in weathered rocks and stones, as if it could have been running with water after rains. Here again we came across just a few *Copiapoa columna-alba*, growing in the valley floor. Also growing here were *Copiapoa cinerascens* and *Copiapoa marginata*.

This was our last sighting of *Copiapoa columna-alba* before we set off to other parts.

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 any 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 *Eriocyce* 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 Cachina, 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 we 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 travelling east for about 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 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 of whose 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.

.....from H.Middleditch

The impression that I have gained of *Copiapoa columna-alba* is of the upper part of the plant being covered with rime and, at a quick glance, perhaps just the one substantial spine per areole, or two. The description for this species provided by Ritter refers to fine radial spines and "stronger" central spine or spines, of twice the length of the radial spines. This might explain the relative insignificance of the radial spines, which do not catch the eye too readily. His description for *C. melanohystrix* does not refer to "fine" radial spines, which may possibly explain why his illustration of this species, his Fig.1043, tends to give the impression of a more spiny plant. He also specifically quotes the spines for *C. melanohystrix* as "black". Of course this is only one feature from his descriptions, but might it suggest that the *C. columna-alba* seen by B.Burke on El Mirador with "blacker" spines than those seen on other *C. columna-alba* during this trip, might fit in with Ritter's *C. melanohystrix*?

.....from R.Zahra

My *Copiapoa columna-alba* displays a very beautiful silver-grey epidermis. These plants grow very slowly and my 25-year-old plants growing with a free root run for the last five years, are only 70mm in diameter. The areoles in the crown are furnished with a kind of dirty white wool, which is not as white as that found on my *C. cinerea*, and could never be described as orange. In the late '70's I bought some seeds from Knize, supposedly *C. columna-alba*, but what these seeds produced was a plant similar to *Copiapoa calderana* with heavy, black spines and a dark purple body. These plants now also have a free root run, but always grew much faster than the foregoing *columna-alba*; they have now formed a clump of heads attaining an overall diameter of about 25cm.

.....from R.Mottram

In general in the cactus family, seedlings of related spp. are usually hard to distinguish at all, and it is only after they have taken on their later mature characteristics that they become different. At present I have some seedlings of *Copiapoa cinerea*, *C.gigantea*, and *C.columna-alba*, of comparable age, which do differ from one another in certain respects. The *cinerea* are dark bodied, with black pigmented spines; at maturity the wool is always grey. The *gigantea* are paler bodied, with spines suffused with orange pigmentation, and at maturity the wool is always orange. The *columna-alba* are like *gigantea* in that they display an orange-coloured wool.
.....from B.Burke

I have no specific recollection of the wool colour in the crown of the *C.columna-alba* which we saw on El Mirador, but the plants we saw growing not far inland from Pan de Azucar had white wool in the crown. Of the *columna-alba* which we saw near Planta Esmeralda, the smaller plants definitely had orange wool in the crown, but this was not evident on the older plants.
.....from H.Middleditch

A picture of *C.columna-alba* taken by C.Doni near Esmeralda (in *Piante Grasse Vol.XI, No.4 1991*) is of a plant with five heads - or of five abutting plants - each with a disc of orange wool in the crown. There are two pictures in the Schultz and Kapitany *Copiapoa* book, one taken inland in the Tigrillos valley, the other not far inland from Pan de Azucar, of *C.columna-alba* which also appear to have a disc of orange yellow wool, an inch or two across, over the crown. Since mature *C.columna-alba* have been seen in habitat with no sign of orange wool in the crown, does this mean that it is a feature which is to be found in some plants, in some places, and not in others?
.....from R.Ferryman

There is variation to be found in *C.columna-alba* - some do have orange-yellow wool in the crown, whilst others do not. Looking at a crop of young seedlings of both *C.cinerea* and *C.columna-alba*, even without looking at the label I have no hesitation in saying that these are *cinerea* and those are *columna-alba*. The body morphology differs, and the *cinerea* have a single black spine. But of the *columna-alba*, some seedling plants will have orange-yellow wool and others will not. In habitat there is the same variation in the colour of wool in the crown. For example there is more variation in this feature in the upper part of the Tigrillo valley than in the lower reaches of the same valley.
.....from C.Pugh

Our visit to Chile took place in the month of January, when we were so fortunate as to find a good crop of seed on many of the *Copiapoa*. This included *C.cinerea*, *columna-alba*, and *gigantea*. Germination was good and the seedlings are now all about golf-ball size. The *C.gigantea* are all pale to grey-green bodied and are less symmetrical in comparison with *C.columna-alba*. They are more vigorous growing so they are now somewhat larger in size than the other two sorts. The appearance of the *columna-alba* is not what I had expected from the picture I had in my mind of the plants which we had seen near Esmeralda. I even went back to check on my seed packets to make quite sure they had been correctly labelled - which they had! The seed of *columna-alba* must have been collected from in excess of 50 plants, many with only one ripe pod, and two ripe fruits was a maximum off any one plant.

Germination of *columna-alba* was good and produced several hundred plants. Looking at these collectively, they give a first impression of being all the same, but then looking at them individually, they are far from all being identical. The bodies range from pale green through grey-green to reddish, or even purplish between tubercles. The spines range from russet-tan to dark - almost black - with the paler spination on paler bodies, the darker spines on darker bodies. The wool is mostly yellowish, not really orange, but on some plants there may be a tinge of orange in the yellow wool. Some plants have much paler wool. Almost certainly these variations will be a reflection of the variations that did exist between the various plants from which the seed was collected.

This was a post-El Niño year and it was probably a consequence of the better moisture supply that season, that we were able to obtain a good harvest of seed. On our visit a couple of years or so later, there was a poor crop of seed. And in addition, at various places the *Copiapoa* seemed to be just surviving rather than growing.

COPIAPOA COLUMNA-ALBA By F.Vandenbroeck Translated by H.Middleditch from Succulenta 1984.

It was in 1962 that Backeberg mentions *Copiapoa columna-alba* as a variety of *Copiapoa cinerea*. These plants were three years earlier described by Ritter as a separate species under the name of *Copiapoa columna-alba*. The plants occur along the coast in a long extended distribution area, to the south of that of *C.cinerea*. Typical for these plants, which the species name ("white column") expresses so effectively, is that they almost never branch, but stand as short greyish-white columns in the desert sands, usually sloping slightly away from the wind. They are strongly reminiscent of the aforementioned easterly growing forms of *C.cinerea*, which likewise grow mostly as unbranched columns, but they differ from those on account of their mostly yellowish areoles and spination, as well as on account of their more numerous and less deeply indented ribs. The plants are widely scattered in a narrow coastal strip of about 60 km in length (from Chanaral in the south to Cifuncho in the north) which constitutes their growing area. At the best habitat locations they grow in such numbers and as close to each other as the beet in a sugar beet field at home. As already indicated, these plants do not branch at all, or very seldom. The statement by Ritter that they would only branch after damage to the growing point, seems to me on the basis of our own observations, too strong.

Because the plants are very uniform within their distribution area and there is no overlap with the

distribution area of *C.cinerea*, we can here without doubt speak of a separate species and not of a variety, such as Backeberg did. Also Ritter misled himself here, by having it extending over a distribution area from Chanaral to Esmeralda (Kakteen in Südamerika 3. p.1095). This leads to some confusion because *C.columnn-alba* also occurs more to the north, as Ritter himself mentions with his variety "nuda", for which he gives Cifuncho as the Type location. Cifuncho is a small bay, almost 30 km S of Taltal, where now and then fisherman make short stays, but apart from that the place has no permanent residents. The establishment of the variety "nuda" seems to me however of doubtful value. This view is based upon the fact that the plants of *C.columnn-alba* in the area of Cifuncho are almost spineless in their young phase - up to 10cm thick. However, we saw similar young spineless plants near Pan de Azucar, a more southerly location, so that one can ask oneself whether or not Ritter was familiar with the temporary almost spineless form of the young plants of *Copiapoa columnn-alba*.

.....from H.Middleditch

The observations (above) made on seedling plants of *C.cinerea* and *C.columnn-alba* would seem to support a distinction between these two sorts. Bearing in mind that, for example, the distinction between *Cereus* and *Monvillea* rests almost solely on one having a deciduous withered flower and the other retaining the withered flower, if that is adequate to separate two genera, then the features distinguishing *cinerea* from *columnn-alba* - none of them especially outstanding differences - may be considered to be just adequate to separate two species. Likewise the different root forms indicated by G.Charles, in addition to the comparison between a multiheaded clump and a mostly solitary growth form, provide an even firmer basis for distinguishing *C.columnn-alba* and *C.longistaminea*. On the other hand, the separation of *C.melanohystrix* as an independent species would appear to be open to question.

A VISIT TO CULPINA. From K.Preston-Mafham. At The Chileans 1989 Weekend.

After spending some time travelling from La Paz to Cochabamba, we went on to Potosi and from there to Camargo. From Camargo, we planned to drive to Culpina. If you look at Rausch's field lists, under Camargo-Culpina, you get more names from this area than just about anywhere else in Bolivia - because the whole of this area is very rich in cacti. The nearer you get to Culpina the more variety of cacti are to be found. From Culpina across to Inca Huasi, Salitre, and La Cueva, it is an amazing area, so many sorts of cacti. On the way we climb up to go over a pass and shortly afterwards we come to a unique habitat for cacti in Bolivia. No other cacti grow on a habitat like this - I would not even have looked for cacti on this sort of habitat. You get so used to the kind of habitat that cacti grow in, that when you see bare, flat, eroded areas like we came to here, you do not bother looking. In fact, the only plant you find here is the only plant that is adapted to live under these conditions and to getting seedlings established. It is the smallest *Parodia* known. It is mostly only one inch across when it is fully grown and it is *Parodia occulta*. It is rather variable. The original plants which Ritter described from this area and photographed in his book, are not identical to those found here. He has got two pictures of *P.occulta* which look quite different to each other anyway. He has obviously been to two populations of these plants, and this population we have found is slightly different yet again. They are called *occulta* because they are hidden. There are literally thousands of these *occulta* here, but you could walk over them without seeing them, it is really amazing. We were very, very lucky as we caught them in flower.

The hills surrounding Culpina have not really been fully explored. They can obviously be full of good stuff. There will surely be *Rebutias* of various kinds. It is near here that *Lobivia rauschii* was found, which is not connected to any other sort of *Lobivia*. There are more sorts of cacti in these hills around Culpina and Salitre than anywhere else in Bolivia - it is incredibly rich. A superb area to explore. Nearer to Culpina there is more than one spot where the rock beds occur - there are two or three areas - but they are extremely localised. And these *P.occulta* are on these rock beds and nowhere else. It is an amazing example of a species evolving to suit a specific habitat. There is no competition from anything else on this rock, as nothing else can grow here. And there are thousands of them. In many cases they are less than 1 inch across, hugging the ground, looking just like *Thelocephala* - and they do have quite a robust tap root. If they had not been in flower, they would not have been discovered to this day. I was busy looking at the different flower colours. There are not many people who have seen these plants. There was no seed - February would probably be the time for seed. It will probably grow a lot larger in cultivation.

Off the rock these plants disappear and are replaced by a form of *Parodia maassii* which are in flower at the same time, but they obviously have a pollination barrier. They both favour a similar ecology and both have large seed. This is a form of *P.maassii* which some people call *P.culpinensis*, but *P.culpinensis* is re-description of *P.subterranea*. It is a form of *P.maassii* which may deserve varietal status in that it is consistently small flowered and its distribution is not continuous across the mountains from Camargo - there is a gap in its distribution and then it starts again here.

Just looking around behind Culpina you find plenty of *Rebutia*, without any problem. They are possibly *Rebutia albopectinata*, or *Rebutia heliosa* v.*pectinata* if you prefer. The *R.heliosa* were found to the east of Tarija and were in flower but they are not in flower at this higher elevation here. Near Inca Huasi we did collect seed, at the Type locality of *Rebutia albopectinata*, which grew over a very restricted area on a rocky slope. We wanted to get across the river to find *Rebutia huasiensis*, a plant which apparently nobody but Rausch has seen, but we could not do so because the river was in flood. Also on this same slope were a form of *Lobivia pugionacantha*, with long spines, quite unlike *L.haemantha*. On more level patches of gravel on this

hillside there were thousands of *Parodia subterranea* growing up to about two inches across.

Retreating from the heavy rain and the swollen river, we made our way back from Culpina, seeing *Lobivia ferox* not far from the road, some way before we got to the pass.

.....from H.Thiele

Making our way back to Culpina from the reservoir we stopped briefly at a spot where we had a fine view over the whole basin. That area is given over to agriculture and so many peasants were to be seen occupied with spring ploughing. Mostly still with yoked oxen, but a few with tractors.

.....from T.Marshall

After the climb up from San Pedro and the long pass through the mountains, we proceed down into the Culpina basin. There is now an obvious type of geology which is predominant: that is micaceous sandstone/shale. A lot of the cliff faces are very loose and difficult to climb. I found this very noticeable around Yuquina, at the locality where we found one sad looking specimen of *Lobivia rauschii*. Here I found a very nice purple flowered climbing member of the Scrophulaceae family.

The floor of the Culpina basin consists of thin plates of slaty sandstone, not often being horizontal. You can nearly always expect to find *Parodia occulta* growing in the vertical planes of sandstone on the basin floor. As would be expected, the vegetation in the basin consists mainly of drought resistant plants such as *Argemone mexicana* (not endemic, just as the name suggests), various *Acacias* and *Cassias* plus plenty of tuft grass. We also find shrubs belonging to the Solanaceae family, possibly *Solanum* - some are spineless and some are intensely spined with spines all over the stem and along the mid-rib of the leaf. We noted various sedum-like plants with a grey glaucous covering to the foliage; all of these sedum like plants grew very low to the ground, forming clumps up to a foot across. At the time of our visit I noticed one type of bulb in flower, a member of the Colchicaceae family. This plant was leafless when flowering, the flower emerging stalkless from the ground, red-orange in colour and up to two inches in height.

When one looks down on the Culpina basin from the hills, the complete flatness of it is quite absorbing. Green trees and shrubs follow the water courses, the orange flowers from *Lugonia lysimachioides* catch the sunlight as you drive past.

RECOLLECTIONS OF CULPINA From F.Vandenbroeck. From Succulenta 74.4.1995

In December 1992 we came once again to the area round Camargo. From here we would undertake an expedition towards the plateau of Culpina that lies at a height of roughly 3000m. Four years earlier we had made an unsuccessful attempt to visit Salitre. Now we laid in bread, bananas, and water and set off in the direction of Culpina. For a time we follow the valley of the Rio Camargo and then struck off in an easterly direction over the river at Puente San Pedro. Here the road left the valley and climbed upward in sharp hairpin bends. Quite soon the white globular forms of a *Parodia* sp. caught the eye. We strode through the bare stony landscape and found numerous imposing groups of *Parodia roseo-alba* v. *australis*. This variety distinguishes itself on account of its markedly offsetting habit. On account of the fact that it was fairly early in the morning, most of the flowers are still half closed. However, we would see the plants in full bloom on our return journey some days later. The flowers are mostly orange-red but also yellowish and deeper red shades were observed. Together with these plants there grew here *Weingartia cintiensis* and *Lobivia lateritia*. The last-named species can attain a height of more than one metre here, which for a *Lobivia* sp. is quite exceptional. Although the three cactus species which were met with here belong to three different genera, they displayed in their appearance a considerable resemblance; with plants out of flower it is not always evident which sort one stands before, and the plants must be closely examined to identify them. Under the influence of the prevailing climatic conditions, the plants take on a fair degree of similarity which is obviously the outward appearance best adapted to the surroundings (phenomenon of convergence).

We climbed again and now obtained a fine prospect over the valley of the Rio Camargo with its preponderantly red coloured rock. At an altitude of a good 3000m we reached the pass and left the valley behind us. Gradually we now came into an arid pampa-landscape. After the summit of the pass we stopped for a closer look at the vegetation. We still found *P.roseo-alba* together with *Oreocereus celsianus* and a reddish-brown *Cleistocactus*, probably *C.tupizensis*. A little later we found flowering specimens of *Austrocylindropuntia weingartiana*. Whilst we were photographing these plants a splendid little snake came sliding along, striped alternatively black and yellow, black and red. A coral snake?

On the slightly undulating high plateau proper we came across huge specimens of *Lobivia ferox* together with *Opuntia sulphurea*. On some hilly ridges we found *P.maassii* v. *albescens*. They have a spination like the usual "maassii" but the spines are brownish at first, later becoming greyish-white. With their coppery-red flower they have a splendid appearance. They grow sometimes in company with *Weingartia westii*, remarkably robust globular plants mostly provided with a robust, dark-coloured spination. These can draw themselves down well into the ground, even so far that only the spination still projects above the surface of the ground. This also appears to be a phenomenon typical for this area; *Parodia subterranea* and *P.occulta* which likewise occur over this district, display the self-same behaviour. Their latin names are indeed explicit in that respect.

During our further journey over the high plateau the landscape became preponderantly dotted with numerous widely scattered stands of umbrella acacias. Now we approached the fertile plain in which lies the town of Culpina. Small hamlets appear, surrounded by little fields with maize, beans, alfalfa (a kind of clover) and onions. When we reach Culpina we are disappointed; the place offers only a neglected, poverty-stricken

impression. We resolve now to direct ourselves over the plain in the direction of Salitre. The plain of Culpina is pancake-flat and surrounded on all sides by hilly mountainous country. We drive across the flat farmland over the barren plateau. There is a cold biting wind but in spite of that there is much activity in the fields - ploughing, sowing, weeding. Here and there along the road we find large groups of *Austrocylindropuntia verschaffeltii* in flower. The brood of buds which provides for vegetative multiplication are plain to see. A little further on we see rose-red flowers in various groups, which stick up out of the ground stemless as it were. On closer inspection it became self-evident that they belonged to minuscule grey-green small segments which barely projected above the ground. We dug up a number of the small segments; they were obviously a clump forming miniature cactus which produced a thickened rootstock up to 20 cm long. We stood here looking at *Tephrocactus subterraneus*, although the habitat location for these plants should lie in northern Argentina, in the highland near Volcan.

We take lunch at a small pass on the edge of the plain and thus have a fine view over it. The weather is worsening - heavy clouds rolled over the plain. Here there grew "acolchadas", tightly compacted cushion shaped plants which could belong to various genera, adapted to the highest altitudes, and *T.subterraneus* once again. Suddenly two young girls appeared on bicycles. They tell us that we have gone in the wrong direction for Salitre. We turn round and retrace our tracks. Just before we reach Salitre we went up a slope, in the direction of the village cemetery. The indians in Bolivia have a custom of placing their cemeteries a good way outside of their villages. We find there a population of *Parodia subterranea*; the plants are not very numerous but are typical on account of their grey-black spination.

Salitre is indeed the type location for this species of *Parodia*. At this time of year the plants are by no means withdrawn into the ground, as the species name would have us expect; it is after all Spring, the plants are looking there fine, some even display buds. Further on we find here *Lobivia ferox*, a small *Lobivia* species, *Tephrocactus rossianus* and *Austrocylindropuntia weingartiana*. Salitre seems a very primitive village; all the houses as well as the church are built of adobe - puddled clay mixed with straw - and it is surrounded by fields and bare mountains. A little further on we find once again populations of *Parodia subterranea* next to plants with a pale coloured spination which we initially assumed might be *P.maassii v.albescens*. Later on however we would find groups of *Parodias* of which the colour of the spination varied from pale brown to black. Variants of *Parodia subterranea*? This is an unresolved question particularly because the name *Parodia culpiniensis* does also crop up in the literature, and ultimately refers to what?

The surrounding mountains look attractive as far as vegetation is concerned and we decided the following day to undertake a journey on foot towards the area round La Cueva, a village which lay further away. For now we turned back towards Culpina to look for sleeping quarters. An icy wind chased slivers of mist over the plain. We find some plain accommodation but the "guard" at the pension had a large powerful dog which snapped at shoes, legs, and clothes. The next morning it ripped my jumper to pieces.

SEARCHING FOR PARODIAS. From H.Thiele Translated by H.Middleditch from I.P.K. Jnl 18

From the Mission station in Camargo we set off for the Culpina basin. We were advised that at this time of year the nights are frosty and too cold to sleep in a tent. So we were glad to have accommodation at the Mission Hostel in Culpina.

At San Pedro we left the main road and climbed over the pass. Then close to San Pedro de Concepcion there were some gravel beds and here I came upon several *Parodia subterranea*, fairly flat growing with pale brown spines. Then another stop further on, to look at *Parodia maassii* with pale brown spines., before we headed off for Culpina. The next day we set off for Inca Huasi, stopping after a few km. On a flat slope I stood looking at *Parodia subterranea* which were different to those I knew from the literature - the spines were longer. Then, beyond Inca Huasi, we climbed a difficult steep slope, finding a *Parodia* which came closer to my own conception of *P.subterranea*. It had short, thick, black spines with a hooked tip and the plant body was deeply concealed in the stones.

The next stop, at HTH 16, was but a short distance away. From steep slopes the landscape had changed to undulating hills. According to K.Beckert, it was the location for Ritter's FR 731a *P.robustiamata*. At first it was like other locations for *Parodia subterranea*, where nothing was to be seen. Then, on closer inspection, I discovered that the *Parodia* grew all over the hills. On account of the season of the year, they were withdrawn into the ground, some leaving only a couple of spines exposed. At another spot I found somewhat larger specimens, with a broader and black spination, then some with a pale brown or yellowish spination instead of black.

Then from near Rancho San Lorancito we had a twenty minute walk followed by a climb, finding more *P.subterranea*. The view of the surrounding mountains and sky boded no good. As always at this time of day, the swirls of cold, thick mist rolled down the hills - it was high time we went back to our vehicle.

On the next day we went to the NE corner of the Culpina basin, at first finding some huge *Lobivia ferox* and the ever present *Austrocylindropuntia*. After we had climbed up to 3000m, we then found typical *Parodia subterranea*. Then we went SE over the basin to a spot previously visited by J.Fahr, [FA 28 - H.M.] where *Trichocereus*, *Oreocereus*, *Lobivia* and *Opuntia* were scattered before us. We were, however, not at a high enough altitude for *Parodias*, but when my GPS read 2972m we did find them. These *Parodias* had quite a different appearance, growing globular and with pale brown spines and no black spines. They were 8-10cm in height and diameter. To me, they had no connection with *P.subterranea*.

Next day we visited a spot close to the reservoir which lay above Culpina [=KB 98 - H.M.]. The *Parodias*



Parodia culpinensis Salitre

Photograph: F.Vandenbroeck



Parodia maassii Salitre

Photograph: F.Vandenbroeck

were very difficult to find, they were drawn down so far into the ground. So at first I saw nothing of them in the grey-brown chippings. But once having got my eye in, more were quickly found. Indeed I discovered that there were *Parodia*, *Rebutia*, and *Tephrocactus* scattered over this flat area, so deep in the ground and obscured by chippings, that they were only found with real difficulty. In the course of time these cacti have adapted splendidly to the inhospitable location. More especially because a number of the *Parodia* found here were similar to *P.occulta* - the location for WR 634 is not 10 km away and stands at the same altitude at the NW margin of the Culpina basin.

Then we made our way back towards Culpina, when my attention was attracted by a couple of large *Trichocereus* growing close to the roadside, in the midst of some low bushes. In close proximity was to be found a columnar growing *Parodia* with pale brown spines in the crown, together with *Lobivia ferox* and *Weingartia westii*.

From the Culpina basin we went south to the Paicho valley, and then decided to make yet one more visit to Culpina, passing through Salitre, after which we took the turn to La Cueva. According to Ritter, Brandt, and Weskamp, we should be able to find *Parodia subterranea*, *P.culpinensis*, and *P.zalataewana* here. We did come across these plants, as variable as they were described - HTH 37. The spination was very much finer and longer than on *P.subterranea*. They grew either in groups or singly. As it appeared throughout, the colour of the spination in the new growth could be very variable; besides the preponderant black, there was brown or dark brown to be seen. On the three-sided more or less level valley floor a flat to hemispherical form predominated. Then, as we discovered, the habit changed on the slope. The higher we climbed, the more columnar became the mode of growth of the *Parodia*. Around the top of the hills, they attained a height of about 20cm with a diameter of 8 to 10 cm.

Then it was time to leave Culpina behind and head back towards Camargo.

.....from W.Verheulpen

A picture of *P.subterranea* was taken near Inca Huasi by H.Thiele on his journey to Bolivia. From this you will see that the central spines are quite long but with very little curve at the tips.

.....from H.Middleditch

Looking straight down on a *Parodia* at HTH 16, this picture from W. Verheulpen captures a bed of angular stone chippings, brown, yellow, white, grey, or black in colour, virtually obscuring any view of the semi-subterranean plant body, with an appreciable number of decidedly robust spines projecting - upwards and sideways - from out of the gravel. Presumably these will be central spines. There is a faint curvature to be seen along the length of many of these spines, as well as a slight bend to be seen at the tip. But no suggestion of a hooked end.

.....from T.Marshall

On the picture of the *Parodia* seen at HTH 16 there are only a set of robust, spreading spines to be seen, projecting up out of the the brown and white chippings. This would have made it very difficult to identify, but on the basis of elimination, and not upon its appearance, this would have to be *P.subterranea*.

.....from R.Martin

We came across *P.subterranea* at many locations in this general area. Some of them had central spines rather more curved at the ends than hooked. But I cannot recall any with spines quite as straight as in the photo of HTH 16. Generally the *P.subterranea* were also shorter spined than the photo, but not invariably so. Not all of the plants were as well buried as this one, either.

.....from H.Middleditch

In Kaktusy 5, 1969, there is an article reviewing the seed of FR 730 and FR 730a, together with several illustrations of plants which presumably have been grown from this Ritter seed. One of these illustrations is entitled *Parodia suprema*; if this particular plant was buried in chippings right up to level with the growing point, the appearance of the remaining protruding spines could pass for the picture of *Parodia* HTH 16.

The location for HTH 37 appears to be close to the turn-off for La Cueva, south of Salitre. It would seem to be quite possible that the *Parodia* found here with the "finer and longer spination" are like the plant pictured in this same general area by F.Vandenbroeck.

.....from K.Beckert

The picture from F.Vandenbroeck of a single plant of *Parodia* is a short-spined form of *Parodia culpinensis*, which I would consider to be a transition to *P.subterranea*. These plants are large, up to 15 cm in diameter, and flower dark red. I found them on the lower slopes above Rancho Yuquina at 3050m altitude (KB 145) near the road going to Salitre, not far from where we had found the *P.maassii v.albescens*, three years before. Similar plants were also to be seen not far from the pass between San Pedro to Culpina, where they were growing in cracks in the rocks at 3590m elevation, about half way along the road to the radio mast.

.....from H.Middleditch

At first sight this solitary plant photographed by F.Vandenbroeck, with fairly slender and very slightly curved spines and possibly as many as 17 ribs, would seem to have little to do with *P.subterranea*. But then we are told by H.Thiele that he saw a great many variations in *P.subterranea*. Not just between different locations in the near and far surroundings of Culpina, but even at one and the same location. Which makes it difficult to discard the possibility of including this plant within the compass of *P.subterranea*.

In addition, in Kaktusy 5, 1969, there is an illustration of a *Parodia subterranea* with similar, almost straight, spines, which stand upright over the top of the plant; the inference is that this plant was grown from Ritter collected seed,

.....from T.Marshall

Very few, if any, of the *P.subterranea* which we saw in and around the Culpina basin were buried into the

ground. Usually it was not easy to see the body on account of the spination. This plant in the Vandenbroeck picture appears to be standing above the ground, possibly four inches tall and wide, with not a lot of the body to be seen on account of the spination. So it does look like *P.subterranea* to me. But plants of this sort were very variable.

.....from H.Middleditch

Available WR field lists are conspicuously lacking in precision for any locations and WR 634 is no exception. From the bare observation made by H.Thiele it does seem probable that WR 634 is not far from BLMT 70 and KPM 175, on the Culpina side of the pass when coming from San Pedro. The description given by K.Preston-Mafham of the location at which *P.occulta* was found - a thin layer of chippings over a flat area of solid rock with vertical bedding planes - seems to be remarkably similar to the locations near the Culpina reservoir KB 45, and also to BLMT 165, north of Cienega, from where *P.occulta* is also reported.

From various field records it appears that the distribution of *Weingartia westii* (Chileans No.56) evidently extends to several places in the surroundings of Culpina.

SOME PROBLEM PARODIA AROUND CULPINA From J.Fahr.

Our visit to Bolivia took us from San Pedro in the valley of the Rio Tumusla, to the Culpina basin. We were there for four days; for the first two days we found lodgings at Incahuasi and for the third night we camped near the reservoir above Culpina. There is a widespread area of flat land under cultivation in the Culpina basin, as well as cows, donkeys, and sheep. It is remarkable how vigorously the maize grows here - we did not see maize growing to this height at any other place in the course of our visit to Bolivia. This may be due to better irrigation, from the reservoir above Culpina. The cacti can only be found on the slopes above the cultivated level area. There is no red sandstone to be seen, like that which is common around Camargo. The stone we saw here is very fragmented and changes constantly from one colour to another. I would suppose that it is all slate.

On the climb from San Pedro in the direction of Culpina, we stopped at FA 21 at 2550m and at FA 22 at 2820m to look at *Parodia roseo-alba v.australis*. Over the pass, on the descent to Culpina, we stopped at FA 23 for a form of *P.maassii* which attained a height of about 20 cm and a diameter of about 15 cm, with a flower about 5 cm across. Then some 5 km beyond Culpina, in the direction of Incahuasi, we found FA 24 *P.subterranea*, whilst a km beyond Incahuasi we came across FA 25 *P.robustihamata*. In the other direction, climbing out of Culpina on the road to Cueva, we found more *Parodia* FA 27 *P.subterranea*. Then beyond Yuquina, at 3000m on the way to Salitre, we found some *Parodia* FA 28 with both yellow and red flowers which may be *P.culpinensis*. At one spot I photographed a red and a yellow flowering plant less than a metre apart from each other.

Of the *Parodia subterranea* which we saw, some of them grew fully exposed to the sun, out in the open, whilst others grew in the shade of bushes. Whether they grew in one circumstance or the other seemed to have no effect on their outward appearance. However it was interesting that the plants at FA 25 and FA 28 were appreciably larger than those identified as *P.subterranea* at FA 24 and FA 27. However there are widely divergent opinions among my friends here in Germany over the question of *P.subterranea*, *P.robustihamata* n.n., *P.culpinensis* and *P.occulta*.

During our expedition to Bolivia we travelled from La Paz via Potosi and Otavi to Camargo. We went for some distance up the valley of the Rio Tumusla in the direction of (but nowhere as far as) Cotagaita, and back, also down to Cieneguillas and along the road to Cana Cruz, as well as visited Culpina, and made many other stops on the way. We were back again in La Paz five weeks later having never seen a drop of rain for the whole of that time, to find that in the same period there had been fourteen days of heavy rain at La Paz!

PARODIA SUBTERRANEA By F.Ritter, Succulenta 3,1964

Body flat to somewhat humped, generally shrinking back down into the ground in the dry season. 25 to 60 mm diameter, with dense white woolly crown. Ribs 11-13, usually 13, usually straight, very blunt.Radial spines 5-8mm long, slim needle-like, white, rarely black, appressed. Central spine markedly awl-like, black, the lower one hooked at the end in young plants, slightly bent or straight on older plants, 7-14 mm long, projecting or pointing somewhat downwards; above it often a further three central spines, straight or bent upwards, 7-12 mm long. Type location Salitre, prov. Sud-Cinti. Found by me 1958, FR 730 and FR 731.

This species is very variable at one and the same location. I had initially designated FR 730 as *Parodia culpinensis*. This form however intergrades with FR 731 so that after this particular observation I no longer segregated FR 730 as a separate species or variety. Even my seed specimens display no difference. despite the data and seed sketches in *Kaktusy* 1969 No.5 pp 103 et al. My seeds conform only with the seed sketched there as *P.subterranea*. The seed sketch and plant photographs included there as *P.culpinensis* are apparently something else, probably *P.maassii v.albescens* which have seed rather like this and which is quite abundant at the habitat location of FR 730. *Parodia culpinensis* Brandt described in *Stachelpost* 1973 p.161 as a "new sort" can therefore not be recognised as a valid species. Such species names based upon a single example in cultivation are worthless and only cause confusion. Only after a number of specimens have been collected together at the habitat and in that way first of all established the breadth of variation to be found on location, is it possible to give an account of what only belongs to forms of a single species and what does not.

Parodia robustihamata n.n. By F.Ritter, Kakteen in Südamerika

Differs from *P.subterranea* by body more hemispherical, 4-7 cm in diameter. Habitat location Incahuasi, prov. Sud-Cinti, found by me in 1958, FR 731a. Perhaps it is to be classified as only a local variety of *P.subterranea*.

.....from G.Hole

It has always seemed to me that *P.occulta* was a miniature form of *P.subterranea*. Some years ago I was fortunate to acquire a small imported plant of *P.occulta* from Rausch. It was about 1.5 inches across but the appearance was not the same as the plants which I recollect seeing on the habitat slide of *P.occulta* taken by K.Preston-Mafham. An FR numbered seedling of *P.occulta* was obtained from J.Donald but in the course of time it grew to about six inches across so I imagine that it would probably be a form of *P.subterranea*.

.....from T.Marshall

The *Parodia occulta* which I was able to obtain as small plants during our visit to the Culpina basin were about two inches across and they did look as if they conformed with this name. But they have grown on in cultivation and gradually turned into *P.subterranea*, now some four inches across. They have a single, strong, dark coloured, central spine pointing straight outwards and a number of shorter, less stout radial spines which really do radiate from the areole. There is some areole wool, but only around the crown. One of these plants has 16 ribs, the other 18 ribs.

.....from H.Middleditch

An interesting rib count - the original Backeberg description for *P.subterranea* gives 11-13 ribs, as does the Brandt *Parodia* monograph - and Ritter.

.....from J.Fahr

Our first contact with *P.subterranea* was at about 5km along the road out of Culpina, towards Inca Huasi, at 2985m altitude. These plants did not project very far above the surface of the ground, which was fairly level and mostly with a covering of gravel. We photographed one of these plants, which happened to have 13 ribs. The *P.subterranea* FA27 which we found on the La Cueva road out of Culpina, at 3035m altitude, were almost flush with the surface of the ground. They had up to 19 ribs and were strongly tuberculated even in old age, with central spines about 1 cm long. There were plants up to 7-8 cm in diameter which were flowering at even as small as 1.5cm diameter.

.....from W.Verheulpen

In my own collection I have a *P.occulta* which was obtained from the Wessner nursery, which is now about 5 cm in diameter. This plant has flowered for several years now, the flowers being about one inch across when wide open. The central spines are black and quite robust, but only 5 or 6 mm long, with the end bent over in a sharp curve; on the newer areoles around the shoulder of the plant, the three upper radial spines are also black and nearly as robust as the centrals, the six or seven sideways and downwards pointing radial spines being much thinner and greyish white in colour. But on the lower part of the plant, where the tubercles are concertinaring, all the radial spines are quite slender.

In addition I have a *P.occulta* of about the same size which was raised from seed purchased from the very last Winter seed offering. It was acquired a number of years ago as a small seedling, perhaps 20mm across, from the collector who had raised it from seed. This also has black central spines of about 5 or 6 mm in length but the 7 to 10 spreading radial spines are all much more slender and all similar to each other. Fruit was set on this plant and I raised some of the seed, these globular shaped seedlings now being about one inch in diameter, and one of them has flowered

.....from R.Mottram

From my own collection of Winter catalogues it looks as though the last one to appear came out in 1962.

.....from H.Middleditch.

Which would suggest that this two inch diameter *P.occulta* grown by W.Verheulpen is some forty years old.

.....from M.Lowry

Even on the slide which I took of the *P.occulta* out in flower near the pass from Culpina to San Pedro, there is one other plant of *Parodia*, not in flower, which has spines which must extend to about 30 mm in length.

.....from J.Brickwood

Parodia occulta certainly seems to be absent from most collections, probably because it was simply not available. Only recently does it seem to have become available as seed. My own sowings of this species have done fairly well.

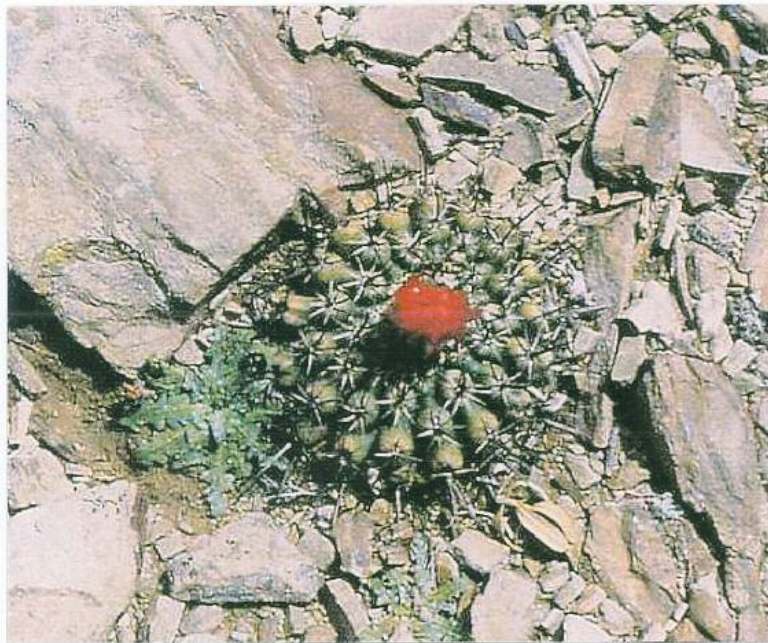
.....from G.Königs, Succulenta, 1970

In my collection there are variations of this particularly fine plant [*P.subterranea*]. I have selected the two most diverse plants, both six year old and grown on their own roots. One has very long and almost straight central spines, whilst the other in contrast has very short central spines but curved to the body. We can see here again one example of how many variations can occur within one certain species.

.....from H.Middleditch

In the text of this article no size is quoted for the plants in the accompanying illustration, so that it is not possible to estimate the length of the long, straight central spines on the one plant. However, they do give the distinct impression of exceeding the 14 mm length quoted in the Ritter description. The shorter spines on the other pictured plant are much more robust and markedly hooked. There is no suggestion here that this degree of variation in the central spines as seen in cultivation is in any way related to the age of the plants.

FA26
4km south-east of
Inca Huasi at
2900m



Parodia
subterranea

Photographs: J.Fahr

FA 27 On climb to
Salitre 3035m

FA28
between Yuquina
and Salitre at
3,000m



.....from R.Gooch

My own plant of *Parodia subterranea* has been in my collection for a good ten years or more - it is now nearly 5 inches tall and nearly 3 inches across the body. Looking at the picture taken by F.Vandenbroeck of the *Parodia* with the spines standing more or less upright over the crown, this was suggestive of my own plant of *P.subterranea*. But after a much closer examination, I discovered that the rib count on the Vandenbroeck plant will be about 19 or 20, whereas my own plant had a mere ten ribs. Also my plant has spines which are nearer black than burgundy and there is a substantial amount of white wool persistent at the areoles to about one third the way down the plant. Presumably this will occur in a greenhouse environment whereas in the wild this wool will be removed by the rain and the winds.

.....from H.Middleditch

The plants of *P.subterranea* in the 1970 Succulenta pictures from G.Königs would appear to have about 14 ribs, but they are basically globular, with very woolly areoles to almost half way down the body, just as described by R.Gooch. Of a similar sort of appearance, with globular body and woolly areoles, is the plant pictured in the Brandt 1989 monograph on *Parodia*. Which might be considered as supporting the observation by P.Down that this is more the cultivated form than the habitat form of this plant. But the *P.occulta* grown by W.Verheulpen only have woolly areoles over the crown, but not at the shoulder or down the sides.

.....from W.Verheulpen

My own plants are sometimes watered into the pot, sometimes overhead. If it is warm weather and they are in need of watering, then they will get a generous overhead watering. There is no doubt that this removes quite a bit of the areole wool. The very woolly plants in the Brandt pictures were never watered from overhead.

.....from K.Beckert

Following my first visit to this area in 1996, I took the view that in the nearer and wider surroundings of Culpina - almost as far as the pass leading to San Pedro - only the very variable forms of *P.subterranea* grow. I have only come across these plants at six different places in this area and in that way I have established that they display a huge range of forms. I believe that the *Parodia occulta* form seen by K.Preston-Mafham a short distance on the Culpina side of the pass to San Pedro, is one of the forms of *P.subterranea*.

.....from H.Middleditch

In Englera 16 the Type location for FR 730 is stated to be Salitre. In his description of *Parodia subterranea* FR 730 (above) Ritter states that “*Parodia maassii* v.*albescens* is quite abundant at the habitat location of FR 730”. This would not fit into the suggestion by K.Beckert that only *P.subterranea* is to be found within the Culpina basin.

.....from K.Beckert

Now that I have made two further trips to this area, I would identify the *Parodia* which I have seen there that are similar to *P.maassii* as *P.maassii* v. *albescens*. These were found not only near the pass between San Pedro and Culpina, at 3550m, not far from the transmission mast, but also above Rancho Yuquina at 3130m. At both locations the central spines range from brownish to whitish. In the case of smaller plants, they are brownish, but become paler with age until they are a grey-white colour. I did not see any *P.maassii* in the La Cueva basin, in the area around Culpina, nor in the Inca Huasi basin.

.....from H.Middleditch

There are various reports of *Parodia maassii* v.*albescens* being found when approaching the top of the pass from the San Pedro side, the varietal epithet suggesting that these plants are whitish spined. Indeed, in Ritter's description of this variety the spines are said to be “pale brown, soon all becoming grey-white”. However, in the picture taken by F.Vandenbroeck near Salitre of some *Parodia* which resemble *P.maassii*, there are young plants with pale orange-brown spines, as well as older plants which still have spines of this colour, together with another plant which appears to have either dark brown or blackish spines.

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

But that is nothing unusual. Every population of *Parodia maassii* that I have seen has looked rather different, and even in any one population the spines are seldom totally uniform in colour.

.....from T.Marshall

My recollection of the *Parodia maassii* which we saw in this area was of plants with varying spine colours, as on the Vandenbroeck picture.

.....from K.Beckert

Both above Salitre and above Yuquina I have seen the plants which look like the *Parodia maassii* on the Vandenbroeck picture, On this picture there is also a *Parodia culpinensis* KB 167 together with the *P.maassii* v.*albescens*.

.....from H.Middleditch

This reference by K.Beckert to a *Parodia culpinensis* on the Vandenbroeck picture of several *P.maassii*, must be to the one plant with the very dark spination. This looks like nothing more than a black spined *P.maassii*. Why does Beckert call it a *P.culpinensis*? In Kaktusy 5, 1969, there is a black & white picture of a *Parodia culpinensis* FR 730 which would readily pass for a *P.maassii*; it gives the impression of having a very dark spination over and around the crown, so that it could very nearly pass for a duplicate of the very dark spined plant in the Vandenbroeck picture of several *P.maassii*. Is this picture in Kaktusy 5,1969, the basis for K.Beckert deciding that *P.maassii* v.*albescens* excludes plants with very dark spination?

.....from T.Marshall

We came across *P.maassii* at a couple of spots not far apart, to the south of Yuquina, one at 2990m on the south facing slope of a hill, the other at 3127m on the NE facing slope of a hill. There was no real distinction

between these plants and the so-called *P.maassii* v.*albescens* which we saw near the crown of the pass coming up from San Pedro. Yes, there is a difference between them in respect of the spine colours, but then there are usually different spine colours to be seen in almost every population of *Parodia maassii* - shades of difference, not white and black spines in the same population.

.....from M.Lowry

It was nearly the end of December when we paid a visit to the Culpina basin, after making several stops at places in the Cinti valley. From Culpina, we crossed the level floor of the basin, which is almost entirely given over to farming, passing through Yuquina on our way to the hilly area which rises immediately to the south. As we approached Salitre, the track started to rise and shortly afterwards we were in the midst of the hilly area.

From Salitre we took a track which brought us to Cienega and then we made a stop just a few km north of this village. Here the immediate surroundings were very flat, the surface being composed of stone chippings roughly 1 to 2 inches deep, overlying solid strata with vertical bedding planes. This was rather similar in nature to the ground at BLMT 70 [picture p.50, Chileans No.56] but here the ground was formed into ripples of low altitude, the crowns rising from 10 to 30cm above the troughs, the troughs running parallel to each other and about 2m apart. The surface of this nature extended over several acres. Around the periphery of this flat area, where the ground was more sloping, with exposed rock, there was an occasional *Trichocereus* or *Oreocereus* - neither of them in flower at the time of our visit - together with sparse *Lobivia ferox*. At one spot there were some *Agave americana*. Other vegetation was sparse, with only a scattering of low growing bushes, together with some small clumps of *Ephedra* sp. - and certainly no grasses. There were no signs here that the vegetation had been burnt off, nor of any recent disturbance for farming activity.

It was on the area of level, rippled, ground surface where we found *Parodia occulta*, *P.subterranea*, and a *Weingartia*, all growing among the stone chippings, just as we had found at BLMT 70. The *Weingartia* were of similar appearance at both of these places and almost identical, in fact, to those we had seen near Cucho Ingenio [picture, Ibid] as well as to those photographed by F.Vandenbroeck to the west of Culpina. I would call these plants *Weingartia westii*.

The disposition of the *Parodia* was quite interesting, as the *P.occulta* grew on the crowns of the low ripples and the *Parodia maassii* grew in the bottom of the troughs. Most of the *P.occulta* were quite large - up to 3 inches across, and consequently could well be regarded as *P.subterranea*. They all had short, straight, black spines; I have only seen black hooked spines on the *P.subterranea* which we saw between Salitre and La Cueva. The *Parodia maassii* were probably what Ritter called variety *albescens* with yellow to straw coloured spines and white radials. There were other plants about of similar looking overall appearance, but with dark radials and centrals, which I took to be hybrids with *P.occulta/subterranea*. There were other *Parodia* of intermediate appearance between *maassii* and *subterranea* which could also have been hybrids and are probably what has been called *P.culpinensis*.

All these *Parodias* were quite common, as numerous as the *Weingartias*.

.....from J.Fahr.

At our stopping place at FA 50, (roughly 10 km west of Culpina) the ground was pretty flat and covered with broken stones. There were some low trees, dwarf bushes, a *Weingartia* and some *Oreocereus*, as well as some *Parodia*. This was probably the location given by K.Preston-Mafham for *P.occulta*. These plants displayed heads so small that they could have been eaten off by goats and then grown again from the crown. In my opinion they are a form of *P.subterranea*.

.....from K.Beckert

Close to the reservoir near Culpina we did find a plant rather like the Preston-Mafham *P.occulta*, where it grew on gravelly slopes and low rocky ridges, at 3050m altitude. It is really only a very little form of *P.subterranea*. This *P.occulta* was also found south of the Rio Pilaya-Camblaya, above Paicho and also near Cieneguillas, this last my KB 197.

.....from H.Middleditch

It is rather unexpected to find *Parodia occulta* reported from Cieneguillas and Paicho, extending its distribution well outside the area from which it had previously been reported. In the notes compiled by those *Parodia* enthusiasts on the continent who have visited the Culpina basin, there is a very brief reference to *Parodia suprema* growing there. This species is normally associated with the area just to the north of Escayache. But if *P.occulta* occurs to the south of the Rio Camblaya-Pilaya as well as to the north, might *P.suprema* also occur to the north of that valley, as well as to the south?

THRIXANTHOCEREUS SENILIS FLOWERS From T.Lavender

Our plant of *Thrixanthocereus senilis* was obtained from a small florists shop in Middlesborough, by recollection it would be about 1960-61. It was then in a 2.5 inch pot and it was about two inches in height. I do know that the shop owner bought his plants from Greens of Sheffield, so it could have originated from there. By about 1990 it was in a 12 inch pot and had grown to seven feet in height, as well as producing two or three side branches from the lower part of the stem. Signs of a cephalium then started to appear in the form of some coarse hairs just below the growing point which turned into a typical cephalium as the stem continued to grow.

It was in 1994 that the flower appeared from about the middle of the cephalium which would then be about 5 or 6 inches long. The purple coloured flower opened late one afternoon and from my recollection it remained open for the whole of the following day, as well as for most of the subsequent day, before it finally closed up. It gave the impression that it also remained open throughout the hours of darkness. The flower

would measure just over one inch across when open, the petals lying just clear of the end of the long bristles from the cephalium. The perfume coming from the flower was not a very pleasant smell. There was nothing else out in flower in the greenhouse at the time, so it was not possible to use some foreign pollen and apply it to the stigma on the *Thrixanthocereus* flower in order to encourage a fruit to set.

Some months after this flowering, the main stem had grown until it was touching the glass in the roof of the greenhouse, so it had to be cut off at about half way up the stem, leaving the three or four young branches still on the remaining stump. An attempt was made to root the top cutting by standing it on a pot full of compost, but after a few weeks it has started to deteriorate next to the cut surface, so it had to be cut back a short way. Different compost mixtures were tried, one after another, to try and find whether any particular mix would encourage roots to grow. It was placed over bottom heat, or off heat, in order to find if either would help, as well as being tried in the propagating frame. And almost every time a change was made, some more had to be cut off from the base of the detached stem where it was either shrivelled up or was rotting. Until eventually there was only the short length of the top of the stem left, with its cephalium, and this just shrivelled up.

.....from P.Hoxey

During the course of our visit to Peru we did come across plants of *Thrixanthocereus senilis* at three separate locations. All three places lie on the eastern side of the mountain range which lies between the coast and the R.Maranon. The first was near El Pallar which is where Lau found this plant and it is also Ritter's location for his *Matucana pallarensis*. Then we found it again at Piscobamba in the valley of the R.Cormabamba, which runs down into the Maranon. And finally at Rauhapampa which is on the east side of the Cordillera Blanca.

This is a very distinctive plant form as it will grow up to almost four metres tall but the stems will be only about 100mm thick. The branches grow from the lower part of the stem so that the plant adopts a bush-like mode of growth. When they had reached about 2 metres in height, both the main stem and the side branches could display signs of a cephalium, but very often these were in the form of a number of tufts. We only saw a continuous cephalium on the taller stems. These plants were only seen growing on steep sided slopes, so steep that they could reasonably be called cliffs. In consequence it was virtually impossible to get into a position where a good photograph could be taken of even one of these plants.

.....from H.Middleditch

A situation which is mirrored in the photograph of this sort in habitat, as Fig.1358 in Ritter's *Kakteen in Südamerika*.

.....from R.Zahra.

In my own collection I have most of the known species of *Espostoa*, including those formerly included in the genus *Thrixanthocereus*. They all have a free root run, inside the shelter of the greenhouse or outside in the garden where they have no protection from the winter rain. Here it must be said that their cultivation needs are slightly different, although they grow quite well in our highly alkaline soil. One exception seems to be *E.mirabilis*, which is planted in a bed in the greenhouse which is open all year round, but protects the plants from the winter rain. Most of my plants are now over six feet tall and some of them even have a cephalium and flower regularly. Also those species which were formerly known as *Thrixanthocereus* are rather tender to our cold wet winters, but they do very well in my unheated, open greenhouse.

On several occasions I have had to take cuttings from my plants - some because they had reached the roof of the greenhouse, others because they were blown down in a storm which produced a number of all sorts of cuttings. This can happen at any time during the year. But for practical purposes these cuttings never produce roots. I have tried every sort of method to encourage them to root down, in every sort of compost, but always with the same result as eventually they would just die off. Cuttings can sit there doing nothing for months - or even for years, as I have one big cutting that has been standing on a pot without rooting for over two years.

.....from T.Lavender.

In the cactus book by Cullmann, Gotz, and Groner, it is suggested that cuttings of *T.senilis* are grafted on to *Opuntia* stock because "cuttings root poorly and slowly".

.....from H.Middleditch

If any of our readers have been successful in rooting down cuttings of either *Espostoa* or *Thrixanthocereus*, information on the method used will doubtless be very welcome.

THAT BROWNING IN THE SUN?

.....from Ms.M.Bischofberg

We also know of this problem here in Switzerland of *Rebutias* getting brown. We are quite convinced that it has nothing to do with red spider mite, but is a fungus attack. The fungus can be on the plant for quite some time without being visible, until a particular combination of air humidity, temperature, etc., makes it break out into active growth. In as little as a couple of hours the whole appearance of the plant can have changed dramatically. It is because the appearance changes so fast that we are convinced that the cause is a fungus. Not all *Rebutias* are equally susceptible. To counteract this problem we use a fungicide - Ridomil Fitorex, made by Ciba Geigy, which includes 8% Metalaxyl and 64% Mancozeb.

.....from F.Wakefield

At one time I was able to obtain a very comprehensive list of insecticides, fungicides, and so on, from the National Agricultural Research Station near Warwick, which would have provided a UK equivalent for that product. But this service has not been available for some time.

.....from N.P.Davies

Over the course of the years most of the really effective fungicides and insecticides have been taken off the retail market; I am always told that it is as a result of EEC Regulations.

.....from J.Cooke

I am fairly certain that Mancozeb is one of those constituents that is no longer permitted for use in retail fungicides.

.....from H.Middleditch

It is likely that any suggestions for a suitable fungicide that could tackle this particular problem would be welcome.

CHILEANS' WEEKEND

On enquiring in 2001 for a booking for a Chileans' Weekend in 2002 at our usual venue at Nottingham University, it was stated that all suitable weekends had been taken up by Corporate bookings - for several years ahead. Subsequent enquiries to well over a score of Conference centres of various sorts in the East Midlands area yielded quotations of between £150 and over £300 per head for facilities comparable to those previously provided at Nottingham University. One location who quoted a price of about £95 per head were "now taking bookings for 2006". If current enquiries now in hand for a possible 2003 Weekend prove fruitful, details will be sent to all regular participants and also to any other members on request.

SLIDE LIBRARY

Slide Library holders advise that the available slides are of very variable quality, doubtless owing to many being of considerable age. Most slide lists will include an indication of the quality of each slide. There are now also three CDs available for *Notocactus*, *Parodia*, and *Sulcorebutia*, respectively. Current indications are that accessing the contents is not necessarily the same for all computers; for example, my own facilities cannot reduce the *Parodia* images to screen size. The respective slide library holders can only indicate basic access procedure appropriate for their own hardware, but may be able to suggest a mode of access suitable for other hardware and other programmes.

.....from J.Brickwood

I have had a good look at the Chileans' *Parodia* slides. Bearing in mind that most of them could be twenty years old (or more) it is not too surprising that the identity of many of them is questionable or indeterminate - and none of them bear field numbers. Also their general quality is not very good. Consequently, I have scanned the best of them onto CDs and added numerous pictures of my own plants and flower sections as well as seeds, many originally photographed by F.Fuschillo.

.....from H.Middleditch

It is probable that the usefulness of the Slide Library could be enhanced if any member cares to scan a selection of their own slides of a particular genus onto a CD to be held by the Slide Librarian concerned.

.....from K.Augustin

Encouraged by the chairman of our Austrian *Gymnocalycium* study group, Hans Till, but also in pursuit of our studies of a section of the South American globular cacti, Dr. Hentzschel and I started quite some time ago to occupy ourselves in more detail with the genus *Weingartia*. As a first step we have just reviewed in detail and newly classified this genus. This work appeared at the end of August in the Austrian Journal "*Gymnocalycium*" 15 (3) 2002 under the title "*The Genus Weingartia Werdermann, Part 1 - review and reclassification*". As I am aware of your interest in *Weingartia*, I also bring this work to your notice. Herewith a CD with an enlarged version of the published article, specifically with the same text but with more pictures together with accompanying notes for which there was not room in the Journal. We would be glad to have your comments or viws perhaps reported in your own journal.

.....from H.Middleditch

This is a miniCD - 8cm - which reads with no problem using my own elementary software. As we go to press, the possibility of adding a copy to the Slide Library is being investigated.

CONTENTS

Finding which sort of Tephrocactus	C. & M. Sherrah	101
Echinopsis eyriesii	P.J.F. Turpin	108
Echinocactus eyriesii	Edwards Botanical Register	112
Some notes on Echinopsis eyriesii	L. Pfeiffer & F. Otto	112
Cereus schelhausii	L. Pfeiffer	114
We find Echinopsis eyriesii	A. Hofacker	114
Around Esmeralda	R.M. Ferryman	123
Little drops of water, little grains of sand?	B. Schultz	130
Looking around the Copiapoa	P. Hoxey	131
Getting acquainted with Copiapoa columna-alba	B. Burke	132
Copiapoa columna-alba	F. Vandenbroeck	134
A visit to Culpina	K. Preston-Mafham	135
Recollections of Culpina	F. Vandenbroeck	136
Searching for Parodias	H. Thiele	137
Some problem Parodia around Culpina	J. Fahr	140
Parodia subterranea	F. Ritter	140
Thrixanthocereus flowers	T. Lavender	144
That browning in the sun?		145
Chileans' Weekend		146
Slide Library		146

Slide Library Holders and Particular Interests

Austrocactus	A. Johnston, 11 Malvern Rd., Scunthorpe DN17 1EL	
Brazilian Cacti	K. Stapleton, 62, Enfield Close, Erdington, Birmingham B23 5SE	joyandkarl@blueyonder.co.uk
Cereanae	G.J. Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU	graham.charles@btinternet.com
\$ Cleistocactus	T. Lavender, Kalanchoe, Market Place, Tetney DN36 5NN	
\$ Copiapoa	B. Burke, 23, Jessica Way, Waterside, Leigh WN7 4QO	
Echinopsis	M. Muse, 32 Fielding Rd., Birstall, Leicester, LE4 3AJ	
\$ Gymnocalycium	S.G. Slack, 50, Sunnyside, Edenthorpe DN3 2PH	grahamandirene@slack2830.freemove.co.uk
Haageocereus	J. Arnold, Suffolk House, 2, Oak Hill, Washingborough, LN4 1BA	
\$ Islaya	M. Williams, 62, Bickerton Avenue, Higher Bebington L63 5NB	maurice.williams@cwcom.net
\$ Lobivia	J.R. Kirtley, 11, Fire Station Houses, Alnwick NE66 2PB	jim@kirtley7.fsnet.co.uk
\$ Matucana/Borzicactinae	P. Hoxey, 34, Stonehill Road, Great Shelford CB2 5JL	paul@hoxey.com
Neoporteriae	R. Moreton, 91, Umberslade Road, Selly Oak, Birmingham B23 5SE	
\$ Notocactus	P. Moor, 60, Milton Hall Road, Gravesend DA12 1QW	philip.moor@blueyonder.co.uk
Opuntia	R. Crook, 35 Cardinal Close, Worcester Park, Surrey KT4 7EH	
\$ Parodia	J. Brickwood, 48 Haselworth Dr., Gosport, PO12 2UH	john@jbrickwood.freemove.co.uk
\$ Sulcorebutia	J. Cooke, Orchard End, Chipperfield Road, Bovingdon HP3 0JR	julian@cactusorchard.freemove.co.uk
Tephrocactus	R.K. Hughes, 16 Ashbourne Ave., 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. Number of slides vary from genus to genus from a few to a considerable quantity. Slide quality and species coverage are also very variable. Donations of further slides will always be very welcome.

The Chileans

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