

# THE CHILEANS '96

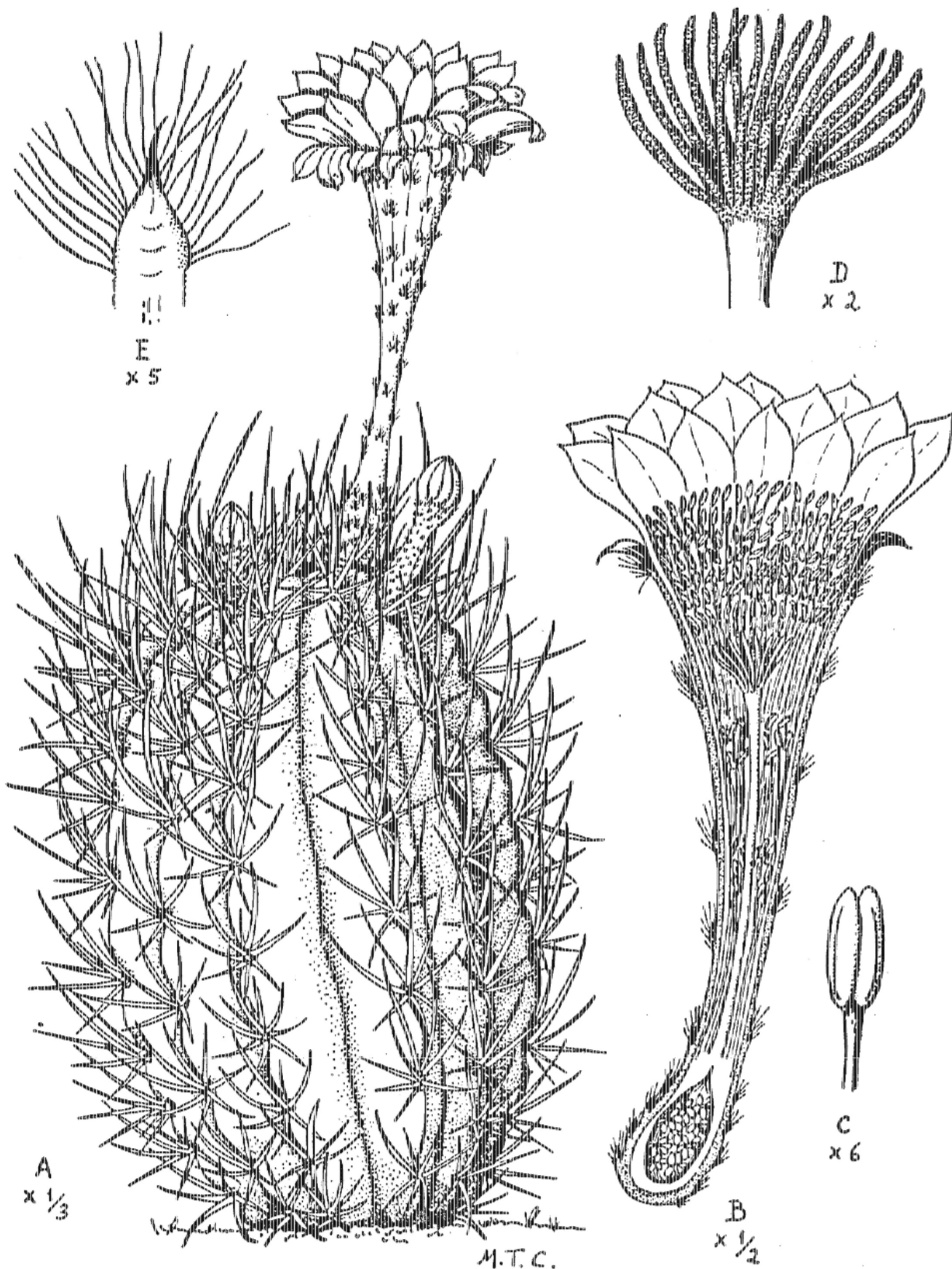
VOLUME 16 NUMBER 54



*Trichocereus camarguensis*

La Colorada, Rio San Juan del Oro

Photo - W. KRAHN



*Echinopsis melanopotamica*

A.J.Cabrera + H.A.Fabris Flora de la Provincia de Buenos Aires

## AN ECHINOPSIS BY ANY OTHER NAME? From J.Arnold

During the magnificent summer of 1989 I had some nice surprises with flowers on several *Echinopsis*. There was even a flower on *E.melanopotamicus* P.98a which is a plant only 3" across. Even slightly smaller are the plants of P.98 and P.98b which both flowered shortly after P.98a! The flowering plants of *E.leucantha* (ex Verab, via Windyridge), *E.intricatissima*, and *E.chacoana*, are of a decidedly larger size. The flowers of all four species are basically the same and I would regard them as belonging to the same group. They flower well up on the shoulder. The flower is small in diameter, the flower petals opening out sharply at the top of the tube and lying almost like a plate. The tube is fairly long and slender, but it widens out at the top so that the throat looks quite wide in proportion to the diameter of the flower. The anthers are in a tight group at the level of the top of the tube, very different from all other *Echinopsis* I have had in flower where the anthers flop to the bottom side of the tube. The pollen is cream, dense, and very sticky. The petals of *E.chacoana* and *E.intricatissima* are white, but those of *melanopotamicus* are a strange brownish pink! All these flowers have a slight scent. I pollinated the *melanopotamicus* flower with *intricatissima* and set a fruit, which steadily increased in size until it was almost two inches in diameter, and ripened to a brownish pink colour. Other fruit which I have set on plants in this group are also fairly large.

My *Echinopsis rhodotricha* will be about 5" in diameter and just a little taller than it is wide. This plant budded up for the first time in 1990 but the flower did not open fully. But I get the impression that it should be included with this group.

I also have a small plant of *E.melanopotamicus* which was grown from seed collected by Inge Hoffmann at Barreiras, but this has a much shorter spination than the Piltz plants. There is a quite definite difference between the three sorts of Piltz P98 in their spination, whilst each sort appears to have a fairly consistent spination. I expect that the three sorts were collected at different locations.

.....from M.Muse

Of the *Echinopsis* which I consider fall within the *leucantha* group, I have now flowered and set fruit on *E.minuana* Speg., *E.leucantha* (Gill) Walp., *E.melanopotamica* Speg. and *E.rhodotricha* K.Sch., all these plants being either ex habitat or from habitat collected seed, as well as *E.klingeriana*. The flowers range from 14 cm long (*E.klingeriana* Lau 362) up to 21 cm long (*E.melanopotamica* P.98a) and with a corolla from 7cm in diameter (*E.leucantha* B.29) up to 12 cm diameter (*E.melanopotamica* P.98a). In addition I would consider *E.intricatissima*, *E.campylacantha* and *E.shaferi* as belonging to this group. Apart from the Type species and one other, all of the species in this group were described by Spegazzini. It has already been suggested elsewhere that much of Spegazzini's written work was done from memory and the reliability of his details and collecting locations can be open to question. I think that at least some of Spegazzini's plants can be recognised in the material collected by Piltz.

The species around *Echinopsis leucantha* are mostly of short columnar growth, 400-1500 mm tall, and solitary in habit; in this respect they tend to stand apart from the other *Echinopsis*, which are preponderantly spherical to ovoid in body habit. The flowers are comparable in length to other *Echinopsis*, but differ from them most obviously in having a lesser diameter over the open petals, mostly of only up to 8 cm across, and the petals are generally much narrower than those of other *Echinopsis*. But it is the flower structure which is so radically different from all other *Echinopsis*. When Zuccarini established the genus *Echinopsis* one of the characters he used to separate these plants was "stamens inserted in two series". This does indeed apply to most spp. of *Echinopsis*, but not to the *Echinopsis* of the *leucantha* group, which have their stamens inserted in one continuous series, from the base of the tube to the junction with the petals, a feature which was originally pointed out to me by R.Mottram. The stamens are so densely packed in the throat that the style is supported in a central position. When viewed from above the arrangement is strikingly similar to that on flowers of *Gymnocalycium gibbosum* et vv. and of *Haageocereus*.

Also the fruits on the *leucantha* group are much larger than those on other *Echinopsis*, attaining up to 4 cm in diameter, and nearly spherical, the surface more or less smooth, scarcely warty, with tiny scales. They are differently coloured - yellow, dirty orange, red, purple, black, and slate grey. The fruits swell up and dehisce with a vertical split. Colour changes do occur on the fruit even after dehiscence. It may be a reflection of my cultivation but most representatives of this group tend to flower quite late in the season. I think that the colour changes i.e. ripening of the fruits are probably triggered by enzymes and the reactions of these will be temperature dependant, so that as temperatures fall in the late autumn, all the changes are slowed down, hence the apparent longevity of the fruits.

The seeds of this group are almost rectangular from side elevation, with the testa wall rolled over and constricting the hilum tissue. The testa is moderately tuberculate, with some spp. having the appearance of intercellular lacunae.

The distribution of the plants within the *leucantha* group covers an extremely extensive area ranging from Rio Negro province in the south to the Matto Grosso of Brazil in the north-east. All the foregoing factors suggest a different evolutionary pattern from the rest of the *Echinopses*, since the *leucantha* group are further removed from the rest of the *Echinopses* than are any other two groups that you may care to select within the remainder of the *Echinopses*. The complex around the *leucantha* group could even be considered as a separate genus if evidence of flowers, fruit, and seed is still of taxonomic significance.

.....from H.Middleditch

But when I was visiting a collection which included a pretty mature plant of *E.leucantha*, I noticed that the fruit on it was dark green and distinctly barrel shaped; certainly a good inch in length, but by no means unusually large for *Echinopsis*, nor of uncommon appearance. At least I was motivated to take a slide of it.

.....from R.Mottram

Your slide shows an immature stage of the fruit on *E.leucantha*. At maturity it swells up to more or less spherical, turns reddish, and splits down one side to reveal the flesh. The pulp and seeds squeeze out of the split like toothpaste from a tube.

.....from M.Muse

On the basis of my own original observations on the fruit of *E.melanopotamica* P.98a I would have said that the fruit was of cylindrical shape, tapering at the upper end, green at first but becoming suffused with a reddish colour towards maturity, much of the green colour persisting, the scales sat on slight but elongated humps which give a faintly undulate fluted appearance to the fruit. However, I have now had an opportunity to see a fully matured fruit on my own plant; this was pillar box red, elliptical, about 3 cm long by 2 cm broad, more or less glossy. The mode of dehiscence is by a longitudinal split and the seeds are embedded in a white tacky matrix, similar to the fruits on the *Echinopsis* from Uruguay and southern Brazil.

### **ECHINOCACTUS LEUCANTHUS Gillies From Salm-Dyck, Hort. Dyck 1834**

*Echinocactus* globose with 12-14 ribs, flattened laterally, areoles close together, oblong, somewhat white woolly when young; spines awl-like, very rigid, brown at the base, becoming yellow in the middle, black at the tip; 8 recurved radial spines, one stronger central spine curved inwards.

*Echinocactus* coming from seed without variety. Found in cultivation under the name of *Echinocactus ambiguus*. Country of origin?

### **ECHINOCACTUS LEUCANTHUS FLOWERS By L.Pfeiffer Translated by H.Middleditch from Allgemeine Gartenzeitung 3. 1835**

When it first came to Europe this fine Chilean (?) plant, like many other sorts which are today classed as *Echinocactus*, was considered to be a *Melocactus*, since in form and habit it displayed an appreciable similarity to young specimens of some varieties of *Melocactus communis*. In Germany it was grown under the names of *Melocactus ambiguus* or even *elegans*. Later they received the correct name of *E.leucanthus*, under which they are to be found far and wide in commerce today. However, if we wish to retain the classification emanating from the Berlin Botanical Garden and also accepted in Hort. Dyckensis, then this cactus (like *E.multiplex* also) belongs to the section *Cerei globosi*, with which the inflorescence appears to be quite similar. Among these it follows the form of the likewise globular *denudatus*, whilst *eyriesii* and *gemmatus* are more flattened, *multiplex* and *oxygona* being more club-shaped.

.....from H.Middleditch

At the time the above was written, Mendoza was still regarded by most Europeans as part of Chile. Despite the high Andes separating Mendoza from Valparaiso, between those two places communication on horseback was quicker than between Mendoza and Buenos Aires. Also in crossing the Andes there was no hazard from attacks by the nomadic indians who roamed the pampas at that time. This situation may have contributed to the "(?)" after the "Chilean" in the above observation. The original description of this species (above) attributes the name to Gillies. It appears to be very probable that this was one of the plants sent back to Europe by Gillies during the period of time he was resident in Mendoza. Indeed Schumann (*Gesamt. Kakt. p.241*) specifically states that "This species was imported from Gillies in 1828". From the field observations (below) it is evident that this plant still grows no great distance from the outskirts of Mendoza city.

### **CEREUS LEUCANTHUS Pfeiffer By L.Pfeiffer. Translated by M.Muse from Enumeratio Diagnostica 1837**

A globose to somewhat conical *Cereus*; ribs 12-14 straight somewhat narrow; areoles roughly oblong, somewhat white woolly when young, spines stiff awl-shaped, brown at the base, yellowish in the middle, black tip, the outer 8 radiating, powerful central, all curving upwards.

Specimen almost a foot long, 6-7 inches diameter, areoles 6-8 lines apart, spines very powerful. Flowers in the months June and July, white, 3-4 inches diameter, opening in the evening, lasting for about 36 hours. Receptacle rather long, brown, densely scaly and woolly. Tube 8-10 inches long, glossy brown, almost naked, sparsely provided with scales and wool, base 5 to 6 lines [diameter], beneath the corolla 1.5 inches [diameter]. Petals narrow, brownish-green, reflexed. Petals in two series, white, tipped rose, acuminate, one inch wide, 2-2.5 [inches] long. Stamens numerous, short at the margin, yellow. Style about an inch shorter than the stamens. Stigma [lobes] about 12. Towards the end of the flowering we have observed the odour of violets.

.....from M.Muse

In my own experience I do not recollect having seen a flower on *E.leucantha* with the stigma lobes set almost an inch below the anthers. But the variation in the disposition of these flower elements, not only between one flower and another, but also during the course of the life of a flower, could account for this unexpected observation.

.....from H.Middleditch

The brown colour of the flower tube, noted by Pfeiffer in the latter description, appears to be a common feature of *Echinopsis* of the leucantha group, although it may not be entirely exclusive to plants from this particular group of *Echinopsis*.

.....from R.Mottram

The *Echinopsis* of the leucantha group have the most simple flower structure and are easily segregated from other *Echinopsis* *sensu stricta* by this feature, the very glossy seeds, and the fruit. It also includes the Paraguayan sp *E.dehrenbergii* and its variety *blossfeldii*.

.....from H.Middleditch.

Being very fortunate in having a selection of seed slides of various *Echinopsis* species, taken by F. Fuschillo to his usual excellent standard, it has been possible to look for any similarities or differences which might lead to tentative suggestions for grouping species on the basis of their seed characteristics. These slides were reviewed at the 1984 Chileans Weekend.

One group which may be readily separated from all other *Echinopsis* seeds is represented by *E.leucantha* B.29, *E.leucantha* DSW 17, *E.leucantha* JL-159, *E.leucantha* MLV.22 & MLV.36, *E.leucantha* P46a, *E.leucantha* R114, *E.leucantha* (ex Kiesling), *E.intricatissima*, *E.melanopotamica* P.98, *E.shaferi*, *E.rhodotricha*, and *E.chacoana* P251. These seeds are substantially parallel-sided in both side and end view, with the top rounded and the base square to the sides. Both in side and end view there is a generous radius between each side of the seed and the base. The hilum does not project below the base of the seed so in consequence the length and breadth of the hilum is appreciably less than the width and breadth of the seed itself. Above the skirt the testa cells are larger and somewhat convex; in the upper two-thirds to three-quarters of the testa there are lacunae, (or sunken testa cells) several to numerous. These features are common to all the above noted species. All these species are found in the Chaco plains or their extension southward into the desert of Mendoza, or westward into the arid province of the Monte. This leads to the thought that this seed form is a product of that particular environment. It was noted in Chileans No.44 p.95 that this group is also distinguished from all other *Echinopsis* in having flowers with stamens inserted in one continuous series. Looking at the complete range of *Echinopsis* species, those which fall within the leucantha group can be segregated by flowers or by seed, more simply than the rest of the *Echinopsis* can be segregated into groups.

.....from J.Piltz

I am of the opinion that all the forms around *E. leucantha* are races limited to regions, that are habitually distinguished from one another; they belong to a closely related group in which the flowers and seeds show no important differences. However I cannot prove the point yet because I still do not have at my disposal sufficient reliable material for comparison. I would consider that the following *Echinopsis*, taken from south to north, belong together: *E.melanopotamica*, *E. intricatissima*, *E. salpingophora*, *E.leucantha*, *E.chacoana*, *E.sp.* P255(perhaps *E. minuana* Speg), *E.adolphofriedrichii* and from Bolivia *E.klingeriana*, perhaps also the new *Echinopsis* of Pierre Braun from Matto Grosso.

We met with *E.melanopotamicus* P.98 in the vicinity of Puelches, where they grew up to fist size, mostly in the vicinity of low bushes and usually immediately next to the bushes. The ground was formed of low hummocks with a lake behind them. Further on we even found one or two plants growing in the banks of the R.Negro. Near Chelforo we came across other plants of this species which had bicoloured top spines, black and golden brown, which we identified as P98a. They usually grew up to about 12 cm in diameter and height but occasionally we came across a plant about 20 cm in diameter and height. These plants were quite often growing amongst bits of broken twig. Between Chelforo and Choel Choel we met with *E. melanopotamica* with much less black colouration to the spines and these we designated P98b. It was August and these plants had already flowered; from the slides which I showed to Chileans' members you would see that there were leaves on the bushes.

Now *E.leucantha* is quite a widespread species. We found it growing in Province La Rioja in the company of a form of *G.stellatum*, always with very scattered bushes. Near the Salinas Grandes we found the occasional plant up to 1 m in height; here they were growing near tall columns of *Stetsonia coryne*. Plants of a similar size were also seen on the slopes of the Sierra Copacabana. Crossing the Sierra Ambato through the Cuesta Cebila we came across *E.leucantha* growing between mats of Bromeliads; here the red fruits were split open from top to bottom. Between the Sierra Velasco and Sierra Mazan the *E.leucantha* displayed reddish-brown spines; here the plants grew partially shaded by bushes. On the road from Andalgalá via Capillitas to Santa María we came across *E.leucantha* P46b at Punta de Balasto. Closer to Santa María we found examples with long, twisting, spines; some of these were quite tall plants, up to 70 cm high; generally they were growing here in the company of *Acanthocalycium catamarcense*. Between Tolombón and Cafayate was the most northerly location at which we found *E.leucantha* and here again the flower tube was brownish (or olive green) even when extended.

.....from F.Vandenbroeck

*Echinopsis leucantha* is undoubtedly one of the most frequently occurring cactus-species in north western Argentina. I would have great difficulty in remembering all the places where I have seen these plants, because there were so many. The size, body shape, and spination may vary greatly according to the different habitats. From my notes I can state with certainty that I saw this species in the following places:-

Sierra de Quilmes, Sierra de Velasco, south of Santa María as far as Campo Arenal, Quines, Chepes and Chepes Viejo, Sierra de Arganzaraz (La Rioja), El Portezuelo (Sierra de Porongo), Malanzán, Marayes, Londres (between Belén & Tinogasta), and Mazán.

.....from O.Irnstorfer, G.O.K. Jnl March 1983

This visit to Argentina was made in February 1981, in company with E.Schlaf and F.Kuhaas. After flying in to Santiago, the journey to Mendoza was made by bus. On account of the abundance of cacti, the area of Cerro Blanco near San Juan was thoroughly criss-crossed. In that way we came upon a group of *Echinopsis leucantha*. Their outward appearance is very variable on account of their extensive area of distribution - they are found in Mendoza and also in San Juan, as well as from La Rioja to the province of Salta. So we find a fine specimen one metre long but of much less diameter whilst further to the north the plants are more robust and barrel shaped.

.....from I.Hoffmann, U.S. C&S.J, Vol.56 1984

In April 1983 we drove about 30 km out of Mendoza. At our first stop we were amazed at the great number of plants to be found in the one wash. *Trichocereus candicans*, *T.strigosus*, *Pyrrhocactus straussianus*, *Cereus aethiops*, *Tephrocactus melanacanthus*, *Opuntia cordobensis*, and a large *Echinopsis intricatissima*. Later we drove along the straight highway leading to San Juan, stopping where we again found *E.intricatissima*. The substrate was black volcanic rock that was warm to the touch even though the wind was cold and cutting. The only problem was that the mountains were still covered by a low cloud mass and pictures were hard to take for lack of light. However, when the cloud cover finally went away and the sun broke through, it shone upon a landscape without plants. Only then did we realize that this was as far as the cloud cover usually reached into the mountains with its lifegiving moisture. Going southwards from Callingasta on the back road to Uspallata, we came upon an *Echinopsis* that we first took to be a *Trichocereus* due to its size. It was fully one meter tall. Rarely were they divided and if so, then just at the base and long after the main plant had matured. *Echinopsis melanopotamica* is the only description I could find to fit this plant. We found it at intervals again and again all along the inner Andine mountain range, all the way through Catamarca into Tucuman.

.....from J.Lambert

In the course of my visit to Argentina in 1981 my travels took me to the city of San Juan. On the outskirts of this place there grew a heavily spined form of *Echinopsis*, probably *E.leucantha*, which seemed to favour pebbly ground. Further to the north, near Huaco, we again found strongly spined examples of *E.leucantha*, which once again displayed a preference for pebbly ground. On my 1983 trip, I went further towards the Chilean border and came across an *Echinopsis* on the Pampa de Hualilan. It was not possible to collect any sample here as no small plants were to be found. Further to the south, on the stony slopes of the Sierra near Villa Nueva on the road to Mendoza, we discover a fine classical *Echinopsis leucantha*. South of Mendoza city, we again came across an *Echinopsis* as we approached Tunuyan. After spending a night at San Rafael, we left it by the road going in the direction of Sosneado, making the first stop at the Cuesta de los Terneros, where we observe the typical white-flowered *E.leucantha* with its brownish floral tube. The plants become more columnar with age, which refutes Backeberg's statement: "never columnar". In 1986 my route took me from Salta to Cafayate; after staying the night at Cafayate, we went on to Callalao, where we observed a large population of *Echinopsis leucantha*, growing together with *Cereus aethiops* displaying some fine bluish stems.

.....from C.Pugh

Both in the course of our visit to Argentina in 1992 and then again in 1996, we were able to see *Echinopsis leucantha* growing at a number of places. On one occasion in Mendoza province we were travelling south in the general direction of Uspallata, when we stopped at a spot only a few kilometres from the main Mendoza-Uspallata road. We had been travelling for some time down a broad valley whose almost level floor might have been about half a kilometre wide, blending into the gentle slopes at either side which then became steadily steeper, rising to the mountains. We stopped here to look at the *Denmozas* growing on the gentle slope. They were a quite astonishing height, up to about twelve feet tall, some of them even starting to branch at the base. They must have been pretty old specimens and were almost the tallest *Denmozas* we saw in the course of our visits to Argentina.

There were a great many bushes, about waist height, scattered over the whole of this valley and as we walked around between them we saw some globular, well-spined cacti growing under these bushes. They would be up to about six inches in diameter and only a few of them looked as though they were slightly elongated-globular. Inevitably the question was asked, "What is this plant?" and after some discussion it was agreed that it was *Echinopsis leucantha*. We did find some seed pods although these were probably not ripe.

.....from G.Charles

These low growing *E.leucantha* which we saw to the west of Cacheuta were really quite extraordinary. Some of them were so low growing that they were almost flat, but still about the same diameter as the more globular ones. Nowhere else on our journeys did we find another population of *E.leucantha* where all the plants had this low-growing appearance.

.....from C.Pugh

We also paid a visit to Los Colorados, taking a look at the outcrops of red sandstone rock. Much of this rock was virtually bare of vegetation, except for the cacti which perched on the rock faces or grew on the sloping patches of eroded red sandstone grit. There were patches of flat rock surface of between tennis court and half football pitch in size which carried some loose eroded rock on which there grew small shrubs which reached waist height at best, but no sign of grasses or herbs that I can remember. Here we saw plants of a short columnar stature with quite fierce spination. In general appearance they were somewhat reminiscent of the picture which had been shown to us on a previous occasion by H.Vertongen, of a plant growing not far from this very same location. At that Chileans' Weekend, no identification had been proposed for that particular plant, but we now knew it to be *Lobivia aurea*. At one or two other locations we had seen similar looking

plants of *Lobivia aurea*, but the plants growing on these red rocks proved to be *Echinopsis leucantha*. They were fairly slim, with quite deep ribs, and up to about one foot tall.

On our 1992 trip to Argentina we were in Cordoba province, driving from Cruz del Eje towards Salsacate when we stopped in a flat area where there was a grove of palm trees of the type we had seen before and we could see that there were ripe seeds to collect. They grew on sandy ground with little other vegetation. On the other side of the palm trees, the ground exhibited a totally different appearance - no palms and a great deal of low growing greenery, looking almost like a green meadow. It was in between the palm trees that we again found *E.leucantha*, this time in flower. The plants were quite tall, the largest being more than 50cm high.

.....from H.Middleditch

There is an entry in the list of synonyms under *E.leucantha* in Schumann's *Gesamt. Kakt.* which reads "E.yacutulana Web, in Cat. Reb". Rebut, a wine-grower, was reputedly one of the largest cactus nurserymen of his time. It may be supposed that the plants listed under this name in Rebut's sales catalogue had originated from Schickendantz' ranch at Yacutala, between Belen and Hualfin.

.....from Monat. fur Kakteenkunde, October 1891

[At the beginning of September, the editor of M.f.K. had seen a closed flower on an "*Echinopsis lamprochlorus*" in the course of a visit to the collection of A.Matheson]

The flower is certainly very similar to an *Echinopsis*, however, the same is the case with several *Cereus* flowers such as *C.subrepandus*, etc., without these spp. being assigned on that account to the genus *Echinopsis*. Not without reason did Salm Dyck emphasize that in allocating species to a genus, the habit too ought not to be disregarded. The peculiar disposition of the filaments on most *Echinopsis* flowers - the lesser number adnate to the tube, the others freestanding - is moreover not characteristic for the genus. Herr Matheson was so helpful as to send to us the picture of a flower of an *Echinopsis campylacantha*, which displays quite a different arrangement of the filaments. In addition the same also applies to *E.salpigophora* Lem. and with the *Echinopsis Yucatalana* Web. imported by Haage junior.

.....from M.Muse

Perhaps some recently reported locations for *E.leucantha* are worth noting, as follows:- VG 113 Caucete, San Juan; DJF 174, N.of Mendoza; DJF 314, S. of Belen; DJF 358, Chilecito; DJF 359, Tinogasta; P.387, N. of Hualfin; HT 1190, Guanchin; HT 90-308, Carrizal, La Rioja, 1800 m; HT 90-324, Chepes-Malanzan rd.

.....from H.Middleditch

In the TG field record (Chileans' Field Number Compendium, Third supplement) there are just over two dozen locations listed for *E.leucantha* under the title of *E.melanopotamica*. Along the eastern foot of the Andes, these range across the provinces of Mendoza - San Juan - La Rioja from La Tosca and Perditas in the south to Fiambala in the north, as well as more to the east from Patquia to Aimogasta. At all but half a dozen of the places where *E.leucantha* was seen, *Tephrocactus sensu* Kiesling were also observed - *aoracanthus*, *bruchii*, or an *articulatus* form. The four southernmost locations for *Echinopsis melanopotamica* are probably outside the distribution area for *Tephrocactus sensu* Kiesling, but at those places *E.leucantha* was seen in company with a hummock-forming *Tephrocactus*. On the other hand there were about a dozen stopping points at which *Tephrocactus sensu* Kiesling were seen, but there was no sign of *E.leucantha*. Was there any feature of these sites in respect of orientation, gradient, soil nature, or whatever, which might point to what controlled the presence or absence of these two sorts?

.....from K.Gilmer

Unfortunately we do not know what might influence the occurrence of these plants. For example, we often found ourselves travelling through a landscape where we would have expected *Echinopsis* to be growing, because it looked just like other places where we had seen these plants. But there was just nothing there. And we do not know why, as the surroundings looked the same where the plants did grow, and where they did not grow. The spination on these plants did vary from place to place, but up to now I see no connection between the nature or density of the spination and the kind of ground where we found this *Echinopsis*. At some places it was growing on sloping ground which looks very stony, that is, covered with lumps of stone of various sizes. But the sandy or loamy soil has been removed from the surface by erosion, probably by rain, whilst underneath these stones there is the same sort of sandy and loamy ground that one can find at most other locations where *Tephrocactus* and *Echinopsis melanopotamicus* were growing. So for most of these plants the roots are not really in different sort of ground.

Although *Echinopsis melanopotamica* is very widely distributed, it was only scattered at the places where we found it, never in great numbers growing close to each other. They either grew solitary, or offsetting sparingly from the base. Most of the plants did not start to form offsets until they were 40 or 50 cm high. Most of the plants we found, solitary or branched, were up to 60 or 80 cm tall, but occasionally we found even taller plants. When we were travelling north from Famatina along Ruta 40 and about 20 km after we passed Pituil, before reaching the road to Tinogasta, we stopped at TG 85. There were great numbers of bushes scattered over more or less flat terrain. Here we saw some low growing, sprawling *Trichocereus*, a species of *Gymnocalycium*, *Tephrocactus weberi*, and also *Echinopsis melanopotamica*. From all the places where we saw *E.melanopotamica*, the tallest plant we saw was here, being about 1.8 m tall, or possibly more. It was growing in the midst of a bush so that only the uppermost 50 cm or so of the stem stood out above the bush. Most of the plants had already flowered when we were there late in 1994. We did find one ripe fruit at TG 92, south of Aimogasta, which measured about 20 mm in diameter.

.....from H.Middleditch

It is recorded by K.Gilmer that he observed *E.leucantha* in habitat offsetting sparingly from the base. In the travelogue by N.Serrano from the Argentine Cactus Club Bulletin, reproduced in Chileans No.20, it is recorded that an *Echinopsis leucantha* was seen on the Cerro Colorados offsetting from the base. This was

originally mis-translated as "spreading" from the base.

.....from G.Charles

We saw *Echinopsis leucantha* at many places in western Argentina on our trip there in 1992. Indeed it was seen so often that we did not take too much notice of it, but we all commented on how unchoosy it seemed to be about where it grew. We saw it on flat ground, on sloping ground, on sand, on rocks, in very dry locations as well as with more lush vegetation, both out in the open, and also under trees, in fact in almost every possible circumstance! We were also surprised to find that different populations seemed to have different flowering times. To the north of Famatina we saw practically every single plant in the population in flower, and yet at other places there was not a single plant in flower; not only without flowers, but not a single plant with either buds or fruit. Whether this might have been due to a good rainfall at some places and a lack of rain at others, we could not tell.

Our first encounter with this species was when we were approaching Salsacate, in province Cordoba, and then again in San Luis province. It was also seen near San Juan, Chilecito, and Famatina, as reported by K.Gilmer, but also further to the east than reported by K.Gilmer, for example at Chepes, Cuesta Mazan, and near Andalgalá, as reported by F.Vandenbroeck. It was seen at the summit of the Cuesta Cebila, quite possibly near where it was seen by J.Lambert. Then our most northerly sighting was some distance to the south of Cafayate. Obviously the plants were not identical over this wide area, but we did not consider it possible to regard them all as anything other than a single species.

By far the tallest specimens we saw were at site GC 24, some 10 km west of Schaqui on the way from Chilecito to San Blas. They would be just over one metre high, and displayed a quite fierce spination.

.....from F.Vandenbroeck

The tallest specimen of *Echinopsis leucantha* which we saw was when crossing the Campo Arenal, between Andalgalá and the valley of the Rio Santa Maria. One plant must have been a good metre in height.

.....from F.Kasinger

The tallest *Echinopsis leucantha* we saw from the whole of our travels in Argentina, was in the Quebrada de Cafayate (or Quebrada de Rio las Conchas) near La Punilla, a plant with a height of 1.1 m and a diameter of some 14 cm. It was growing in the shade of a bush.

.....from H.Middleditch

This last field record appears to be the most northerly location for *E.leucantha*. It is quite possible that it may be the same site as DJF 304 which is merely recorded as "north of Cafayate".

.....from Nova Addenda ad Floram Patagonicam by C.Spegazzini, 1899

*Echinopsis leucantha* Walp. Habitat - common in arid sandy elevated plains at the margins of salinas but not near to banks of rivers. Rio Negro, Neuquen and Lymai,

.....from H.Middleditch

These plants were collected in 1898 and evidently Spegazzini decided shortly thereafter that these particular plants could be given a new name, so in 1905 we find a twenty-four line description of his new name of *E.melanopotamica*, followed in turn by a ten line description of *E.leucantha* Walp., and then by *E.campylacantha*, in brief as follows:-

.....from Cactacearum Platensium Tentamen, C.spegazzini, 1905

***Echinopsis melanopotamica*** Speg. sp.nov. Syn. *E.leucantha* (non Walp.) in Nov. Add. ad Flor. Pat. Body cylindrical, up to 1.5 metre high by 10-15 cm diameter, initially solitary, offsetting at the base in old age. At first dark green, thereafter sub-glaucous, finally tending to become greyish ..... fruit ovate-globular 35 mm long by 30 mm diameter, becoming a dirty-looking red. Common in arid areas along the Rio Negro and Rio Colorado

***Echinopsis leucantha*** Walp. In arid sandy thornbush scrub, Prov. San Luis, Cordoba, Mendoza and La Rioja. Species smaller than the preceding one, never columnar, hardly green or not covered to a degree with a waxy bloom; flowers by night with a very intense odour of jasmine and immediately distinguishable; mature fruit dark red.

***Echinopsis campylacantha*** R.Mey. Species easily confused with the preceding one .....

.....from H.Middleditch

It is reported by K.Gilmer that an *E.leucantha* of some 1.5 metres or more in height was seen in habitat, from which it is quite understandable that the name *E.melanopotamica* would be selected for that field record, on the basis of the maximum heights quoted by Spegazzini for this particular name in comparison with *E.leucantha*. However, the observations made by G.Charles and party, as well as by J.Piltz, would suggest that no real dividing line can be drawn in the field between these names.

From all the field observations noted above, an idea may be gained of the great extent over which *Echinopsis leucantha* is distributed. Outside the confines of the Andes, the northern most location for this species appears to be on the margins of the Chaco plain between the northern end of the Sierra Cordoba and the Salar Ambargasta. However, there is a wide gap from the Sierra Cordoba, across the Chaco lowlands to where any other *Echinopsis* of the *leucantha* group have been sighted. It may be assumed that the Argentine Chaco forest does not support the growth of *E.leucantha* and so forms a very extensive barrier separating the Argentinian *E.leucantha* from the Paraguayan *E.chacoana*/*rhodotricha*.

## A STUDY of the SALINAS GRANDES By A.E.Ragonese

Translated by H.Middleditch from Revista de Investigaciones Agrícolas Vol.V, Nos. 1-2, 1951

The study of the halophytic communities in Argentina involves much of scientific and agronomical



interest. The greater or lesser accumulation of salts in the earth, the influence which each one of them exerts, the rainfall, the atmospheric humidity, the temperature, etc., are all exceedingly important factors which exert a significant influence over the vegetation. It can be stated that each halophytic community reflects exactly the edaphic and climatic conditions in which it occurs.

The halophytic communities of the phytogeographic province Chaquena are entirely different from those which grow in the province Bonariense, and in turn those are quite distinct from those which inhabit the Monte or province Andina. On the other hand, in contrast with those plants of vast geographic distribution, there exists numerous halophytic species and also genera which not only grow solely in our country, but which are often exclusive to salty soils of certain geographic provinces of Argentina. In this present work, only the communities of the Salinas Grandes and the plains surrounding it are considered, without treating the characteristic vegetation of the hillocks and mountains which enclose this intermontane basin.

The salinas presents an immense white plain whose surface is partially entirely lacking in vegetation. The pioneer is *Heterostachys ritteriana*, that is to say, the first element which appears on the parts of the Salinas Grandes where the concentration of salts and the excess of moisture does not exceed the tolerance of living plants. In these places the foregoing species forms small green clumps, well separated one from the other. Gradually, in proportion to the reduction in salinity, the total coverage increases, whilst other elements such as *Allenrolfea patagonica* become incorporated until they constitute the dominant species. As may be observed, the analytical data reveals a predominant emphasis of chlorates and sulphates among the anions and of sodium and calcium among the cations. The carbonates are entirely absent. A surplus of this strongly alkaline salt gives rise to the black alkali or black saltpetre, which appears in the form of blackish spots on certain salty terrain.

The thickets of Cardon - *Cereus coryne*, another of the halophytic associations typical of this region. grows on top of salty soil, rich in chlorides and sulphates, without sodium carbonate but with a reduced percentage of soluble salts, much less than is known from the heaths of *Allenrolfea patagonica* and *Heterostachys ritteriana*. This community forms a thicket of up to 8 m in height, with a marked xerophytic aspect. The most typical species of this association is *Cereus coryne*, known in the region by its native name of cardon, with columnar stems, white flowers and yellowish fruits with a bitter-sweet taste, sometimes used by the children to quench their thirst. In addition there grows *Opuntia quimilo*, of 1.5 to 4m in height, with orange-red flowers and elliptical to obovate segments with long white spines; *Cleistocactus baumannii*; *Opuntia vulpina*, with yellow flowers and red fruits, and *Harrisia pomanensis*, with red fruits, dehiscent, which open to expose a white edible pulp. Associated with these grow various shrubs and small trees, among which may be mentioned *Suaeda divaricata*, with succulent leaves.

In addition there usually grows in these cardonales the *Cereus validus*, another arboreal cactus of 3 to 6 m in height, with cylindrical stems and fruits with a red edible pulp; more correctly they form an accidental element of this community since their typical habitat consists of the dry and non-alkaline soils.

The soil in the halophytic communities varies between pH 7.1 and pH 9.1. The annual average relative humidity ranges from 54% in La Rioja, 58% in Catamarca, and 62% in Cordoba, less than the figures for the seaboard of Argentina, which amounts to about 71% to 76%, but greater than the relative humidity on the Puna - 48% at La Quiaca. The months with the most rainfall are November to March inclusive, the dry season being June, July, and August. The rainfall distribution is irregular, displaying variations between one year and another. All the terrain which surrounds the Salinas Grandes and which is not salty, displays a cover of xerophyllic vegetation, an eloquent indication of the climatic conditions of the region, with semi-desert characteristics.

[Moving further away still from the Salinas itself] On the non-salty soil is to be found the xerophytic woodland. This woodland is greatly changed on account of human activity now that the forestal species of value have been the object over the course of many years of an intense and unbridled exploitation. Originally the woodlands of *Aspidosperma quebracho-blanco* have been just like some almost virgin sites where the woodland still displays its original aspect. These places which still remain like faithful relicts and of greatly reduced area, are without doubt destined to disappear in a short time, owing to the continuing active exploitation of the wood of the dominant species, the quebracho-blanco, for the manufacture of carbon fuel and for sleepers for the tracks of the numerous narrow-gauge railways which cross the Salinas Grandes to the places destined for the extraction of salt.

In addition to the *Aspidosperma quebracho-blanco*, there are other woody species among which may be mentioned: the tintitaco - *Prosopis torquata*; the mistol - *Zizyphus mistol*; the alpataco - *Prosopis pugionata* with spines of 11 cm in length; the algarrobo negra - *Prosopis nigra*; the brea - *Circidium australe*; the palo cruz - *Tabebuia nodosa*; the lata - *Mimozyanthus carinatus*; the garabato blanco - *Mimosa detinens*; the teatin - *Acacia furcatispina*; the pata - *Ximenia americana*; the pichana - *Cassia aphylla*; the jaboncillo - *Bulnesia bonariensis*; the retamo - *Bulnesia retama*; the jarilla - *Larrea divaricata*, and the Jarilla pispa - *Larrea cuneifolia*.

Other common bushy species are the albardon - *Prosopis ericantha*; the guashiyo - *Prosopis campestris* v. *elata*; the piquillin - *Condalia microphylla*; the atamisque - *Atamisque emarginata*; the molle-negro - *Gymnosporia estabiei*; the pinon - *Jatropha excisa* v. *pubescens*; the chanar - *Geoffroea decorticans*; the tusca - *Acacia aroma*, and the tramontana - *Ephedra triandra*.

In the same way the Cactaceae are a characteristic element of this formation. Among the more common sorts worthy of note are: the ucle - *Cereus validus*, arboreal cardon, with cylindrical stems, columnar with 4 to 8 ribs and edible fruit with red pulp; the quimilo - *Opuntia quimilo* with flattened stems, segmented, elliptical, with large white spines and yellowish fruits which are consumed by the cattle; the hachon - *Cereus aethiops* with upright stem, cylindrical, of bluish green colour, spines yellow or blackish and white flowers;

Cleistocactus baumannii with slender cylindrical stems, prostrate or upright, with flowers and fruit of red colour; Gymnocalycium delaetii, with almost globular body and white flowers, which usually grow indiscriminately in the heaths of Allenrolfea patagonica and the scrublands of Aspidosperma quebrachoblanco; the ulua - Harrisia pomanensis with edible red fruits, dehiscent; the penca, tunilla, or quiscaludo - Opuntia vulpina with flattened segments, numerous white spines, yellow flowers and red fruit, truncated in the upper part, as well as Opuntia glomerata with white flowers and more or less globose segments; Opuntia utkilio which grows widespread on the ground and displays yellow flowers; and Echinopsis leucantha, with stems usually cylindrical of 30 to 60 cm in height and with white flowers, which is an equally common element in the heaths of Allenrolfea patagonica.

The winter is very dry since the months of June, July and August are those with the least rains of the year, these also being scarce in August and September [sic!]. Not unexpectedly in consequence at the start of Spring the vegetation displays a very xerophyllic aspect that is customary. At the start of the season many plants are seen to be still devoid of foliage, whereas others display strong signs of the drought which prevails. With the increase in rainfall and temperature, their appearance changes gradually as the season advances. All the species send out new foliage, most of the species which make up the different communities starting to flower at the same time. Some species look very ornamental, such as the brea which at this stage is completely covered with yellow flowers

The cactaceae, so common in this region, also possess showy flowers. The first into flower in this season are; Opuntia vulpina, with sulphur-yellow flowers; Opuntia quimilo with orange-red flowers; Cleistocactus baumannii with red flowers; Cereus coryne, Echinocactus leucantha, and Gymnocalycium delaetii, all with white flowers, whilst Opuntia glomerata, O.paediophyla, and Gymnocalycium ragonessii, with white flowers, bloom somewhat later, at the end of Spring.

.....from H.Middleditch

Included in the foregoing review is a series of tables listing the species recorded at a number of sites around the Salinas Grandes. There are twelve recorded locations within the Allenrolfea heath, where vegetation cover ranges from 5% to 80%, with a typical height of between 30 and 80 cm. Within this formation there are low bushes and shrubs, and a "curious caudiciform" Talinum polygaloides. Various Opuntias are present at almost all these locations, whilst Echinopsis leucantha is noted at six of these sites and Stetsonia coryne at one site. Still on saline soil but nearer the margins of the Salinas, within the areas typified by the aborescent Stetsonia coryne, there are a further eleven sites where again one or other Opuntia sp. occurs at most of these locations and E.leucantha was seen at nine of these sites.

It would surpass belief that the Echinopsis leucantha are growing on fortuitous isolated tiny patches of salt-free soil within this halophytic formation. The only conclusion which it appears reasonable to draw from this survey, is that the E.leucantha growing in this formation are tolerant of soil with a pH in excess of 7.0. This species is recorded both from the succulent heath which grows on the saltiest vegetation-bearing soil as well as from the Stetsonia-rich scrubland which occurs on the less-salty soils. This would suggest that E.leucantha is capable of tolerating soils with a saline content equivalent perhaps up to pH 9.0. In addition, this species is also noted as a feature of the xerophytic woodland which flourishes on the non-salty ground beyond the edge of the Salinas proper. Which would suggest that E.leucanthus can tolerate alkaline soil but is equally able to grow on non-alkaline ground.

However, it may be that E.leucantha can only tolerate a mildly acidic soil so that it may not be suited by being cultivated on an acidic soil which could suit most cacti. This species seems to have a reputation for not only losing its roots but also for being strongly disinclined to put down new roots thereafter. It would hardly be appropriate to suggest a small admixture of common household salt to the compost to assist re-rooting, in view of the comments made by Ragonese on the make-up of the alkaline components of the ground in habitat. But might an admixture of alkalis of the same nature as those identified from the margins of the Salinas Grandes, in appropriate proportions to give a suitable pH, be of any help in persuading a rootless E.leucantha to become re-established?

However, such a project would face the problem that on p.16 of his article, Ragonese states that in the Matorral of Cardon grows on soil containing less soluble salts, "con acentuada dominancia de cloruros, sulfatos, sodio y calcio" i.e with a noticeable predominance of chlorides, sulphates, sodium and calcium, whilst on p.50 he observes that the Halophytic matorral, the cardonales of Cereus coryne, etc., grow on soils of moderate salinity "ricos en cloruros y sulfatos, sin carbonato de sodio", i.e. rich in chlorates and sulphates, without sodium carbonate. From this conffliction, it is not quite clear how one would proceed to formulate an alkaline addition to make up a compost suitable for Echinopsis leucantha..

.....from J.Cooke

It may be unwise to place too much emphasis solely on the question of the pH of a soil. There are a great many other factors which affect soil chemistry, which is a very complex and often fragile system. For plants to succeed, getting the pH right is one thing but all other ions must be present and available in the correct concentrations, as well.

.....from H.Middleditch

The observation made by Ragonese on the height to which E.leucantha is found to grow in habitat i.e. 30 to 60 cm tall, may be compared with the "never columnar" observation made by Spegazzini in 1905 regarding the form of this species. Apart from the apparent taller maximum height of "E.melanopotamica" there would appear to be little to set against the view expressed by J.Piltz that the leucantha group cannot readily be divided into separate species.

The article by Ragonese indicates that in the remnants of the original xerophyllic woodland found on

non-saline soil, there is no occurrence of *Stetsonia coryne*, but this species is recorded as a component of the xerophytic woodland of secondary growth, after exploitation by man. Conversely, the *Cereus validus* (or more likely, *Cereus forbesii*) appears to occur by preference on the non-alkaline soil.

.....from J.Lambert

We found *Cereus forbesii* on the ascent of the Cuesta Totoral at an altitude of 950 metres. The surroundings were bushes and trees which obviously had plenty of moisture. This would be perhaps 200m below the pass itself. Of course this is well away from the lowland area. On other occasions I have observed adult specimens which attained 8 metres in height.

.....from H.Middleditch

Opinion in the cactus reference literature appears to be divided between whether to call the *Cereus* species found in the Chaco and its margins by the name *C.validus* or *C.forbesii*. In recent times the latter seems to be the preferred identification. Up to the moment only a few references to observations of this plant in habitat have been found in travellogues and so forth.

In addition to the Salinas Grandes, there are other large areas of saline ground in western Argentina. Some of these have been reviewed by other authors and may possibly likewise contain references to *E.leucantha*.

### **THE VEGETATION OF MENDOZA PROVINCE. By F.A.Roig. Bol. Soc. Arg. Bot. Vol 13 (supp) 1972**

Halophytic communities. In these soils, communities are modified under the influence of two factors - the concentration of salts and the greater or lesser amount of available water. In general terms the more salty places are those where water accumulates most frequently and correspond to the lowest parts of the basins.

If the saline soils which occur to the north of Mendoza city are examined in a profile which runs from the margins to the centre, it is possible to establish the following sequence:

In the more elevated parts in sandy-clayey soils from which the water drains off without silting up, there is a community of *Atriplex lampa*, *A.flavescens*, *A.argentina*, and *Suaeda divaricata*. This community includes abundant cacti and even elements which are not characteristic of salty soils, such as *Larrea*, *Bougainvillea*, etc.

In the lower parts, specifically in the area of silting-up in the basin, with clayey soils, at times impermeable, and in which water accumulates forming transient shallow lakes, there is a bush zone of *Allenrolfea vaginata*, *Cyclolepis genistoides*, *Atriplex vulgatissima* and *Prosopis alpataco*.

In the most salty soils, but relatively dry, there occurs a very pure community of *Heterostachys ritteriana*.

.....from H.Middleditch

And do the "abundant cacti" in the salty soils include *Echinopsis leucantha*? Which does, of course, occur in the foothills of Mendoza province.

In "The Phytogeographic Province of the Monte" by J.Morello 1958, the halophytic communities of the western desert of Argentina are reviewed, but there is no specific reference to any cacti. From these two references it might be assumed that either *Echinopsis leucantha* does not occur on the margins of the saline areas reviewed by the two foregoing authors, or they did not see fit to mention the existence of this species.

.....from G.Charles

We saw *E.leucantha* at a great many places on both our visits to western Argentina, growing under all sorts of different conditions. It would grow under bushes, or where there were no bushes; where *Tephrocactus* also grew, or where there were no *Tephrocactus*. Indeed at some places there were no other cacti to be seen except *Echinopsis leucantha*.

.....from H.Middleditch

And might that have been a more saline patch of ground?

### **SOME ARGENTINIAN PARODIAS From J.Lambert At the 1991 Chileans' Weekend.**

This Parodia-tour of Argentina will be by no means a complete review of all the Argentinian species of the microsperma group, as I shall only comment here upon those forms which I have personally encountered and observed. Let us start with the southernmost species, in the south of La Rioja province: *P.fechseri*. Here it grows together with a young specimen of *Gymnocalycium saglionis* at Petroglificos. This name was given because some of the stones there display drawings and inscriptions left by the earlier indian population. It is close to Solca, which in turn is about 20 km east of Malanzan. A couple of other plants of this species, one of them in flower, were photographed slightly more to the south, at Anzulon, at the foot of the Sierra de los Lujan. Here it grows together with *G.castellanosii*. This species was subsequently described by Brandt under the name *P.mesembrina*, but to avoid confusion it may be desirable to retain Backeberg's name of *fechseri*. Like most Parodias, this species flowers readily and abundantly in the greenhouse. On this species, the central spines are straight, not hooked. Like many other Parodias, this species becomes elongated with age.

We shall now cross over the province of Cordoba, where no Parodias have been discovered up to the present time, and enter the province of Santiago de Estero, where we will encounter the southeasternmost of all known Parodias, at La Punta, at the foot of the Sierra de Guasayan. This is *P. albo-fusca*, which grows in an area supporting small bushes and some specimens of *Eriocereus pomanensis*. In this species, the lower

central spines are classically hooked, and the plants produce a big yellow flower, with a diameter of 4 cm.

From here we proceed to Catamarca, by crossing the Sierra Ancasti, where we discover *P.malyana* at Anquincilla. The landscape here is one of gentle slopes. In this species, most flowers are yellow, more or less "flamed" with red, but some plants bear pure yellow or more reddish flowers. As these forms originate from the same population, there is no valid reason to create a "*v.citriflora*" as did Backeberg. A variety *rubriflora* had also been described, but I cannot tell whether this is justified or not, as I do not know the exact origin, and did not collect it myself. This is again a species with straight central spines.

Now we come down from the heights by the Cuesta del Portezuelo, in the upper part of which we meet a nice red-flowered species, probably *P.rubriflora*. It grows there on steep cliffs, but as is probably the case with many *Parodias*, at spots where there is a small amount of humus. Weskamp writes that this species is a synonym of *P.sanguiniflora*, but I do not think so, as not only is the flower smaller, but there are also some differences in the shade of the stamens and the style. However, the plant collected by Piltz under the name *rubriflora*, P.158, from the Cuesta de Totoral is not the same as this form, but does indeed seem to be similar to *P.sanguiniflora*. A further possibility which we cannot discard out of hand is that our plant should be *P.catamarcense v.rubriflorens*.

Indeed as we descend below 1200m, our species is replaced by the yellow-flowering *P.catamarcense*. This is a species which well deserves its name, as it is indeed found all round the city of Catamarca; from the Cuesta del Portezuelo to the east, Dique de Catamarca and El Rodeo to the north, and to the Cuesta de los Angeles to the southwest. At the foot of the Cuesta, i.e. at El Portezuelo, we photograph another specimen of *P.catamarcense*. Here it grows together with *G.nigriareolatum* and *Lobivia fallax v.catamarcensis*. Slightly to the north, at Huaycama on the road to La Puerta, an older specimen illustrates very well the way in which those plants become more elongate with age - 15 cm and more. And at last, here are a few specimens observed at the Cuesta de los Angeles. The surroundings here are fairly similar to those on the Cuesta de Portezuelo. Here, too, this species is sympatric with *G.nigriareolatum*.

We now proceed to the Cuesta de Cebila, along the border of Catamarca and La Rioja provinces, where we meet with *P.riojense*. The surroundings are a fine landscape full of bushes with scattered stems of *T.terscheckii*. This *Parodia* becomes quite elongated with age, and old plants may hang down from the cliffs. In the greenhouse the flowers are a rich golden yellow, like the flowers on *P.catamarcense*.

We are now in the north of La Rioja, and proceed to the Sierra Velasco. The first locality with *Parodias* is Agua Blanca, at a height of 1650 metres, where we collect one or two small specimens. They might belong to *P.sanagasta*, but this remains an open question. The terrain here is a steep slope of granitic rock, with only sparse bushes, and a number of *Trichocereus cabreræ*. Further down, along the Cuesta de Huaco, below 1450m, one encounters what seems to be a different species, with longer spines. So far we have not been able to attach a name to this species. Here the nature of the rock is again granite, with small crystals of quartz embedded in the mass of rock.

Let us now re-enter the province of Catamarca, but more to the west, and proceed to the Quebrada de Belen. This is a quebrada with fairly steeply sloping sides, where we found some small specimens of a *Parodia* which proved to be *P.fuscato-viridis*. This is again a species becoming more columnar with age. The seeds are darker than most seeds of the subgenus *Parodia* - nearly black instead of chestnut-brown. Slightly more to the north, at Barancas, in the Sierra de Belen, I collected another population which received my field number JL-276. This is probably the same species; the only noticeable difference is that the anthers of *P.fuscato-viridis* are yellow, whilst those of JL-276 are white. This is a feature which, in my opinion, is not sufficient to separate two forms.

Turning due eastwards, we arrive at Andalgalá, where we first climb the Cuesta de Capillitas, a fine mountain road. At an altitude of about 2250m, we encounter the very nice *P.spegazzinii* with flowers of a shining red, or of a more orange colour. This plant has fairly long central spines.

Back in Andalgalá, we now leave the little town by the road which runs eastwards to the border of Tucuman. Among the lower hills around 800m, before reaching the Cuesta de Chilca, we meet with the first *Parodia*, which is probably *P.wagneriana*. Here it grows together with *Gambatoense*.

We now climb the Cuesta de Chilca, and at an altitude of 1600m we come across the fine *P.sanguiniflora*. A flower section shows that the stamens are yellowish orange with more reddish tops. Like many *Parodias* of the subgenus *Parodia*, this species has spiralled ribs. This means that if one counts them clockwise (sinistrorse) and anti-clockwise (dextrorse), one obtains two different numbers. These, however, are not haphazard, but conform to well-defined mathematical criteria. First, the clockwise number is always smaller than the anti-clockwise number, for instance 5 as against 8, which is recorded as 5:8. Moreover, if a list of the observed ratios are noted, they represent an uninterrupted series in which the highest number of any one ratio is always equal to the smallest number of the following ratio, and also equal to the sum of the two numbers of the preceding ratio. The ratios in question would be : 3:5, 5:8, 8:13, 13:21, 21:34, etc. In *Parodia*, the ratios most generally encountered are 8:13 and 13:21.

We now proceed along our road and a little further on, beyond Agua de las Palomas, we turn off right in the direction of Singuil. At Condor Huasi, on a high plateau at 2100m altitude, we first meet some llamas, and then discover a site which supports *P.tafiensis*, together with *Lobivia grandiflora v.lobivioides*. As far as we know, this is a new locality for this *Parodia*, which up to now has only been collected around Tafi del Valle.

After Singuil, we first cross the border of Tucuman, and drive down to Dique Escaba. Still lower, between the dique and the village, at an altitude of no more than 650 m., we come out into a gorge amongst densely wooded hills, with a much more humid climate; in fact, a good image of many of Tucuman's hills below 2000m. The vegetation is quite different from that which we are used to seeing in the arid areas, and cacti are represented by several *Rhipsalis*. However, at the foot of the cliff which is alongside the road we find

an abundant population of a yellow-flowered *Parodia* which proves to be *P.rigidispina*. This is interesting, because up to the present time, no precise locality was known for this species, for which one only found the more than vague reference "Argentina"! The central spines are short and stiff, which inspired the choice of name by Kiesling. The conical, as opposed to subspherical shape of the strophiole, has also been checked on the seeds.

We now cross the province of Tucuman heading north, passing Concepcion and Tucuman city, until we leave the main road just before Trancas, in the direction of San Pedro de Colalao. About 7 km to the south from there, at Las Tacanas, we explore a hill, which consists of a densely wooded zone surmounted by a more open woodland towards the summit. This is indeed a typical landscape for *Parodias*! Here we discover our first population of *P.microsperma*, growing together with *Echinopsis ancistrophora* at this spot. The flowers vary from pale to flamed yellow, examples being remarkably similar to Gurke's drawing of the species in Schumann's "Bluhende Kakteen". We proceed further along the road to Gonzalo, and arrive at the Rio Rearte. There another population of *P.microsperma* is found, which produces orange to red flowers. A difference which is by no means significant, as the colour of the flower in this species may vary from yellow to red, through orange, with all sorts of combinations, such as a greenish, pale yellow, or pink flower tube, greenish to red scales, yellow to red throat, yellow to red stamens, etc. Coming down the R.Choromoro, we find another population about 5 km beyond Gonzalo, and yet another one at La Higuera. In both cases, the plants grow on vertical cliffs.

After this short diversion, we now enter the province of Salta at El Tala, where the surroundings once more consist of small hills covered by trees and bushes. Here we discover what some authors call *P.talaensis*, but which in our opinion is a synonym of *P.macrancistra*. In addition, K.Schumann regarded *P.macrancistra* as a variety of *P.microsperma*, and he may well have been right. The main difference between both forms is that the central spines are stronger and darker in *P.macrancistra*.

We now enter the gorge of the Rio Grande del Sauce, once more with rather humid surroundings, as attested by the Puyas hanging down from the cliffs. After 17 km of very bad dirt track, we spot some *Parodias* growing among *Deuterocnias* on a vertical cliff. This is our first population of *P.weberiana*. The colour of the flower is yellow tinged with orange. About 10 km and a number of fords more upstream, we meet another population, which has definitely more reddish flowers. This variation of flower shade has already been pointed out by Brandt, and also by Weskamp. The ground here consists of softer material and the slopes are less steep. *Parodia weberiana* also seems to be closely related to *P.microsperma*; the most obvious difference is the fresher green colour of the body.

Carrying on further along the same road, we leave the valley of the Rio Grande, and arrive at Cuesta El Lajar. Here the rocks consist of a soft red sandstone, on which grows *P.rubelliamata*. A very nice species indeed, and one which displays an interesting distinctive feature. Most *Parodias* of the subgenus *Parodia* have sensitive stamens i.e. when they are touched, they immediately start to close in towards the style, the scientific word for this action being *seismonasty*. Well, *P.rubelliamata* is an exception to this rule. We checked a number of other species of *Parodia* in regard to this feature, and up to the present have found only a single other *Parodia* of this group to be insensitive i.e. *P.setifera*.

Back on the main road, we pay a visit to the beautiful surroundings of the Cabra Corral dam. Two kinds of hills are to be seen around the lake, distinguished by the colour of their rock; where it is white, there are no cacti to be found, whilst where it is brown, a peculiar *Parodia* does thrive. This plant, although quite well known, still has no official name. Weskamp gives a detailed description in his book of 1987, but without a latin diagnosis, saying that the official description will be made by J.Piltz. Four years have passed, but nothing of the kind has been published.

From here we turn back to Cafayate, and stop at Alemania, the hills nearby being sparsely covered by small trees and bushes. This is the home of another *Parodia*, namely *P.tuberculosi-costata*. A somewhat variable species which has given rise to several unjustified names such as *P.microsperma v.cafayatensis*, or *P.rubristaminea*. I have not encountered the species *P.glischrocarpa*, which is said to originate somewhat higher up in the mountain, so am not able to make up my mind as to whether this is a good, valid species, or yet another form of *P.tuberculosi-costata*.

Arriving in Cafayate, we first make a slight detour to the south, just over the border of Tucuman, to visit the indian ruins of Quilmes. This place has been widely colonised by *Trichocereus pasacana* and there are also some *Acanthocalycium thionanthum* to be found. But on the rocks forming the boundary of this flat area there thrives a small *Parodia*, *P.dextrohamata*. The flower of this species is a bit more cupuliform, as compared with the generally funnel-shaped form of most *Parodia* flowers, and the outer petals are more broadly striped than in most yellow-flowered species. Weskamp calls this plant *P.rigida*, and disparages *P.dextrohamata* to the rank of synonym, arguing that both were described simultaneously by Backeberg, so that neither has priority. However, in such a case, the rules demand that priority should be given to the name which is first mentioned in the publication, which here is *P.dextrohamata* (Descr. Cact. Nov. III p.10.) instead of *P.rigida* (Ibid, p.11). So that, even if Weskamp finds that "rigida" is a more appropriate name than *dextrohamata*, he is not free to make a choice. Apart from this, we may also consider the discarding of "rigida" will avoid any potential confusion with *P.rigidispina*.

We now take the road from Cafayate to Cachi and make a first stop at San Lucas, where we discover *P.horrida*. This species, well characterised by its strong and blackish central spines, is also encountered further along the road, for example in Santa Rosa, where we meet with an older, more elongated specimen. The landscape here consists of stony hills, with only sparse bushes, as near Angastaco. On this species the wool on the flower buds, as well as on the floral tube, is significantly darker than in most *Parodia*. Some plants of this species develop female flowers i.e. with sterile stamens. The remarkable feature in this case is that the sterile

stamens retain their sensitivity!

We now approach Molinos, where we follow the old road to Seclantes, and discover a small population of *P. heteracantha* growing among the rocks with really very little soil to support the plants. Progressing to the north, we take another side-road just before reaching San Jose de Escalchi, which leads to Vallecito. Here we find a nicely spined *Parodia*, *P.kilianana*. This plant has not yet flowered in our collection, but the form collected to the N.W. of Cachi by D.Herzog develops an abundance of red flowers. We now progress somewhat more to the north-east, along the road from Payogasta to Portrero. There we observe that the road actually separates two distinct populations of *Parodias*. To our left, i.e. on the slopes facing east, we find numerous small plants of *P.lohaniana*. And to our right i.e. on the slopes facing west, we discover a nice collection of *P.aureicentra* v. *variicolor*.

The remarkable feature of this region from Molinos to Cachi is that it is home to a number of small-seeded *Parodias* but also to the first *Protoparodias* encountered in this tour. Hence we may consider this as a transitional area between the two sub-genera.

.....from M.Lowry

It is noted by J.Lambert that he has only found *P. rubelliamata* and *P.setifera* to be lacking in sensitive stamens. During the course of the year I have been monitoring all my *Parodias* as they flower to see whether they have sensitive stamens. Sensitive stamens were observed in the following species: *P.herzogii* ( 2 plants ), *P.cabracorralensis* MN 93 (2 plants), *P.microsperma* JL 251 (2 plants), *P.procera* Lau 912, *P.chrysacanthion*, *P.hausteiniana*, *P.mairanana*, *P.mutabilis*, *P.dicroacantha* and *Parodia* DH 137. Thus it appears that sensitive stamens are not confined to *Parodias* of the *microsperma* group. In most cases I tested the flowers every day they were open and found the greatest effect on the first day, whilst on the third day most species showed no response at all. However, there was one species in which I could not stimulate stamen movement at any time, *P.caraprina* Lau 398 (2 plants).

.....from J.Brickwood

With over 800 plants of *Parodia* in flower over the last few weeks, I have been able to check quite a lot of them for seismonasty. In some cases, up to ten individual plants of a particular species and I can say quite categorically that they all have sensitive stamens. Various forms of *P.rubelliamata* and *P.setifera* were checked for this feature and also as many of the *Protoparodia* as were in flower at the time. They all had sensitive stamens. It appears to be a generic characteristic. As to any decline in sensitivity of the stamens with ageing of the flower, I can only say that by the time *Parodia* flowers start to exhibit a lack of sensitivity with regard to their stamens, they are already becoming faded and bedraggled. No proportionate decrease in sensitivity with increasing age of the flower was noted. However, as the flowers age, the stamens do become more spread out when the flowers are open during the day, and hence may give the impression that they are taking longer to react with age. But this does not seem to be a significant feature, the important characteristic being that the stamens are sensitive throughout the life of the flower, apparently on all species of *Parodia*.

.....from H.Middleditch

It is most peculiar that diametrically opposite observations have been made in different collections in regard to the sensitivity of the stamens on certain species of *Parodia*. This inevitably raises the question whether temperature, humidity, or some other factor has a bearing on the sensitivity of the stamens. Checking the flowers on my own *Parodia* by irritating the stamens with a small paint brush did produce a few reactions, but by far the greatest number showed no reaction whatsoever. Even waiting a moment or two in case there was some delay before the stamens moved inwards, and repeating the irritation, produced no response whatsoever. This was tried on more than one day, at different times of day. Since many *Parodia* flowers become larger and paler each day they are open, it was also fairly easy to identify and to irritate flowers of differing ages on the same plant. Again, there was usually a nil reaction, whilst those which did respond were not confined to first-day or second-day open. No logical explanation became apparent for the unpredictability of the reaction.

## **SEISMONASTY IN PARODIA By W.Weskamp**

**Translated by J.Brickwood from *Parodia* 2.**

Seismonasty is the scientific name for the movement of the stamens of flowers when irritated. That is to say, when the stamens are touched or brushed against, they move and close around the style in a curved fashion, usually achieved by way of a twisting movement. The speed of this movement varies from species to species and takes about 15 to 20 seconds in most cases.

There has not really ever been any convincing explanation as to why the stamens on *Parodia* are so sensitive to touch. Possibly it represents a mechanism, whereby transference of pollen from visiting insects is promoted. This could well be the case, bearing in mind that any insects in the search after nectar in the depths of the flower would tend to become enclosed through the stamens closing round the style. Thus through the struggles of insects to release themselves from the encircling stamens, more pollen is likely to be released, increasing the chances of pollination being achieved.

Contrary to this hypothesis, however, it has been argued that because even some self-fertile *Parodia* species have irritable or sensitive stamens, the movement of the stamens alone is sufficient to achieve pollination and thus additional assistance from visiting insects and the like is not required. At present, many cactus friends still believe that this seismonasty is an indication of self-sterility in a species. They argue that if the function of this process is to improve the chances of cross-pollination and fruit production by promoting

the transfer of greater amounts of pollen, then that is therefore indirect proof of the self-sterility of the plant.

I must here note that I have based all my work on *Parodias* on the genus as re-organised by Buxbaum, where nothing was said about the self-sterility of self-fertility of the species which he examined. I only know that all the plants to the group of forms around *P.formosa* are self-fertile.

In conclusion It must be said that in many species of the *Protoparodia*, the stamens are often already inclined towards the style, thus a movement in this respect does not take place.

.....from H.Middleditch

My own impression is that when *Parodia* flowers first open, the size of the flower somewhat restricts the outward spread of the stamens so that they do tend to adopt an upright or even slightly inward leaning stance. Or possibly the stamens do not spread themselves out when the flower first opens. The difference in stamen disposition in relation to the number of days a flower has been open is easy to see on a plant carrying day one, day two, and day three flowers at the same time.

## FINDING WHICH SORT OF PARODIAS? From G.Charles

During the course of our trip to north-western Argentina in 1992, we came across *Parodias* of the *microsperma* group at a number of our stopping places. For the most part, these were logged in the field notes just as *P.microsperma* type, rather than under a specific name. We were able to collect quite a reasonable amount of seed of many of these *Parodias* and germination was fairly good. Now that many of these plants are approaching flowering size, it would be nice to put a specific name on them

.....from H.Middleditch

The first *Parodia* found in the course of the above field trip was at GC 23.06, a spot 5km north of Chilecito. This place lies south of Famatina, at the eastern foot of the Famatina massif and on the edge of a broad basin which stretches across to the Sierra Velasco to the east. Near the southern end of the Sierra Velasco there lies Sanagasta. It is at Agua Blanca, not many miles to the north of Sanagasta, where J.Lambert reports finding *P.sanagasta*. Unlike the great majority of other *microsperma* group *Parodias*, this species is reputed to form clumps. In the absence of any alternative name in the literature for a *Parodia* growing near Chilecito, *P.sanagasta* may be suggested as an identification.

.....from J.Brickwood

The *Parodias* from the Chilecito area remain relatively unknown, and I have no material from that area at all. It appears that Weskamp did not possess any of these forms either, although he does observe in his *Parodia* - 2: "Back in La Rioja, Till discovered two previously unknown populations of *Parodias*. One of these was in the Sierra Famatina, on the way from Pituil to Chilecito, near the turn off to the town of Famatina. This *Parodia* grows on steep granite slopes together with *Trichocereus terscheckii*, *T.strigosus*, *Gymnocalycium saglione*, *G.guanchinense*, and spp. of *Tillandsia*. A few km before Chilecito, he found the *Parodia* HT 78. The same *Gymnocalycium* spp. (very long-spined forms) grew here on a granite scree slope, the *Parodias* growing in the area above them."

.....from H.Middleditch

Moving on to those *Parodia* found at GC.27 at the summit of the Cuesta Cebila, the name *P.riojensis* could be adopted. In K.u.a.S. 32.5:1981 it was noted by Weskamp: "In the Cuesta Sebila at altitudes between 1000 and 1300m, in the boundary area of the provinces Catamarca and La Rioja, a species already well known to us was again collected by Piltz as *P.27*. There were similar plants to the east near Chumbicha (*P.27a*) and to the northwest near Mazan (*P.135*). The *Parodia* Lau 484 also came from this area. They are all the *P.riojensis* discovered by Ritter which was not published on account of the absence of flowers." In his *Kakteen in Sud-Amerika*, Ritter merely quotes this name as a *nomen nudum*; in the absence of a description and conserved Type specimen, this name is invalid. But it may be convenient to use it for the time being.

.....from J.Brickwood

The name *Parodia riojensis* was published by Ritter & Weskamp in Weskamp's book on *Parodia* (pp.474-476) with full diagnosis in both Latin and German, with Type deposition in the Herbarium of the Bot. Gard. Tech. Univ. Dresden, so that this is now a valid name.

.....from J.Lambert

You will find the new combination of *Parodia catamarcense* v.*riojense* has been made in my book, so that *Parodia riojense* is now reduced to a synonym.

.....from H.Middleditch

A short distance to the east of Catamarca city was found a yellow flowering *Parodia* (GC 30.06) which would traditionally be regarded as *P.catamarcensis*. The *Parodias* found to the west of Catamarca city on the road from El Rodeo at GC 32.05 might likewise be regarded as *P.catamarcensis*. It is observed by Weskamp in K.u.a.S. 29.6;1978 "In late summer 1977 I visited the collection of Klein in Troisdorf, about an FR 24 *P.catamarcensis* standing there, which for years I had sought for in vain, in order to compare it with *Parodia P.23* which Piltz had found on his trip west of Catamarca city. Ritter, whom I contacted concerning the habitat of his own plant, quoted me the same finding location. The *Parodia* FR 24 of Ritter and the *Parodia P.23* of Piltz correspond with the data given by Backeberg for *P.catamarcensis*." A postscript from Piltz followed: "The plants grow above the city on the bank of the reservoir on the eastern outlyers of the Sierra Ambato. They grow in the company of *Gymnocalycium saglione*, another *Gymnocalycium* sp., *Lobivia shaferi*, *Cleistocactus flavispinus*, and *Trichocereus terscheckii*. The slopes are covered with grass and partly with very

dense stands of a disagreeably spiny *Acacia* which grow above head height. The *Parodia* are generally to be found in mossy clefts in the rocks, occasionally at the base of a bush". The reservoir above the city, referred to here, is possibly the Lago de Jumeal.

However, in Inter-*Parodia* Kette 3,1994, Kasinger observes that after visiting Dique Catamarca and then stopping on the road towards El Rodeo: "We proceeded in the northwards direction towards El Rodeo on Route 4, always following the banks of the Arroyo El Tala through a rather narrow and enclosed quebrada. Just beyond where the valley broadens and where the mountain slopes become less steep, I found a location with both red and yellow flowering *Parodias* on a green-clad northern slope. Most of the plants here had a height of 3 to 4 cm and a breadth of 5 to 6 cm. In comparison with the *Parodias* from the outskirts of Catamarca, these plants were veritable giants. Again, I believe they belong to *P.sanguiniflora*."

.....from J.Brickwood

A further example of red and yellow flowering *Parodias* growing together is quoted by Weskamp in his *Parodia*-2, where he describes a discovery made by Neuhuber in 1991 "near Los Angeles, in the Sierra Ambato. This place lies on the opposite side of the 3000 to 4500m high mountain chain from Poman, near the town of Catamarca. The *Parodia* GN 460 found here has both yellow and red flowers".

.....from H.Middleditch

It may well have been this record of GN 460 which caused Kasinger to reflect [Ibid]. "We made a stop by the roadside on Route 4. Here, on the steep banks of the Arroyo El Tala, which emerges from the Sierra Ambato, next to the water pipe which carries the drinking water supply to Catamarca city from the reservoir at Lago de Jumeal, I initially found *Cleistocactus flaviflorus* and then, some 2 to 3 metres higher up on the near perpendicular rock face, a small, yellow-flowered *Parodia*, which was almost out of reach. Here I asked myself the question, is this still *P.catamarcensis* or a member of the red and yellow flowering *Parodias* belonging to the Sierra Ambato area? Where is there a transition, where is a boundary between the two?"

Going now further to the east of Catamarca city, to El Portezuelo and the ascent of the steep flank of the Sierra Ancasti. At the top of the Cuesta Portezuelo (GC 29.09), the red flowering *Parodia* may be *P.sanguiniflora*, it being so recorded from here by Rausch as R.723f.

However, it is noted by Kasinger in Inter *Parodia* Kette 3.1994: "With a view of Catamarca city in the distance we started on the descent of the Cuesta Portezuelo, making many stops on the way down. In the upper part of the Cuesta at around 1700m elevation, the *Parodias* were always red-flowered - FK 129. Only at 1200-1300m did there first appear yellowish-orange flowering plants, whilst between 800 to 900m we saw only yellow flowered examples - FK 128. All of these forms, in my opinion, belong to the *sanguiniflora* group." The alternative view would be to regard the red-flowering *Parodia* seen in the upper section of the Cuesta Portezuelo as *P.sanguiniflora* and the yellow-flowering plants from the lower section as *P.catamarcensis*, in which case this latter name would apply to those found at GC 29.05 near the lower part of the Cuesta Portezuelo.

This begs the question of what name to give those *Parodia* from roughly half-way up the ascent of the Cuesta Portezuelo, which bore orange-yellow flowers.

The red-flowering *Parodia* found at the crown of the Cuesta Totoral (GC 33.04) would be quite close to the original finding place of *Parodia sanguiniflora* Fric [see Chileans No.50 pp.80 & 83]. When the four-man team from the U.K. were on the Cuesta Totoral in November 1992, a yellow-flowering *Parodia* was also recorded there by R.Ferryman. We also find in K.u.a.S. 32.5;1981, that Weskamp observes: "At the Cuesta Totoral, north of La Merced, immediately next to the road between Catamarca and Tucuman, grow *Parodia* P.158. Amongst my twelve imported plants there were five different flower colours, namely reddish orange, carmine, magenta, reddish orange with a lilac pink middle stripe, and yellow! Of the later, one specimen only. Later we would see that this is not unique with *Parodias*. Once again we see before our eyes that variations in flower colour in no way justify separation. The question also remains, whether Fric was also here previously." Evidently Weskamp was not aware that this location was effectively the very same finding place for *Parodia sanguiniflora* Fric.

Descending the Cuesta Totoral and then going north from La Merced, we come to GC 35.05 "near Singuil on grassy hillside with rocky patches at 1300m" where a yellow-flowering *Parodia* was observed. In the account of his travels in north-west Argentina, Kasinger records that after climbing the Cuesta Chilca, then "shortly before reaching Buena Vista, we turned off and headed south along Route 1. A few km before reaching the village of Singuil at just above 2000m, I found a small, red-flowered *Parodia* growing on a 3 to 5 metre high banded rock face which runs directly alongside the road. This *Parodia* has a reddish-brown epidermis which disguises it well amongst the similarly coloured rocks. This *Parodia* FK 122 attains a size of only 2-3 cm high and broad, and seems to get little protection from the full sun." The location for FK 122 [ see map Chileans No.50 p.70] must be on the same road and not far from GC 35.05 Both the yellow flowered GC 35.05 and the red flowered FK 122 may be regarded as belonging to *P.sanguiniflora*, but this again begs the question of how a dividing line is to be drawn, if at all, between *P.catamarcense* and *P.sanguiniflora*.

.....from G.Charles

I well remember the location near Singuil as we sat down to eat our lunch at that spot. There were slabs of rock jutting out of the ground, some at a very convenient height to sit on, just like a bench - but of course some were deeper than a bench whilst others hardly projected above the grass. The *Parodias* did not grow in clefts and hollows on top of these rocks, but in crevices on the vertical face of the rock. I suppose that they they might have got some shade there at some time of the day.

.....from H.Middleditch

Moving on further north of Singuil, the red flowering *Parodia* found at GC 36.07, some few km south of Buena Vista, may also be regarded as *P.sanguiniflora*. This site is probably close to (or the same as) the



Condor Huasi at which J.Lambert recorded a red flowering *Parodia* JL 215 as *P.tafiensis*.

.....from K.Preston-Mafham

The *P.microsperma* forms which we saw at sites GC.35 and GC.36 (not far from Singuil) do not correspond closely to the plant we know as *P.tafiensis*. The *Parodia* at site GC.35 in particular was far less densely spined and also larger-growing than *P.tafiensis*. The *Parodias* at site GC.36 were exclusively red-flowered and had variably coloured spination, mostly dark. At both site GC.35 and GC.36 the *Parodia* grew mainly among jumbled flat and sloping rocks or among dense grass and moss in rock-crevices, rather than on vertical cliff faces.

.....from J.Brickwood

In Weskamp's *Parodia-2* it is noted "From November 1991 to January 1992, G.Neuhuber was again in north Argentina. This time his journey took him from the south of Catamarca province, across Tucuman province, into Salta province. In the course of that journey he discovered about 15 *Parodia* locations, of which several were completely unknown, For example, Las Pirquitas near La Puerta, and at Las Charitas just before Buena Vista. The *Parodias* at both locations have red flowers."

.....from H.Middleditch

The location of Las Charitas would appear to be very close to both GC 36.07 and JL 215, all a few km down the turn off to Singuil just south of Buena Vista .

Moving on west from Buena Vista and on to the west of Andalgalá, we have GC 37.04 which was found 10 km north of Andalgalá, prior to the ascent of the Cuesta Capillitas. At a rather similar altitude to the east of Andalgalá, a *Parodia* is found on the lower slopes of the Cuesta Chilca, for which the name *P.wagneriana* was erected by Weskamp. Hence it may be appropriate to apply the name *P.wagneriana* to GC 37.04

.....from J.Lambert

It was to the east of Andalgalá that I first met with *P.wagneriana*, along the road to the Cuesta de la Chilca, but before ascending the latter, at an altitude of only 800m.

.....from F.Kasinger

Indeed *Parodia wagneriana* is to be found on the Cuesta Chilca, but only for a distance of 200 metres along the road. My FK 149 was found 15 km north of Andalgalá. It flowers yellow and may be a form of *P.wagneriana*. I have seen *P.wagneriana* in habitat up to 20 cm tall and 8-9 cm in diameter, whereas the FK 149 in habitat were only 3-5 cm high and 2.5 to 3.5 cm in diameter.

At km 35 on the road to Capillitas we came across FK 69 which has a large red flower of about 5 cm in diameter, whilst the plant in habitat is only 3-4 cm in height and diameter. This may well be *P.spegazziniana*.

.....from J.Brickwood

According to Weskamp (*Parodia-2*), "the red-flowered FK 69 that F.Kasinger discovered between Capillitas and Andalgalá at 2350m does not seem to belong to *P.spegazziniana*".

.....from H.Middleditch

Continuing on the route from Andalgalá to the Rio Santa María, then some way after ascending the Cuesta Capillitas, the *Parodia* seen at GC 39.06 near Capillitas at around 3000m, is at the traditional location for *P.spegazziniana*. This red flowering sort was seen somewhat more to the south, nearer the Cuesta Capillitas, at an altitude of 2250m, by J.Lambert. This location will be not far off the finding place of the red-flowering FK 69 from 35 km north of Andalgalá. A photograph of *P.spegazziniana* taken near Capillitas was shown by J.Piltz to a local Chileans' get-together at G.Charles', some years ago, but this appeared to be distinctly higher than the body diameter, quite different from FK 69. The original description of *P.spegazziniana* in 1971, gave a body size of 6 cm diameter and 10 cm height, with a dark orange flower (and a habitat of prov. Jujuy!). The 1977 publication of the presumed synonym, *P.capillitaensis*, gives a body height of 15 cm and a diameter of 6cm, together with an orange-red flower. However, the illustration accompanying that description suggests a flower with a pale throat and dark upper parts to the petals.

.....from J.Brickwood

Really *P.spegazziniana* is very variable in flower colour, including light yellow, yellow, orange- yellow, orange, red, and bicoloured. Weskamp (*Parodia-2*) groups together the *Parodias* found near the Capillitas mine, the P.51a from nearer Punta de Balasto, and DH 123 from 18 km NE of Mina Capillitas on the Aconcagua massif, as members of the *spegazzini* group which "display a more cylindrical growth habit and flexible central spines. These characteristics are also displayed by P.141 *P.wagneriana*, discovered by the Piltz couple in 1976 at the foot of the Cuesta Chilca, at about 1100m altitude."

.....from J.Lambert

I do not recollect observing columnar specimens of *P.spegazzinii* in the field, but did so in the case of *P.wagneriana*.

.....from H.Middleditch

Now we come to the *Parodia* found at GC 40.04 at 2700m, some way above Amaicha del Valle on the road climbing in the direction of Tucuman. In the original description of *P.tafiensis* Backeberg, it was stated that the plant was collected by Lembecke at "Km90, Tafi". The Argentine Automobile Club map of Tucuman province, received from J.Lambert, identifies the petrol station at Tafi del Valle as Km 62, and 55 km further along the road over the Cumbres Calchaquies the petrol station at Amaicha del Valle is at Km 118. On the west side of the Abra Infiernillo, a place called El Molle is situated 28 km by road from Amaicha del Valle, so presumably it lies at Km 90. One might reasonably assume that this was the original finding place for *P.tafiensis*. In an early review of the genus *Parodia* received from Brandt in 1972 he did refer to *Parodia tafiensis* from "Tafi Molle" which Brandt supposed at that time was near Andalgalá. Presumably he had received a quite specific location for *P.tafiensis* but did not recognise it. The height of the pass at Abra Infiernillo has not been found on record but it appears to be not much above 3000m. Hence the *Parodia* from

GC 40.04 at 2700 m along this road above Amaicha del Valle, and that found at GC 40.13 nearer the Abra Infiernillo i.e. not far from El Molle, as well as at GC 42.02 at 3000m on the west side of the Abra Infiernillo, might therefore be classed as a *P.tafiensis*.

Considering *P.tafiensis* a little further; in K.u.a.S. 32.8:1981 Weskamp observes that "Fechser conveyed a batch of imported plants to Uhlig in 1963 from which Backeberg described a whole series of new names, without really having studied them for any length of time." In his *Descriptiones Cactacearum Novarum III* 1963, Backeberg erected eighteen new species or varieties of *Parodia*: an appreciable proportion of these new names were recorded not only as having a Type with a U-number in the collection "Uhlig & Backeberg", but also as "Inventa Fechser" i.e. found by Fechser. This appearance of a spate of new names was no novelty, as it is almost certain that Backeberg followed exactly the same procedure on this occasion as he did before the war, making use of his expertise as a professional photographer to take a good picture of a nice looking plant which stood out from the run-of-the-batch, which would then appear in his *Kaktus ABC* or *Bfk* under a new name. This would promote sales of his own publication and at the same time it would help to stimulate demand for these plants. Hence the nurserymen with a crate load or two of imports would be unlikely to discourage a visit from Backeberg as soon as the consignment arrived, since a new name would sell better than an old one. Amongst these 1963 new names was *P.tafiensis*, recorded as "found by Fechser". However, each of Backeberg's eighteen new names was attached to a Type plant growing at Uhlig's at the time and there is no record of a specimen being conserved in a herbarium. As Urs Eggli pointed out in *Bradleya* 3,1985, p.98, this transgresses Article 9.5 of the then current ICBN rules. Consequently the name *P.tafiensis* is invalid, although it might well be convenient to use it for the time being for plants from the higher parts of the Cumbres Calchaquies crossed by Route 307 from Tafi to Amaicha.

.....from J.Lambert

*Parodia tafiensis* was validly described by Weskamp as *Parodia lembckei*.

.....from H.Middleditch

Moving down the valley of the Rio Santa Maria, we come to the location GC 43.05 at 20 km to the south of Cafayate which is in an area associated with at least two *Parodia* names. *Parodia rigida* was first described by Backeberg in *Descr. Cact. Nov.* 1963, and stated to originate from Tolombon, which lies 14 km by road south of Cafayate, according to the A.C.A map. In K.u.a.S. 32.8:1981 Weskamp observes: "As I wished to describe *P.dicroacantha* in 1967, Fechser wrote to me that its habitat location was to be found somewhat north of the boundary between the provinces of Tucuman and Salta at 1000m, and that both specimens with red flowers and with yellow flowers occurred there. Fechser has guardedly shifted the habitat southwards a little and adjusted the altitude. The Piltz couple again found these in existence - P.44a - and indeed away from the highway in a small side valley west of Cafayate at 1600m. This species is closely related to *P.rigida*". It may be noted here that the border between Tucuman and Salta provinces lies some 8 km or so to the south of Tolombon, so that the Fechser location of "just north of the border" for Weskamp's *P.dicroacantha* is effectively the same place as the "Tolombon" for Backeberg's *P.rigida*. Since the Type of *P.rigida* was a living plant and so renders the name invalid, this leaves *P.dicroacantha* as a suitable name for those *Parodia* found at GC 43.05.

In his *Parodia-2*, Weskamp refers to Backeberg's descriptions of new *Parodias* in *Descr. Cact. Nov.* 1963, stating that "The variable *Parodia rigida* was even published by him once again as *P.dextrohamata*" i.e. in one and the same publication. If this contention is accepted, then both *P.rigida* and *P.dextrohamata* become reduced to synonymy under *P.dicroacantha*.

For site GC 51.05 just south of Cachi, two names might be considered - *P.heteracantha* and *P.kilianana*. The name *heteracantha* appears to originate from Ritter, but in his *Kakteen in Sud-Amerika*, *P.heteracantha* is given merely as a *nomen nudum*. On the other hand, *P.kilianana* is yet another of the 1963 Backeberg names with a living plant as Type specimen and so this name is invalid. Weskamp took the opportunity afforded by this situation to rename this as *P.cachiana*, which merely adds confusion. For the time being it might be convenient to use the name *P.kilianana* for the *Parodia* from this location.

.....from J.Brickwood

In regard to the choice of the two names *P.kilianana* and *P.heteracantha* from this location, this latter name was validly published by Ritter & Weskamp in the East German cactus journal *Kakteen/Sukkulenten* 21(4) 1986 pp 82-84, with a full diagnosis in both latin and German, with holotype material deposited in the Herbarium of the Bot. Gard. Technical Univ. Dresden. Hence it would appear that we should use the name *P.heteracantha* rather than *P.kilianana*.

.....from H.Middleditch

The information about the publication of *P.heteracantha*, in the east German Cactus and Succulent journal, is very valuable and means that the *Parodia* from near Cachi can be identified by this name, and not as *P.kilianana*, whilst *P.cachiana* can be disregarded.

Finally there is the *Parodia* from GC 65.06 from north of Alemania. There is a choice of names which can be used here, of which *P.glichrocarpa* Ritter 1980, "from north of Alemania" may possibly be the most appropriate, since *P.rubristaminea* Ritter 1980 is attributed to a Type location southwest of Alemania. It is suggested by Weskamp that *P.tuberculosis-costata* also originates from this area. This name was erected by Backeberg in 1966 with a living plant as Type specimen and so this name is invalid. There are quite a number of other names which originate from the vicinity of Route 9 which runs across the Cumbres Calchaquies between La Vina in the Rio Conchas valley and El Tala on the Chaco margins. There does appear to be rather too many names here for such a small compass.

There would now appear to be a suitable name for almost all the GC numbered *Parodias* recorded in the course of the 1992 visit to Argentina.

## WE FIND TRICHOCEREUS CAMARGUENSIS From F.Vandenbroeck

On our return from our 1988 trip through Bolivia I was able to catalogue all the pictures I had taken, but there remains only one species which I cannot identify. It is a very conspicuous plant - columnar growing up to 1 m tall, branching from the ground and vividly golden yellow spined. We found this species in the valley of the Rio San Juan near Tojo, prov. Viles, growing together with *P.fulvispina*.

.....from H.Middleditch

This description bears a remarkably close resemblance to a plant I am growing under the name of *Trichocereus camarguensis*. The origin of this plant is now lost in the mists of antiquity, although it may have been obtained over thirty years ago from a collector in Leeds. The more it grew the larger the pot it needed and the last move was to repot it into a bucket in order to provide root room to match the plant size. The stems do branch from the base and are indeed columnar, but not entirely upright, more of a "curved upright" shape per the original Cardenas description. As the plant increased in height the lean of one or two stems increased; these had to be pruned and went to other collections. Stem height exceeds the 50 cm given by Cardenas, the tallest stem not being far off the 1m quoted by Vandenbroeck. Stems about 5 cm thick. The most outstanding feature is the spination, which is virtually entirely in one colour, a golden yellow; "The spines only yellow and not varying in colour" just as Backeberg observes, *Die Cactaceae* p.1132. Although the spines do not quite achieve the 5 cm long centrals and 3 cm long radials quoted by Cardenas. Stated habitat, Camargo, 2700m. The location of Tojo, province Avilez, (indicated by Vandenbroeck) lies some 125 km to the south of Camargo but both are in the same north-to- south running valley in which flows the Rio San Juan del Oro.

.....from M.Cardenas, Autobiography, 1973

[Travelling south from Potosi, via Cuchu Ingenio]

Presently we crossed the R.Tacaquira near Camargo, on one of whose banks we saw a columnar cactus in flower, *Trichocereus tacaquirensis*, which was discovered early this century by Dr.Fiebrig. On March 8 we left Camargo early in the morning with a view to reaching Tarija that day. On leaving the Quebrada Camargo with typical red and ashen coloured rocks, the road crosses a gentle, dry, sandy slope where grow a few spiny trees and bushes and abundant cacti, mainly *Opuntia*. A typical tall tree is the churqui, *Prosopis ferox*. Another aboreal species which is frequent in this sandy ground and which is noticeable for its stunted, knotty trunk and whitish bark, is *Acacia feddiana* or palqui. Along with the palqui is found a spiny, yellow-flowered shrub *Cercidium praecox*, as well as a columnar cactus with a relatively thin, light green stem and large white fragrant flowers, *Trichocereus camarguensis*.

.....from J.R.Kirtley

It was on the more level ground shortly before we reached Impora that we met with a plant which was supposed at the time to be a *Cleistocactus*. Somewhat later this was identified as *Trichocereus camarguensis* by H.Middleditch who was growing a similar looking plant under this name. On the BDH expedition, similar plants were found in flower, which proved beyond doubt that those plants found at Impora two years before were indeed *Trichocereus camarguensis*. The examples recorded at Impora were no more than 1m high with few stems from ground level. Not many plants were found.

.....from P.Down

Between Potosi and Cotagaita we made a stop near Vitichi, where I noticed quite a few yellowish-spined *Trichocereus* and took a few photographs. The terrain was pretty gently sloping hills, with virtually no apparent soil, the ground just covered with small broken rocks. Apart from the odd acacias ranging from 1 to 3 metres high, there was very little other vegetation. The yellowish-spined *Trichocereus* was fairly abundant, growing mostly out in the open, with plants sometimes only a few metres apart. All the stems appeared to branch from the base. Plants with about three stems were common, but I did find one clump which looked as if it was just the one plant, with over a dozen stems. Most of the stems were about half a metre high or a little higher, but there were a few plants growing in the shelter of the acacias which probably reached about one metre high. On these the spination was rather more open. Many dead flowers were to be seen, but no fruit. On one branch of the many-stemmed clump which I photographed there was a flower bud which might have opened the following day (or night). Only the backs of the outer petals could be seen and these were a very dark colour indeed, a dark grey perhaps or such a dark brown as to be nearly black. Leaving this site and driving along in the direction of Cotagaita, we continued to see this same plant growing at various places at both sides of the road, for the next 10 to 12 kms. I do not recall seeing any more of these plants later in our journey. After our return home we were later able to identify this plant as *T.camarguensis*.

.....from F.Vandenbroeck

The name *T.camarguensis* for my unidentified plant seems to be right, although we did not find any specimens in the neighbourhood of Camargo. I do remember seeing them in the valleys of the Rio San Juan, Rio Tumusla, and also in the valley of the Rio Camblaya near Camblaya Chica, not far from Villa Abecia. We also spotted them high up in the mountains near the pass altitude on the road from Camargo to Cotagaita. These plants were similar to those on the slides you sent to me of the plants seen near Impora by J.Kirtley. I certainly never saw places with plants every few metres, but plants with a score of stems are certainly no exception. This species may grow on steep rocky walls of a valley but also on gently sloping flattish hillsides. We also saw it growing partly hidden in bushes. It is generally to be found in fairly lush habitats, i.e. with a fairly variegated associated vegetation. The only instance at which we saw a plant actually in flower was between El Puente and Carrizal on 1 December 1992 at about 2.00 o'clock. Most of the flowers had withered but we were so lucky as to find one flower that was still fairly fresh. We had been looking forward to seeing these plants flowering because up to then we had come across so many of them with their long brownish buds.

.....from H.Middleditch

For the last three or four years my own *T.camarguensis* has put out several flowers, around midsummer. These appear at various places on the stems, even on the short stump of a pruned decumbent branch. During the course of the day on which these flowers are due to open in the evening the flower petals form a long, tapering cone, the backs of the outer petals being an extremely dark grey-brown colour. It is my suspicion that the flower buds seen in this stage by F.Vandenbroeck, and so photographed by P.Down, would be opening the very same evening.

Impora lies at the foot of the mountains in a side valley which joins the Rio San Juan between Carrizal and El Puente. Camblaya Chico lies close to the confluence of the rivers San Juan del Oro and Tumusla, near Villa Abecia. The distribution of *Trichocereus camarguensis* would appear to stretch along the valley of the Rio San Juan del Oro from the vicinity of Tojo as reported by F.Vandenbroeck, through Impora and north along the Cinti valley to Camargo, as well as along the valley of the Rio Tumusla to the BDH location near Vitichi.

.....from W.Krahn

The enclosed photograph was taken in the valley of the Rio San Juan del Oro, near La Colorada which is roughly half way between Tojo and Carrizal. We do not have a note in the travel log for the plant in the picture.

.....from F.Vandenbroeck

This picture offers a charming view of the valley of the Rio San Juan del Oro. It was obviously taken in the dry period; the speckless blue sky, the yellow fields and the clear river water prove this. In the rainy season the water is brownish and muddy. We never saw such a limpid sky during our travels there! The cactus in the foreground is very typical for the whole of the Cinti valley and its surroundings - *Trichocereus camarguensis*. We saw numerous specimens of this species in early 1997, some still flowering but mostly developing their large shiny bulbous fruits.

This picture gives a very good idea of the tilted layers of strata rising from the river valley. The same type of landscape can be found all the way northwards up to Camargo. The crests of these tilted rocks, where the cliffs face away from the river, can usually be reached within one hour's walking from the road, coming across such species as *Lobivia lateritia*, *Opuntia sulphurea*, *Trichocereus camarguensis*, *Weingartia cintiensis*, different *Parodia* species, and *Gymnocalcium cardenasianum*. These *Gymnos* are usually to be found at the top of the cliffs which face away from the valley. From near Impora we followed a track going down the west side of the river until we were halted at a water-filled river bed near a place called Taraya. We had hoped to find *Parodia* here, but found *Gymnocalcium* instead.

## **THE EAST BOLIVIAN ANDES By O.Schmieder From University of California Publications in Geography Vol.2 No.5 1926**

My first expedition into Bolivia was undertaken in July 1924, from La Quiaca, the northern railway terminus of the Argentine republic. This small town on the Argentine-Bolivian border was especially convenient as a starting point, since a railroad from La Quiaca to Tupiza, and also an automobile road to Tarija, had lately been completed. Thus two new routes into Bolivia were available. Fully as important was the resultant fact that the muleteers of the northern frontier had in large part lost their occupation, so that mules and men were to be had promptly and most reasonably.

The first trip took me across the Puna to the valley of Rio San Juan del Oro. This valley is passable only during the dry winter months, since for long distances it is so narrow and the sides so steep that the only path is the river bed, and the summer floods sometimes cover its whole valley floor for months at a time. From Escapana I then ascended to the Puna to the east and rode back to La Quiaca on the Tarija road.

The main base of the eastern Puna is formed of Paleozoic rocks. They are chiefly argillaceous and arenaceous schists, friable yellowish brown sandstones, and quartzites. As a rule the older formations are compressed into upright anticlines and synclines, striking north-south. These folds form a great series of parallel meridional waves, their length varying from a few hundred metres to several hundred kilometres. The synclines, usually filled with erosion debris, form the Puna plain.

Only one Mesozoic formation is involved in the composition of the eastern Puna. It consists principally of red, often argillaceous sandstones containing but little of the coloured marls which form the striking middle member of the formation in northwestern Argentina as, for instance, in the Quebrada Humahuaca. These sediments occur in the Puna mostly in the form of narrow, meridional synclines, some of which are of most extraordinary length. The most striking of these belts begins in the Quebrada del Toro, extends thence by way of Yavi through the valley of the Rio San Juan del Oro, and still further north beyond Sucre, a total length of nearly 700 kms with a width ranging from several hundred metres to several km. The margins of these beds is always a steep escarpment against the older strata. These cliffs of brilliant red sandstone, wherever developed, form a conspicuous landmark in an otherwise monotonous surface.

The valley of the Rio San Juan del Oro follows in almost its entire extent the aforementioned syncline that begins on Argentine territory and extends beyond Sucre to the north. Near Yavi, the greater part of the red sandstone lies under the younger Puna fill, which there constitutes the surface of the Puna plain. Only the highest parts of the red sandstone rise above the plain in the form of hogbacks. The Yavi river, an affluent of the Rio San Juan, flows north along the scarp base of a hogback.

Where the Rio San Juan begins, the relation between river and syncline is very close. For long stretches the river is bottomed on the sandstone syncline. The bottom of the syncline has a gentle slope towards the

north with varying dip, which is therefore not identical with the gradient of the river, the latter aggrading on the flatter portions of the syncline, trenching where the dip is steeper. Remnants of fluvial terraces indicate that the river has in part filled the syncline with its deposits. These deposits are auriferous and it is for this reason that the river bears its name.

Only the larger rivers of the eastern Puna are permanent. The slight significance of snow and springs and the strong seasonal rhythm of rain entrain extreme variations in flow. The larger the drainage basin the more regular the seasonal range; the small streams simply rise briefly during each rain, but may be dry a few days later.

The floor of the Rio San Juan valley is about 1000 m below the level of the monotonous grey landscape of the Puna plain. As striking as the contrast between the extensive plains of the high Puna and the deeply incised valley, is the climatic contrast between the two areas. They only have one feature in common, the seasonal distribution of the rainfall, the main rainy period being in summer. The eastern Puna has a pronounced dry season from April to November and a single rainy season, usually from December to March. On the plateau, during the rainy season, the sky is generally overcast, especially in the afternoon, and brisk thunderstorms are common. As the sun moves north the skies over the puna are cleared of clouds. In the months of May, June and July, even feeble showers are an unusual occurrence. The relative humidity at this season may sink to less than ten per cent; desert-like dryness may prevail. At night the sky is usually clear and radiation is great. The diurnal range of temperature is therefore very high and may amount to 35°C in the course of a few hours. Low temperatures are often made especially disagreeable by high winds. The velocity of wind on the Puna is often very high. During the dry season the wind brings discomfort, blowing about fine particles from the sparsely covered surface.

The Rio San Juan valley has a distinctive climate. The bottom of this depression is between two and three thousand metres. It is therefore an island of warmth. The conditions of precipitation are similar to those of the Puna plain. In the winter of 1924 the floor of the San Juan valley was comfortably warm during the day and early part of the night. However, after midnight, when the adjacent puna upland had cooled far below freezing point, this cold highland air poured regularly and steadily into the valley, and an icy wind blew down the valley until some time after sunrise. In the absence of meteorological observations of any length, further inferences regarding climatic conditions must be drawn from the vegetation.

#### **PLANT GEOGRAPHY OF THE ANDES OF SOUTHERN BOLIVIA By K.Fiebrig From Engler's Botanische Jahrbuch Vol.45 1911**

The area of southeastern Bolivia which I explored botanically is divided into two parts at approximately 64° 30'W by a major chain of the Andes with an average height of between 4200-4500 m and passes at 3900 to 4000m. This runs from north to south, under various names; it also forms a dividing line between the high mountain flora and the vegetation formations of the lower lying areas to the east. To the west of this major chain the Rio San Juan del Oro in the Cinti (Camargo) valley sends its waters to the Rio Pilcomayo. On account of the mild and relatively uniform climate and the widespread introduction of cultivated plants, this valley belongs, climatically and floristically, to a distinct phytogeographic zone. In the Cinti valley the red sandstone outcrops in huge mountain masses, which are often crowned by grotesque eroded shapes. South of the Cinti valley i.e. S(-W) of Tupiza and S(-E) of Patancas, the real altiplano occurs in the form of a high plateau. This lies at a relatively uniform elevation of 3500 to 3700 m, above which the mountain chains rise only some 1000 to 1500 m higher. The mountains of the real altiplano i.e. the Puna and their slopes, are mostly grey paleozoic strata of a slaty structure.

.....from R.K.Hughes

The main road from Camargo to Villa Abecia seems to run in a relatively narrow river valley. We came to it first, from Cotagaita over the mountains. Towards the end of this stretch we reached a point where we had to make a long descent into a narrow side canyon. We could not see the river far below us until we had come some halfway or so, down into the canyon. The road had to zig-zag across the mountainside to descend. The brown ochre coloured rocks changed to red on the mountains above us as we roller-coasted along the last section close by the river up to the main highway. From here we turned south on our way to Tarija.

On our return from Tarija we again followed the Cinti valley northwards until we turned off at the hamlet of San Pedro. We crossed the river by a narrow girder bridge to San Pedro which lies on the east side of the river and took the road to Culpina. We started to climb immediately as this road zig-zagged up the mountainside. We made a stop on the lower slopes that we called BDH 22, faced by the huge red mountains across the valley. On our return this way, we stopped at the top of this mountainside, (upper BDH 22) and halfway down. Both places gave spectacular views of the towering red mountains opposite.

.....from H.Middleditch

At various Chileans' Weekends we have been fortunate to see a number of slides taken in the Quebrada Humahuaca, where the strikingly red colour of a bed of strata could be seen running for quite some distance along the mountainside. Presumably this would be the bed of red sandstone described by Schmieider, which continues for a very considerable distance northwards and also appears in the Cinti valley.

The above account by Fiebrig would suggest that the climate of the Cinti valley and that of its tributaries differs to an appreciable degree from that of the surrounding mountains. It appears that the valley floors provide an altitude and a climate more to the liking of *Trichocereus camarguensis* than the adjacent mountains or the intermediate levels.

**A REVIEW OF GYMNOCALYCIUM MIHANOVICHII** By F.Pazout  
Translated by R.Allcock from Friciana Rada V. 1965 (Abstracts)

A.M.Friedrich ventured into the northwestern Chaco at the time of the war between Paraguay and Bolivia, making in all ten journeys into this region during the years 1932-1935. Their routes extended in accordance with the growing depth of the huge territory, taken step by step by the well-armed Paraguayans, who were accustomed to the lowland climate, while most of the soldiers of the Bolivian army, coming from the very high plains of the Andes, endured with difficulty the incursion into the "green hell" of the Chaco. Thus the Paraguayans and with them A.M.Friedrich reached even to the foothills of the outlyers of the Andes. Friedrich's harvest of plants and especially of cacti continually grew, but all remained without proper botanical evaluation, because he was a layman and his instructor, the botanist Prof. Hassler, was already old and unwell at that time. The collector was therefore relieved, when later the whole of his cactus harvest was taken over by O.Marsoner (it ran to 70 species of cacti in 4000 examples); but it did not please him, that all, including the novelties from the form-circle of *G.mihanovichii*, were sent at a ridiculously low price to american customers. Also he did not agree with this, that his little dark rose-flowered *Gymnocalycium* was then described by Werdermann as a mere variety of *G.mihanovichii* (*v.friedrichii*). The opinion was already established at that time, that this and other plants from that form-circle, the discovery of which had fallen to him, are independent species of the genus *Gymnocalycium*.

.....from R.Allcock

This passage is followed by an account provided by Friedrich in 1938, of an expedition or expeditions undertaken into the Chaco. Friedrich served on a commission which was to make an expedition to a new part of the Rio Parapeti. This expedition was to involve travel in chaco woodland, in sandy regions, to Parapeti, and the hillsides of the Cordillera de Charagua i.e. the foothills of the Andes in the west as far as the R.Pilcomayo, and then following further the course of that river. From Asuncion they first went by steamship for two days against the current of the R.Paraguay, then 20 hours by rail, to the headquarters. This might have been the military headquarters as they had two young soldiers of the Paraguayan army in the expedition party. Thence they did 2700 km by automobile - presumably this was the round trip. For some 370 km along their route there was no drinkable water to be had anywhere. On a good road 370 km is no great distance but on a poor road where one can do only 100km daily, it is a long ordeal. When they came to recently annexed territory, the soldiers walked alongside with machine-guns in hand. On account of their slow progress they caught sight of a small rosy flower on the ground. Hazards were momentarily forgotten as they stopped and collected several hundred plants. At places they became bogged down in sand. Eventually they reached the R.Parapeti, which was almost 1 km broad, meandering among huge white sand dunes, wholly without vegetation. In the foothills of the Cordillera Charagua, one sp. of *Pfeiffera* was collected, also orchids in plenty. Finally they reached the R.Pilcomayo, where there was clay terrain. At a spot near the river bank they found the largest *Gymnocalycium* of the *G.mihanovichii* complex. It had a body with 12-20 ribs and white flowers [Type 5, Friciana No.23 - Ed.]. Also there a huge *Echinopsis* of 180 cm in height.

Of the many plants which he collected in his travels in the Chaco which were handed over to Blossfeld and Marsoner, Friedrich also laments the following circumstance "Alas, I am unable to bring names to the cacti collected here. because all were later despatched to american dealers and nobody ever ascertained what species were involved."

.....from H.Middleditch

Many travellers and explorers visiting the Paraguayan Chaco have started out from Asuncion by first making use of the steamships plying up and down the Rio Paraguay. Julian Duguid - "Green Hell"; Sir Christopher Gibson - "Enchanted Trails"; David Attenborough - the very same - "Zoo Quest in Paraguay". Stopping at the most appropriate landing point, they have then disembarked and made their way along the trails running into the Chaco. Friedrich evidently did exactly the same. Two days by steamship, even at low water, would hardly reach as far as Puerto Cooper. Twenty hours by train, at a speed of 30 km per hour, might have taken Friedrich to Isla Poi, also known as Villa Militar - a suitable designation perhaps for the "military headquarters" quoted in the 1965 Pazout account (above)? Entry 0261 in the February 1937 catalogue of Robert Blossfeld, Potsdam, is for a *Gymnocalycium* sp. from Isla Poi, (another name for Villa Militar) so we can be reasonably sure that Friedrich at least passed through this place.

It was from the vicinity of Villa Militar that Buining travelled further north-westwards into the Chaco, via Mariscal Estigarribia, Garapatal, Nuevo Asuncion and Yrindangue (Fort Garay) - see Chileans No.33 pp.103-104. Trails do not change greatly from decade to decade in wild territory and it is quite probable that Friedrich followed a somewhat similar route to that taken at a later date by Buining. Continuing further to the north-west from Yrindangue, into Bolivian territory, there is Laguna Redonda where Moser places the discovery of the *G.mihanovichii* with the rose coloured flower [Ibid]. Further on still, the R.Parapeti is reached. Beyond the river, again in the same direction, lies Charagua in the foothills of the Andes. It is most unlikely that any means would be available for transporting a vehicle across this broad river, even at the season of low water. Following the general line of the river upstream, the Friedrich party would meet the Sierra Charagua, which extend south almost as far as Boyuibe. These front ranges are a formidable barrier to east-west travel - see K.F.Mather, Along the Andean front in southeastern Bolivia, Geographic Review (New York) Vol.XII 1922. Continuing south following the line of these front ranges, ere long the Rio Pilcomayo is reached. From Isla Poi to the R.Pilcomayo by this route would amount to about 1200km as the crow flies, so for the round trip starting at and returning to Villa Militar, a total of 2700 km actual ground travel would not be unexpected. The location given by Moser for the discovery of the "rose flowered plant", subsequently *G.friedrichii*, is in the part of Bolivia adjacent to the westernmost part of present day Paraguay, from where it is currently reported to

occur. Fitting this postulated outline route are the area of distribution for *G.friedrichii*, the original finding location quoted by Moser, as well as the account from Pazout of the trip into the Chaco undertaken by Friedrich.

Pazout also reports that after visiting the foothills of the Cordillera Charagua and reaching the banks of the R.Pilcomayo, Friedrich found some "large *Gymnocalycium* with 12-20 ribs and white flowers". Where the R.Pilcomayo exits from the foothills of the eastern Andes, we would expect to find *G.marquezii*, which is not one of the mihanovichii group. Did Friedrich and party believe they were at the R.Pilcomayo when in fact they were further to the north? Do any "large" *Gymnos* occur thereabouts?

.....from L.v.d.Hoven

In December of 1992 I set off from Buenos Aires to visit Paraguay. From Asuncion I set off across the Chaco. The first *Gymnos* to be seen were *G.mihanovichii*, which were seen over a stretch of about 150 km, displaying many forms, seen mostly under shrubs. Still on the main road to Bolivia and estimated about 50 km from the border, onwards, there was *G.megatae* to be seen. These plants grew near to low shrubs or on grassy patches or even completely in the open, sometimes on pure soft, sandy slopes. They were fairly easy to locate as they were on the very first low hills since leaving Asuncion - one could see the hills from quite some distance away. The cacti were not too difficult to find, either, because some of them were up to one foot in diameter.

.....from W.Knoll [Ibid]

At Tenient Encisco ..... we found *G.pflanzii* growing in large clumps. About 25 km to the north of the Air Force base of Nueva Asuncion we found the large, flat bodies of *G.megatae* WO 82 in the fine sand. At the post the indians had also collected *G.megatae* for us.

.....from A.F.H.Buining [Ibid]

From Nuevo Asuncion to deep into Bolivia there grows *G.megatae* in large, mostly flattened spheres, but only on top of sandy hills.

.....from F.Ritter Kakteen in Sudamerika Vol 2.

A.Friedrich states that he also found *G.tudae* near Nueva Asuncion.

.....from F.Fuschillo.

My own plant of WO 82 was obtained from Knoll as *G.megatae*; it was about four inches in diameter and nearly the same height. It has eighteen ribs, with a wavy groove between the ribs that that is a rather darker green than the rest of the body. The rather faint cross-groove between tubercles does not always run fully across the rib. The areoles sit at the top of the tubercles, partially into the cross groove. The tubercles are fairly prominent with a distinct, almost pointed, chin. Spines are usually seven per areole, not overlapping below the shoulder, radiating outwards away from the body, straw coloured, often with a short, sharp, curve at the tip. No centrals. No spines on the areoles round the growing point. Once it had become established it flowered as well as all my other *Gymnos*. It has had about five years when it has sulked and neither grown to any degree or flowered, but it has now started up again.

The flower gave the impression that it had several rows of petals. The outermost petals opened right out until they were reflexed, whilst the innermost petals remained curving inward, enclosing the anthers and stigma; only the upper part of the innermost petals recurved into an upright attitude, leaving a very small opening through which a compact mass of anthers was visible. The flower tube was pale green, with a few large scales, white with a broad diffuse green midrib and a large red patch at the tip; the lowermost scales were almost completely white with a broad diffuse red patch at the centre and tip. The gently tapering tube broadened out markedly at about half way up the flower.

In section the flower had a fairly elongated ovary; above that a cylindrical nectar chamber which extended half way up the style. Above the nectar chamber the receptacle broadened out very sharply indeed into a marked urn shape. The style was very stout, carrying robust stigma lobes which opened out like a cup. The lowermost stamens were inserted at the very top of the cylindrical nectar chamber, just below the place where the tube broadened out. This was followed by a distinct gap and then a further series of filaments, densely packed; the uppermost of these filaments sprang from the inner wall of the tube close to the base of the innermost petals. On the sectioned flower it could be seen that the lower petals sprang from the outer wall of the tube well below the point at which the topmost filaments were inserted on the inner wall of the tube. The lower series of filaments were curved in towards the style and the anthers rested against the underside of the spreading stigma lobes. The upper series of filaments curved up and over towards the centre of the flower and all the anthers were carried above the stigma lobes, the upper ones packed into the confined gap between the innermost petals. The anther sacs are brownish black in colour, so placing this plant unequivocally in the *Muscosemineae* seed group.

Another plant which came to me as *G.tudae* KK 830, is from Palos Blancos according to the Knize Field number list. In general appearance this is rather similar to WO 82, except that the spines are flattened and have a dark tip, again mostly sharply curved at the tip. The young buds are also very striking with the prominent bright pinkish red patches at the tip of each scale. The flowers again appear to have several rows of petals with a very small aperture in the centre of the innermost petals, whilst the outermost petals are reflexed. In section the flowers have a remarkably similar internal appearance to those of WO 82.

However I did have two plants which I obtained as *G.tudae v.viridis* Lau 397, from Caspari-Palos Blancos. The *v.viridis* were not only roughly half the size of my KK 830 and WO 82 but remained green all the year round, whereas KK 830 and WO 82 always tended to take on a bronzed or purplish-brown hue. The areoles were placed just clear of the cross groove on the ribs but the tubercles still had a distinct chin. The spines again radiated, no centrals, yellowish in new growth fading to straw coloured, but about half as long again as those on the foregoing plants. On one plant the ribs had increased from ten to thirteen in the new

growth which had been put on in my collection. But there is a difference in the appearance of the buds on the two plants of Lau 397; on one, the scales had the pinkish red patch at the tip, on the other there was a narrow pale margin to the scales but no sign of red.

Once again the flowers on both plants had the very marked broadening out of the receptacle above the nectar chamber, which occurs at about half the height of the very stout style. The robust stigma lobes again formed a cup shape, the few lowermost filaments carrying their anthers up against the underside of the spreading stigma lobes. Again the uppermost anthers originated from the inner wall of the tube at a much higher point than the intermediate and outer petals sprang from the outer wall. The upper series of stamens again all curved over the stigma and obscured it from view when looking into the flower. But in one particular respect these flowers on Lau 397 did not match those on WO 82 and KK 830, for the innermost petals open half-outwards.

.....from H.Middleditch

The illustration of *G.tudae* v.*bolivianum* Fig.648 in Ritter *Kakteen in Sudamerika* depicts a plant with buds rising from the shoulder, the anthers appearing to be of a dark colour. The flower section in Fig.649 is virtually identical to those taken by F.Fuschillo, with a tube opening abruptly into a broad urn shape immediately above the point at which the lower set of stamens are inserted. However Ritter quotes a dimension of 2mm for the gap between the first and second series of stamen insertions which appears to be much less than that visible on the flower section taken by F.Fuschillo. Neither in his comparison between *tudae* and *tudae* v.*bolivianum* nor elsewhere does Ritter make reference to body size. If it is accepted that the *G.tudae* which Ritter saw in Paraguay are the same plants noted by Knoll, v.d.Hoeven, and Buining as *G.megatae*, then Ritter's *G.tudae* v.*bolivianum* from Boyuibe presumably will also display a body up to about a foot across.

### **AROUND THE SIERRA CHARAGUA By M.Cardenas Translated by H.Middleditch from Cardenas' autobiography 1973**

Since beginning to publish diagnoses of New Bolivian Cacti, commencing in 1950, I was attracted to the area of the Serranias of Sararenda, Caipipendi, and Charagua by its flora in general, which I had started to study during the Chaco war, and especially by its local cacti. Colonel Careaga, Minister of Defence and a graduate of mine in the Military College of La Paz in 1928, was approached for a flight for myself and two assistants. A friend of mine, Ing.Mariaca, director General of the YPFB [Bolivian National Drilling Commission] was also approached for lodgings at the Camiri encampment and transport facilities to explore the region.

Accompanied by my graduate A.Uzeda, now Professor of Botany at the School of Agronomy, and one of his students, we left Cochabamba by plane. Despite the bad weather our pilot took us without incident to the airstrip at Choreti. We were taken to Camiri by an army truck. We were provided with accommodation at the YPFB encampment guest house. Whilst staying at this encampment we had to eat in the social club.

After spending a day collecting in the neighbourhood of Camiri, a new town lying at 880m altitude, we set off towards Lagunillas. On the outskirts of Camiri we came across a small "custard apple" of an orange colour and with prominent tubercles, which was called aratico in the native tongue. The Argentine agronomists Ragonese and M.Coroveto mention this fruit in their leaflet "Indigenous Argentine plants with edible fruits or seeds" and assume they are edible. We ate some of the fruits which were enjoyable although covered with maggots of the fruit fly, in some instances. They were the species *Anona nutans*.

Before going to Lagunillas we visited the splendid suspension bridge across the Parapeti, like that at Choreti, arriving straight away at a small settlement still situated on the plain, which was Ipati. Here grows the cactus with fine salmon pink flowers and detachable cylindrical segments, *Opuntia ipatiana*. Leaving this spot we started to climb amongst a sandstone rock towards Lagunillas at 1000m. In the whole of the stretch from Camiri up to there, there were dense stunted colonies of *Cleistocactus baumannii*, next to the Solanaceae so characteristic of the Chaco, *Solanum argentinum*, likewise a bush of some 3 metre in height, adorned with splendid yellow flowers, appropriately named "Ramo" or *Cassia spectabilis*, as well as a leguminose plant made attractive on account of its leaves and its winged fruit, *Pterogine nitens*.

Between the sandstone rocks in the vicinity of Lagunillas we collected a globular cactus *Gymnocalycium lagunillasense*, which were new in spite of having been collected by P.L.Porte in 1920, mentioned as of uncertain identity, as may be seen in the well known monograph of Britton & Rose, next to a *Begonia* with fine intensive red flowers which proved to be *B.micranthera*, as well as a wild "mani", *Arachis villosa*.

From Lagunillas we continued in the direction of the Rio Grande to Gutierrez at 990m altitude. Shortly after Lagunillas we came across the attractive Bromeliaceae *Puya olivacea* which was discovered by Herzog around Charagua in 1910. Every so often we also saw the columnar cactus *Castellanosia caineana* which we discovered at Jatum Pampa near the Rio Caine some years ago. Around Gutierrez and in the fissures of the sandstone rocks we came across an *Echinopsis* in flower, very similar to the *E.silvestrii* in Argentina.

Passing Gutierrez we reached Rio Grande, a small settlement with only two streets and few houses, situated on top of a high bank of the Rio Grande or Guapay which at this spot occupies a broad bed lying at only 550m altitude. The vehicle road from Camiri to Rio Grande is well maintained and allowed of progress at 50 km per hour in our jeep. In the bed of the river there are masses of "mariguas" which are never absent near to rivers with rounded stones. On top of the high river bank where the settlement was, we came across the *Opuntia quimilo* of Argentina, which also turns up at the Rio Chico near Sucre at 1900m altitude and even at Mizque at 2000m. We stopped overnight at the Rio Grande and on the following day we went back by the



same road as far as the turn off for Charagua via El Espinol. This ran over sandy ground and was almost all obstructed by the branches of the plants at its edges, in a long section as far as the Hacienda Huariri. This road was completely deserted as there was no sign of even a single vehicle in more than 100 km.

At about 3.00 p.m. we arrived at another hacienda called Laguna Hedionda, located in a marshy area with pools of foul smelling water and infected with malaria at this time. Around the building of the Hacienda there were colourful groups of cacti with leaves and the habit of a tree, which were *Quiabentia pflanzii*. We continued our journey and arrived at five in the evening at Charagua where we were accommodated by the Commandante of the garrison, in his residence, located close to the barracks and some distance from the town, capital of the province of Cordillera, at 850m altitude, and sited at the foot of the mountain range of the same name. This was an important town before and during the Chaco war on account of its proximity to the important cattle rearing properties such as the Hacienda Izozog of the house of Elsner, and Itaguazurenda of the Gutierrez family. There were also important commercial houses such as that of Rojas Mery, makers of a creditable wine. Nearly all these properties maintained plantations with orange trees, which produced an excellent fruit. In some orchards there were also cultivated the best varieties of vines and pears.

I was here for more than a month during the Chaco war. The vegetation of the surroundings of Charagua was known to me to a large extent, because during the war I collected specimens in the month of May while now it was February.

We left Charagua in order to get on to the main road from Camiri to Santa Cruz, via a quebrada through the Serrania Charagua where a river comes down. This area is called Agua Caliente and the road which we had to climb is no more than the bed of the same river, with large stones. In spite of that, we passed a picturesque stretch, it being impossible to collect the plants which we had seen on account of the difficulty of travelling along this quebrada.

Completing the difficult passage of the Agua Caliente, we descended the other flank of the Serrania de Charagua in order to climb then the eastern slope of the parallel Serrania de Caipipendi thus coming to Caipipendi, located at 1,100m altitude, on a plain or slope between the mountain ranges, inhabited by Chirigunos indians.

In an adjacent locality, called Eyti, we came across a wild potato with white flowers and large tubers which was described with the name *Solanum caipipendense*. Just here we collected a globular cactus with acute ribs and elongated fruit which proved to be a new species which was later published as *Gymnocalycium eytianum*. At the climb to Eyti, our attention was caught by a large colony of the columnar cactus *Castellanosia caeana*.

Finally we reached the trunk road from Rio Grande to Camiri which passes Itapi. Further on, we came to Lagunillas where we spent the night. On the following day we decided to take the main road as far as Muyupampa, continuing to Incahuasi. We carried on next along a sandy plain where we came across some cattle ranching establishments and entered the Incahuasi canyon.

This is a very humid quebrada confined between almost vertical rocky sides covered from top to bottom with mosses and a great variety of other plants with flowers in vivid colours. Our attention was drawn to *Begonia boliviensis* with large pendulous red flowers to *Begonia macranthera* and *Begonia wedelliana*. On seeing these plants we remembered the intrepid botanical explorer Hugo Algernon Wedell who passed this way in 1845. Among the tangle of creeping and climbing plants, we saw in this canyon a drooping cactus which was afterwards described as *Acanthorhopsalis incahuasina*. Continuing as far as Muyupampa we caught up with a group of road repairers who came from Incahuasi and who told us that there was no way through on account of several falls in this part of the road. We turned round to Lagunillas in order to go from there to Ipati and Camiri.

During the second night after our return to Camiri, torrential rain fell for more than five hours which destroyed a bridge over the Parapeti. Our next botanical objective had been Boyuibe, where we considered taking the track-maintenance train to get as far as Villa Montes. Unfortunately the persistent rain had destroyed the road from Camiri to Boyuibe over a stretch of 10 km and so this trip to Villa Montes which was regarded as very interesting from the point of view of the cactus flora, had to be abandoned.

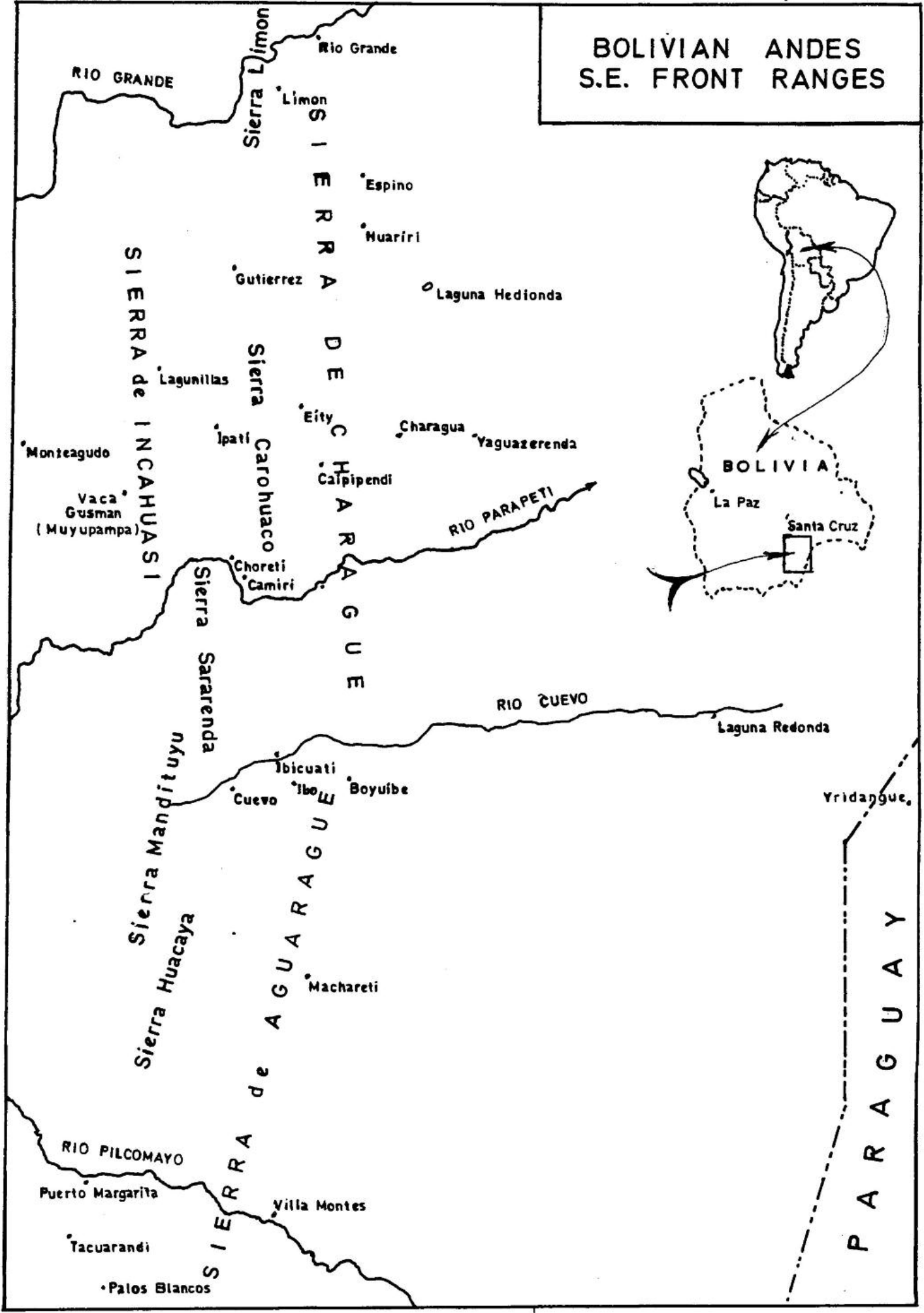
In the section from Camiri to Charagua, we had noticed a good number of species of *Cereus* which were differentiated by the shape and colour of their fruits, being spherical or ovoid-elliptical, the epidermis purple or yellowish when ripe. The time available and the absence of flowers on these plants made identification impossible. Professor Uzeda and I returned to Cochabamba by an aircraft of Lloyd Aereo Boliviano, whilst student Salazar remained for a few more days in the YPFB encampment with all the living material which we had collected, awaiting a TAM flight.

**ALONG THE ANDEAN FRONT IN SOUTHEASTERN BOLIVIA By K.Mather**  
**Geographical Review (New York) Vol. XII 1922**  
**Bulletin of the Geological Society of America Vol.33 1922**

The plains of Santa Cruz are the northwesternmost extension of the Gran Chaco, which occupies the entire southeastern quarter of Bolivia and continues southward into Argentina. The trails leading southward from Santa Cruz traverse for scores of miles the monotonously flat surface of this plain. Near the mountains there are many low knolls and irregular rolling hills of sand. Among the sand hills during the rainy season there are numerous ponds and marches which disappear in times of drought.

The Bolivian Chaco stretches eastward from the front of the Andes to the Paraguay river. Although the region of the Chaco is normally referred to as a lowland plain, its monotony is broken by several groups of

# BOLIVIAN ANDES S.E. FRONT RANGES



hills and many isolated elevations.

The eastern front of the Andean Cordillera rises abruptly from the western side of this plain and forms a broken wall, trending approximately north and south. The mountain ranges along this margin of the Andes are for the most part long, narrow, sharp-crested ridges which rise to an altitude of 1500 to 2500 feet above their surroundings. Between the successive parallel ridges there are strips of undulating lowlands, two to fifteen miles in width, with only slightly greater relief than that of the Chaco beyond the easternmost ridge. Each ridge is bordered on one or both sides by steeply inclined hogbacks rising abruptly from the adjacent plain.

The Sierra de Charagua is a long, narrow, sharp crested mountain ridge extending for some a distance of some 85 miles from north to south, its width approximately four miles. It is the most easterly of the front ranges of the Andes. Both to the north and to the south the other front ranges lie in echelon, with each successive range a few miles farther to the west than its predecessor in line. Its eastern slope rises abruptly from the margins of the lowland of eastern Bolivia; its western side overlooks in a similar way the intermontane depression which separates this range from the next to the west.

Throughout nearly its entire length the skyline of this range is very even, its summit has an estimated height of 4500 to 5000 feet altitude. The surface of the lowland along its eastern foot is close to 2700 feet in elevation, while the intermontane depression to the west is generally between 3200 and 3000 feet. For long distances on both sides of the Sierra there are numerous dip slopes formed by resistant strata pitching away from the axis of the mountain at high angles. These make rank after rank of hogbacks, which in most localities decline in elevation regularly from the innermost to the outermost.

The range is traversed by the gorges of four master streams with courses approximately at right angles to the major axis of the range. From north to south these are: Tacuru, Saipuru, R.Charagua, and R.Parapeti. In crossing the Sierra, each flows through a remarkable canyon, with narrow floor, rarely wider than the stream bed and with steep rugged walls towering to elevations of 1500 feet or so above the valley bottom.

The intermontane depression west of the Sierra de Charagua is modified by two lines of prominent hills. The eastern group forms the Cuesta Oquita. These are separated from the Sierra de Charagua on the east by a long, narrow lowland about 3 miles in width. Their eastern margin is a bold, rugged cliff which extends for at least 40 miles north from the Rio Parapeti. This escarpment rises abruptly to an elevation of about a thousand feet above the lowland and is broken at long intervals by such gorges as that traversed by the R.Parapeti, approximately at right angles to the trend of the hills. To the west of this easternmost ridge there are typical hogbacks with steeply inclined dip slopes on the west and rugged eroded cliffs on the east. Successive ridges towards the west are lower in altitude and display more gentle dip slopes, until finally the westernmost cuesta blends almost imperceptibly into the undulations of the plain which separate this group of ridges from the next ridges to the west.

In the vicinity of the Rio Parapeti this lowland is about ten miles in width and extends to the east front of the Cuesta de Pipi. Their eastern margin is a steep escarpment rising abruptly to elevations of about 1500 feet above the intermontane lowland.

.....from H.Middleditch

In travelling from Camiri via Lagunillas and Gutierrez to the Rio Grande, Cardenas followed the length of the intermontane depression lying immediately to the west of the Sierra Charagua. Shortly before reaching the Rio Grande, Cardenas passed the northern end of Sierra Charagua where it sank to the level of the lowlands. Consequently, on his return trip south, Cardenas was able to pass round the northern end of the Sierra Charagua and then take the road running to the east of that ridge, where the mountain meets the Chaco plain. But to return to Camiri, Cardenas had to cross the Sierra Charagua, which he did by following the Agua Caliente, a deeply incised river valley which arises within the Sierra Charagua. After the ascent to the head of this valley, Cardenas then descended to that part of the longitudinal intermontane valley lying to the west of the Sierra Charagua.

The isolated sandy hills found in the Chaco plain to the east of the Sierra Charagua evidently stretch some appreciable distance across to Paraguay; presumably it will be these particular features which support the *Gymnocalycium megatae*, as mentioned by L.v.d.Hoeven. Like other members of the Muscosemineae group, these plants are usually associated with the Chaco plains, so it is somewhat unexpected to find that the discovery location for *Geytianum* lies in the intermontane valley between the Sierra Charagua and the Sierra Incahuasi.

.....from O.Schmieder, The East Bolivian Andes, University of California publications in Geography, Vol.2, No.5, 1926

The striking difference between the Puna and the front ranges also finds its expression in the land forms of both areas. The limit between these two morphological areas is sharply drawn. The brusque change of the land forms does not even escape the eye of the native, perhaps because it has a strong influence on the grade of the trails. On the way from the Chaco to Sucre I was told of the place where I would come to the "caminos llanos" or level roads, several days before I got to it. .... The front ranges form long, narrow hogbacks which extend in meridional direction for hundreds of kilometres. On the way from Tarija to the Chaco one crosses nearly a dozen such ranges. The meridional depressions extend between these ranges. In the west they form deep valleys, but towards the east they become continually broader, often many kilometres in width. Their bottom is flat and covered by the same fine deposits which form the soil of the Gran Chaco. The Chaco does not find its western limit at the foot of the eastern front ranges; it penetrates between the mountain ranges, the surface of the large meridional depressions of the eastern part of the ranges still showing its typical form.

.....from H.Middleditch

This article is accompanied by a series of illustrations, one of which is taken in the depression of Chimeo, where "the vegetation in this inter-andean valley is the same as in the Chaco". The depression of Chimeo lies

to the south of the R.Parapeti and forms the southward extension of the same longitudinal inter-montane depression along which Cardenas travelled from Camiri to Lagunillas and on to Rio Grande. Since it was in this particular valley where Cardenas found his *Geytianum*, it might be presumed that *Geytianum* was found growing in more or less typical Chaco conditions. Cardenas describes their drive from Lagunillas towards Muyupampa as "across a sandy plain" which conforms to the account given by Schmeider. The question inevitably arises, how does *G. eytianum* differ from *G. megatae* if they grow in a similar environment?

It was in the latter part of 1948 that Cardenas attended the second South American Botanic Congress, in Tucuman. At the conclusion of that event, Cardenas took the opportunity to travel back to Bolivia via Salta, Jujuy, and Oran. This took him through the Quebrada de las Conchas and Alemania. Presumably it was here where Cardenas saw the *Echinopsis silvestrii* which resembled the *Echinopsis* he came across near Gutierrez.

According to the Cardenas autobiography, he made a visit in the January of 1949 to Colomi, in company with Winifred Brook of the British Museum. Then in February he made a train journey to Potosi, Sucre, Tomina, and Oruro. Over Easter Week he visited El Choro (not far from Cotacajes) which was visited shortly afterwards by Winifred Brook. In June of that year, Cardenas went to Morochata and then travelled by mule to Independencia. In July he travelled to the Yungas of La Paz, reaching La Plazuela and Miguilla. There is no reference to any other travels in Bolivia during the course of that year. The trip to the Petroleum District of Bolivia is recorded as having taken place during February and March 1951. In consequence it is somewhat peculiar that in the original description of *Gymnocalycium eytianum*, it is stated quite unequivocally that this species was discovered in March 1949. If this latter statement is correct, then it brings into question a great deal of the chronology of the Cardenas autobiography.

### **WE FIND GYMNOCALYCIUM EYTIANUM From F.Vandenbroeck**

It was in the December of 1992 that we started our visit to Bolivia by flying in to Santa Cruz de la Sierra. From there we drove south in the direction of Villamontes. Travel in this region can be hazardous during the rainy season and we met with considerable difficulties there. We passed through Camiri, traversing an area with a Chaco-like vegetation. The place "Eyti" must not be far from this road, as I remember seeing this name on some signpost or board. This struck me as peculiar because I had never found this name on a map. During my previous travel in Bolivia in August 1988 we had found *Gymnocalycium megatae* as well as exceptionally large specimens of *G. pflanzii* on bare sand dunes near Cuevo, which is south of Camiri.

In the early seventies I had a *Gymnocalycium* in my collection that was labelled *Geytianum*. I acquired this plant at the nursery of Mr. De Herdt and it has always intrigued me where this name came from. But later, after seeing the signpost for Eyti, I came to believe that *Geytianum* is probably the same as *G. megatae*, as it can also be seen in adjacent Paraguay. We were able to revisit this area when we were in Bolivia in January 1997 when we suffered many difficulties arising from the wet season. Virtually not one day passed without rain, often in torrential showers, turning roads into mudbaths within a couple of hours. If the local newspapers were to be believed, the 1997 wet season was worse than ever. When we were in Camiri we found out how to get to Eyti. About 18 km north of Camiri there appeared to be a primitive track leading eastwards. After about 35 km you reach Eyti, a small comunidad of poor campesinos. We went there to have a look at the *Gymnos* and now feel able to state that the plants near Eyti do in no way whatever differ from *G. megatae* found elsewhere in this part of Bolivia. The trip was quite an adventure, though. When we were in the hills looking for the plants a sudden torrential thunder storm came up and within an hour flooded all the lower parts of the surroundings, including the track we had used. We expected it would be a couple of days before we would be able to return but in the late afternoon the water gradually disappeared. With the help of a local we managed to get through but got stuck three times on this 35 km distance.

### **GYMNOCALYCIUM EYTIANUM By M.Cardenas**

**Translated by H.Middleditch from K.u.a.S 9.2.1958 & 11.3.1960**

Simple, globose, flattened above, 20-30 cm broad 10-15 cm tall, bluish-green and sometimes brown. Ribs about 18, 1 cm high, 4 cm broad at the base, fairly straight and divided into 4 cm wide tubercles by narrow horizontal cross-furrows. Areoles round to elliptical, 5 mm diameter, grey-felted. Spines not distinguishable between centrals and radials, 4 to 5 in number, spreading sideways, 15 to 25 mm long, awl-like, yellowish-brown to whitish. Young spines straight, yellowish-green below, brown at the tip. Buds rounded, about four in number, forming a garland around the depression in the crown. Flowers opening broad cup-shape and tapering above, 4 to 4.5 cm long. Ovary about 2 cm long, with a bunch of cream-coloured silky hairs at the base and furnished with crescent-shaped 2 mm long reddish scales. Flower tube slightly curved, 5 mm long, shiny green, with broad reddish scales. Uppermost scales on the tube 7 mm long and 7 mm broad, thickened. Outer petals 12 mm long, lanceolate, white below, greenish above, with reddish tips. Inner petals 15 mm long, lanceolate, clear white. Stamens arise from the base of the tube to the base of the petals, 5 to 7 mm long. Filaments slender, white, anthers brownish. Style about 7 mm long, thick, white; stigma with 15-16 spreading lobes, yellow, 6 mm long. Stigma does not stand above stamens.

Habitat: Bolivia, prov. Cordillera, Dept. Santa Cruz, near Eyti, on the road from Caipipendi to Ipati, 1200m, March 1949, Type plant Cardenas 5065 in Herbarium Cardenasianum, Cochabamba.

The appearance of this plant is reminiscent of *G. pflanzii* Vaupel and *G. lagullinasense* Cardenas, but differs from them however on account of the lesser number of spines, and especially through the longer ovary

which is uncommon in this genus. The flower colour of this species is clear white, likewise the style, which is commonly magenta red in other species of this bolivian genus.

.....later. (K.u.a.S. 11.3;1960)

In the intervening period, *Geytianum* Card. has set fruit so that the diagnosis can be completed in respect of fruit and seed. Fruit obconical to spindle shape, 2.5 to 3 cm long, dark green with a few naked scales. Fruit flesh white, juicy. Seeds small, of 1 to 1.2 mm in size, spherical, brown, spotted, matt, hilum barely visible.

.....from H.Middleditch

In this group of *Gymnocalycium* it is not unusual for flowers to arise from areoles on the outer edge of the shoulder of the plant. In consequence of this disposition, the bud points well away from the vertical. But when the flower opens the mouth of the flower is usually level. Hence the "slightly curved tube" of Cardenas' description. The body size of "20 to 30 cm broad" is a good match for the "up to one foot in diameter" reported by L.v.d.Hoeven for the *Gymnocalycium* seen in north-west Paraguay. The "about 18 ribs" falls within the "12 to 20 ribs" reputedly quoted by Friedrich to Pazout for the large *Gymnocalycium* found near the R.Pilcomayo.

On paying a call on H.Ewald in 1971 I found he had visited de Herdt the previous year and acquired several imported plants of *Geytianum* of about six inches in diameter. They were almost flat, somewhat dehydrated and of a dirty brown colour. But most of them had rooted and were in various stages of plumping up and growing. The flowers were about 5 cm tall, with a distinctly elongated ovary. On one plant the scales on the pericarpel and tube were pointed hemispherical with a red tip, on another plant they were a very flat ogee shape. The anthers were a dark grey colour. The outer petals had a dark green patch on the back and a small red pointed tip. There had also been further plants acquired from De Herdt which were under the name *Gizozogzii*. This species was described by Cardenas in The U.S. C & S. Jnl. with a location in that part of the Chaco plain crossed by the R.Parepeti in which *Geytianum* had been found. From both the description and illustration of *Gizozogzii* it is plainly of *G.pflanzii* affinity and is indeed so stated by Cardenas in his text. The plants grown under the name *Gizozogzii* at that time by H.Ewald were definitely not of *G.pflanzii* affinity, but of *Geytianum* affinity. It is possible that the name *izozogzii* was mistakenly applied by the collector supplying these plants; or the stock on hand at De Herdt's may have been so numerous that another name was used to try and move some more of the stock. One plant had 13 ribs, another 14, a third had 18 ribs - again within the rib count attributed to Friedrich by Pazout. These plants had been red-brown on receipt and two of them were still this colour, the smallest however was starting to turn greenish. The flowers were again about 5 cm tall, with what might be described as a solid stem some 10 mm long below the 12 mm long elongate ovary, with a 3mm high nectar chamber in the 10mm tall tube. The scales on the pericarpel and tube were a very flat ogee shape, brown with a cream margin, the outer petals having a green midstripe and a brownish-red patch at the tip. The stigma lobes seemed to be below the lowermost anthers; there had appeared to be no ring of stamens below the stigma, leaning against the style. But this impression was contrary to the usual stamen disposition in this group, so a further visit to this collection was made a few weeks later. Fortunately one of the *G. "izozogzii"* still carried an open flower and a section revealed that indeed there was a ring of short stamens leaning up against the style below the stigma. Also that the anthers were a grey-brown colour.

.....from G.J.Swales

Having studied the original description, I am now of the opinion that *Geytianum*, with its long flower tube, and larger dull brown seeds must be considered as belonging to the *Muscosemineae* and probably close to, if not synonymous with, *G.tudae*. It has no connection with *G.pflanzii*.

.....from H.Middleditch

If we are prepared to accept that *G.megatae* and *Geytianum* are synonymous, are there any other names which it would also be advisable to consider?

.....from F.Ritter Kakteen in Sudamerika Vol.1

Friedrich found a *Gymnocalycium* near Villa Militar in Paraguay, of which he sold plants and seeds to Blossfeld and Marsoner. From there seeds came to Europe and Japan in 1937 under the name of *G.tortuga* and from those seeds which reached Japan there would originate plants which were published by Y.Ito under the three names of *tudae*, *megatae* and *onychacanthum*.

Near Filadelfia some 50km NW of Villa Militar I found in 1963 a *Gymnocalycium* that belongs to this species complex. From this I find that I cannot confirm that *G.tudae* and *megatae* (and likewise *onychacanthum*) are one and the same.

In addition Ito takes up a name of Fric's which appears to belong in this relationship, *G.marsoneri*, and provides a description for it. Whatever Fric called *G.marsoneri* over 40 years ago could not be established precisely today, so that Ito ought not to have made use of this name; according to Ito this species comes from Argentina. The inner petals stand upright in *G.tudae* but in *G.marsoneri* are widely outspread, so that the flower opening is much wider, and not partially closed as in *G.tudae*.

.....from H.Middleditch

Does this mean that we can distinguish plants of *G.marsoneri* by how widely the petals open?

.....from F.Fuschillo

Some years ago a fellow collector in these parts complained to me that his *Gymno. ragonessii* never opened its flowers completely. One day I was talking to him on the telephone when he bemoaned this problem and I looked at my own plant of *G.ragonessii* which was out in flower, with its outer petals not just opened out flat but actually reflexed backwards. We both lived in the middle of the built up area of London so there was no question of my plants having better conditions of light intensity, or whatever. So I think you should be careful about setting too much store on comparing flowers which open to a slightly different degree.

.....from D.Metzing, Plante Grasse Vol.XII, No.4, 1993

Synonyms for *Gymnocalycium marsoneri* Ito are: *G.megatae*, *eytianum*, *hamatum*, *matoense*, *michoga*, *onychacanthum*, and *tudae*. This species would be best divided into two varieties, the more southerly *G.marsoneri* v.*marsoneri* from Argentina and *G.marsoneri* v.*megatae* from the Chaco of Paraguay and Bolivia plus the Mato Grosso of Brazil. In Paraguay these plants form large, dark, flat bodies which later also offset.

.....from H.Middleditch

Why pick the name *marsoneri* in preference to any of the others?

.....from F.Fuschillo

Bear in mind that the first valid appearance of the name *marsoneri* was as *G.schickendantzii* v.*marsoneri* Backberg in 1935

## **OBSERVATIONS ON THE MUSCOSEMINEAE GROUP OF GYMNOCALYCIUM By F.Pazout Translated by H.Middleditch from G.O.K. Newsletter Jan. & Feb. 1964.**

The story of the older well-known sorts or even new but validly described species will not be repeated here. That applies to the spp. *G.anisitsii*, *damsii*, *schickendantzii*, *delatetii*, *joosensianum*, and to *G.mihanovichii* with its vvs *stenogonum*, *pirarettaense*, *fleischerianum*, *melocactiformis*, *angustostriatum*, and *albiflorum*. I referred to those in my review in *Kaktusarske listy* 1951 and in *Friciana*. Our attention is directed to those plants about which the most problems arise. For that we must go back to Fric's last journey of 1926-28 and consider his *G.michoga*, *G.knebelii*, *G.marsoneri*, of which two spp (*michoga* and *marsoneri*) were described at a later date by Y.Ito.

***G.michoga*** is a small, pale grey-brown to dark grey plant whose body is divided into 10-11 humped ribs. The areoles bear seven robust, dark spines ca. 2 cm long and are speckled dark green. The 3-5 cm long and almost equally broad flowers have a dark green tube and white, greenish striped petals. In accordance with the data on a map of habitat locations, which I acquired 25 years ago from the Gymno specialist V.Fort, Fric collected these plants in the province of Santiago de Estero near Estancia Union, south of the R.Salado. Backeberg was of the opinion that this species ought to carry the name of Fric as author of the name. In my own view that should also be the case with two further plants, since Fric described his plants shortly before a latin diagnosis was required.

***G.knebelii*** is a large, flat, grey-green plant with five short but strong spines per areole. It flowers with plump, white flowers and according to the above mentioned map of Fort, originates from the north of Tucuman province where it was collected by Fric near Trancas. From the seeds imported by Fric grew homogeneous plants, which testify to the validity of this species.

***G.marsoneri*** differs from *G.knebelii* only on account of the number of spines. It has seven dark radial spines per areole and probably originates from the self-same area as *G.knebelii*.

.....from H.Middleditch

In *Aztekia* 14 1991 the reproduction of the Fric 1929 seed catalogue includes entries for both *G.michoga* and *G.knebelii*. This same publication records the first reference to *G.marsoneri* in 1933. All three names are stated to be invalid.

Does this mean that the first valid publication of *G.marsoneri* was by Y.Ito?

.....from G.J.Swales

My own record indicates that *Gymnocalycium marsoneri*, *megatae*, *michoga*, *onychacanthum*, and *tudae* were all described by Y.Ito in 1957.

.....from H.Middleditch

Did those descriptions suggest that a Type specimen had been deposited in a recognised herbarium in accordance with the then current ICBN requirements?

.....from G.J.Swales

There is no statement to that effect on the document in my possession.

.....from H.Middleditch

Does this mean that the only validly published name is *Geytianum Cardenas* for all these plants? The Type specimen was stated to have been deposited in the Cardenas herbarium. Reports from those who have visited this establishment suggest that the material there is not conserved in accordance with best recognised practice. But the ICBN Rules state only that a Type should be deposited, not that it should be looked after properly.

In his *Kakteen* in Sudamerika Ritter repeats a number of the observations made by various authors regarding the body colour which is associated with certain of these species names. It appears to be quite probable that these differences may well represent natural variation in habitat. On the other hand there are not many observations from plants in cultivation regarding flowers and fruit. Are the flowers always a striking urn shape? Do all these plants display grey brown anthers on their flowers? What is the fruit like?

## **A TALL STOREY FROM RIO GRANDE DO SUL From N.Gerloff**

During my six visits to Rio Grande do Sul I have had an opportunity to travel through many different parts of that State. In the course of each one of my visits there, columnar plants of *Cereus* were to be seen at widely scattered spots. Not only were they found growing at many of our stopping places, but from time to time they were also visible from the road whilst we were driving along. There are several names which have

been attached to the *Cereus* in this part of Brazil, but I think that it is always the same species to be seen, but with regional differences. For example, there were some *Cereus* to be found at the foot of the Cerro Jarao, which Ritter did not identify either as *Piptanthocereus alacriportanus* or *P.bageanus*, but as *P.jamacaru*.

During my visit in May 1996 we found an old abandoned and derelict house near Itapua where some *Cerei* were growing on the roof. One or two of the stems were even drooping down the side of the wall from the eaves. Some of the stems would be over a metre in length. Further on, near Tabai, we found more *Cerei* growing in a patch of forest where the trees were a good 4.5 metre high. The *Cerei* formed candelabras with their many branches, up to about 4 m. high. They were often overgrown with *Tillandsias*, *Rhipsalis*, or orchids. More to the south we saw plants which Ritter described as *Cereus bagensis*. They were always growing between large stones in the middle of a completely open meadowland, or forming hedges. They were only about 2.5 m. high but they were visible from a kilometre away.

My first visits to Rio Grande do Sul were made in the months December-January. It was in March-April of 1994 that I went to Rio Grande do Sul for the first time at the beginning of their winter and this was also the first time that I found ripe fruit on the *Cerei*. The unripe fruit are green but the ripe fruit are yellow or orange in colour. Near Sao Francisco de Assis we found a *Cereus* with ripe fruit that had obviously been partially eaten. There were a great many birds around this particular hill. During our midday break I did see one bird pecking away at a fruit. I believe that the *Cereus* fruit is eaten by the birds and the seeds are then deposited by them on the ground. But I think that in addition, small rodents such as mice may also gnaw away at these fruits. It was on our 1996 journey that we came across many *Cerei* with ripe fruits and my travelling companion M.G.Hamster was able to eat some ripe fruit every day. For myself I prefer to look for unripe fruit as I find this better for bringing back for seed. We found a suitable unripe fruit near Melo (in Uruguay) and seeds from this have already germinated back here in Germany.

.....from H.Middleditch (Reviewed at Chileans' 1996 Weekend)

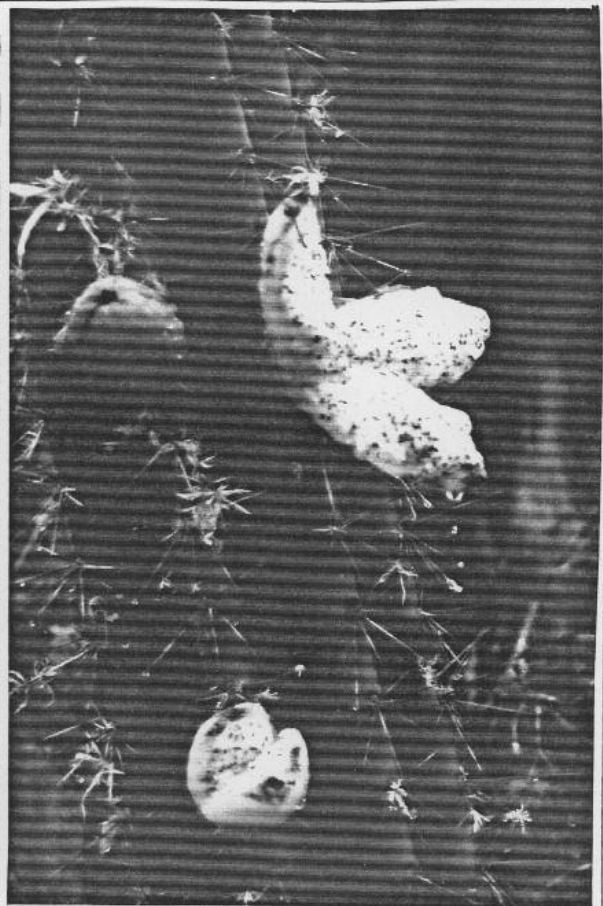
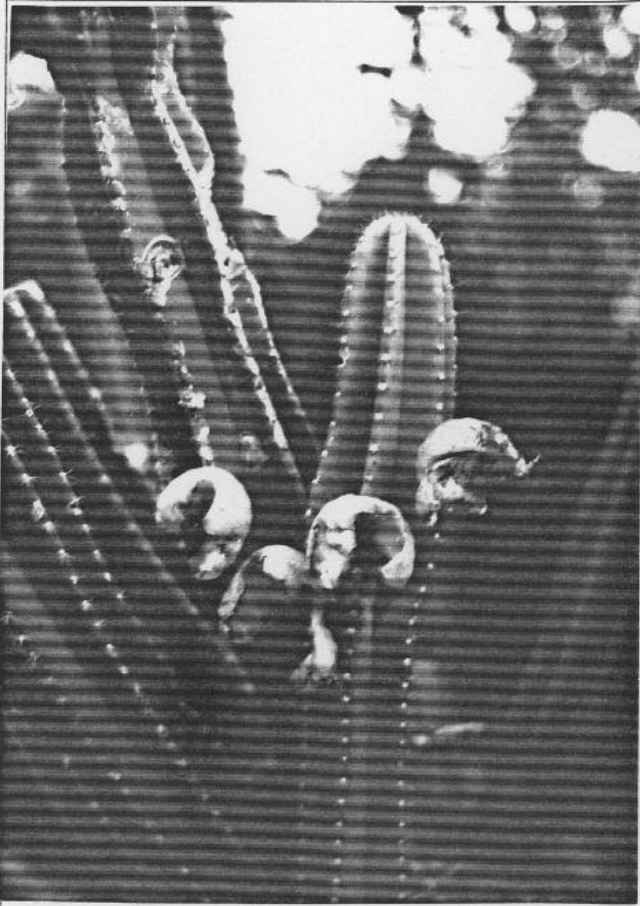
The extraordinary picture of a bunch of *Cerei* growing on the roof of a derelict building suggests that the seed were deposited there by a bird which had made a meal of some ripe *Cereus* fruit. That these plants appeared to be not just surviving but growing fairly well can perhaps be attributed in no small measure to the rainfall in this part of Brazil, which is spread fairly evenly throughout the year. It varies from month to month only between 80 and 130 mm, there reputedly being seldom many days in succession without some rain falling. So the *Cerei* seen on the rooftop probably benefit from a more regular watering than my own plants.

The site near Tabai is among the rolling hills north-west of Porto Alegre which must originally have been almost covered with forest. Now, much of the forest has been replaced by agriculture but evidently near Tabai there is still a patchwork of fields and forest mantling the hillsides. Further to the north and higher into the hills, the forest gives way to open grassland. In the middle of a vast and almost level open space are what seem at first to be a pair of trees, but a closer look shows them to be two huge multi-branched *Cerei* surely of a very old age. The lowermost main stem, brown and lignified, gives the impression of being nearly a metre thick. Nowhere in this wide open space are any seedlings to be seen; they would surely be destroyed by the farmer keen to see only grass for his stock.

An excellent selection of additional pictures received from N.Gerloff indicate how widespread are *Cereus* in Rio Grande do Sul, how variable the circumstances under which they grow, and also the extent of the variation in rib count, spination, and epidermis colour. Travelling much further to the west, near Santiago, is a stony hillside partially covered with half open woodland with odd clumps of tall trees, together with large rocky areas with only knee-high bushes and shrubs. Here are some branching *Cerei* on the rocky ground, barely 2 m high, this time with two or three fully-open flowers. Elsewhere on the slope are some taller *Cerei* which have strong new growth and are probably on better ground for their roots. The constrictions on the stems look as though they mark the places where annual growth has slowed down or stopped for the winter season.

Between Unistalda and Canuto in what must be wide open cattle ranching countryside, only a thin line of trees can be seen, probably along a watercourse. Rising out of the meadowland, a small hill flanked by a jumble of boulders. Out from among the boulders rises some *Cerei*, some stems with good new growth but also with many dead and dying stems, some right down to the base. In the picture of the upper part of one stem the section representing last year's growth is twice as long as those below - a better year, perhaps? Then some way to the south west, near Sao Francisco de Assis, at the small table mountains which are the site of *Gymnocalycium buenekerii*. On the steeply sloping sides, an occasional *Cereus*, and then a seedling barely 15 cm tall with a magnificent blue-green epidermis and nice woolly areoles. Some of the taller *Cerei* are also a bluish green, but not quite as intense a blue colour as this small seedling; other tall plants are green with very little blue tinge at all.

Now at Barro de Quarai, where the Rio Quarai joins the Rio Uruguay at the easternmost point of Rio Grande do Sul. Some distance away great areas of gently rolling hills are given over to farming, but still with tall trees in the hedgerows and in odd clumps. There are also larger patches of woodland and even occasional hills whose sides and crown are completely covered in trees. Here and there is a rocky slope and ahead a slightly higher hill where some cacti are found, including some *Cerei* projecting above the trees, in the company of grasses and bushes on rocky ground. Some long stems of one plant have evidently fallen to the ground, now producing a considerable number of branches, growing vertically from the fallen stem. The newest offsets have almost gingery short spines. On the older stems are a few flowers which look as though they had already been open the previous day, together with two or three large green fruit. Another tall *Cereus* is growing next to the trees, perhaps 4 or 5 metres high, but the top part of many of the older stems have been broken off at some time. This plant carries many fruits on its upper branches, all bluish green, whilst the



**Sao Francisco de Assis**

Ripe fruit partially eaten by birds or animals

PHOTO - N.Gerloff

**Santana da Boa Vista**

Ripe fruit splitting normally

PHOTO - A.Hofacker

**Cereus Alacriportanus**

largest fruit has a hint of pink.

Coming east from Barro de Quarai we reach the Cerro Jarao, an extensive rocky ridge where we are able to find a Cereus with blue-green body and brown spines. Specimens were seen with seven ribs and it is suggested by N.Gerloff that this may be Ritter's Cereus xanthocarpus. Much further east, near Dom Pedrito, we find Cereus growing on a rocky hillside with heaps of stones, giving the impression of being a quarry site. Most of the photographs from N.Gerloff are of Cereus with 5 or 6 ribs but at Dom Pedrito is seen a Cereus with 8 or 9 ribs on every stem.

Near Lavras do Sul an occasional Cereus is to be seen on a gentle rocky slope carrying scattered trees and bushes. South from Lavras, we come to Acegua on the border with Uruguay. It is once more almost level ground with a view for several km in all directions of meadowland with only the occasional tree or copse to be seen. Next to an arable field is a small patch of ground, barely tennis court size, where some rocks project up to about one metre above the surface where a few Cereus, about 2 m tall, survive amidst the farmland.

Between Pinheiro Machado and Piratini some more tall Cereus appear on a steep, rocky hillside. One of them has only four ribs; a young offset has nice gingery spines probably up to 5 cm long. Nearer Piratini more tall Cereus appear in company with tall trees and bushes, close to some high rocky outcrops. Here again is a plant with 8 to 9 ribs, the others with 6. Near Darilho is a patch of flat rock fronted by some woodland. There is a Cereus growing out of a crevice in the rock. Many platyopuntia and some grasses gain a foothold where the mantle of soil is edging over the bare rock surface. There are many more platyopuntia thickly scattered over the hillside which may make it very difficult to gain access to the tall Cereus further up the hillside. Nearer Darilho is a very tall Cereus in a patchwork of trees and grasses. Further on towards Santana de Boa Vista, on a flat, gently sloping hillside is a large Cereus growing together only with grasses, low bushes, and many platyopuntia.

On the approach to Pedro de Segredo is a rocky eminence carrying a Cereus with both buds and open



flowers. Most of the petals are white but the base of the outermost petals are dark reddish brown. There are buds on the stem both above and below the topmost constriction, so that presumably the plant is flowering both from "this years" and from "last years" growth. The top of the main stem looks as though it has dried up but remains in place; perhaps if it shrivels up altogether it will leave the stem looking like the plants in other photographs which give the impression that the topmost part of the stem has broken off.

Near Cacapava do Sul is a tall branching *Cereus* which has two fruits near the top of the main stem, but more than half the stems seem to be dead - brown and shrivelling. Yet not far away is a branching *Cereus* which must have scores of flowers from the upper parts of the stems. Perhaps one is growing in decent soil, the other on a thin layer of soil over solid rock. Further to the north, near Sao Saepe, is a small patch of ground in the midst of farmland where a few low humps of rock project above the surface. Here is growing a *Cereus* with short, fat branches and a couple of fresh offsets with a nice bluish epidermis.

The general impression is of a widespread occurrence of *Cereus* in Rio Grande do Sul, growing on both level or sloping ground, in thick woodland, in open woodland, or in places lacking trees, perhaps with a preference for more rocky areas. There is a range of rib count; epidermis may be mid green, deep green, or bluish, or shades in between; spination may be gingery brown or dull grey brown, of insignificant length on some plants and 20mm long (or more) on others. These features seem to occur in various combinations so that it does not appear to be possible to designate a particular combination of features with a specific name.

.....from A.Hofacker

It is quite typical to find *Cereus* fruit still on the plant, which look as though they have been half-eaten. The untouched ripe fruit can only be found on the plant for a short period of time. I think that some sort of animals are lured by the colour and taste of the ripe fruits. We have always seen lots of insects in ripe fruits. Especially ants. In my opinion, they are the main seed dispersers. Not only for the genus *Cereus*, but also for most other genera in southern Brazil, such as *Notocactus*, *Gymnocalycium*, etc. The pulp filling the fruit is very tasteful and the ants must have a attraction to it; especially in the *Malacocarpus*. With these you never find ripe fruits, but only lots of ants over the crown. If you want to collect seeds, you need a knife and have to gather unripe fruit. In other genera you often find only the empty shell of the fruit. In consequence it is very important to visit the plants at the right time, if you want to collect seeds. In one week, there are thousands of ripe fruit and one week later, nothing remains.

The fruit of *Cerei* is quite variable in colour. We have seen yellow, orange, and red fruits but I do not know if any of these particular colours are determined by the age of the fruit.

In regard to the distribution of *Cereus*, I would estimate that at about 75% of the locations we visited in Rio Grande do Sul and Uruguay, there were *Cereus* to be seen growing. It is a good indicator for globular cacti. If you see stones and *Cereus*, you can be almost sure that there are other cacti at that spot as well. But the species name is an open question.

.....from H.Middleditch

A photograph received from A.Hofacker of a *Cereus* seen near Santana da Boa Vista displays both green unripe fruit and pale peach coloured ripe fruit. One ripe fruit has split in half from top to bottom as if cut by a knife; a second ripe fruit has split into four segments, the segments lying wide open like a flower, exposing the stiff white pulp in which the seed is embedded.

.....from U.Eggli

In 1994 I paid a visit to this area and I also found similar plants with similar fruits to those photographed by A.Hofacker. It appears that upon full maturity, the fruits of the taxon in question split open, often irregularly. According to my experience with other taxa of *Cereus* in Brazil and in north Argentina, large wasps (perhaps various different species) eagerly visit the open flowers and in addition take away the sweet pulp from the fruit, thus also removing the seeds. It is likely that other animals are also involved, but I do not have any personal observations. I think that ants, perhaps some birds, and/or fruit bats might be likely candidates. As far as my own observations go, only the the pulp with the seeds is removed and/or consumed, but the fruit wall is mostly left intact and soon shrivels or gets mouldy. As to the identification of this *Cereus*, I cannot help at present. *Cereus sensu stricta* is very poorly understood, and some of the old names which can be applied to these plants, such as *C.peruvianus*, lack proper typification.

.....from H.Middleditch

A quick glance at a selection of *Cereus* names which could possibly apply to the area of Uruguay and Rio Grande do Sul, very quickly produced a morass of complications and loose ends.

.....from P.Moyna

With regard to *Cereus* I have found them growing quite extensively all over Uruguay. They usually seem to grow well on the rocky outcrops of hills, but they are also common around Punta del Este, in flat, sandy soils. In most cases, they seek protection from the winds (for Uruguay is very windy) and grazing cattle and sheep. This might explain their preference for, or rather their survival and growth in more protected rocky areas, etc. It is common to see them growing from within spiny bushes. I have seen *Cereus* in Salto, Rivera, Artigas, Tacuarembó, Colonia, San Jose, Minas, Rocha, Maldonado, Canelones and even within Montevideo. That seems to point at a widespread habitat from where human and farming pressure has been expelling them.

## **FINDING WHAT SORT OF CACTUS? from K.Preston-Mafham**

After the trip round north-west Argentina in company with G.Charles, R.Ferryman, and C.Pugh, a couple of days were spent with R.Ferryman revisiting the Quebrada del Toro. After that I spent a month travelling on my own in order to catch as many cacti as possible out in flower. During the course of that month I drove from

Andalgala to Belen. More or less all the way along the road from the bottom of the Cuesta Chilca, as far as a few km up the Cuesta de Belen, I saw an enigmatic plant to which it has so far not been possible to give a name. This was an upright columnar plant, always branching from the base and also from part way up the stem - although that might be due to grazing or other damage. The individual heads are much narrower than *E.leucantha*, often only 7-8 cm across but growing up to as far as half a metre tall. The upswept spination was reminiscent of that seen on many *E.leucantha*. After ascending a few km up the Cuesta de Belen this plant was replaced by the "standard" *Echinopsis leucantha*. Unlike *E.leucantha*, which only occasionally grows in the shade of a tree or bush, this plant always grew under bushes (or trees). The stems were perhaps comparable with those of *Cleistocactus*; but unlike any *Cleistocactus* I have seen. From the slide which I showed at The Chileans Weekend you would see that it displayed quite an open, but robust, spination. There were a lot of these plants near the road leaving Andalgala to the west.

.....from H.Middleditch

This picture was shown to the 1995 Chileans' Weekend and did not elicit any definite ideas as to possible identity. Of our continental contacts who have travelled in South America, several had visited Andalgala, but only two had taken the road from Andalgala to Cuesta Belen. As they were on the look-out for other sorts of cacti they had no recollection of seeing these plants.

.....from F.Vandenbroeck

We do not recollect seeing any plants like that on the slide taken by K.Preston-Mafham.

.....from H.Middleditch

The picture of this plant taken by K.Preston-Mafham was put into the hands of L.Bercht at our 1995 Chileans' Weekend and taken to the German *Gymnocalycium* group meeting held shortly after our own Event, where it was shown to several other travellers who had visited that area.

.....from L.Bercht

The slide taken by K.Preston-Mafham was discussed with several friends at our autumn Gymno meeting, one or two of whom have been either near Belen or near Andalgala. It was suggested, rather tentatively, that it might be a plant of *Lobivia aurea* v. *shaferi*, which does grow columnar and can display quite fierce spination.

.....from K.Preston-Mafham

The flower would not be right for *L.aurea*. There was a long slender bud on one plant we saw, which must produce a long, slim, white flower. This plant was seen in early December when it was also carrying an unripe fruit, (but alas no ripe ones) so it must have two flowering seasons, one in October/November to produce the unripe fruit seen in December, the next about mid December, when it was in bud. It was hardly likely to be an aberrant *Echinopsis leucantha*; we saw buds on *E.leucantha* at several places before coming across this plant, but none subsequent to seeing this plant. For example, the *E.leucantha* at the Cuesta Belen were neither in bud or flower. Approaching Belen we saw a few more of these peculiar plants.

.....from H.Middleditch

If it was a very slender *Echinopsis* flower, then *Setiechinopsis mirabilis* comes to mind. The plant photographed by K.Preston-Mafham gave the impression that the growing point had died off when the main stem was possible 10 to 15 cm tall, a new branch or branches then being formed, which had in turn died at the growing points, and so on, giving an overall appearance of a very untidy looking plant indeed. This bears little or no resemblance to any *Setiechinopsis* known in cultivation.

.....from C.Pugh

On our 1996 trip to western Argentina we flew to Mendoza. On our very first day there we made a circular tour from Mendoza via Villaviciencio to Uspallata and then back to Mendoza via Cacheuta. From Mendoza city we drove northwards along a straight road running over fairly flat terrain, with no sign of farming or agriculture. The lower slopes of the mountains were visible to the west and the road started to rise quite gently. We were passing through a very arid, sandy area with scattered bushes roughly waist height, when we decided to stop and take a look round. At that point we would still be about 20 km to the south of Villaviciencio. This was still a flat area, mostly sandy but with stony patches, with scattered bushes and occasional low, leafless trees. There was a surprising variety of cacti to be seen here, the ubiquitous *Opuntia sulphurea* as well as *Tephrocactus aoracanthus*, both in flower. In walking round we began to see some short, slender plants growing under the shade of the bushes and it struck us immediately that these were *Setiechinopsis mirabilis*. They were spinier than we would expect to see them in cultivation but had a typical grey-white colour to the body. One or two plants carried the rather long, thin, fruit associated with this species. The biggest plants of this sort were no more than two to 2.5 inches tall. In the course of the remainder of our trip we did not see any *Setiechinopsis* at any of our other stopping places.

.....from K.Gilmer

Yes indeed we have come across *Setiechinopsis mirabilis* in the course of our travels in Argentina. On our visit to western Argentina in 1994 we drove north out of Mendoza city along Ruta 7 towards Villaviciencio. The area along this stretch looks quite flat and level but in fact it ascends steadily from about 800m near Mendoza up to about 1200m by some 15 km before Villaviciencio. Over the stretch from about 5 km north of Mendoza to about 15 km before Villaviciencio, we stopped a good half a dozen times. All the vegetation - the bushes, the grasses, and the cacti - looked the same at each stopping place so we gave all these stops just the one TG 57 number. Here we found *Setiechinopsis mirabilis*; we also found it at TG 24 near Patquia, and at TG 95 near Los Baldecitos. Quite possibly about half the plants we saw were growing unbranched and the other half had something like 1,2, or 3 branches. The biggest plants were up to 3 cm in diameter at their base. All the plants we found grew solitary under small bushes that shed their leaves in winter, and so *Setiechinopsis mirabilis* grows in the shadow of their leaves only in summer.

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

On my journey through Argentina in December of 1995, we did see *Setiechinopsis mirabilis*; the tallest plants I remember were about 20 cm high. Unfortunately all the field notes were taken down on tape by my Czech travelling companion, Josef Odehnal of Bruno. He was to transcribe these after our return home so that I could identify and title my slides and have a record of my trip. It is now over a year since our return and unfortunately I have still not heard anything from him, so I am not able to tell you yet where we saw this particular plant.

.....from S.Stuchlik

It has been possible for me to speak to Josef Odehnal now [March 1997] that he has returned from another journey round Argentina. He has not yet transcribed his notes made on the journey with Leo v.d.Hoeven. They are in Czech, on a voice tape.

.....from U.Eggl

*Setiechinopsis mirabilis* seems to have a wide but localised distribution northwards from the south of Mendoza. The plants apparently remain solitary as a rule, but clustered examples seem to be possible, especially when a stem has been damaged by grazing. I have not yet found this taxon in the field, but have worked with herbarium specimens. The largest stem encountered measured some 30 cm tall with rather fierce and strong spination, not unlike that sometimes found on *Lobivia aurea*. This herbarium specimen is lodged at MERL, the Ruiz Leal Herbarium at the IADIZA Institute in Mendoza, but I do not have any note to hand of the finding location. However, there are at least two other herbarium specimens with 15-18 cm long stems, one is Ruiz Leal 21607, collected 1960 at Chacras de Coria in the Lujan area, the other Ruiz Leal 7639, collected 1941 at Santa Rosa, Las Castitas.

The plant in the photograph taken by K.Preston-Mafham is certainly very interesting. I agree that the plant is neither *Cleistocactus* nor *Lobivia aurea*, and in addition, not *Setiechinopsis mirabilis*. I have myself travelled in the Quebrada de Belen and based on that experience and observations made otherwise in Argentina, I am quite certain that this plant is an atypical specimen of *Echinopsis leucantha*. While the long and narrow body form is atypical, perhaps attributable to the plant growing in partial to dense shade, and the abnormal dichotomously divided head is a further indication that the plant has to cope with special conditions, the offsetting nature, the spination of slightly curved and upward pointing longer centrals, and especially the flower bud with the rounded thickened tip are very typical and I have accordingly no doubts about its identification. I hope there will be agreement on this view.

.....from H.Middleditch

*Setiechinopsis mirabilis* has also been reported from near Los Colorados (between La Rioja and Famatina) by N.Serrano in Chileans No.20. Also taken at this locality was a habitat slide of *Setiechinopsis mirabilis* shown by D.Hunt to the 1988 Chileans' Weekend. The various locations reported here for *Setiechinopsis mirabilis* all lie more or less around the margin of the Pipanaco basin. The altitude and the environment at each of these locations will be somewhat similar. This distribution is rather unexpected as in the original description of this species by Spegazzini it was stated that *Echinopsis mirabilis* emanated from Colonia Ceres, prov. Santiago del Estero. This is a quite different phytogeographic environment to that existing between Andalgalá and Cuesta Belen, or around the Pipanaco basin.

.....from R.Allcock

There might be an explanation for this in the pages of Lovéc Kaktusu, by Karel Crkal, which is a comprehensive account of Fric's travels and works. This tells us that Fric left Uruguay and took the ferry across to Buenos Aires; after some days he set off by rail for Tucuman. "However, I broke the journey at Ceres in the province of Santiago del Estero, for I wished to see there *Echinopsis mirabilis* Speg. This highly interesting plant is illustrated in the work of Britton & Rose and intrigued me on account of the unique flower. The breaking of the journey and the hotel charges cost me 30 dollars, and the one thing I learned was that that for 20 km around Ceres the vegetation is entirely dense. Moreover in Tucuman I ascertained that the plant was found somewhere else, and that it was sent from Ceres as a gift to Spegazzini. This is a new demonstration that finding places given in the scientific literature are for the most part valueless and can only lead one astray."

.....from H.Middleditch

The original description of *Echinopsis mirabilis* by Spegazzini in his *Cactacearum Platensium Tentamen* 1905, states that this plant is rare in woodland around Colonia Ceres, Province Santiago del Estero. It also notes that it is distinguished by the natives under the name "Flor de la oracion" i.e, funeral flower. The quoted location may be intended to refer to the railway station of Ceres, but this place lies not in the province of Santiago del Estero but just over the border, in Santa Fe province.

.....from A.E.Ragonese, Estudio Fitosociológico de las Salinas Grandes, Revista de Investigaciones Agrícolas 5. 1-2. 1951.

***Echinopsis mirabilis***. Cactus with conical or cylindrical stem, of 5 to 12 cm height, endemic in the salty soils of Santiago del Estero, Córdoba, and Catamarca. Very common in the jumeales of *Allenrolfea patagonica*, in the vicinity of Tuscal, prov. Córdoba. In fruit in May

.....from H.Middleditch

The publication by Ragonese [pp108-110 above] is concerned with the vegetation found on the saline ground around the Salinas Grandes and Salina Ambargasta. Starting from the middle of the Salinas with a surface formed solely of salt and entirely without vegetation, it describes the initial signs of vegetation and the gradual change which takes place when moving ever closer to the margins of the salt pan itself and eventually reaching the thickly wooded terrain on the salt-free ground of the adjacent lowland. At the edge of the monotonous expanse of the vegetationless salt crust, the first sign of vegetation is an occasional low hummock of the succulent halophyte *Heterostachys ritterianum*. With the change from almost pure salt to a strongly

saline soil, this plant is joined by *Allenrolfea patagonica*, which may grow up to between 30 and 80 cm tall. The ground cover in this formation varies between 5% and 80% in accordance with the concentration of salts in the soil. Other herbs are present, but sparse, including the caudiciform *Talinum polygaloides*. Leapfrogging the intermediate vegetation and going beyond the margin of the salinas, to where the ground is no longer salty, there grows the xerophytic woodland which is common over much of the slopes and highlands of Cordoba. Sandwiched between the association of low growing halophytic succulents and that of the xerophytic woodland, but where the ground is still moderately salty, there occurs a scrub vegetation in which *Stetsonia coryne* is prominent.

“In some places the association of halophytic succulents displays a scattering of trees and bushes of greater height, ..... including some aboreal cacti such as the cardon, *Cereus coryne*, with cylindrical stems in the form of a candelabra and white flowers, and *Opuntia quimilo* with orange-red flowers. In addition there grows in this community other cacti of less bulk, such as: *Cleistocactus baumannii*, *Echinopsis leucantha*, *Echinopsis mirabilis*, *Gymnocalycium delaetii*, *Gymnocalycium ragonessii*, *Opuntia paediophila*, *Opuntia vulpina*, and *Pterocactus tuberosus*, some of these very abundant and characteristic of the halophytic succulent steppes which are so common around the Salinas Grandes.”

.....from J.Piltz

We have stopped and searched for cacti on the margin of the Salinas Grande where there were some low growing bushes but no tall *Stetsonia*, but we have never seen *Setiechinopsis mirabilis* there.

.....from H.Middleditch

If the *Setiechinopsis mirabilis* only grew to a typical maximum height of 12 cm (barely five inches) in the midst of the transition community of much taller succulent halophytes and bushes, it is hardly surprising that it tended to escape notice.

The location quoted by Ragonese for *Setiechinopsis mirabilis* is at Tuscal, which lies at the southern tip of the Salina Ambargasta, on the plain lying at the north-west foot of the Sierra Cordoba. On the opposite side of the Sierra Cordoba from Tuscal, the Rio Primero and Rio Secundo drain the heights of the Sierra Cordoba and flow into the Mar Chiquita, which (like the Salinas Grandes) has no outlet. From the northern shore of the Mar Chiquita there extends a considerable area which is characterised by a saline soil. In “The Grand Chaco” by H.Kanter (Hansische Univ. Abhandl. a.d. Gebeite d. Auslandkunde XLIII Section C - Naturwiss XIII 1936) the Fig 63 plots the various plant associations to be found in and around the Chaco plain. This indicates that the vegetation adjacent to and north of Mar Chiquita is similar to that around Tuscal. If this is correct, then it would not be unduly surprising to find that *Setiechinopsis mirabilis* also grew on the saline soils lying immediately north of Mar Chiquita.

To the south, south-east, east, and north-east of Mar Chiquita there are a good two dozen settlements with a name commencing with “Colonia”. One of these, Colonia alpina, falls within Santiago del Estero province. To judge by the absence of roads to the west of Colonia alpina, it may be presumed that the soil becomes too saline there to permit any form of farming activity. If one accepts the statement by Ragonese that *Setiechinopsis mirabilis* occurs on saline soils, then this plant could occur in the area immediately west of Colonia Alpina. The Ceres railway station is only some 25 km from Colonia alpina; the place name on the map is Ceres, in Santa Fe province, and not “Colonia Ceres, prov. Santiago del Estero” as quoted by Spegazzini. However, if a comma is added to this quotation, viz: Colonia, Ceres, prov. Santiago del Estero then we do have a Colonia in Santiago del Estero province near where *Setiechinopsis mirabilis* could well grow, which is relatively near Ceres railway station.

.....from J.Lambert

The area around Colonia alpina and Ceres, which I have visited, is completely devoted to agriculture nowadays. There are but a few small relicts of the earlier bush, which are called “bosque virgen”. This is where I found some sparsely represented *Eriocereus* and *Cleistocactus*, but no *Echinopsis*. Elderly people there remember the “flor de la oracion”, but say that it has disappeared altogether!

I have never observed *Setiechinopsis mirabilis* in the field. I have presently 4 plants in cultivation, of which one is branching part-way up the stem.

.....from *Echinopsis mirabilis* in cultivation, by E.Koch, K.u.a.S 48.2;1997

*Echinopsis mirabilis* originates from Santiago del Estero. There it is also affectionately known as “flor de adoracion” or flower of admiration.

.....from C.Spegazzini, *Cactacearum Platensium Tentamen*, *Anales del Museo Nacional de Buenos Aires* Vol.XI 3rd series No.IV, 1905.

***Echinopsis mirabilis*** Speg. sp. nov. [Description in latin] Species distinguished by the natives under the name “Flor de oracion”

.....from H.Middleditch

According to my Collins Spanish dictionary (1980), oracion can be translated as prayer, so “flor de oracion” is presumably prayer flower.

.....from J.Lambert

The correct name for *Setiechinopsis mirabilis* is “Flor de la oracion”. This points to the fact that the flower opens only at night, the “oracion” being the evening prayer or angelus.

.....from G.Charles

I am amazed at the suggested height to which it is reputed that this plant will grow. My experience is that it is difficult to persuade it to grow above four or five inches in height in cultivation.

.....from J.Cooke

At present I have one single stemmed *Setiechinopsis mirabilis*, about 4” high, brown stemmed with eleven ribs, the stem being about one inch across. Each areole has about 12 radial spines of 2-3mm in length,

the single black central being up to half an inch long. I suspect the flowers are self-fertile. I did have another specimen that grew to about six inches high, with a branch, which died off, due - I think - purely to old age. It would possibly have lasted for 10 or 12 years.

.....from N.Tate

Now that I have retired I should have more opportunity for watering and observing my plants. They have not received a great deal of attention previously, but of the *Setiechinopsis mirabilis* which I have grown, plants have reached 8 inches in height.

.....from H.Middleditch

Do we have any claims to have improved upon this sort of height, or branching in cultivation, for this species?

**MEMOIRS OF A NATURALIST   By M.Cardenas**  
**Translated by H.Middleditch**

On 4 March 1952 I started on a long and interesting botanical collecting trip to the south east of Bolivia, accompanied by Leandro Rojo and Remberto Herbas. Leaving Cochabamba by train we arrived at Potosi where a vehicle was made available for our trip. Having passed Cuchu Ingenio and Pampa Lecori, we presently crossed the R.Tacaquira near Camargo, on one of whose banks we saw a columnar cactus in flower - *Trichocereus tacaquirensis*, which was discovered early this century by Dr.Fiebrig. We stopped overnight at Camargo; before arriving at Villa Abecia (Camataqui) we came across a stunted shrub adorned with yellow flowers, *Cassia crassiramea*, which I had collected before, between Cafayate and Salta. In the vicinity of Carreras and El Puente we came across another tree - *Larrea divaricata* - which has an aromatic resin, and in addition a new Cactus, *Corryocactus tarijensis*, the most southerly representative of this genus. Before climbing up the hump towards Escayachi we crossed a valley with a green copse of columnar cacti on its banks.

On the ascent towards Escayachi we were able to observe the occurrence of two pasacanoid columnar cacti with unbranched trunks one or two metres high, *Trichocereus tarijensis*, with reddish spines and another with yellowish spines, possibly a new species. At the summit of Escayachi there were a great many *Parodia escayachensis* with curved spines and reddish flowers; also *Oreocereus trollii* which formed dense colonies which at a distance resembled a flock of sheep. From the summit of Escayachi we descended to the Hacienda San Antonio. Then the climb began to the Sama pass; as it got dark there appeared here a *Cajaphora* with large yellow flowers. We were unable to observe the vegetation on the long, slow, descent from the Sama pass at 3900m down to Tarija.

[After travelling to Villa Montes and returning to Tarija] We arrived at Sama at nightfall and slept in the humblest of lodgings where the air was damp and cold. On the following day we left Sama in the direction of Villazon by a road built by the Public Works section of Tarija prefecture. We went over the Escayache pass and on the Villazon side we found at over 3000 m altitude a rare cactus *Maihueniopsis molfinoi*, which I had seen previously at San Antonio de los Cobres. We took lunch in the Quebrada Honda where we found another wild potato *Solanum platyterum*, also collected by Hawkes. Our specimens had narrower leaflets and were very reminiscent of those of the species *S.infundibuliforme*, described by Philippi from Chile. We continued to Villazon, thence to Uyuni and returned to Cochabamba on 26 March.

.....from H.Middleditch

After visiting Tarija and returning via the Sama pass, Cardenas took the road leading south from Escayache to Villazon, climbing out of the basin in which Escayache lies in order cross a saddle and then descend to the Pampa Patancas. This saddle is described by Cardenas as "the Escayache pass". No other author appears to have used a similar phrases to describe this saddle.

.....from M.Cardenas (continued)

In January 1959 we set off for a botanical trip to Tupiza, the capital of South Chichas. From Tupiza we took the road which leads to S.Cinti and which was constructed by Captain Engineer Mendez Torrico. This road which was very well built, is almost deserted with the aspect of the Puna, with a preponderance of grasses and cushion cacti. As we approached Las Carreras in South Cinti we came over the top of the Impora crest at 4270m. Below lay the one-horse town of Impora which lies at only 2740m. Here we came across various interesting cacti and among them a semi-columnar *Lobivia* with subulate white spines and red flowers which was diagnosed much later as *Lobivia cintiensis*. From Impora we eventually descended to Las Carreras situated at only 2500 m.

After passing one night there, we proceeded the next day to Tarija via the Sama pass. From Tarija, we returned on the following day to Las Carreras, to stop the night. Thence we returned via Abecia, Camargo, Sivingimayo, Lecori, and Cuchu Ingenio to Potosi and thence to Sucre.

In April 1960 Zabaleta suggested a trip to the province of Cinti, in order to obtain the tubers of the potatoes that I had collected only in flower during my previous trip. We followed our previous route from Potosi to Camargo, collecting cacti and wild potatoes on the way. From Camargo we proceeded to San Pedro whence comes the wines and spirits which carry that name. On the following day we decided to go to Culpina, the Hacienda of the Patino firm which was laid out for the organised production of the consumable and industrial plants typical of the area located at some 2500m above sea level. On leaving San Pedro we came across a great colony of cacti with fine white spines, *Parodia ritterii*.

From Culpina we returned along the road to Villa Abecia, finding extensive colonies of *Parodia* at the top of the pass, from which I described a new species *Parodia splendens*, which seemed to form caespitose clumps

with long flexible yellowish white spines and a corona of pale yellow flowers. In addition quite a lot of groups of the other species *P.camargensis* also occurred there. From Abecia we continued to Las Carreras and from there to Escayachi. Approaching the pass of Escayachi we found a number of colonies of *Parodia escayachensis* and of *Oreocereus trollii*. Where the roads joined together from Sama, Villazon, and Camargo, there were a very interesting group of cushions of *Maihueiopsis molfinoi*, a *Tephrocactus*, which I had collected in the October of 1948 in the Plaza of San Antonio de los Cobres. From here we returned to Camargo, thence to Sucre.

.....from H.Middleditch

Although Cardenas describes the Patino Hacienda at Culpina as lying at an altitude of some 2500m, my ex-Brandt map gives one height of 2950m not far off Culpina. The altimeter records taken by the BDH party put Culpina at about 3100m altitude. The RH Field Number list gives altitudes of between 2850 and 3150m at various places in the Culpina basin; it also records an altitude of 3700m between San Pedro and Culpina, which is probably the pass height at which Cardenas states he found his *P.splendens*. The above accounts and recent records all place the bottom of the river valley near San Pedro at 2450/2500m. It would therefore appear that Cardenas has made an error in giving the height of 2500m for the location of Culpina.

**PARODIA SPLENDENS By M.Cardenas**  
**From U.S. C & S J Vol.33 1961**

Solitary, globose, about 10 cm high, 11 cm broad, light green to glaucous. Ribs about 13 slightly spiralled 1-1.5 cm high, 1.5-2 cm broad. Areoles 12-15 mm apart, circular, 4 mm diam., grey to brown felted. Radial spines 12-14 thin acicular spreading and laterally compressed 2-4 cm long; centrals 1-3 subulate curved downwards 4-10 cm long. All spines white, brownish at base. Upper spines pink to light brown directed upwards 2-6 cm long. Flowers numerous from a cushion of white wool at the top of the plant. Flowers broad funnellform or urceolate 4 cm long, 4 cm limb covered by a dense white wool up to the base of the petals. Ovary 5 mm long, 8 mm broad, pink with a few minute whitish scales bearing dense white curly hairs. Tube short, pink, with whitish acute scales which bear white hairs. Upper scales 3 cm long; uppermost scales with whip-like bristles. Outer perianth segments linear, purplish yellow at base, 1 cm long; inner segments alternating, with the outer ones lanceolate 17 x 4 mm, bright yellow. Stamens from the bottom of the tube to the base of petals 10-12 mm long; filaments thin, yellow, glossy. Anthers yellow. Style 2 cm long, yellow, thick. Stigma lobes 9, yellow, 4 mm long, thick.

Bolivia. Province of Sud Cinti. Department of Chuquisaca. On the route Las Carreras to Chaupi Unu at 2500m. April 1958. M.Cardenas No.5527 (Type) in Herbarium Cardenasianum.

This southern Bolivian cactus attracts attention at once on the borders of the highway from Las Carreras to Chaupi Unu by its white glossy spines and its general superb appearance.

.....from H.Middleditch

In his autobiography, Cardenas states that the *P.splendens* were found on the pass [possibly at about 3700m altitude] between Culpina and San Pedro i.e. near the border of Sud Cinti and Nor Cinti provinces; also that these plants were caespitose and had long flexible yellowish-white spines. In his description (above) of this species in the US C & S Jnl., Cardenas states that these plants are solitary with "all spines white, upper spines pink to light brown". Here he also gives the habitat location as 2500m on the road from Las Carreras to Chaupi Unu, Prov. Sud Cinti. This road runs within Province Mendez, not in Prov. Sud Cinti; it is also well to the south of the R.Camblaya whereas in his autobiography Cardenas gives the habitat location for *P.splendens* as north of the R.Camblaya (see map, South-east Bolivian Andes). A height of 2500m may possibly exist at river level near Las Carreras but the general run of later reports would suggest that *Parodia* are commonly found on the valley sides, not on the valley floor. The altitude of 2500m quoted by Cardenas for this Type location thus appears to be open to question. As may be seen in the above extract from his autobiography, Cardenas states that it was during his 1960 trip when he came across the plants near the San Pedro pass which he subsequently described as *Parodia splendens*, whilst his original description of this species gives the first discovery as April 1958. From other writings of this same author (see below) it is evident that Cardenas is not renowned for consistent accuracy.

**PARODIA SPLENDENS Card. By F.Ritter**  
**Translated by H.Middleditch from Kakteen in Sudamerika 2.1980**

The description of *P.splendens* by Cardenas applies to none of my published *Parodias*, even though the habitat area mentioned by him has been well explored. Unlike Buining, Cardenas has declared it is the same as my *P.camargensis*, but that is incorrect. The photograph produced by Cardenas as *P.splendens* is also something else - it could be one of my *P.maxima* before it has reached flowering size. But *P.maxima* does not grow in S.Cinti, as quoted by Cardenas, but in prov. Mendez and indeed grows at higher altitudes, between 2900-3400m, whilst Cardenas quotes an altitude of 2500m for *P.splendens*. Also *P.maxima* is significantly broader at flowering age, from 12-23 cm. It has no pink coloured spines, as stated by Cardenas. The flower length of 40mm for *P.splendens* falls within the flower length of 30-40mm for *P.maxima*. The other flower details could apply to *P.camargensis*, but the flower is shorter. In the area designated by Cardenas i.e. Las

Carreras-Chaupiuno, *Parodia* is represented by *P.camargensis* v. *prolifera*, which flowers at 11 cm diameter, and offsets freely, with variable spine colours of brown, pale yellow, golden yellow, pink, or clear white, and flowers 25-30 mm long. The important data on fruit and seed by which both species differ significantly, is absent in Cardenas' description. It must be assumed that that Cardenas in his *P.splendens* has jumbled up more than one good species and that some parts of his diagnosis are from one species, some from another.

Lau has taken the *P.roseoalba* found growing above San Pedro, Sud Cinti province, and illustrated in K.u.a.S. 1970 No.4 p.10, to be *P.splendens* Card.

.....from A.Lau, Cactus Log, US C&S J Vol.61

... at San Pedro we turn east towards Culpina. Whereas *P.maassii* has brown spination, here we see from quite a distance that all is white, so that the name chosen for this variety is *albescens* (Lau 911). Soon though as we travel higher and further east, it gives way to an even more spectacular *Parodia splendens* Lau 917, contrasting beautifully with the deep red flowers.

.....from H.Middleditch

In the US C & S Journal Vol.61 p.204 there is a habitat photograph accompanying the Lau Cactus Log which is entitled *P.splendens*. To judge by what appears to be the sunlight reflecting off the surface of a river running between the mountainsides in the background, this shot could well have been taken on the climb from San Pedro up the road going in the direction of Culpina. In that case the river would be running in the Cinti valley and the very steep mountainside to the west of the river would be near the road to Cotagaita.

.....from M.Lowry

Whilst we were in La Paz I acquired a copy of a book by Willy Kenning with an excellent collection of photographs of the landscape and countryside in various parts of Bolivia. One of these photographs was taken in the valley of the Rio Cotagaita a km or two before it reaches the Cinti valley, looking across the river to an extremely steep sided cliff topped by two prominent peaks - one with a pointed top, and to the left of that, another with a blunt top - formed out of red rock. This very same feature appears in the Lau picture of *P.splendens* in the US Jnl.

.....from P.Down

After setting off from Cotagaita in order to take the road leading in the direction of the Cinti valley, we must have gone quite a considerable distance when we came in sight of the valley of the Rio Cotagaita, (or R.Tumusla). This valley led away in a generally eastward direction and in the far distance we could see on the horizon a jagged mountain ridge. As we travelled further east, we gradually came nearer to this feature which was to be seen whenever our view was not obscured by the intervening mountains. The northern end of this jagged ridge terminated in two peaks, firstly a steep-sided pointed peak and finally to the left in a lower, blunt topped, and even steeper sided peak. Eventually we came near enough to see that both this ridge and these two peaks were formed from a red coloured rock. When the road we were following finally emerged from the canyon we discovered that the western side of the Cinti valley was formed by the exceedingly steep flank of this jagged ridge. We could see this self-same feature and the two unusual peaks when we were climbing out of San Pedro on the road to Culpina.

.....from H.Middleditch

On the slides taken by P.Down when travelling east towards the Cinti valley, the two-peak feature may be seen quite distinctly, at the north (left-hand) end of the ridge. To the north of that feature there lies San Pedro, in the Cinti Valley. On the photograph taken by P.Down on the ascent from San Pedro, a position lying to the ENE of this feature, there may be seen the same two peaks again at the left-hand end of the ridge. Precisely the same profile appears in the background of Fig. 209 on p.204 of the Vol.61 US Jnl., again with the blunt peak to the left of the pointed peak. The river running in the bottom of the valley with a long, low hogsback between the river and the jagged ridge, is virtually identical in both the US Jnl. and P.Down pictures. Thus the blunt peak is to the left of the pointed peak both on the Kenning picture and the P.Down pictures taken looking east at this feature as well as on the P.Down and Lau pictures taken looking WSW at this feature. This is all very puzzling.

.....from K.Beckert

In the Weskamp *Parodia* 2 the Figure 13 is stated to be a habitat picture of *P.splendens*, taken by Lau. But the habitat data given by Lau for his L.917 must be false, because this habitat picture shows plants which are growing on red sandstone. Between San Pedro and the pass there is no red sandstone!

.....from R.Mottram

The colour picture of *P.splendens* provided by Weskamp in his *Parodia* 2, Figure 13 Plate suffers from a reddish-purple cast over the whole of the frame, including the plants. This cast could have been on the original exposure or affected in the reproduction. This colour is not confined just to the ground on which the plants are growing, so the ground in the picture would not necessarily be red sandstone.

.....from W.Weskamp, *Parodia* 2.

The fact that Lau had never visited the location of Ritter's *Parodia roseoalba* was perhaps well known to most *Parodia* enthusiasts.

.....from H.Middleditch

In his Cactus log it is stated quite clearly by Lau that he did travel the road from San Pedro to Culpina, and also found "albescens" on the ascent to the pass. This "albescens" could be either what Ritter called *roseoalba* v. *australis*, or *Parodia maassii* v. *albescens* Ritter from "west of Culpina".

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

*Parodia roseoalba* v. *australis* - Type location east of Puente San Pedro. Flower with ruby red mid-stripe and golden yellow margin, suggesting at a glance an orange red colour.

.....from K.Beckert

After travelling 5 km from San Pedro on the road to Culpina, at 2550m altitude, there are clumping plants of *P.roseoalba* (probably *v.australis*) growing on granite. Then at 2810 m, some 11 km out of San Pedro, are plants of *P.roseoalba* which are solitary and grow in clefts on flat granite slabs. Shortly before the pass, at 18 km from San Pedro, grows a somewhat brownish spined form of *P.roseoalba*. Then a short distance further on, not far from the transmission mast, is found the Ritter location of *P.maassii v.albescens*.

.....from F.Vandenbroeck

Looking at the copies of the pictures of the *Parodia* seen above San Pedro by K.Beckert, I recognise most of the plants. As to *Parodia roseoalba*, this species is really very different from *P.maassii*. It is difficult to express in words what the differences actually are, (apart from the *roseoalba* distinguishing itself by its markedly offsetting habit) but when one can see hundreds of plants in the wild, then the differences are clear. It is like explaining to a south-american indian the difference between a hazel tree and an elder tree.

.....from M.Lowry

The *Parodia* we saw east of Estancia San Pedro, after crossing the pass between San Pedro and Culpina, were identified as *Parodia maassii*.

.....from J.R.Kirtley

When we climbed out of San Pedro on the road to Culpina there were certainly plenty of white spined *Parodia* to be seen. But my own impression is that there were also many *Parodia* with brown spines in the new growth and at the crown of the plant. We were nothing like 18 km out of San Pedro when we saw *Parodia* with both sorts of spine coloration.

.....from M.Lowry

On the climb out of San Pedro there are places where the steepness of the mountainside obliges the road to double back on itself with hairpin bends. At one of these hairpins I got out of the vehicle and went on foot up to the next but one bend whilst the vehicle followed the road and then picked me up again. On this one fairly short climb there were both white spined *Parodia* and brownish spined *Parodia* to be seen.

.....from H.Middleditch

The field record made by J & P.Fahr places *Proseo-alba v.australis* on the climb to the east out of San Pedro at 2550m and again at 2820m. A few km further on were seen a form of *P.maassii* growing up to 20 cm tall. This record matches reasonably well the foregoing observations of J.R.Kirtley, M.Lowry, K.Beckert and F.Vandenbroek

Other than the reference by Cardenas and by Lau, no other collector appears to have recorded *P.splendens* from the pass over to Culpina, although the actual names used to identify the *Parodia* to be seen on that stretch of road are not identical amongst all travellers to that area.

.....from W.Weskamp, *Parodia 2*

In the Lau habitat photograph [in the 1989 U.S.C&S. Jnl] of *P.splendens* we can see a small valley, a few higher mountains in the background, and about half a dozen tall, rounded, barrel-shaped plants in the foreground, about 30 cm tall and 25 cm thick, which are thus much larger than the dimensions stated by Cardenas.

.....from H.Middleditch

In front of me as I write is the 1989 US C&S Jnl open at the Lau Cactus Log together with the Weskamp *Parodia 2* open at his Figure 13. Included in this Lau cactus log are two pictures, Fig 209 "*Parodia splendens* in habitat" and also Fig 213 "*Parodia camargensis* in habitat". This US Jnl. Fig.213 of *P.camargensis* is duplicated in Weskamp *Parodia 2* but there it is titled Fig. 13 *Parodia splendens*. In his Cactus Log, Lau refers to his *P.camargensis* Lau 909 from Camargo as "growing cylindrical" whilst Ritter in his *Kakteen* in Sudamerika describes *P.camargensis* as "growing to 25 cm tall and 10-13 cm thick". Not too surprisingly, the tallest *Parodia camargensis* in Weskamp's wrongly titled Fig.13 are roughly twice their diameter in height.

.....from W.Weskamp, *Parodia 2*.

I leafed through my pile of old letters and dug out one from Cardenas dated March 1965, in which he wrote "one of the most beautiful of all *Parodias* with regard to growth habit, the colour of the spines, and the flowers, is *Parodia splendens* which occurs between the Pampa Otavi and Escayache. Amongst the plants are a few up to 30 cm or more in diameter"

.....from H.Middleditch

It might be suggested that Cardenas had found *P.splendens* near the pass between San Pedro and Culpina and also near the pass on the road from the Rio San Juan to Escayache, both places being at similar altitudes and with a similar environment. However, this fails to explain the other various discrepancies in the Cardenas description and travelogue. From the somewhat conflicting data provided by Cardenas it is difficult to put forward a sound argument that might rebut the assessment made by Ritter on the status of the name *P.splendens*.

Ramirez Bros. have offered *Parodia splendens* RCB 325 from Villa Abecia; unless this is a very general indication of the nearest large town to the location of this species, there has been no other report of *P.splendens* being found in that locality. The Weskamp comments on *P.splendens* in his *Parodia 2* appear to be largely self-destructive.



**FORTY YEARS OF ADVENTURING - CINTI** By F.Ritter  
Translated by H.Middleditch

In the middle of February 1931 I was in Tupiza where I searched for and collected cacti. In the following months I explored further in Bolivia, Argentina, and Chile and returned to Mexico from Callao in May 1931.

In February 1953 I crossed the border into Bolivia at La Quiaca - Villazon; from there I took a truck to the town of Tarija where I had already explored 22 years earlier. After I had roamed around the surroundings of Tarija for three days and collected samples of cacti and seeds, I left in the afternoon on a truck going towards Villazon, as far as Chorcoya, which I reached late at night. The next day I set off on the trail. Everywhere grew great numbers of the snow-white woolly balls of *Oreocereus trollii*, as well as white-haired columns of *Trichocereus tarijensis*. In addition *Lobivia* were associated with them and here and there a *Rebutia*. I scaled a high mountain ridge and descended the other side towards Curque, a cactus paradise. I had been here once before 22 years previously and here I stopped overnight again.

In the course of collecting cactus fruits I had trodden on a dreadfully spiny *Trichocereus tacaquirensis* at that time. One spine went right through the shoe leather into my foot; the shoe was full of blood in no time so that I had to empty it out; obviously an artery had been pierced. But this did not happen again and so I pressed on with my collecting. Then when I was back in my lodgings, I began to feel unwell; I started a fit of shivers and fever, the foot swelled up again and hurt terribly. What was wrong? I was helpless. What could I do? There was a doctor in Tarija, but it would need two days' travel to get there - one day alone to reach the motor road. How should I get there? On a mule? I could not really hold on to one and would drop off. I explained to my host that I evidently had blood poisoning and was dying here in his house. He replied "Rubbish", trotted off into the bushes and quickly came back with some herbs, which he applied. The pain subsided; I slept - my host asked me if I was still dying - Rubbish, I replied. On the second day after the accident I had shivers and fever again. On leaving Curque I went down a canyon to the village of Carrizal on the R.Camblaya. The most important cactus discovery here was a new *Gymnocalycium* - later published by me as *G.cardenasianum*. I was able to find quarters in a small storehouse and stopped there for three days to explore the surroundings. The proprietor had trees carrying ripe figs but no-one to harvest them.

.....from H.Middleditch

Ritter mentions that he descended from Curque to Carrizal in the valley of the R.Camblaya, whereas the river running close to Carrizal would normally be called the R.San Juan del Oro, which only becomes the R.Camblaya after joining the R.Tumusla, just below Villa Abecia. However, these last two rivers in particular seem to be given different names on different maps.

**MEMOIRS OF A NATURALIST** By M.Cardenas  
Translated by H.Middleditch

[March 1952] We arrived at Palos Blancos at about 6 p.m. and took quarters in the only hotel in this tiny hamlet. Its proprietor was a Sr. Salinas from Cochabamba who had settled there after the Chaco war. We discussed cactus collecting with Sr. Salinas and he told me that he knew the German collector F.Ritter who had passed that way at various times. The first time he passed was in 1935 still very modestly and then in 1950 with his own transport. When F.Ritter first came to Bolivia in 1935 as a commercial collector, he discovered many new species. When he returned in 1950, he crossed through various parts of Bolivia searching for the species which I had published and for many others which were still new. Coming to Cochabamba in 1954 he presented me with many plants and some seeds which he had collected in more than two years and proposed to me that his new species were published with his name and mine together. I obviously declined this since in order to describe a new species requires a representative plant with flowers. It appears that this attitude of mine annoyed him and stimulated his own pride, since not long afterwards he changed from collector to author, in spite of having no general botanical education nor yet any academic status. He published a great number of new species in the genera *Parodia*, *Rebutia*, *Weingartia* and *Lobivia*. He sent out of Bolivia vast quantities of seed and many plants; he made a big business of it and sold them through the firm of Winter in Germany, which belonged to his sister-in-law. To sell these seeds, he published some bulletins which carried the list of species with the price of seeds for amounts of 30, 100, and 1000. Cactus seeds are very small and never could I come across them in order to send some of them to friends or colleagues in Europe or USA. I have come to the conclusion that for this study one requires a magnifying glass and tweezers and above all the patience of the idle.

In those small catalogues which F.Ritter published he was in the habit of relating some romantic anecdotes in order to display his feats in travelling through this primitive country full of dangers. One of these small seed catalogues tells how on one of his journeys through this part of the south-east, he fell over a stoutly spined cactus which injured his foot. In consequence of this accident, which occurred in the Cinti province of Department Chuquisaca, his foot swelled up and his general condition was grave. There was no hospital where he could travel to be treated, a situation which he accepted with some resignation, expecting to die at any moment. At this point there turned up at his humble lodgings an Indian who recognised his symptoms; this Indian set about helping by applying to his foot a potion of herbs which put it right in a couple of days.

As may be appreciated, this tale is the sort which many gringos relate in order to exploit the good faith of those who do not have any knowledge about our country. The truth is that in Cinti provinces, there are doctors or at least health workers, and on the other hand the stories about the miraculous medicinal plants which foreigners report, are already hackneyed.

.....from H.Middleditch

It has been noted (above) that Cardenas placed the road from Carreras to Chaupi Uno in Sud Cinti province, whereas it lies in Mendez province, Department Tarija. Ritter's sharp encounter with the *Trichocereus* spine took place near Curque, province Mendez, Department Tarija, but once again Cardenas places it in Cinti province, Department Chuquisaca. One cannot help harbouring the suspicion that Cardenas was not really familiar with the geographical disposition of either the Department or provincial boundaries in this particular patch of his own country between Escayache and the Rio San Juan.

Cardenas also observes that Ritter "passed through Bolivia in 1935 and then with his own transport in 1950". In the extracts from his book "Forty Years' Adventuring" (above) Ritter records his first visit to South America in December 1930, starting with a trip in Peru, then re-embarking from Callao for Mexico "on 14 May 1931". The H.Winter seed catalogue no.18 which offers the very first seed collected by Ritter, from Peru, carries no date but is bound into my 1931 German Cactus Society Journal (Monat. der D.K-G) between the April and May issues. This offer would fit in with the seed being collected by Ritter in early 1931. In the December 1932 issue of the M.d.D.K-G, under the new description of *Rebutia kupperiana*, Boedecker observes that a specimen of this plant was sent to him from Catamarca by Ritter in March 1931 and that more plants were offered by H.Winter in 1932. In the 1954 Winter cactus seed catalogue there is a reference to "my first South American visit in 1931". The available evidence would suggest that in Ritter's account the year of his first visit to Bolivia is given correctly as 1931, but not so in Cardenas' account.

In the Winter cactus seed catalogues from 1955 onwards there is frequent reference to Ritter collecting in South America "since Christmas 1952" whilst a duplicated foolscap seed list issued by Winter in 1953 (received from New Zealand) does start with a reference to "the South American expedition of Friedrich Ritter". In his "Forty Years' Adventuring" Ritter says that after returning to Europe in 1937 he left Marseille in December of 1952 for Rio de Janeiro and Buenos Aires, reaching Villazon in February 1953 en route for Tarija, where he had been "22 years previously". Then follows a number of accounts of his travels on foot or by public transport until in "August 1955 I bought an old Ford wagon in Santiago", which compares with the "1950" quoted by Cardenas in his autobiography. It is also stated by Cardenas that when he was in Palos Blancos in March 1952, he was discussing Ritter's second sojourn in Bolivia, whereas Ritter appears not to have crossed the border into Bolivia at Villazon until 7 February 1953. Once again available evidence points to Ritter's record being correct whilst Cardenas' dates appear to be incorrect.

In his autobiography Cardenas records a visit to Tupiza, Impora, and Tarija which took place in January 1959; it was during the course of this trip that *Lobivia cintiensis* was found and "published much later". In Cactus (France) for December 1959 Cardenas published *Lobivia cintiensis* sp.nov., noting that it was collected in February 1958. Once again there would appear to be an inconsistency in the dates quoted by Cardenas.

The Cardenas autobiography is dated 1971. Would certain of Cardenas' errors be due to his relying on memory rather than on a written record? How do the above discrepancies compare with "arrived at San Francisco mine at 5 p.m. on 14 November 1956" or arriving at Huachi "at 2 p.m." when travelling down the Rio Bopi by balsa raft in 1921? In his introduction to his autobiography, Cardenas says that "the diaries were written at the time during the course of the journeys in precise chronological order". There is indeed precision in some parts of his account, but evidently not in others. There have been previous occasions in these pages where attention has been drawn to apparent discrepancies in certain 19th century accounts or descriptions and it has also been noted that the great problem is to distinguish between those facts which the author has got right and those where he appears to be in error. It would appear that Cardenas has kept alive a fairly well established tradition.

Botanical workers in Bolivia were normally rather isolated from external literature. For practical purposes there were no Botanic gardens in Bolivia and no reference herbaria. In his autobiography, Cardenas observes that "until the second world war, there were very few South American specialists in any taxonomic plant group since the botanical explorers in this part of the world sent their specimens to the specialists in the US and in particular to those in Germany for identification. It was virtually impossible for South Americans to identify their collected specimens because of the lack both of herbaria for comparison purposes and of the necessary reference works. From about 1930 there began to appear South American specialists who were able to identify their material and make diagnoses of new species, such as Parodi with grasses, Castellanos with cacti and bromeliads, Duke with the Amazon Flora, Dugand with plants of Columbia, Burkhart with legumes, Cabrera with composites, etc."

"Since 1939, the author has been concerned with the wild potatoes of Bolivia, and after consulting the appropriate references in copies, photocopies, and microfilms, began to describe his first new species. Commencing in 1940, he decided to study the cacti making use of the well-known work "The Cactaceae" by Britton & Rose, and the bulletin "Blatter fur Kakteen Forschung" from Curt Backeberg. After 1954 he also entered into the domain of the Amaryllidaceae having to hand the requisite references and having established a regular correspondence with the very few foreign specialists in this field. He described more than 10 new species of wild potato, three new genera and more than 150 new species of cacti, and about 20 species of Amaryllis"

From his autobiography it appears that Cardenas made his first visit outside Bolivia to the USA in 1935, a second to Argentina in 1938 and his third via a transatlantic convoy and a London air raid to Cambridge University in 1944/45. In the course of this last visit he once again met Dr.Hawkes, the two having originally met when the latter was collecting wild potatoes in Bolivia in 1939. It seems that the first new species published by Cardenas was a wild potato *Solanum virgultora*, as joint author with Hawkes, in 1945; his publication of new species of cacti appears to have commenced in 1951.

During his schooldays in Cochabamba, Cardenas had to prepare a small herbarium of local plants under the direction of his natural history teacher. As a postgraduate of the La Paz Teacher's Training College, he was seconded to the Asplund expedition to the Bolivian Yungas in 1921 where he was directly involved in botanical field work. When Asplund left Bolivia he handed over to Cardenas various pieces of field collecting

equipment; from which one might conclude firstly that Cardenas had acquitted himself to the satisfaction of Asplund and secondly that good quality field collecting equipment may not have been readily available in Bolivia. Later in 1921 Cardenas was seconded to the Rusby Expedition to Bolivian Amazonia. From 1924-1930 Cardenas was employed as a lecturer at various colleges; then he gave up teaching for almost two years to reside in Quechisla and botanise in that area. During 1932-34 he was engaged in lecturing at Potosi College, with botanising spells during vacations. It is fairly evident from this that Cardenas was often directly involved in the necessary procedures of field collecting work. In 1936 he moved to La Paz following his appointment as Inspector General of secondary education in Bolivia. In August 1937 he moved to Cochabamba after his election as Rector of the University there.

In Cardenas' autobiography references begin to appear from about 1939 onwards to ex-students or ex-academic colleagues now in posts of authority in the various parts of Bolivia, whom Cardenas visited and who made arrangements for transport for his field trip by jeep or (once) by a local military airborne milk-run. When travelling by jeep there is usually a precise entry as to which member of his accompanying staff or ex-students did the driving. From these indications the impression is gained that Cardenas had by then become more concerned with running affairs than with doing the spade work. Excursions by jeep give the impression that fair distances were done to a sharp timetable (especially bearing in mind the usual state of the roads) so that little time could have been available for effectively scouring a locality. Occasionally footslogging away from the jeep is mentioned - around the Cuesta Sama for example - but otherwise the impression is given that Cardenas' later discoveries were effectively made from whatever was at the roadside. Not all new descriptions were evidently so made - the genus *Saimaipaticereus* was collected on a horse-and-mule trip through Ayopaya in 1935, but not published until 1951.

During his trip to Ayopaya province Cardenas says that he took photographs to record the phytogeography of the countryside; on a later visit to Villa Montes he notes specifically certain vegetation formations en route. This would suggest that he was aware of phytogeographic associations. But nowhere is there any indication that he carried, or made use of, an altimeter in the course of his field trips. This may account for the anomaly in an altitude he quoted, such as that noted above. If Cardenas gave instructions to his travelling aides for material to be collected, then that magnificent gem about never being able to come across any cactus seeds to send to his overseas contacts becomes understandable.

From the foregoing we may be able to appreciate not only that Cardenas made errors in his writings as do most authors from time to time but, more importantly, from knowing his education, training, background, and experience, we may be better equipped to assess whether it was or was not Cardenas' error or oversight when conflicting statements need to be resolved.

.....from W.Rausch, Lobivia '85

It was in 1963 that I visited Prof. Cardenas in Cochabamba for the first time and asked after the old Bolivian *Lobivia maximiliana* and *L. lateritia*. I received the crushing answer, given in an overbearing manner with supposed wisdom, that these did not exist in Bolivia. I could not suppose at that time that he knew these as *Lobivia cariquinensis* and *Lobivia cintiensis* respectively.

.....from H.Middleditch

This brief comment may be taken to illustrate Cardenas' lack of familiarity with much post-war literature regarding Bolivian cacti. On the other hand it may be regarded as a similar attitude to that adopted by a number of early 19th century writers, who would give a cactus a new name even though it had already been described by another contemporary author.

## **GERMINATION OF MAIHUENIA POEPIGII By K.Zimmer**

**Translated by H.Middleditch from K.u.a.S 1970**

According to Buxbaum (1962) and Backeberg (1966), *Maihuenia poepigii* was to be found in the high andean region of southern Chile and Argentina, as well as in the snowline area of Patagonia. In K.u.a.S for 1967, Krauss wrote about the habitat conditions of *Maihuenia* at Laguna del Laja in the Bio-Bio province of Chile. Concerning the germination of this species, Buxbaum wrote in 1962 that it only succeeded if one undertook the sowing in the winter frost and snow, whilst Kluglin likewise discussed the problem of the action of frost in this journal.

Through the friendly co-operation of H.Behn in La Calera, Chile, it was possible for me to obtain a large quantity of fresh seed from the vicinity of the Laja waterfalls near Yumbel in Bio-Bio province. The outcome of the very comprehensive study will now be briefly described.

A test of germination capability at temperatures from 15°C to 30°C yielded a germination of only about 1 to 5%, although the seeds were steeped as usual. After 18 hours they had taken up more or less 25% of their dry weight of water and this water-uptake lay roughly within the range of water uptake of quick-germinating cacti species such as *Oreocereus celsianus*, *Parodia maassii*, *Hamatocactus setispinus*, and *Cereus peruvianus* (Kuas 1969, 105-107).

The hard nature of the testa shell can be discounted as the cause of inhibited germination. It was thus left to test whether the inhibition of germination could be overcome by lower temperatures. On this basis seeds were pretreated at 2°, 5°, 10°, and 15°C for 20, 40, 60, 80, or 100 days on sterile, moist quartz-sand and then put to germinate at 20°, 25° and 30°. The question of the influence of light, which was included in the study, should be mentioned here in passing since light appreciably affected germination capability.

The tabulated results relate only to the germination capability which was achieved with moist, cool, pretreatment in light and subsequent germination in light or dark. Since we had here to deal with a whole range of influencing factors, we first of all looked at the major factors separately from one another. The

separation of "Pretreatment temperature effect" allows the effective values of these factors to be appreciated.

The best average % germination was attained when the pretreatment of 5° and 10° was adopted, although at 2° and 15° it was still effective but produced a reduced germination. It can be stated here that frost is in no way essential for germination.

Germination increased in proportion to the increased duration of pretreatment. It appears however that the effect of pretreatment can always differ as a result of subsequent conditions of germination. To achieve maximum germination, 60 days at 5°-10° is already sufficient, followed by germination in light at 25°C. Lower and higher germination temperatures reduce the % germination. All together, with germination in light, the optimum pretreatment temperature is 10°. Darkness during germination gives a poorer results. It appears however that the optimum pretreatment temperature is displaced towards 5°C. It is to be noted that *Maihuenia* is able to germinate to about 45% in darkness (pretreatment and germination). Under exclusion of light the optimum pretreatment temperature lies at 5°C - also displaced to a lower temperature - and the optimum of the germination temperatures then lies at 25°-30°C, thus displaced towards higher temperatures

As a cause for the requirement to make use of lower germination temperatures, it must be accepted that the embryo is still not fully formed. Freshly harvested seed contains a fairly large starchy perisperm (similar to *Peireskia saccharosa*, Buxbaum 1958) which is fully dissipated and consumed in the course of a cool-moist treatment, by the time it is put to germinate. Very probably the mobilisation of this reserve material from the perisperm, which must first be incorporated into the embryo before it is ready to germinate, results from the low pretreatment temperatures. This form of response has been demonstrated by Stokes (Ann. Bot. 1952, 1953) for seeds of *Heracleum sphondylium*.

.....from H.Middleditch

The author mentions that the initial germination test, which was virtually unsuccessful, was preceded by steeping the seeds "as usual". By this phrase he presumably means steeping in water. There is no mention of the steeping being done in cold or warm water, but steeping seeds in warm water appears to be regarded by several of the writers in Thompson & Morgan's pamphlets (Chileans No.48) as a traditional process for encouraging good germination. What is not entirely clear is whether the *Maihuenia* seed used for the full series of experiments was always steeped in water prior to the lower-temperature pretreatment. However, as the seed was placed on moist quartz-sand, then by inference, the cold pretreatment was given with the seeds moist (or damp) and not dry.

Similarly the use of a period of low temperature followed by germination at a higher temperature is commonly regarded as an essential pretreatment for certain seeds. In the Brooklyn Botanic Garden handbook on seed sowing, a low pretreatment temperature of 35° to 40°F is quoted, "about the temperature of the average domestic refrigerator". This temperature is an excellent match for the "best average germination at pretreatment of 5° and 10°C" given by Zimmer, above. The Brooklyn Botanic Garden handbook states that low-temperature pretreatment should be in a moist medium; a point further emphasized by J.Kelly, quoted in Chileans No.48 - "Take no notice of those who tell you to freeze them ..... The vernalisation process is kidding the seed that it has passed through winter and ..... all is safe for germination. It is not a bit of good subjecting dry seed to this treatment, it must be in contact with water. Small plastic bags, in which the seed is placed, mixed with damp peat, are the answer ..... put in a cooler part of the domestic refrigerator."

The Thompson & Morgan booklet "The Germination Times" is also quite explicit on this point:- "Prechilling was traditionally done by standing the pots outside in a cold frame during the winter. It is often quicker to use a domestic refrigerator. Large seeds can be mixed with 2-3 times their volume of damp seed compost and then placed in a polythene bag which is sealed and put into a refrigerator for the recommended period. However, there must always be sufficient air inside the bag, and the compost should never be either too dry or too wet."

It is suggested by Zimmer that the seed does not germinate before the cold pre-treatment because the embryo in the ripe seed is not fully formed, but does become fully formed after the period of cold pretreatment. The same author suggests (in K.u.a.S. 1.1973) that the embryo is incompletely developed in the ripe seeds of the ash tree. Similarly it was observed in the seed sowing notes from the Brooklyn Botanic Garden (Chileans No.48) that "Gingko and American holly will germinate only after the embryo matures", whilst P.Thompson also indicated that germination of ripe seeds of certain species was delayed because the embryo was only partly formed at that stage.

Several Chileans members have already reported improved germination resulting from chipping or abrading seed coats, which may possibly act as an alternative to stratification - cold pretreatment. But if Zimmer's theory about the embryo being unripe before cold pretreatment is correct, one is left to wonder whether chipping might bring about germination of an embryo not yet in a strong enough state to resist the rigours of seedling existence; is this one reason why members suffered so many losses at the seedling stage? Would a couple of month's sojourn in the refrigerator be preferable to chipping the seed?

But Zimmer is only concerned with germination. Clearly, cold pretreatment or chipping the seed coat produces acceptable germination results (Chileans No.47 & No.48). It is growing on seedlings from the cotyledon stage where the problem now lies.

.....from C.Holland

A sowing of *Maihuenia* seed has now produced seedlings with a cotyledon stem that is much shorter than from other sowings which I have made, and for that matter, from seedlings which I have seen from sowings made by other growers. I consider the reason for this to be that these were sown earlier in the year when the weather happened to be persistently cold and cloudy; such that, soon after germination had occurred, I was

able to remove the pots from their closed environment and place them on an open bench in the unheated, ventilated greenhouse, without fear that the compost would dry out and the seedlings shrivel to nothing, as has occurred with similar experiments. I suspect that the combination of dry air and good light, but without undue heat, suppressed elongation of the hypocotyl. In the previous year a sowing was made in June or July of some ex-DJF *Maihuenia* seed, when 30 - 40 of them germinated and perished in the same day in a sealed bag under a blazing sun. In both case the seeds were sown in a fairly coarse medium and covered with a thin layer of sand.

.....from H.Middleditch

Compared with the short stumpy, cotyledon stage seedlings grown on by C.Holland in an "unheated, ventilated" greenhouse, all the other cotyledon stage seedlings that I have seen - which have been grown on in warm greenhouses - possess a very long elementary stem. It now appears that this may be a sign of marked etiolation, contributing to early demise. Similarly, no problem with seedling elongation and excessive losses is reported by A.Butler, raising *Maihuenia* at a commercial nursery, where the germinated seedlings are kept in a "sheltered but unheated" greenhouse.

It has already become quite clear from the wet and dry bulb thermometer readings made by Meyen (Chileans no.47) that the air in central Chile has an extraordinarily low relative humidity. In addition, where the P & W seed of *Maihuenia* was collected in northern Patagonia, the prevailing westerly winds which there descend the eastern flank of the Andes will undergo adiabatic warming, thereby reducing further their already low relative humidity. Thus it is to be expected that *Maihuenia* seedlings in habitat will grow up under the influence of dry ventilation, with some daytime warmth, but certainly not with sub-tropical heat or moisture. It appears that in this instance, cultivation which approaches habitat conditions may afford an excellent chance of success.

.....from C.Holland

The way not to germinate *Maihuenias* is to leave the seed in a closed humid atmosphere in hot weather! Although they will germinate quickly like this, they will die off just as fast. My early sowings of *Maihuenia* were made before my realisation that a warm humid atmosphere was fatal to a newly germinated seedling of this sort. Consequently I now have only one surviving DJF 202 out of 25 germinations, and no survivors from 18 germinations of DJF 353,

.....from H.Middleditch

The *Maihuenia* seed exhibit no sign of the arillus coat which is such a prominent feature of the *Tephrocactus* seeds. So is chipping or abrading of the seed an advantage when it comes to *Tephrocactus* seeds? Would a period of cold pretreatment be necessary to ensure that the embryo is fully formed? Is a warm (but not hot) and well-ventilated environment best for these seedlings? As observed by P.Thompson (Chileans No.48), germination of Peruvian lily seeds needed "a small tear making in the seed coat immediately before seeds were placed at low temperature for a period, before sowing." How does the environment and climatic regime where they grow compare between these plants and *Tephrocacti*? If it is somewhat similar, would a similar pretreatment of the seed be expected to be appropriate?

.....from C.Holland

In the course of soaking my *Tephrocactus* seeds before sowing, I discovered that several of them developed an envelope which appears to be some form of slime. Perhaps this is a residue of the slime which surrounds the seed when it is in the fruit, and then dries up on exposure to air, but becomes reconstituted when the seed is given a good soaking. From the appearance of the seed they all seemed to be of the "bolivianus" group and were received as:- *Tephrocactus* sp. MN 192; T.sp. MN 218; *T.bolivianus* KK 2025; *T.litoralis*; T.sp. yellow spines Tucuman 3000 m; *T.camachoi* KK 2026; *T.cylindroarticulatus*. The seed of *T.asplundii* KK 2024 did appear to be similar to KK 2025, KK 2026, and *cylindroarticulatus* but had no envelope of slime after soaking. I also soaked a number of other seeds of *Tephrocactus*, all with very hard, thick, arils of various forms and these were received as:- *Tephrocactus* sp. MN 176; *T.pentlandii*; T. sp. Yocalla, Potosi 3600 m; *T.ignescens* KK 2023; and *Maihueniopsis ovallei* (which were all of the "rossianus" type of seed) as well as *Tephrocactus noodtia*; T.sp. Tastil; *T.viridiflorus*; but none of these developed the coat of reconstituted slime. All these seeds differed in their appearance from the seed of the *sphaericus*, *articulatus*, *Austrocylindropuntia*, and *glomeratus/darwinii* groups.

.....from R.K.Hughes

With regard to the coating of slime found by C.Holland after soaking some of his *Tephrocactus* seeds. When we say that some *Tephrocactus* seeds are not embedded in a pulp when the fruit is opened and so are classed as dry, this is not strictly true. They are damp due to this gelatinous coating which is not necessarily slimy. If this coating is not washed off at this time, it will dry up and then if the seeds are wetted at a later date, this coating will soak up water and make itself apparent once again.

.....from K.Gilmer

Our experience is that in habitat the hummock-forming *Tephrocacti* begin to flower early in Spring - at least in Argentina. The first fruits are ripe 5-6 weeks after flowering. At first the fruits are coloured - yellow, orange, or red - and pulpy within. After a further three to four weeks the fruit has dried out internally. Often one can see still pulpy fruits lying on the ground next to the plants. It is likely that they are eaten by animals. It is probable that these fruits push themselves off the plant as they enlarge during the ripening process. Any fruit which remains on the plant will gradually dry up and after two or three years they will be covered up by fresh segments. In our experience, seeds from fresh pulpy fruits will germinate better than those from older and drier fruits.

.....from R. Moreton

It will now be over three years ago that I sowed some *Tephrocactus* seed and got very poor germination. Being somewhat reluctant to throw away the remaining seeds I simply put the seed pots outside and left them there over winter. They were put back into the greenhouse in early summer of the following year and after only a few weeks, some more seed germinated, in July. Once again the pots with the remaining seed were put out of doors for the winter and brought back into the greenhouse in early June the following year, and once again more germination took place - this for the third year running. Also with *Pyrrhocactus umadeave*, germination in May was rather poor, as usual, but being reluctant to throw away seed which just might germinate, I put these pots to one side and left them alone until September, when they were watered again. This resulted in the germination of some more of the seed!

.....from A. Johnston

Two years ago I sowed some *Tephrocactus aoracanthus*, *T. articulatus*, and *T. alexanderi* which germinated quite well and are making nice plants now. Last year I received from K. Gilmer two fruits of *T. glomeratus* and one of *T. geometricans* which he had collected on his 1994 trip; the seed from these also germinated fairly well. As soon as I get any *Tephrocactus* seed or collect them off my own plants I now put them in the fridge and keep them there until I sow them. I do not bother with chipping or filing the seed, or soaking them.

.....from H. Middleditch

Perhaps the cold pre-treatment may be the most effective process for encouraging germination of *Tephrocactus* and *Maihuenia*?

### **CACTUS BERTERI By A. Colla**

**Translated by G.J. Swales from Memor. Accad. Sci. Torino 37, 1834.**

*C. Berteri* Nob. Ovate, sub-cylindrical, rounded at the apex, unbranched at the base, with small dark green compressed ovate tubercles very close together, lacking hair, very spiny at the apex, spines twice the length of the tubercle, whitish becoming blackish, 2-5 upper ones upright radiating, rigid, the others flexible (Plate XVII Fig. 2).

Habit. It grows together with the previous plant. It differs from it and other *Mamillarias* mainly in the number of spines which are so closely packed together that it may not be possible to distinguish the regular arrangement of the tubercles.

.....from R. Crook

Luigi Aloys Colla (1766-1848) was a great friend of fellow botanist Carlo Giuseppe Bertero (1789-1831) and whose daughter was the accomplished flower painter Tecophila Colla, after whom the beautiful Chilean crocus *Tecophilaeae cyanocrocus Bertero* was named.

Whatever plant Colla gave the name *Cactus berteri* to, Ritter transferred it to *Tephrocactus* in 1958. The Rep. for 1958 tells us that the comb. nov. is both valid and legitimate. He originally transferred this species in "Die von Curt Backeberg in 'Descr. Cact. Nov.' veroffentlichten Diagnosen "neuer" peruanischen Kakteen" 1958.

.....from H. Middleditch

In front of me as I write I have a copy of Plate XVII, page 85 from the Memor. Accad. Sci. Torino 37 for 1834, of which Fig II shows *Cactus berteri*. Superficially this consists of two segments, the lower and somewhat smaller segment being totally denuded of spines, the upper segment having a dense covering of slender (but not very long) spines. The tubercles are clearly visible on the lower segment and it is possible to count some 50 tubercles; allowing for those on the horizon which are indistinct, a total of not far short of 100 tubercles may be postulated. These are all shown packed close together - *tuberculis creberrimus*, as Colla states. This plant is referred by Colla to *Mamillaria* which suggests a plant with prominent tubercles; this is supported both by the description and the Plate. Neither the prominent tubercles nor the areole count appear to be consistent with what has been reported for *T. berteri*. However, the Colla description and drawing would pass for a *Neochilenia* which has grown a fresh top on a battered old head.

.....from Britton & Rose, The Cactaceae 1923

*Neoporteria subgibbosa*. Synonym - *Cactus berteri*, Colla

.....from C. Backeberg, Die Cactaceae

[under *Neoporteria subgibbosa*] .....here also is included *Cactus berteri* Colla.

.....from J. Iliff

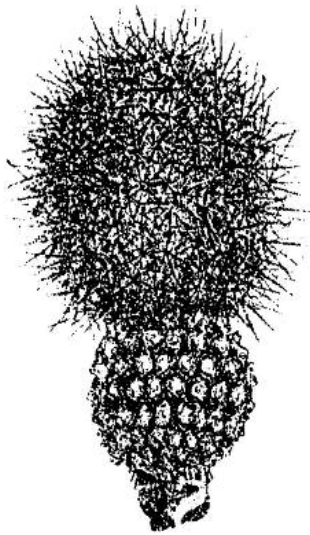
You may be interested to know that I have studied the protologue of *Cactus berteri* once again, very carefully, and there can be no doubt that this plant was not an *Opuntia* at all, though what it was it is difficult to say. Ritter's attitude to old names is completely unreliable; one can see no reason for his excessive enthusiasm in some cases, and strong exception in others. His acceptance of this name was totally uncritical.

.....from H. Middleditch

The original description of *Cactus berteri* included a note to the effect that "It grows together with the previous plant". Does this provide any indication of where it might have been found?

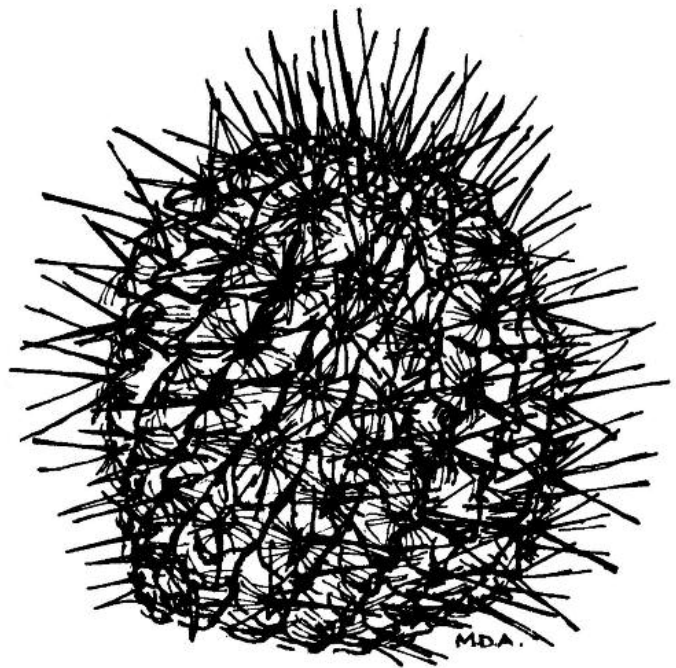
.....from G.J. Swales

This publication by Colla occupies 84 pages of text and provides descriptions of 47 different sorts of plants. The section dealing with the *Cactus* commences with a fairly lengthy set of notes, including numerous references to *Mamillaria*. It is also noted here that *Cactus curvispinus* was first published by Bertero in *Mercurio Chileno*, whilst elsewhere in this work it is noted under a number of species that they, too, were first



*Cactus berteri* Colla

Memor. Acad. Sci. Torino 37. 1834



*Neoporteria subgibbosa*

published in this same periodical. Under item XXXIX, *Cactus berteri*, it is noted that “it grows together with the previous plant”, the previous plant being item XXXVIII, *Cactus horridus*, Colla. Of this plant it is noted “Habitat in Chile, on rocky hill slopes, Valparaiso”.

.....from H.Middleditch

This would appear to place the original collecting location for *Cactus berteri* either at or quite near to Valparaiso. There do not appear to be any reports of *Tephrocactus berteri* from anywhere in the vicinity of Valparaiso.

.....from D.Maloney

But Valparaiso could be only an indication of the nearest large town to where the plant was first collected. I live a good ten miles outside Exeter but if anyone from another part of the country enquires where I live, I say Exeter, because then they will be almost sure to know where that is; whereas if I said Ottery St. Mary they are hardly likely to know whereabouts it is. So Bertero could have said “from Valparaiso” purely for convenience.

.....from H.Middleditch

But Bertero was out in Chile and would be aware of the many and various place names inland from Valparaiso, just as Gillies (who was his contemporary out there) did.

.....from F.Wakefield

But where does the other plant from the same location, *Cactus horridus*, come from?

.....from R.Ferryman

For me, the interpretation of the original description of *Cactus berteri* would be to equate it to *Neoporteria subgibbosa*. The original description, with the presence of tubercles, the absence of branching, would confirm this. On the illustration, the lower part of the body is clearly a spineless portion and this appearance is often seen with plants that have fallen from their hold; the lower spines rub off easily.

However, the original collecting location is extremely significant, near Valparaiso. The location of *N.subgibbosa* is coastal. Near and to the south of Valparaiso, *subgibbosa* and *horridus* grow together, where they range at most 2 to 3 km inland from the shore. *N.subgibbosa* grows on the rocks and *N.horridus* grows on the flat land. As noted above, *Tephrocactus* do not grow in the coastal area and in fact *Tephrocactus* is not to be found growing with these two species. Hence the original *Cactus berteri*, found growing together with *Cactus horridus* near Valparaiso, cannot be a *Tephrocactus*.

.....from H.Middleditch

From the foregoing, it would appear that *Tephrocactus berteri* does not really exist. In consequence, perhaps we should preferably say *Tephrocactus sphaericus* (Foerst) Backeberg, synonym *Tephrocactus berteri* (Colla) Ritter?

**ERIOSYCE -The genus revised and amplified By F.Kattermann.  
Reviewed by R.Ferryman**

The interpretation of the cactus of Chile by F.Kattermann has been with us long enough now that we should be able to make a reflective, non-emotional review. Mindful as I am that it is easier to make criticism than produce a similar effort, I have to say that the author is to be commended on the painstaking task of unravelling the *Neoporteria*, *Neochilenia*, *Thelocephala* problems that prevailed before his review. Whether one wishes to follow the author in using the all embracing genus *Eriosyce* or indeed follow the new species grouping is entirely a personal decision. The review and evaluation is after all a very personal interpretation.

The author places a great deal of weight behind the use of cladistics in his review. The utilisation of cladistics is not new but once again is subjected to the individuals' weighting of characteristics, some of which are difficult to support. Many of the features used in the analysis are at best plastic: stigma lobe attitude, tube bristle shape/thickness/attitude, shape of hilum, for instance show variation within a population and personally I have great difficulty in accepting these cladistics as serious. They appear to me to be used to support a view rather than confirming it. Most Chileans members will be aware that on *Neoporteria* the stigma length, attitude, and lobe positioning for instance can be influenced by prevailing weather conditions. Similarly the Chileans have discussed seed characteristics and nectary shape in the past and concluded that these are not reliable characteristics amongst *Neoporteria*.

My own analysis often conflicts with that of the author and this includes plants found at the same location on the same joint field trip! e.g. the *N.taltalensis* group. To further emphasise this, *Eriosyce lauii* is included as compatible even though over 25% of its characteristics are unknown! It must also be concluded that it is virtually impossible not to include a number of other genera, *Parodia* for example, if the criteria listed in the cladistics were the defining limits.

The erection of a new subsection *Chileosyce* to handle a few species previously encapsulated under *Thelocephala* is very questionable and to my mind undermines the author's generally valiant attempt at a review. This section includes *E.lauii* which is not a *Chileosyce* and in no way fits the author's diagnostic feature in that the tube is naked, the seed is not small but extremely large for this group - which is why Lau first thought the plant was a *Copiapoa*. In the narrow sense *E.lauii* is an *Islaya*. Again in the *Chileosyce* section, *E.tenebrica* is so close to *E.napina* to make it difficult to distinguish, yet *napina* is placed in the *Horridocactus* subsection. In addition *E.krausii* is freely offsetting, has a dense tube covering but in every other aspect is identical to *E.odieri*, which again is placed within a different group.

The fruit characteristics found within *Eriosyce* are well covered by the author and the reader may be forgiven in wondering if there remains any other form of seed dispersal. Many Chileans members will know that I have spent many weeks specifically studying *Eriosyce* in habitat and I am obliged to say that I have yet to see an *Eriosyce sensu stricta* where the fruit dehisce and expose the seed. During these studies I have witnessed rodents aggressively attempting fruit removal - which I suspect is the origin of Ritter's *Rodentiophila*. Dried fruits full of seed are often found and these can be detached with or without a basal pore. In his overview of *Pyrrhocactus* fruits (p.14) the author makes no mention of the very different fruit attached to *P.bulbocalyx*, yet this is acknowledged elsewhere. Staying with this species, the author suggests that the seed of all *Pyrrhocactus*, with the exception of *P.umadeave* "have similar testa cell surfaces"; this is not in keeping with my own findings as the seed of *P.bulbocalyx* is very different and interestingly very similar only to *P.villicumensis*.

The species grouping follows an obvious and I believe acceptable determination. Much argument will be attached to the retention of some species now simply gathered under one name, and again I believe a number of combinations have been made with some haste. At the same time some combinations do not go far enough, although the author is to be commended for grasping the nettle with the *curvispina/tuberisulcata* group and combining the two. It is not so commendable to hang on to *v.choapensis*, *v.mutabilis*, *v.robustus*, etc., when these show little variation from the species. Why *marksiana* is not sunk into *curvispina* and why *clavata* or *simulans* are not retained are just examples of what must be viewed as a personal interpretation.

It is disappointing that we still see the use of varietal status whereas the commonly accepted mode now - and at publication time - was subspecies.

There are mistakes: *E.chilensis* comes to mind as the author suggests the white flowered form is a subspecies form of the pink flowered "type" yet *chilensis* was first described with a yellowish flower. In fact flowers of the population vary from white to fuschia pink over just a few kilometres.

In Philippi's description of *Echinocactus occultus* specific mention is made to a collection location at Paposo which has subsequently been verified by others, myself included. Philippi indicated seeing this plant from Copiapo to El Cobre, but the plant called *E.heinrichianus* by the author is located further south around Trapiche and is certainly not "small almost entirely buried" as Philippi described. There is much more ambiguity surrounding *heinrichianus* than around *occultus*!

The author also prefers to call the plant found in the Elqui valley *E.kunzei* (*P.erosyzoides* Ritt) and the plant found at Copiapo *E.confinis*. It is stated by Ritter that his research indicated Forster's *kunzei* was found around Copiapo; it is difficult to follow the author's reasoning behind the reversal. To say that it never snows in the Sierra Hornillos does not reflect the habitat and altitude at which this plant can be found. It occurs along



the eastern side of Copiapo on the road to Argentina where quite clearly snow can fall in winter. I would still reserve judgement on the correct identity of *Echinocactus kunzei* but remain unconvinced by the author's argument.

On the basis that it is a well illustrated, generally well researched attempt, I can recommend the investment to any serious Chileans' member, although whether or not you choose to follow the author's thoughts is again a personal choice. I must repeat that this review is a very personal interpretation.

.....from K.Preston-Mafham

A great many species names are submerged into synonymy with others in this book. On the whole I feel that the "lumping" undertaken by F.Kattermann is reasonably logical. But there are one or two instances where I disagree. Quite definitely wrong is to equate *heinrichiana* v.*heinrichianus* with *v.simulans*. These two sorts grow only inches from each other and yet do not interbreed; therefore by definition they cannot be subspecies [=varieties - H.M.] of a single species. This also applies to *taltalensis* v.*pygmaea*; Kattermann makes *Neoporteria transiens* a synonym of this, but they again are sympatric and again do not interbreed! *N.taltalensis* and *N.pygmaea* have nothing to do with one another anyway, so this really does seem to be a mistake here.

.....from H.Middleditch

Some years ago a broad selection of seed of *Pyrrhocactus* Berger were put on to SEM pictures for the Chileans by M.Bregman and subsequently discussed at the Chileans' Weekend. On the basis of the seed alone, it was possible to divide this group of plants into two distinct sections, a division broadly supported by the flower form. Within one group the seed was of a fairly uniform appearance, but the other group lacked uniformity, not only in the detail nature of the testa cells. As is pointed out by R.Ferryman, this data is completely at odds with the appreciation by F.Kattermann of the seed testa.

The section of this book covering the "Systematic treatment" opens with a map of the general distribution of the genus sensu Kattermann. This includes an irregular circle centred on Salta, which might be supposed to be the habitat area for *Pyrrhocactus umadeave*. Unfortunately the habitat area for this species lies to the west and north west of Salta, in the dry area some distance from that city, and not within the cultivated plains and wet mountain slopes behind Salta, as the map suggests.

Almost all well written reference books that I can call to mind have one feature in common - an index. An index where specific names will be listed in alphabetical order, so that reasonably quick and easy information retrieval is possible in regard to any one particular name. By comparison, this particular publication appears to be without any useful form of Index at all.

At the rear of this particular work is to be found an alphabetical list of synonyms, each of which is given two reference numbers; one of these two reference numbers is listed in numerical order in Appendix IV, which provides no indication of page number on which this name is treated. The second reference number may be found, not in numerical order, by searching through the "Index of accepted taxa" which does provide a page number for the name concerned.

The index of illustrations provides, for each name listed under *Eriosyce* (but not for each species of *Neochilenia*, etc.) a baffling set of figures. The small print tells us that these figures are for coloured plates, line drawings, and SEM of the seed, respectively. It tells us that the page numbers for coloured plates are (in brackets) but fails to tell us that the page numbers for line drawings and seed SEM are also in brackets. These series of numbers would have been far less baffling if they had been arranged in six columns, each with its own heading.

The maps which display the distribution of the various groups and species are very useful, proving you can find the one you want. Thus for example under *Eriosyce aspillagai* on page 73 there is quoted "Distribution map 8", but without any indication of the page number on which map 8 appears - you have to search for it.

The colour illustrations are plentiful and illustrate a very good proportion of the names treated in this publication. but without consistent references in the text. Taking as an example the section treating *E.heinrichiana*, on page 79; no Figure numbers are quoted in this section of the text despite an illustration of this name being included in the book. In other publications such as Britton & Rose *The Cactaceae*, Backeberg *Die Cactaceae*, or Ritter *Kakteen in Sud-Amerika*, any Figures which appear in the publication are almost invariably quoted by number in the text dealing with that name. But here, one is obliged to consult the list of illustrations and decode the mysterious set of figures to find if there is an illustration for the name being consulted.

All the foregoing indexing, or absence of clear indexing, appears in the Appendix IV, under the authorship of D.Hunt, N.Taylor, and D.Zappi. Perhaps it is just as well that these authors are not involved in any other work requiring a clear and effective index.

The "Characters used in classification" are divided into sections, each with its own sub-heading, such as "Floral characters". Against each subheading is a reference to "Matrix nos. so-and-so" but without any indication of where this matrix is to be found. These matrix numbers appear to run from 1 to 58 and a search reveals a "Table One" nearer the back of the book which lists 58 characters. This is followed by a totally unintelligible table of figures described as a data matrix. No doubt it will mean something to anyone familiar with presenting scientific data in this manner.

This work represents a great deal of effort on the part of the author and it contains a considerable reservoir of useful data. The diagrams, maps and pictures may well be of interest to the general collector. However, it would be incorrect to describe this book as a ready reference to *Neoporteriae* and *Eriosyce*, since it cannot be readily referenced. Even to one with a keen interest in this group of cacti, information retrieval must be irritating. Not one of the best buys.

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### Particular interests

Austrocactus	A.Johnston, 11 Malvern Rd., Scunthorpe DN17 1EL
Cereanae	G.J.Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU
Cleistocactus	T.Lavender, Kalanchoe, Market Place, Tetney DN36 5NN
Copiapoa	A.W.Craig, 32 Forest Lane, Kirkclevington, Yarm TS15 9LY
Discocactus	R.Moreton, 91 Umberslade Rd., Selly Oak, Birmingham, B29 7SB
Echinopsis	M.Muse, 32 Fielding Rd., Birstall, Leicester, LE4 3AJ
Frailea	C.Holland, Newling Farm, Litcham, Kings Lynn PE32 2PB
Lobivia	M.Lowry, 7 Bygot Close, Leconfield, Beverley HU17 7NN
Matucana	D.Aubrey-Jones, 62 Rosehill Park, Caversham, Reading RG4 8XF
Melocactus	J.Arnold, Suffolk House, 2 Oak Hill, Washingborough, LN4 1BA
Neoporteriae	R.M.Ferryman, The Bungalow, Park Mews, Cheltenham GL53 0NE
Opuntia	R.Crook, 35 Cardinal Close, Worcester Park, Surrey KT4 7EH
Parodia	J. Brickwood, 48 Haselworth Dr., Gosport, PO12 2UH
Rebutia	M.O'Hara, 242 New Road, Booker, High Wycombe, HP12 4RG
Rhipsalis	A.Hill, 8 Vicarage Rd., Grenoside, Sheffield S30 3RG
Tephrocactus	R.K.Hughes, 16 Ashbourne Ave., Bootle L30 3SF

*When contacting any of these members please enclose an s.a.e. in the first instance.*

### THE CHILEANS

Organiser	H.Middleditch, 5 Lyons Ave., Hetton-le-Hole DH5 OHS
Treasurer	R.L.Purves, 19 Brocks Drive, Guildford GU3 3ND
Membership Secretary and Back Numbers	Mrs.G.Craig, 32 Forest Lane, Kirkclevington, Yarm TS15 9LY