

THE CHILEANS '92

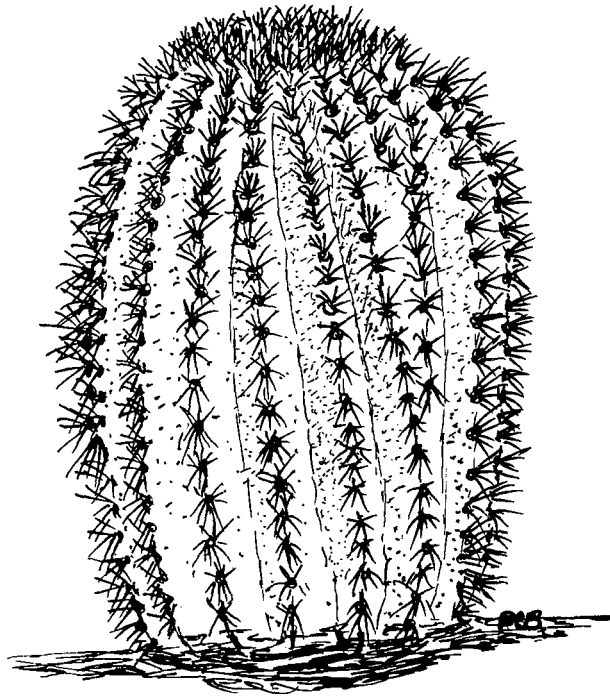
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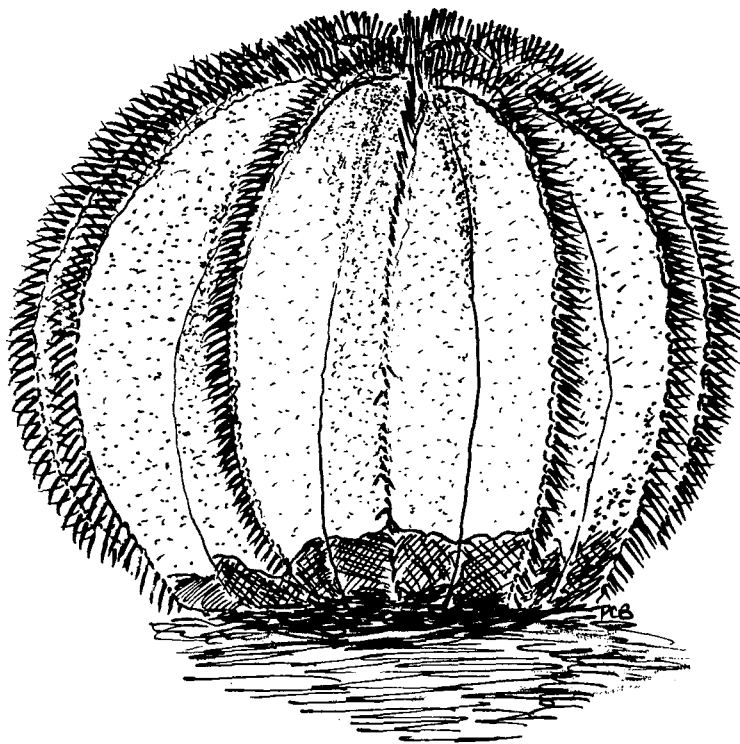
Floribunda bahiensis AH307

Chapada Diamantina, Brazil

Photo - A. HOFACKER



Uebelmannia flavispina



Uebelmannia pectinifera

PROBLEM UEBELMANNIAS From D.Angus

Some years ago I bought one or two imported Uebelmannias which I tried to get established on their own roots. Although one of these plants was still with me after a year, the only way to describe my attempt to grow these plants is to say that it was a failure. Despite being careful with the watering and giving extra heat, they were all lost. Since then I have kept clear of Uebelmannias, until a couple of years ago when I obtained one or two grafted seedlings from a local grower. As soon as these plants got to a decent size they began to send down roots from the bottom of the graft. From my previous experience I did not want to take these plants off their graft and try to get them away on their own roots. So I reduced the length of the stock on *U.flavispina* to about one inch, and then got it rerooted. After that I cut down the length of stock on *U.pectinifera* and on *U.pectinifera v.multicostata* to a bare half an inch and they are now obviously re-rooted. I do not intend upsetting them by trying to find out if there is any of the original grafting stock left, or whether it has just dried away leaving the plant on its own roots.

Even some of the offsets on these grafted Uebelmannias put down roots, so I have now removed two or three of these offsets and put them on a gritty compost on a heated bed, to see how they get on.

.....from K.Etheridge

Having acquired a fairly mature elongate plant of Uebelmannia with a very poor root system, I set about trying to get it established on its own roots. Although I gave it every possible encouragement, there was no sign of new roots even after several months. So I then tried slightly different methods, all of which equally failed to result in any new roots. The plant was clearly going steadily backwards so eventually I came to the conclusion that there was no alternative but to put it on to a graft. The body was very grotty around the waist so I decided to cut through at about that level. However the epidermis was very tough and hard so that in order to cut through it with a knife quite a lot of pressure would have to be applied. I felt that this might do some irreparable damage to the plant. Fortunately we had recently acquired an electric carving knife so I decided that it could be put to use for the first time on this particular job. It cut through the tough epidermis without any trouble at all. The plant is now growing well on its grafting stock.

.....from A.Hill

In about 1976 I purchased half a dozen imported Uebelmannias from Jumanery. One of these, *U.gummifera*, died after about a year and instead of just discarding it I first of all cut it in half and photographed the section through the tubercles, which really do look as though they are hollow. The two *U.warrasii* and the three *U.pectinifera* are still with me, on their own roots. They have always been kept in the propagator, where they are given a spot of water early in the season and very sparse water for the rest of the summer. One of the *U.warrasii* has put on rather more growth over the last few years, and a couple of years ago I experimented with giving one of the *U.pectinifera* a little more water, and that also has put on new growth. Up until then, I would be the first to admit that these plants have been kept alive but have hardly moved - at least they are still with me. Of course the spination on the new growth is distinctly shorter than the habitat spination. Is the name Uebelmannia warrasii a n.n.?

.....from A.Johnston

In the winter of 1970 we had Clive Innes to speak at our local branch meeting. He had some plants of Uebelmannia with him which he was offering for sale and I bought a collected plant of *U.pectinifera* from him. On that very day I had received a list from him in which he offered seeds of Uebelmannia, which was the very first time I had seen this sort of seed offered for sale. He told me that he had a tea cup full of the seed, and in due course I did receive some of it. The seed was sown on 21.3.71 and quite a number germinated; I grafted one of them for safe keeping and some of the seedlings were passed on to other collectors. Eventually the one on the graft was the only one that survived with me. When this plant grew on it became obvious that it was *U.pseudopectinifera*. It has recently started to put out offsets from quite near to the growing point. Is this a typical form of growth for an older plant?

After growing for 16 years this plant flowered for the first time in 1987 and has flowered each year since. Each time it has set seed without being pollinated. Last year it set just the one fruit, which I think is the largest one I have seen on this plant. It was almost one inch tall and nearly 3/8 inch in diameter. The fruit takes a few weeks to ripen and turns a reddish colour, roughly spindle shaped with a blunt top. In September I can give a quite gentle tug and the fruits will come away from the plant. The tug may really be needed just to get the fruit out of the dense spines at the growing point. The fruit is quite dried up but has almost no splits. From two fruits I had 58 seeds in 1990 and between 70 and 80 seeds from four fruits the previous year. I keep the seed and sow it in March of the following year; it is viable with excellent germination. The seedlings tend to be quite match stick like, long and thin at first, fattening out at the top after a month or two.

The collected plant of *U.pectinifera* which I bought off Clive Innes grew well for a while and then lost its roots. It did not seem to want to re-root so I grafted it onto a robust stock and got it going for a year or two until the stock rotted. I then managed to root the plant down and still have it growing on its own roots. I also have another large grafted *U.pectinifera* which was bought several years ago from an old collection that was being sold up. This flowered for the first time in 1990 but it did not set seed. I also have another *U.pectinifera* which again flowered for the first time in 1990 but this did not set seed either. A seedling of *U.pectinifera* which I was given was grafted for safety and is now making good progress.

Flowering takes place in midsummer. I wonder if the good summer of 1990 had encouraged the two *U.pectinifera* to flower or was it that they were mature enough to flower? Because of the long black spines on *U.pseudopectinifera* the flowers have difficulty in opening properly and do not project above the spines. It is easier to see the flowers on *U.pectinifera*.

Of my 1989 seed sowings I now have some seedlings of *U.pectinifera*, *U.flavispina*, *U.multicostata*, and *U.642* *U.crebrispina*. By the end of the summer some of the seedlings of *U.pectinifera* were 1" tall and 3/4" broad at the top. At least one of each of them has been grafted. A couple of match head size seedlings of *U.crebrispina* were grafted on to *Pereskopsis* and then subsequently on to *T.giganteus* and *Haageocereus* respectively. Both are doing very well, approaching 2" in diameter at the end of the same summer. All the seedlings have been moved twice, from seed compost into 2" pots and (near the end of the summer) into 2" pots.

During the winter all my Uebelmannias are kept in a warm enclosure within the greenhouse made of a simple framing surrounded by polythene sheeting. This enclosure is heated by soil heating cable which is covered with grit. The rod type thermostat stands just above the grit and is set at 60°F. These plants are watered with rain water to which I add two teaspoons of phosphoric acid and one teaspoon of Chempak No.8 to two gallons of water. They are also sprayed regularly on warm evenings. I often add Chempak No.8 to the spray water as a foliar feed.

I much prefer to grow my *Uebelmannias* grafted as once they get settled down they make nice plants and are not so much of a worry. The imported *Uebelmannias* have been in their pots quite a long time and I am reluctant to move them as I do not think that they like being disturbed.

.....from P.Bint

At present a fellow collector near here is erecting a new greenhouse and so I am looking after most of his plants; among these is a plant of *Uebelmannia pectinifera* which was purchased from T.Jenkins in 1983. It was about 2 inches high and some 2 inches in diameter when purchased; now it is approaching 3 inches tall and 3 inches in diameter. I am told by T.Jenkins that the plant came from Wouters nursery in Holland and was raised from seed ex-Buining about 1979-1980. It is being kept at bench level in my warm house where I endeavour to avoid the temperature dropping below 10°C. This plant stands in a tray along with others and I water only into the tray so that the water is taken up by capillary action, whereas the owner waters directly into the pot.

The other plant which I have sketched is *U.flavispina*, which I also purchased round about 1983. It is now about 50 mm wide and 88 mm high. It has always been grafted; cultivation as for the foregoing. The compost is roughly 50-50 John Innes and a combination of sharp sand, grit, and perlite. It stands on a high shelf on the NE side of the greenhouse. In summer it receives sunshine from 0900 to 1800 hours, but in winter it only has three hours of sunshine a day. Neither plant has yet flowered.

.....from W.Clarke

It must be all of sixteen or seventeen years ago that I acquired three imported plants of *Uebelmannia* - *U.pectinifera*, *U.ammotropha*, and *U.flavispina* v. *aureispina* to be joined about twelve years ago by an imported plant of *U.pseudopectinifera*. They have stayed with me all this time, still on their own roots. There is no doubt that they have had their setbacks, like losing their roots, (probably because I let them get too dry) but I have always managed to get them to restart. They even survived the move when I replaced three small greenhouses by one large one and suffered quite a number of unexpected losses in the first winter in the new house. They do not have the best conditions as they are on the north side of the greenhouse where they tend to be overshadowed by a large tree in the neighbouring property and so get what I believe is inadequate sunlight.

It is probably due to this that only the *U.pectinifera* had produced flowers fairly regularly, but even then I have never had all the buds open into flowers, usually the majority abort and only one or two open. This plant does not produce flowers every year, and the flowers themselves are rather insignificant. This year my imported *U.pseudopectinifera* has also flowered and set seed. The size of the fruit was almost as insignificant as the flower. I would regard the flowers on this species as self-fertile.

In addition I also have some seedlings of *U.pectinifera* and *U.multicostata* growing on their own roots. These were treated like all my other seed, sown in Spring in 2 inch square pots on the surface of a compost of roughly equal parts of ericaceous peat and horticultural sand. The pots are then stood in a solution of Murphy's copper fungicide until the compost is absolutely soaking wet. The pots are then stood side by side in a Ward propagator on about an inch of sand, which is always kept wet. The propagator has a 20 watt heater which stays on all the time. The small vent in the transparent cover over the tray is left open at all times. When watering, I often pour water over the top of the pots, not just on the sand bed. I like to see the water droplets collecting on the inside of the top of the cover. In most of my sowings of *Uebelmannias* I have had the odd seedling topple over with root rot while still only a quarter or a third of an inch across. All have quickly re-rooted and caught up with their more healthy companions.

The seedlings come out of the propagator the following Spring in order to make room for the next batch of seed. The seedling *Uebelmannias* from the 1986 sowing were stood on the bench or on the shelf, just like the imported plants, wherever room was available. Now they are being stood on the heated sand bed, not because I think that they need the extra heat, but solely because that is the only place left for them to go. They are all getting a drop of water occasionally over the winter whereas previously they were left dry over the winter, in a greenhouse temperature set at 40°F minimum. Although having said that, there have been rare occasions when frost has formed on the inside of the glass.

My *Uebelmannias* are planted in my usual compost which I use for all my plants. It is made up of 25 parts John Innes No.2, 10 parts coarse horticultural sand, 25 parts grit of 3 - 6 mm size, available locally, 4 parts of Hortag, 1 part of bonemeal and about 2 ounces of John Innes base fertiliser. This extra base fertilizer is to make up for the dilution of the J.I. No.2 with sand and gravel. In hot weather, small pots will dry out in about 24 hours after watering; large pots take proportionately longer. To conclude, I find that *Uebelmannias* are far easier to grow on their own roots than *Discocacti*.

.....from S.Stringer

I have been fortunate enough to keep five imported *Uebelmannias* growing on their own roots, *U.pseudopectinifera*, two forms of *U.flavispina*, both green and purple forms of *U.buiningii*, and *U.pectinifera*. These are all kept on the hot bed with my other Brazilian plants. Apart from *U.pectinifera*, the other four have flowered. *Uebelmannia pseudopectinifera* and *flavispina* usually flower in the months of January or February, *U.buiningii* rather later (the autumn). The flowers on the *U.flavispina* and *U.pseudopectinifera* are lemon yellow and very small, not rising above the spines. The flowers on *U.buiningii* are comparatively much larger and deep yellow, whilst this species reaches flowering size at 3 cm in diameter, or even smaller, compared with at least 4.5 to 5.0 cms diameter for the other species. There is a problem with the buds because quite a few of them are lost before they get near the opening stage. I also have a grafted *U.gummifera* which offsets prolifically; from time to time an offset has been removed but none of them has ever rooted down.

The two habitat plants of *U.flavispina* came from T.Jenkins a few years ago. Both had thin and fairly short tap roots. There does, however, seem to be two fairly distinct forms of this species in cultivation - the form distributed by T.Jenkins (ex-Warras?) and a form which has been available on the continent in recent years, usually offered on a graft. They appear to go round under the names of *U.warrasii* and *U.flavispina*.

In addition I have grown some *Uebelmannias* from seed. Both *U.buiningii* and *U.meninsis* v. *gummifera* are about 10 mm in diameter at one year old, whilst *U.pseudopectinifera* are also 10 mm across but have reached 25 mm in height.

.....from G.Charles

In 1975 I was paying a visit to *Uebelmann's* nursery in Switzerland when I found on the staging a solitary seedling plant of *Uebelmannia* HU 362 *ammatrophus*; it was only half an inch across and was grafted on to an *Echinopsis* stock. Apparently it was not supposed to be among the sales stock, but after a certain amount of diplomatic haggling I was able to acquire it. It is still with me, but rather larger now! And it has not been removed from its *Echinopsis* stock, although this is obscured by the layer of grit on top of the pot.

I regularly remove offsets from *U.pectinifera* at the warmest time of the year - in June and July - letting them callouse for about one week. They are then set in a 2" pot on a 50/50 compost of perlite and grit and stood in a drainless

seed tray which always has some water in the bottom. This is put up in the highest part of the greenhouse, near the roof; roots are put down quite quickly, often in less than two weeks after being potted up.

.....from J.Arnold

In 1976 I obtained an imported plant of *U.pectinifera* v. *flavispinga*, which is still on its own roots. It is kept in the warm end of the greenhouse which I endeavour to keep at no less than 50°F. This plant flowers sporadically, normally in late summer to autumn. I feel it is probable that they would flower at any time from February to October, given favourable conditions.

.....from R.Moreton

This year I have been able to obtain quite a lot of *Uebelmannia* seed. Each species was split into two batches and one batch of each species was sown in April and the second was sown in June. The "easy" ones like *U.pectinifera* showed very little difference in germination between the two sowings, but the most difficult ones like *U.gummifera* and *U.meninensis* did much better at the later date of sowing. Could this have been due to the high ambient temperature in June, or some other factor?

.....from H.Middleditch

In that part of Brazil where *Uebelmannias* grow, the seasons are very clearly distinguished between a warm wet season and a hot, dry season, as the travelogue by Auguste de St.Hilaire (below) demonstrates. The fruit on *U.pectinifera*, *U.pseudopectinifera*, and *U.flavispinga* appears to be of the "balloon" type, like *Islaya*, *Neochilenia*, and *Neoporteria*. This fruit may well be intended to stay on the plant over the dry season and for the seed to be dispersed by some agency prior to, or at, the onset of the following rainy season. If the *Uebelmannia* seed germinates in habitat at the start of the rainy season in the highlands of Minas Gerais, it will be approximately October-November time. At that time the sun will be overhead there, moving even further south to the tropic of Capricorn, coming overhead again towards the close of the rainy season. Daytime temperatures will be around the 70°F mark with an elevated night-time temperature. This might approximate to a good English summer but not to conditions inside a propagator.

BRAZIL - A CACTUS PARADISE By A.F.H.Buining Translated by H.Middleditch

Succulenta 53.11.74

One of the most interesting discoveries in the region of Diamantina was certainly *Uebelmannia pectinifera*. This species has a very extensive area of distribution and occurs upon bare rocks as well as on those carrying other vegetation. Especially on bare ground where the body is exposed to full sun, the epidermis becomes silver white. At the various places where these plants grew there sometimes appeared small differences, such as a larger number of narrower ribs, but after a detailed comparison we have up to now come to the conclusion that these are not new sorts or varieties. Young grafted plants or seedlings in our climate do not attain the silver-white colour. They remain almost black. Like all the species of this genus known up to the present, the flowers yellow or shades of yellow. They are smaller than those of *U.gummifera* and particularly smaller than those of *U.meninensis*. The fruits are also different from the aforementioned sorts. Out of the somewhat woolly crown there develops the rather long, thinwalled, oblong, balloon-like, red fruits.

A variety already described is *Uebelmannia pectinifera* v. *pseudopectinifera*, initially brought into commerce under the name *U.pectinifera* v. *elegans* n.n. With *U.flavispinga* one finds comparable, but somewhat smaller fruits than *U.pectinifera*. Although undoubtedly closely related to *U.pectinifera*, it differs from that in various respects in such a way that it is quite certain to be regarded as a good species. It is striking that under the epidermis small cells occur with the well-known gum. It is remarkable that where plants have effectively been grilled by the burning of the shrubs and grass by the local people, these small, barely visible, cells have become appreciably larger. It is possible from this to conclude that these cells, among others, must give protection against the heat of the fire. *Uebelmannia flavispinga* does not grow exclusively upon quartzite, but more at places that have a good cover of grass, mosses, small shrubs and especially Bromeliads.

Uebelmannia gummifera and *U.meninensis* have the very well developed cells, grow almost exclusively on the strongly heat and light reflecting white quartzite. Young plants of *U.flavispinga* are especially different from their full-grown companions. They look like *Notocactus succineus* Ritter rather than *Uebelmannias*.

Succulenta 53.12.74

Uebelmannia buiningii was also discovered in the area around Diamantina, but in 1966 it was evidently very restricted in its occurrence. Happily in 1972 we found another growing place, of which however nothing more will be said than the large numbers of this species. They are darker brown to occasionally lighter greenish-brown plants, which remain smaller than the other spp of *Uebelmannia*. The bright yellow flowers contrast nicely against the quite dark plant body. This is especially the case with the almost blackish-brown to nearly black epidermis of a separately growing form, which is still not published, but in commerce goes under the variety name *nigra*.

These plants grow upon mountain slopes with a covering largely of quartz grit, but in general more shaded by shrubs and also by the *Canella da Emma*, which occasionally attains the size of a small tree, on which account the ground is at the same time richer in humus.

.....from P.Braun K.u.a.S. 40.6.1989

U.gummifera and the closely related *U.meninensis* are distinguished in a unique feature from all other cacti on account of the especially interesting formation of much gum in cell-like arched cavities in the area of each tubercle.

.....from P.Braun K.u.a.S. 38.12.1987

U.buiningii, in contradistinction to the remaining species in this genus, displays no gum cells in cross section.

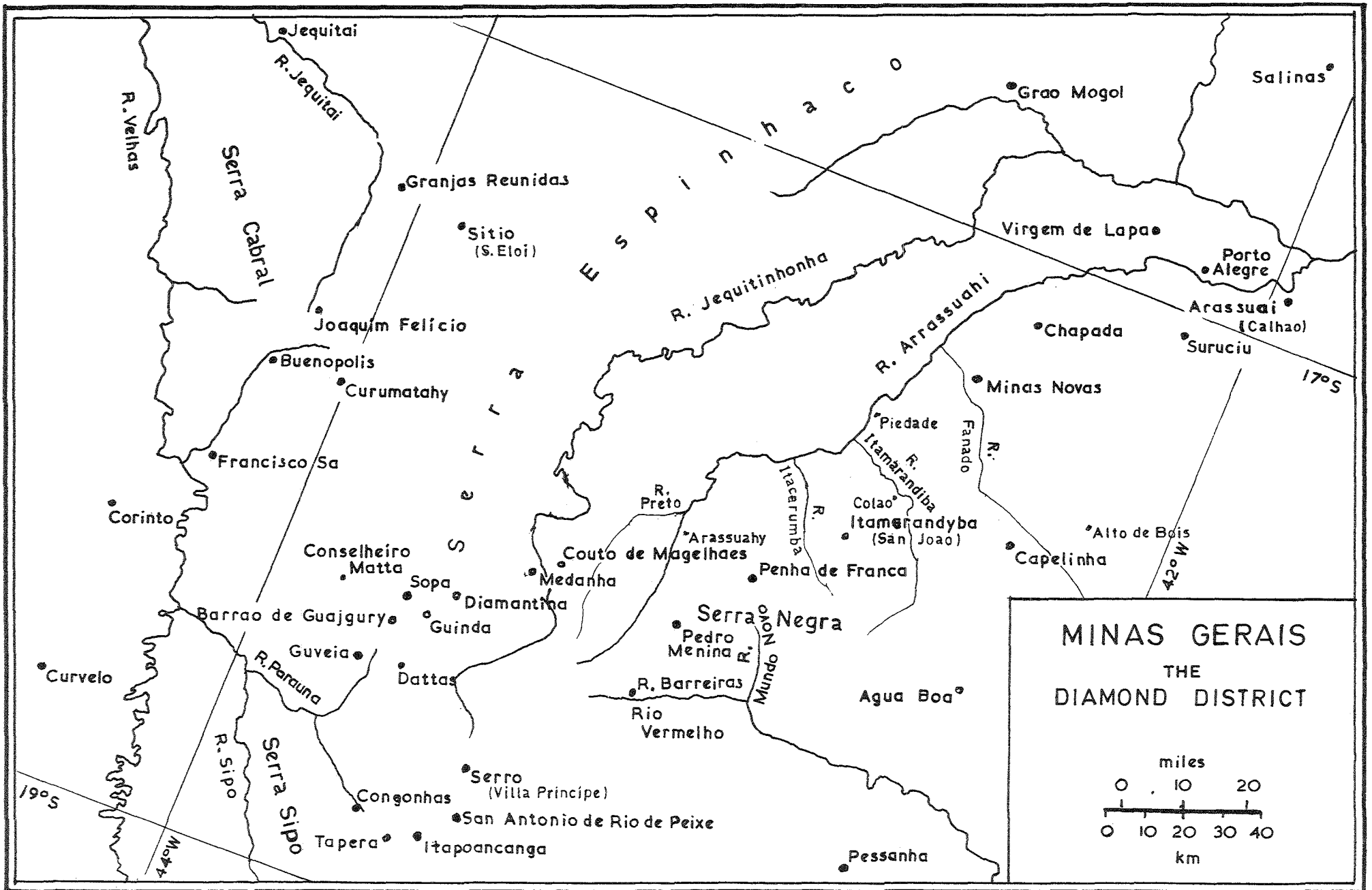
.....from H.Middleditch

These two foregoing observations appear to be in conflict with Buining's comment that gum-cells are to be found in *U.flavispinga*, but not in *U.Pectinifera*.

....from F.Ritter, 40 Years Adventuring 1977.

April 1959 I was asking this morning in the hotel in Diamantina whether anyone knew of any means of transport by road from here that would approach close to the Serra do Ambrosio. So I went by omnibus to Itamarandiba, in order to walk from there to the Serra Ambrosio. There were places on the route from which it was far less distance to it, as I discovered much later. It was merely clear to me that Itamarandiba was too far away.

So I walked back again some way along the same road, in order to turn off somewhere in the direction of that



mountain. After about an hour a rider caught up with me, with a second horse, saddled but riderless. He offered me that horse to ride. I explained to him that I would soon be turning off the road so that it would be no good to me to mount up further than that. After a dip came a side road, which seemed to me to be suitable. However the rider turned off here too, and now offered me the free horse once more, which I now accepted. After about an hour's ride we came to a farm which belonged to my companion. He invited me to enter, treated me to coffee and then later on to an evening meal. I certainly wanted to walk on further, but he invited me to stop with him overnight. Since the route to the Serra would take a full day, where there was no possibility of lodgings, which would be too much to do, I therefore accepted his offer and stopped there. I had a good night's rest and set out the next morning on my further trek.

It must be roughly 20 km from here to Penha de Franca at the foot of the Serra, but en route I deviated from the road here and there and once I came out from some shrubbery with hundreds of ticks, so that I had to undress to pick these pests from my body and clothing. In this way I lost several hours. I went for several hours together without there being even a single cactus. Finally I came past a flat rocky spot where a *Melocactus* grew in abundance. It was already late in the afternoon, when the road went over hilly terrain, that was covered with pure snow-white quartz sand. Suddenly there appeared on the loose sand globular cacti in abundance, which had to be those described as *Parodia gummifera*, but I recognised straight away that this was no *Parodia* but a new genus. Unfortunately they were without flowers and fruit and accordingly I finally had to abandon the search and take a specimen. Time was pressing, and besides I wanted to start the return journey towards Diamantina the same day, when a passer by on horseback told me that Penha de Franca was no distance away. I was soon there and stopped there overnight.

BRAZIL - CACTI THE HARD WAY By Inge Hoffman
From U.S. Cactus & Succulent Journal Vol.58 1986

Beginning the trip in Belo Horizonte, a long drive found us in the town of Serro ... next morning, shortly after leaving Serro, the old road was gone and the new one had not yet been built. We pressed on to Diamantina ... and set out next morning to drive to the little settlement Barron de Guacay, where a splendid habitat of *Uebelmannias* was supposed to be. ...we drove back a bit along the road we had come the day before and near Datas at Km450 we found *Uebelmannia pseudoplectinifera* almost as soon as we left the car. The only sad note was that many of the plants had deep burn scars and wherever the fire had found some fuel there were no plants left. It must have been a tremendous habitat, as we found *Uebelmannias* far back into the back country at random.

Next day we wound our way up the very dusty road to a plateau that must have been formerly covered by forest. Much downcast we proceeded for mile after mile on that miserable road through nothing but eucalyptus groves. The government of Brazil has had miles of acreage of rain forest razed to plant eucalyptus. The burning that is started along the existing roads goes on unchecked deep into the back-country until it is stopped at a natural barrier. No birds and few other plants live up to these nightmare stands of eucalyptus

In Itamarandiba we enquired about the Rochas Rancho where *Uebelmannia buiningii* was supposed to grow. Our hotel-owners soon turned into champions for our cause and a relative of theirs promised to take us in his taxi into the back-country the next day. Rochas Rancho was a lesson in ingenuity, frontier-spirit and hardship that would alone deserve a book. The son led us through the palm-groves of *Attalea* palms that are used for sugar and palm-heart production. Alone we would never have suspected that above this lush forest would be areas of quartz and sand again. The first thing we saw growing when we had reached the required altitude was a huge stand of very woolly *Pilosocereus densilanatus*. Intermingled were a few *Pilosocereus crassipetalus*. Right out in the bright sunlight we found dozens of the lovely, small *Uebelmannia buiningii*. Young Mr. Rochas told us that they were much more abundant further up but we had just come to take pictures, so we drove on.

Trusting our driver to get us out of these side-valleys and narrow ravines through which our car would never have made it, we somehow ended up high above the little settlement of Penha de Franca and on another completely quartz covered patch. This time it was *Uebelmannia gummifera* that seemed to grow right out of the thick snow cover. Indeed the quartz even made the sound of snow when we walked through it. Large crystals clung to the spines of the cacti and when I dug out one just to see how thick the quartz layer was, the roots came out completely clean with not a trace of soil clinging to them: grown in pure quartz! *Tillandsias* grew here in abundance, terrestrially as well as hanging from bushes and orchids bloomed pink and yellow everywhere.

Our trip now had to go north, so we had to drive many miles before we came to our next habitat at Coronel Murta. This is how it is in Brazil: hours of driving with absolutely nothing to see. Each day brings one tightly encircled habitat, mostly surrounded by devastation of burned forest or reforested areas....the garimpoes who dig for precious stones know the country very well. Often we found them a good source of information. ...early next morning we were on our way to Grao Mogol. The thunder clouds thickened and we barely made it back before a tropical storm hit and made further exploration impossible ... all night long it rained. We headed further north to Porteirinha unfortunately the rain persisted through the night, so we decided to return south and seek the only paved road leading from Monte Claros to Diamantina. We made the trip in record time, and there was still that habitat across the river near Barron de Guacay with *Uebelmannia flavispina*.

But once more the raging river foiled us. ... we found a sympathetic soul in the mine foreman, Walter. He had this really dilapidated VW and he was ready to plunge it into the river. On a spot where the gold-seekers usually wash the rocks loosened by the heavy rain, we crossed. Over a moonscape of loosened boulders, we made our way, clearing a path for the lurching VW. Over an old dam road and long abandoned bridges, until we reached a place far up above the valley but from where Barron de Guacay and the river could still be seen. We started walking. No, it was more like hopping from one solid spot to another across a morass. The morass came up to our ankles with every step and made a sucking sound when we extracted our foot. We went over small rivulets and back into the mud again. It seemed like miles we crossed that way. But soon another menace appeared; small granite outcrops that lay across our intended path had to be climbed over one by one. Suddenly we saw it; *Uebelmannia flavispina*, a beautiful golden spined *Uebelmannia* gorgeously gleaming in the sunlight that tried to break through the thick layer of thunder clouds. We had found the last plant that was missing on our agenda.

SEARCHING FOR UEBELMANNIAS By C.Wolters.
Translated by W.W.Atkinson from Succulenta 68.9.1989 & 68.12.1989

From Vitoria we descend gradually and sugarcane plantations come into view ... the weather is changing, becoming cloudy, the climate being drier to the north of us. The sugar plantations are now vast and monotonous. We set course for Sao Mateus and thence to Malacacheta. From here to Agua Boa we drove through an uninteresting vegetation, ... but as we moved onwards in the direction of Capelhina the vegetation recovered to some degree. Before we came to Capelhina there are huge coffee plantations. ... our next overnight stop was at Itamarandiba.

We rose at six in the morning and after breakfast we left Itamarandiba. The morning is still a little fresh out of doors at 13° with a relative humidity of 85%. In the vicinity of San Modestino Gonsalvas, on the road to Diamantina, we stopped to try our luck on the quartz-rich, promising, slopes. Without success. All circumstances pointed to potential growing places for *Discocactus*, but up to the present things had always worked out otherwise. Near Felisberto Santos we found tall slim columns of *Pilosocereus werdermannianus* v. *densilanatus* on the high rocks. Just beyond Medanha and up to within some 20 km of Diamantina we found many interesting plants. Brimful of enthusiasm and courage we plunged in to the supposed finding place of *Uebelmannias*. But, as it turned out later, this was not to be such a simple task.

Sadly there were many areas here too where everything had been burnt down to the ground.. Around Diamantina the ridges of the Sierra de Diamantina, or Sierra de Espinhaco if you prefer, rear up. They etch themselves in fanciful patterns against the blue and clouded sky, with changing patches of sunlight. We are still searching feverishly for *Uebelmannias* in the last rays of sunlight before the sun sinks below the horizon. Today, however, we are out of luck. It is high time we were seeking some overnight accomodation. We drive into our destination for today - Diamantina.

On the following morning we drove out of Diamantina in a temperature of 12°C and a relative humidity of 90%. Today we have allocated the whole of our time to the search for *Uebelmannia* populations out in the wild. After all, we now feel certain we are getting warm, but this proved to be a fine hope, but without result. Full of fresh courage we embarked upon a stretch of ground across which we had had previous information that *Uebelmannias* should grow. After much difficulty we did indeed find *Discocactus placentiformis* again, but no trace of *Uebelmannias*. Even these *Discocacti* were difficult to recognise. But it is quite a challenge to pick them out in the monotonous caatinga grassland.

Subsequently we stopped to search at a further seven or eight places on the off-chance of finding our prey; but it continues to be a matter of looking for a needle in a haystack. Towards five o'clock we have to admit defeat and, bitterly disappointed, resolve to stay in the same hotel in Diamantina overnight. It has been a very tiring day. All that climbing cost us much energy. Although mostly of fine, smooth and irregular structure, there were always firm footholds and leaning points enabling us to get across the loose rocks. But it was always a balancing act.

Departure is early next morning, with a temperature of 13°C and a relative humidity of 90%. We find ourselves in the part of Minas Gerais which lies at the highest altitude, namely at about 1000 m. First of all we have to get a minor repair carried out to the car door, so that it is about half past nine before we are able to move off in the direction of the Diamantina airport, in order to try our luck for the last time for *Uebelmannias*. It is another cold morning and feel in the air bodes nothing good. It is winter here.

First we have to clear a traffic control, then off we go, for a last attempt just past the airfield. In preparation for our final effort, we check the habitat location data concerning *Uebelmannia pseudopectinifera*, where we did achieve a success. Although this was accompanied with blood, sweat, and tears (of joy, or tears of sorrow?) we did believe it or not find four small plants of this species. Extremely rare, or had other "collectors" left their tracks here? I suspect the latter. Meanwhile the weather had become a great deal better, warm and dry, but still quite bearable.

Now we decided to leave the mountains round Diamantina and move on towards Consolia Mata.

....from F.Vandenbroeck

From our travels in Brazil it is my impression that *Uebelmannia* is rather rare in nature. We spent some days in the neighbourhood of Diamantina, where we found *Pilosocereus*, *Cipocereus*, *Piptanthocereus*, *Arthrocereus*, and *Discocactus*, but no *Uebelmannia*. It is possible that several original habitats have been virtually exterminated by commercial exploitation.

....from K.Preston-Mafham (At the Chileans' Weekend)

The road we were following through Penha de Franca ran parallel to a mountain ridge which lay perhaps five or six miles away. From the road we could see what looked like a covering of snow on the steeply sloping mountainside, although snow would be impossible in this tropical Brazilian climate, and in summer, too. When we climbed up to the site we found that the hillside was covered with small lumps of a shining white quartz, just like sand. Growing in this bed of quartz was *Uebelmannia gummifera*. The slope was so steep and the bed of quartz so loose that it must have been quite unstable in very heavy rainfall conditions. For this reason I believe that the seedlings of *U.gummifera* must establish themselves very quickly, growing quite rapidly when very young. There was good regeneration taking place for young seedlings of 1' to 2" across were quite abundant. At certain times of year it is very wet and very warm, perfect conditions for growth. What they have not got is any nutrient whatsoever. When we were there in the month of November there were no buds, flowers, or fruit, although most of the other cacti we came across in Brazil were either in flower or fruit. These *Uebelmannia* have been heavily collected for years. The area occupied by this population is very limited and it is no great distance from the road, so it would be quite possible for an unscrupulous collector to decimate this population in a very short period. We told the villagers not to let this happen, because this was the only spot where these plants grew. They thought that they grew everywhere, even in England!

In addition to the *Uebelmannias* there were a few dwarf bushes growing in the quartz; as well as some *Vellozias*. The *Vellozia* is very common in Brazil but they only grow on the edge of rocky areas so those which appear to be growing in quartz are probably rooted right down to the rocks. The *Uebelmannias* do not grow anywhere near the rocks. There were also *Pilosocereus crassipetalus* with thin sprawling stems, as well as *Pilosocereus densilanatus*. Away from the site of the *Uebelmannias* the hills carry no cacti at all.

Near Datas we collected some seeds of *Pilosocereus aureisetus*. There are a lot of nice *Vellozias* here and some nice yellow orchids - these are terrestrial orchids; all heavily burnt. The Brazilians are never satisfied unless they can send their countryside up in flames. Unfortunately there is enough vegetation on the rocks here for the burn to cross the rocks. The non-cactus vegetation will recover from the burning but it is the cacti that suffer most. The *Uebelmannia pectinifera* and *pseudopectinifera* here are all heavily burnt. These plants are exceedingly rare as it has been heavily collected, almost wiped out. The few *Uebelmannias* that remain have been burnt, which is probably why they have not been collected. But they are still alive.

.....from Auguste de Saint Hilaire, A voyage in the province of Minas Gerais, 1830.

[On seeing *Vellozia* for the first time, between Ouro Branca and Villa Rica] We were struck by the singular appearance of a monocotyledon which arose in the midst of the grass. Its perennial branches were five or six feet in height; they are as thick as an arm, twisting, and divide into a small number of equally crooked branches, spreading, and of similar thickness. With the exception of the crown, the whole of the plant is bare of leaves and covered only with dry scales which overlap like tiles on a roof, which are nothing more than the base of the old leaves. The new leaves form a canopy at the extremity of the branches, and are about as long as half a foot, stiff, linear, and pointed. In the midst of these arises a fine blue flower of about three or four inches in diameter and which, on account of its overall habit, has a resemblance to our lily. The stamens are numerous, the ovary inferior, topped by a long style which is crowned by a yellow stigma, flexible and with three lobes. This singular plant belongs to the genus *Vellozia*, of which the fairly numerous species are frequently a feature of the unforested and stony summits of the western mountain range. On account of their dry stems covered with scales, the large species of this genus are called canella d'ema (ostrich shank) by the natives.

I have given abridged details of *Vellozias* in my introduction to "The History of the more remarkable Plants of Brazil and Paraguay". If one re-unites the spp. with a definite number of stamens with those bearing numerous stamens, the genus should bear the name of xerophyta, previously given for the first time by Ant. Laur. de Jussieu. But I believe it is better to conserve the two genera.

.....from G.J.Swales.

In descriptions of this particular era it was usual for the actual number of stamens to be quoted if this was no more than about ten or twelve, although I am not aware of any specific number being recognised and accepted by all authors. If there was a greater number of stamens than about ten or twelve, this was usually described as "stamens numerous".

.....from L. v.d. Hoeven (At The Chileans' Weekend)

Not far from Penha de Franca I came across a population of *U.gummifera* also on a fairly deep bed of quartz, but this time on almost level ground. It also supported a fair number of low, spindly trees. There were both flowers and fruit on many of the plants - this was in August, so it seems that they are quite quick to produce fruit. There were one or two quite tall plants of *U.gummifera* to be seen.

Three or four miles away there was a site of *U.meninensis*, also on quartz, but on a bed of finer material and also possibly not as deep a bed, in comparison with the site where *U.gummifera* was growing. This site is far more difficult of access than where *U.gummifera* grows, with about half a day's walk through difficult terrain from the nearest vehicle track. There were both red and green bodied plants to be seen, all mixed up together. There were no tall growing plants to be seen.

Between the site of *U.meninensis* and that of *U.gummifera* is found *U.buiningii*, but again on ground made up of quartz grit. All these plants were a deep purple brown colour.

To the west of Diamantina, and growing on a quite different sort of ground, a dark brown soil with much more humus, was *U.pectinifera*. Here there were a variety of grasses, herbs, and bushes. Some plants were columnar, others barrelloid. There were occasional plants of *U.pectinifera* which were over a foot high. The spines stand straight out from the rib.

U.warrasii (*U.flavissima*) also grew on similar sort of ground.

UEBELMANNIA BUININGII - AN ALMOST EXTERMINATED SPECIES By P.Braun & E.E.Pereira
Translated by H.Middleditch from K.u.a.S. 39.1.1988

In July and August of 1987 we visited all the habitats of *Uebelmannias* in Minas Gerais. Up to the present time we know of *U.buiningii* from a small chain of mountains in the Serra Negra. There are hereabouts some four patches of quartz grit, very small in area, completely surrounded by tall evergreen forest. All these spots are to be found on only one Hacienda. The most easily accessible Type location is only of comparable size to a football field at the most. Despite a very intensive search we could find no more than 10 growing plants. There was certainly exploitation by an 8 man group of Germans who had no doubt come to the settlement a week before and after enquiring from the resident owner of the Hacienda, according to him had carried away about 10 kg. of plants. We found only traces of roots, cigarette ends, a handbill of a photographer in Leverkusen and bits of photographic packaging.

This is only one isolated example and has certainly not brought the population to its present state. Clearly responsible for the almost annihilated population is the commercial collection of thousands of plants over a duration of ten years. Such a restricted habitat cannot survive such a process. In addition the farmer was commissioned to collect annually as many seeds as possible, so that even the next generation failed to appear. It is outrageous that according to the statement of the farmer about one of the commercial collectors, even the crown of the small plants were literally cut out in order to facilitate harvesting of the seeds.

Whilst the farmer certainly has no innate respect for these spiny plants, nevertheless he regretted it when, a little later, he saw the dying plants. Now *U.buiningii* is not one of the freely offsetting sorts and also the continual high atmospheric humidity leads to rapid fungal infection. After a very long and wearisome trek we became acquainted with another small habitat, whose condition appeared to be still undisturbed. At least until a longer commercial collecting trip finds it here, when within a short time the same effects will occur.

This must be effectively thwarted, since seedlings and young plants have been collected wholesale in Nature and then after grafting and several months of cultivation they have been exported to Japan, USA and Europe as products of commercial nurseries. Under cover of "cultivated plants" many rare species have already lucratively escaped protection.

....from Succulenta June 1992

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..... *Discocactus horstii* *Uebelmannia pectinifera*
Frans Noltee, Rotterdamsweg, Zwijndrecht

VIEWING THE UEBELMANNIAS From A.Hofacker

In August 1992 we paid a visit to north-eastern Brazil, when we were very fortunate to be travelling in company with Ingo Horst who was familiar with many worth-while cactus locations. We had already made several trips to southern Brazil and seen much of the country there, but the plants and the landscape here in the north is completely different. Everything was new to us. We stopped for a few days in Diamantina and travelled to various places in the surrounding area. Some parts are quite well wooded and others are bare of trees and bushes. Bromeliads, tillandsias, terrestrial orchids and cacti are all fairly common. *Pilosocereus werdermannianus* v. *diamantinensis* is the most prominent cactus plant, growing up to about 2 m in height.

One great surprise to us was to find how and where the plants grow. The *Uebelmannia* (as well as the *Discocacti* and *Arrojadoa*) are growing more or less in the shade, underneath grass, trees, and shrubs. And as to the locations where *Uebelmannias* are growing, there is one group which grow around Diamantina - in all directions, and another group which grow on or around the Serra Negra, to the east of Diamantina. Around Diamantina the plants are more or less all related to *U.pectinifera*, where they grow on very rocky places. The rocks are deeply cleft, high and steep. Sometimes the plants are in quite deep trenches in the rock, up to 20 m or more in depth, so it is sometimes very dangerous to try and collect them. At other places they are growing on absolutely flat rock and at these places there is no problem in being able to see the plants. Most of the *Uebelmannias* grow in the clefts in the rock, where some humus has collected. So that most of them are growing with their roots in pure humus. The biggest plants we have seen were about 30-40 cm high and 15-20 cm in diameter. But I do know that *U.pectinifera* can become about one metre high. I do know the exact location, but we did not have time to visit this place.

Not far from Diamantina we came across *U.flavispina*, which never grows in full sun, always in among trees or under grass. At a second location we came across what I believe to be *U.pectinifera* v. *multicostata*, again always growing in woodland. Only five km from this site we came across plants looking quite different - a long spined *U.pectinifera* v. *multicostata*. At a further location on this road we found plants of the same species with short spines and fewer ribs. It can be very difficult to be precise in giving an identification to *Uebelmannias*, for these differ so much from one population to another.

Now we move from around Diamantina to Itamarandiba. Here *Uebelmannia* grow in the company of completely different vegetation, for here there are palm trees all around; palm forests in fact. This other group of *Uebelmannia* - *U.buiningii*, *U.gummifera*, *U.meninensis* and its v. *rubra* - are quite different from the *U.pectinifera* from around Diamantina, and they grow on flat places, without rocks, but again between bushes and trees. When we were at the first site we had to wait in the car for between half an hour and an hour until the really heavy rain abated, but we still had to photograph these *Uebelmannia gummifera* in the rain. There were lots of them growing among *Vellozias*. The stems of the *Vellozias* are not woody, but very soft. Each *Vellozia* has about four or five leafless stems, nearly upright and unbranching below the canopy which starts at about head height. Each *Vellozia* stands several paces from the next so it is quite easy to walk round between them, over the exposed bed of white quartz in which almost nothing else but the *Uebelmannias* grow. Some of these *U.gummifera* must be very old plants. There were plants up to about 70 cm tall, which must be several hundred years' old, because they grow so slowly. There were also a lot of young plants growing there in the pure quartz sand. In the vicinity we saw *Pilosocereus werdermannianus* v. *densilanatus* and *Cipocereus crassipetalus*.

To the south of Itamarandiba, not a long way from the site of *U.gummifera*, we came across *Uebelmannia buiningii*, again on ground of white quartz grains. Shortly before, the area had been burnt off so only a few small plants remained. The largest plant we had seen was 7 cm in diameter. On this one slide you can see many small plants of *U.buiningii* dotted over about half a square metre. Much of Brazil is affected by the regular habit of burning the dry vegetation. During one night we saw whole lines of mountain tops ablaze that had been deliberately set on fire. On several occasions we were prevented from following our intended route on account of the danger of being caught by an advancing fire.

This group of *Uebelmannia* grow in ground made of large particles of quartz for the first 3 to 4 cm depth and below that there is some humus mixed with finer quartz sand. But if you see a picture of the growing place, it looks as if the plants are growing in nothing but quartz. It is the same with *Discocacti*, which also seem to grow in quartz, but below the quartz there is also humus. I think that this gives us a tip on how to cultivate these plants - by using a mixture of mineral and humus compost but at the top part of the pot only mineral without any humus at all.

Now we leave the Diamantina region, travelling northwards towards Montes Claros. On the way we found charcoal burners at work, using eucalyptus trees which have been planted over huge areas in place of the original vegetation. Some 200 km from Diamantina, and still south of Montes Claros, orchids with purple flowers were very widespread, as well as *Pilosocereus* sp. and more *Arrojadoa*. Here we came across *U.pectinifera* v. *horrida*, with fairly long spines. Barely 5 km further on we came to the last of the *Uebelmannia* sites that we visited. The plants here did not appear to be *U.pectinifera* v. *horrida*, but *U.pectinifera* v. *multicostata* with very short spines, much shorter than at the previous site. This is probably the northernmost known habitat of *Uebelmannia*.

Uebelmannias are quite widespread and it is no great problem to find them, provided you know where you have to look..

....from H.Middleditch

When Pierre Braun paid a visit to our Chileans Weekend he showed us some slides of *Uebelmannia* in habitat. The horizontal rocky strata outcropped in a low vertical face, with narrow vertical clefts a metre or more in depth which ran at right angles into the solid rock. Some *Uebelmannias* were to be seen growing in these rather narrow vertical clefts. We were shown one photograph of an *Uebelmannia* which was almost one metre in height. It was roughly the same height as the depth of the rock cleft, and there was not a great deal of room to spare within this narrow cleft to accommodate the distance over the spines. It was in quite deep shadow from adjacent bushes or trees. This picture must have been taken not far from Diamantina.

It has always puzzled me that *Uebelmannia* was reported as growing in "pure quartz", evidenced by the ability to pull up the plants from the loose grains of quartz without any apparent damage to the roots. It is difficult to envisage any plant being able to survive without having any access whatsoever to some nutritious content of the soil, so it is very interesting to read the comment from A.Hofacker about the existence of humus at some distance below the surface. The summer rainfall in this part of Brazil can descend in torrential fashion, so that any degraded remnants of vegetation (dead leaves and so forth) on the surface of the quartz will, sooner or later, be carried down as the water percolates through the bed of crystals.

On 21 April 1817 I left Passanha in order to go and visit Minas Novas. I slept at Cana Brava and just beyond there at a spot called Ponte dos Paulistas, I turned off the road which led to Villa de Principe (=Serro, H.M.) in order to take that which led to the village of Rio Vermelho and Minas Novas, where I struck out towards the north. About a hundred feet from the junction of the two routes is to be found the bridge of the Paulistas, crossing the Rio Vermelho. The rivers Cocaes, Barreiro and Turvo join together with the Vermelho to form the R. Sussuhy. The route from Passanha up to Ponte dos Paulistas and for a league or two further on, passed through virgin forests with majestic trees, drooping lianas, bamboos, and tree ferns with only a few flowers making an odd spot of colour amongst the mass of greenery.

Beyond this point, the forests are less dense, and the capoeiras become more numerous. After three more leagues, we come to the village of Rio Vermelho. The river of the same name is about a league and a half from the village, whilst the R.Barreiro flows near the village. The village is on a small plain, surrounded by mountains on all sides. Very dense virgin forests cover the fairly steep slopes which form the northern margin of the small plain. At a distance of about one league from Rio Vermelho I came across an andaia, a coconut palm which is never found in the thick of the forest - it dislikes shade and so it becomes an indication of some change in the landscape. In effect, the opaque forests are no longer to be seen. I found myself above a broad valley, whereas those encountered on previous days had been deep and narrow. The hills covered with capoeiras become less elevated and at length the countryside loses the dark and wild aspect which it had had for so long [on the route from Rio de Janeiro - H.M.]

The country around Minas Novas which I am going to visit differs in its appearance and by its vegetation from any that I have seen until now. Here I speak only in general terms for, as will be seen, there are also virgin forests in Minas Novas. This place was discovered in 1726 or 1727 and in the year 1729 or 1730 it was established under the name of Nossa Senhora do Bom Successo de Minas Novas. The "Termo" of Minas Novas is bounded to the north by those of Urubu and Rio de Contas, to the south by that of the Villa de Principe and to the west by the justice of Barra, and to the east by vast forests, and by spurs from the main chain parallel to the Ocean, named Sierra Aimores and Sierra Negra. It is 150 leagues in length and 86 in breadth.

This country may be divided into four unequal but quite distinctive regions in accordance with the natural vegetation and the altitude of its different parts. To the east, the forest section extends along the frontier from the southwest to the northeast. After that comes the region of the carrascos, which is more elevated and where the cold makes itself felt in the months of June and July. The region of the catingas, much warmer and quite suitable for the cultivation of cotton, is located on the margins of the Arassuahy and between that river and the Jequitihonha. Finally the region of the campos, perhaps even warmer, is all to be found between the Jequitihonha and the Sao Francisco; this forms part of the immense territory called the Sertao or desert on account of its low population. I will give details about these four regions successively. At first I visited that of the carrascos, crossed by the most upstream tributaries of the Arassuahy. Next I passed into that of the catingas, then into that of the forests and finally, after retracing my steps, I explored the region of the campos.

At two and a half leagues from Rio Vermelho I made a stop at the Fazenda Mundo Novo, built on the edge of a stream of the same name. Before arriving at Mundo Novo, I had already observed some differences in the appearance of the countryside. To my eyes, the most thorough change took place when I had left the hamlet. To start with I climbed a steep and high mountain slope whose flank displayed capoeiras once again, but at the top of this slope the ground became blackish, sandy, and I found only bushes and shrubs. It was from the top of this same slope that I recognised how much the country I would be crossing was unlike that which I had previously encountered. I was no longer looking at dark, wild, forests; the mountains which lay before my gaze until they were lost to view, were bare and I could see only patches of woodland at odd intervals.

I will not describe all of the faint shades of difference in the soil and the vegetation which may be observed between Mundo Novo and the village of Penha. However, I cannot avoid saying something about the most remarkable hill called Morro d' Andaia. This prominent knoll, located about a league and a half from Penha, has a crown which consists of an extensive plain where the sandy ground supports only herbs, sub-shrubs and some stunted trees. To the right, the vegetation extends for a great distance. To the left, the view is limited by other hills of greater altitude still, where black rocks with a coating of lichens appear among a yellowish grass. Finally, looking forwards, there is a vast extent of arid hills, upon which grow a few sparse patches of woodland.

However, if the vegetation spread before me only disappointed me when viewed as a whole, then it earned my admiration when examined in detail. I have never seen such a diversity of vegetation. It consisted mainly of corymbiforms, a multitude of hyptis, of convolvulus, of verbena with aromatic leaves, etc. The species which appear as trees and as great lianas in the woods only produce dwarf stems here. For example I noticed a myrtle of only one foot in height, some bignonias, some cassias, a multitude of malphigias which are only sub-shrubs or small bushes. Whilst this occurs pretty commonly in the campos, it must be admitted that on this mountain there is a much greater breadth of species than of genera.

After travelling only four and a half leagues from Mundo Novo I arrived at the village of Penha. This village is dominated on all sides by the mountains whose peaks display only grasses and whose flanks are covered with trees which display the effects of the infertile ground. Around Penha there is only ground which cannot be cultivated because it is so arid and contains little vegetable humus, but on the other side of the hills which dominate the village are the great forests which are reminiscent of those of Passanha, and it is there where the majority of the cultivation is carried out. With the exception of the crowns of some high mountains, there is possibly not a single place in the province of the Mines which affords such variety of vegetation as the surroundings of Penha. I stopped in the village for several days and this is one of the places which I believe I would recommend to any botanist who wishes to visit the province of the Mines.

One terrain where the most plants are to be found is that which I crossed immediately before arriving at the village. Night had overtaken me and in the light of the moon it seemed to me that the ground was covered with snow between the gnarled bushes, an illusion produced by a pure quartzitic sand in large particles and of perfect whiteness. One of my tasks was to botanise in this place and I can say that during the whole of my residence in Brazil I have seen nothing else at all like it, either in the nature of the soil or in the general body of vegetation. It was a sort of dwarf forest of bushes standing apart from each other and about five to six feet in height, the trunk being very stout in relation to the height, the bark black or covered with cracks, the wood very hard, the foliage usually being hairy and dark green. Between the bushes were to be found smaller sub-shrubs, some climbing plants belonging mainly to the family of the asclepidaceae, and lastly, occasional tufts of grasses with stiff stalks and glaucous leaves.

Crossing this curious place, I came to a small spring; the soil was the same, with a trifling admixture of earth of a black colour, and this change, outwardly so slight, combined with the humidity, brought about a very great change in the vegetation. In the vicinity of the spring the ground was entirely covered with grasses and with Cyperaceae having dry leaves, not very suitable for sustenance for animals. In the midst of these were to be found some *sauvagesia*, some *utricularias*, and many *melastomaceae* which did not grow anywhere in the dry areas.

A league and a half from Penha lay Fazenda d'Itangua. The road to it is hilly and from the summit of one of the rises over which it passes, I came across a very extensive view which provided a mixture of unwooded ground and of woods with a pretty open growth. On this section I sometimes passed through *capoeiras*, and sometimes through the *carrascos*, a sort of thicket of tremendous extent. Before reaching Itangua the road descends into a hollow and the ground improves. In general the whole of the canton exhibits a pretty unusual alternation of good ground and of arid terrain. Along the road from Penha to Itangua, I noticed some ants' nests which I had not previously seen anywhere else. They were not the sort of post like those much nearer the coast, but simply small hummocks which rose in the very middle of the track to a height of about half a foot.

The elevated tract which extends from Penha to the vicinity of Alto de Bois, exhibited an appearance and a form of vegetation which was entirely new to me. There one no longer saw any high mountains terminating in ridges or sharp peaks, separated by narrow and deep valleys, and covered with majestic forests. Nothing more than simply undulating terrain covered with herbs and low shrubby trees. There are slightly elevated hills (separated by small vales) of which the summit looks like a small plain. (There also occur in this area some rounded hillocks, or at least they look like that when seen from a distance.) These curious summits are given the name of *taboleiros*, which signifies plateau, or they are called *chapadas* when they have a greater extent. (Properly speaking, *taboleiro* means a flat area with a brink all round). A sort of dwarf forest, called *carrascos*, crowned these plateaux; it is composed of low, shrubby trees with slender stems and branches, three to four feet in height, usually pretty close together. The characteristic plants of the *carrascos* are a *compositae*, two *hyptis*, a small palm and a *mimosa* which is very common. On the slope of the hills, the vegetation is no longer quite as thin; it grows steadily taller and exhibits gnarled and stunted trees, more or less well apart from each other. Finally, in the bottom where the streams run, the plants once more acquire vigorous growth; here there grows veritable virgin woods and it is here where the farmers have their dwellings.

Thus on the flanks of the hills crowned by *taboleiros* or *chapadas*, the plants acquire proportionately more vigour as the valley is approached; also where a hill which is covered with *carrascos* exhibits some depression where moisture could be retained and where vegetation could be sheltered from the winds, woods are always found there.

It might be thought that the ground of the plateau is of a stony or sandy nature and only yields scraggy plants; but it is not so. It seems fine to me; it is of a red colour and looks like that which was formerly covered with forests in the vicinity of Villa do Principe. It is of course necessary to acknowledge two causes in order to explain the difference giving rise to forests and campos. The first is the nature of the earth which gives rise to woodland when it is fertile but on becoming stony, sandy, or ferruginous in certain places it yields only small trees or bushes. The second cause of the disappearance of the forests is a difference in the surface of the ground and a lack of moisture.

I have just indicated that the vegetation was more varied when the campos were due solely to some change in the nature of the soil which, from fertile, becomes ferruginous, stony, or sandy. But one also observes changes upon the *chapadas* which are made up of good soil; one may be led to think that some differences of exposure and even some faint difference in the nature of the soil are the main reasons for it. However, it is necessary to acknowledge other possible causes which have not been detected, as I have seen some alterations in the nature of the plants with the same exposure and a terrain which appears to me to be all the same, whereas elsewhere some fairly considerable differences in the soil do not produce a more trifling alteration in the vegetation.

I occupied two days in travelling from Penha to Sao Joao (=Itamarandiba - H.M.), stopping overnight at Fazenda Itacarambi. On the first day I crossed three main plateaux, where I noticed a great number of stems bare of leaves and partially scorched. After the long dry season, around the month of July or of August, the *carrascos* are set on fire and the new growths which arise from the stumps of the burnt bushes provide fine sustenance for beasts. In this area I collected a very great number of plants; only a quarter of an hour's botanising around Sao Joao procured for me ten species which I had never obtained until then, thereby substantiating how varied is the vegetation there.

Leaving Sao Joao, I travelled two and a half leagues across two vast plateaux covered with *carrascos*. The hillslope which terminated the first of these plateaux was covered with gnarled, stunted trees, growing apart from each other, and between the trees was to be found grasses with stiff leaves and shrubs; altogether it looked exactly like an old-established copse-wood of our poor terrain in the Sologne, when a negligent proprietor has left beasts to pasture there. I have noted exactly similar vegetation elsewhere on previous occasions. From the top of the plateaux, my view took in an immense tract. There were unwooded hills whose summits displayed a rounded hump which were more or less at similar altitudes, and in the midst of which could be seen some patches of woodland widely separated one from the other.

The season of the rains is that of the insects. They were already very scarce before I left the virgin forests and even though I put myself to some trouble to look for them, only with difficulty had I found two dozen of them between Villa do Principe and Rio Vermelho. At the time when I was crossing the *carrascos* of Minas Novas, these animals became even less common and the only ones which I had seen were some *tetrapterers* with wings, and a very small number of butterflies. With the exception of the humming birds (and mainly of those with amethyst coloured throats) I likewise saw very few birds on the *chapadas*. Driven from these plateaux by the aridity and by the winds, they took refuge in the woods which bordered the streams and which, for them, are like some oasis where shade, water and abundant feeding is to be found.

Further onwards, when descending from a hillock, I observed a change in the vegetation which was unfamiliar to me until now. The very steep slope of this hillock carried only small trees; but they were about 15 feet high; their straight and slender trunks were very close to one another; in short their general effect would give an impression of some copse in our good ground [France - H.M.]. It is to these *carrascos* of a more vigorous nature to which the name of *carrasqueinos* is given and these form the initial transition between the *carrascos* properly speaking and the *caatingas*. On the summit of a second hillock I again found some *carrasqueinos* and after descending from there I came into the *capoeiras*. Here I had the pleasure of seeing a magnificent *bignonia*; it was twining between the trees and embellished them with great bunches of its long orange coloured flowers.

A little way before this spot, the lie of the land lost its regularity and the vegetation also displayed more varied changes. On reaching a place where a great stretch of landscape could be viewed, I saw that the low hills and the broad plateaux had been replaced by elevated bluffs, whose slopes were steep, the summits narrow, and which were separated by deep valleys. On the generalised basis outlined above of the correlation between the various types of ground with this

or that form of vegetation, I hardly need to say that the bluffs no longer carried carrascos, but were covered with tall forests or with capoeiros.

Ere long a deep valley is reached in which runs the little river of Itamarandiba. The hilly trail then skirts the R.Itamarandiba or an arm of that river called the San Lorencio. Finally the river is crossed and at this spot I came across a multitude of humming birds. After crossing a high bluff covered by woodland and campos I reached an even higher mountain which is crowned by a plateau and known as Chapada de Matro de Mandru. The vegetation on this plateau consisted of very small bushes interspersed with great clumps of grasses having straight yellow leaves. After travelling over this chapada for an hour I caught sight of the little village of Capellinha straggling along the valley, in which runs the R.Fanado. The hillsides and hilltops above the village are covered with carrascos after leaving Capellinha I again crossed several plateaux covered with carrascos, halting on the banks of the R.Fanado again after two leagues, at Antao Soares. Between here and Alto de Bois, I again crossed some chapadas intersected by shallow valleys. In this canton, the vegetation is very sparse, generally only grasses in the midst of which gnarled trees grow here and there. From the top of the plateaux, there stretched on all sides a view of a long succession of unwooded hills between which were some clumps of trees. No dwellings, no animals, no cultivated fields were to be seen. The road which took me to Alto de Bois was very difficult to follow. Around half a league from Alto de Bois the track became almost impassable; it had to descend some very steep slopes in the midst of rocks and boulders and the mules had difficulty keeping their feet ... I eventually arrived at Alto de Bois.

This hamlet is situated a little way below the summit of a bare hill, overlooking a fairly deep valley, dominated by a chain of uneven hills around it. On the lower of these hills grew some herbs interspersed with small bushes; the flanks of the other hills are covered with very dense and very dark virgin woodland, whilst the hilltops carry only a yellowish, almost smooth, sward. The elevated position of Alto de Bois has a marked effect on its temperature. From the time when I left Villa de Principe behind me, the really hot season had passed and I had always been cold during the night, when I had slept in my hammock; but nowhere had I experienced a cold as sharp as that at Alto de Bois, even though I slept in a bed. In the morning all the plants were covered with an exceedingly abundant dew and anyone would have thought that there had been a fall of rain during the night. Whilst in the forests which extend from Rio de Janeiro to Barbacena and likewise in the artificial campos of Catas Altas, Villa do Principe, etc., only an almost insipid milk is to be obtained from the cows, but that of Alto de Bois could compete with the better milk products of Europe and the cheeses of this canton a.e first class.

After leaving Alto de Bois, I descended into the valley overlooked by this hamlet; then, climbing up the opposite side, I found myself at the beginning of an immense plateau. Once again I caught sight of the village, the inhabitants waving their hats to bid me a last adieu. The plateau on to which I had climbed extends to within a league of Villa de Bom Successo [de Minas Novas = Villa Fanado - H.M.] pretty nearly in a NNE direction. It is parallel to the course of the R.Fanado and more than seven leagues in length. The vegetation there displays numerous shades of variation. There are no habitations to be met with, no streams are visible, but some marshes are to be seen there which give off most unpleasant smells and which owe their existence to small springs whose waters have no outlet.

About a league from Villa de Fanado, I started to descend by a very steep slope, then descended further by more gentle slopes and a series of terraces, each one lower than the last. When the descent commenced, the soil which had always been red before, became stony at this point. It appeared to be extremely arid and the appearance of the vegetation changed completely. There the 6 to 10 feet high trees had straight trunks, pretty slender and branched from the base; they grow quite close together so that the branches from one cross those of another (the carrasqueinos). All the hills around Villa Fanado are covered with these carrasqueinos right down to the edge of the R.Fanado. Among the treelike species of which they are composed, many lose their leaves in the dry season, but others are not deciduous. I left here on the 18 May 1817, for the village of Chapada and in the direction of the caatingas.

Having passed through the carrasqueinos around Villa Fanado, I reached a stony terrain covered with trees having gnarled branches. Chapada lay on a lengthy ridge and is overlooked by hills. Around the village much of the original woodland had been destroyed; none of the bushes spread over the ground were in flower. From Chapada I set off for Sucuriu, five leagues away, along a road which rose and fell the whole way. The terrain is reddish, stony, and of remarkable aridity. As to the vegetation, it exhibited a multitude of variations, which were perhaps accounted for by the altitude of the mediocre earth. Throughout this section I saw only one dwelling, scarcely any flowers, few birds and almost no insects other than a few butterflies. On leaving Chapada, the first hills are covered with short trees. Sometimes the carrascos are visible at a lower level. Elsewhere the small gnarled trees arise from a dried up pasture. Finally, on approaching Sucuriu, are the caatingas, trees higher than in the carrascos but less vigorous than the virgin forests, from which they are also distinguished by losing their leaves every year.

Between Chapada and Sucuriu the caatingas are not the only woods which the season had largely stripped of their attire. All the other sorts of wood had suffered the same fate; some trees had retained no leaves at all. Among those I saw almond and peach trees which were covered with flowers before bearing any new foliage. From the tint of purple or yellow in those leaves remaining on the trees I might have imagined myself in one of our own woods at home in the autumn. Here and there some palms were to be seen, with perfectly straight trunks, some 25 to 40 feet high. The dessicated leaves droop around the trunk, surmounted by six green, curved, leaves and crowned by a floral spathe.

.....from H.Middleditch

This route followed by St Hilaire in the above account of his travels, crosses the area in which *Uebelmannia gummifera*, *U.meninensis* and *U.buiningii* are to be found growing. It gives us a very comprehensive account of the natural vegetation as it was to be seen at that time, bearing little evidence of the influence of man. It appears that vast tracts of this area have now been cleared of their original vegetation.

LOBIVIA GRANDIFLORA FLOWERS. By H. Middleditch

It is many years ago that my collection included a slow growing plant with a yellowish green body and with short, slender spines somewhat reminiscent of those on *T.schickendantzii*. This plant carried the label *Lobivia grandiflora*. Eventually it became marked and was broken up for disposal, without once having shown signs of a flowering. From time to time over the course of several years I came across plants in other collections which had a very similar appearance to my own *Lobivia grandiflora*; sometimes they were labelled *Chamaecereus grandiflorus*. But it was not until I was paying a visit to the collection of A.Gray, then at Driffield, that I finally found one of these plants in flower. That particular plant

had been acquired locally as an offset from a fellow collector and much to my surprise the owner did not seem to regard the flowering performance as anything especially unusual. I was fortunate enough to depart with a small offset from this plant.

After some six or seven years of growth it achieved some 4" in height and also put out a couple of globular offsets from the base. Then for no apparent reason (or could it have been in response to that dreadful winter?) it put out a flower bud from the shoulder of the main stem. The progress of the bud was followed daily in the hope of being able to catch the flower on slides, along with a sliced flower. If it was going to be one of those *Lobivias* that opened its flowers almost at the crack of dawn, some sharp early morning photography would be called for. But if it only opened its flowers about mid-morning and then closed up for the day before tea-time, then there was every probability that I would be unable to catch it with the camera.

The bud continued to grow slowly, with a stout green hairy stem, carrying numerous long green scales. When it had reached about 35mm in length the bud was more or less fusiform in shape, the unopened petals tapering to a point. The time was fast approaching for a planned visit to Birmingham and by the day of departure the flower bud was over 50mm long and seemed likely to open any time. Fortunately the plant travelled well, it was also a nice dry and sunny day, the flower did open and it was recorded in whole and in parts on camera. This flower was quite unlike any other *Lobivia* flower that was familiar to me at that time. Whilst it did not quite attain the 10cm length attributed to it by Britton & Rose, when fully open, it had a much stouter and more widely tapering tube than any other *Lobivia* I knew. In addition, the flower was much broader over the petals when wide open than any other *Lobivia* flower I had seen. It would certainly merit the name *grandiflora*.

In order to try and find out more about this plant such as whereabouts it grew in the wild, what sort of habitat ecology it had adapted itself to, and so on, it would first be necessary to find out if my plant was correctly named. The starting point was to refer to "The Cactaceae" by Britton & Rose which provided the first description of *Lobivia grandiflora*, based upon a plant collected by Shafer, between Concepcion and Andalgala. My comprehension of the geography of that area was, at that time, virtually nil so I did not really know this location; I had even less information about the vegetation there. From that point, a check was made through the more recent cactus literature.

In an early issue of the NCSS Journal an article by Ernesto Vatter described a bus journey in northern Argentina during which he came across this plant; as far as I could judge from the maps then in my possession the Vatter location was in the same general area as the Britton and Rose location. Naturally reference was made to Backeberg's *Die Cactaceae*, in which my *Lobivia grandiflora* was apparently listed as *Helianthocereus grandiflora*. It seemed to have grown a bit since Britton and Rose's time, from 15-20cm high to 35cm tall. Backeberg's illustration Fig 1290 was very similar to my own plant, whilst his Fig 1291 had a more barrelloid body, somewhat similar to the plants of *Lobivia grandiflora* illustrated by Rausch in his *Lobivia 3*. One of these Rausch plants was from "Ambato" and another from Sierra Graciana. As far as could be judged from the limited amount of body visible on the Rausch illustration of the plant from Ambato, this appeared to be of similar habit to the *Lobivia grandiflora* commonly met with in cultivation. The Rausch illustration of the plant from Sierra Graciana also looks like the commonly cultivated sort - but the really interesting part of that photograph is the short length of stem of a herb with a mint-like leaf. This looks rather like the herb that is also visible in the photograph which accompanies the Vatter article in the NCSS Journal. Did the Vatter location for this plant also lie within the Sierra Graciana?

In his text on *Lobivia grandiflora* in *Lobivia 3*, Rausch infers that the form of this species found at Totoral (possibly Cuesta Totoral) is also the commonly cultivated sort, although the statement on this point is far from clear. Ritter writes about *Lobivia grandiflora* in his book "Cacti in South America". He uses the name "*Lobivia grandiflora sensu Werdermann*" and refers to it as the type which is commonly met with in cultivation. He says that he found it in the Sierra Ambato to the west of Catamarca city; after discussing the nomenclature he opts for calling this plant *Trichocereus lobivioides*.

When Roberto Kiesling talked about *Trichocereus* at our 1979 Chileans' Weekend, he had called my plant of *Lobivia grandiflora* by the name of *Trichocereus rowleyi*. In due course of time I had an opportunity to look at Kiesling's review of the genus *Trichocereus*, which had been published in Argentina. Here I discovered the origin of the name *T. rowleyi*. It was a synonym for *Lobivia grandiflora* Br. & Rose. The sketch of the flower of *Trichocereus rowleyi* in Kiesling's work was generally similar to the flower on my own *L. grandiflora*, but there did seem to be one flaw in this sketch. The scales on the flower tube do not form a consistent set of clockwise and anti-clockwise spirals; indeed there seems to be one scale omitted altogether more or less at the midpoint of the tube. It would appear to be possible, or even probable, that the artist has put scales on the sketch of the tube but not the precise scales that occur on a flower. One is consequently obliged to wonder how much more artist's licence also appears in the rest of this particular flower sketch.

In his *Lobivia 3* Rausch states that between La Puerta and Las Juntas, the plants are "stronger in all parts" and conform to the description of *Lobivia purpureominiata* given by Ritter. Whether this means that the spines are longer and stouter, or the body is larger, or what, remains quite unclear to me. However, when I paid a visit to see J. Piltz he had a plant which he had collected from near El Rodeo which lies in the very area La Puerta - Las Juntas. This plant was two or three times fatter than any *Lobivia grandiflora* I had ever seen and almost twice as high. Was this one of the "stronger" plants referred to by Rausch? This stout plant with numerous dwarf ribs, with short, fine spines, sparsely or not offsetting from the base, was a type I had seen in many collections and often wondered what to call it. Indeed, I even had one myself. It had put out a flower from not far below the shoulder and when it opened there was a faint hint of blue sheen to the petals so I had immediately put it down as one of those obnoxious hybrids and did not bother to photograph it. Standing in front of its near double in Piltz' collection I began to have ideas that my unknown *Trichocereus* (for what else could it be) might not be a hybrid after all. What could be the connection between this plant and the orthodox British Standard *Lobivia grandiflora*?

Five or six years ago I was fortunate to receive a small offset of R.526a from R. Moreton, who had been growing a nice selection of *Lobivia* species for many years, quite a number of them being R numbered plants which were probably acquired as first generation material. The offset grew until it was a good two inches in diameter, and then it started to elongate, but it did not grow upright, rather taking on a leaning attitude. Subsequently it began to put out offsets from the base, the two oldest ones also starting to elongate and grow not just upwards, but outwards, so that the whole plant took on a sprawling appearance, after the fashion of *Lobivia huascha*. The oldest stem will now be some 15 cm in length. Not only does it differ from my British Standard *Lobivia grandiflora* by growing in this sprawling fashion, and not upright, it also has a deep green body, not a yellow-green colour. The rib count is more or less the same, but the 15 mm long spines on R.526a are at least twice as long and despite the stouter body they overlap the spines from adjacent areoles to a greater degree, so that it gives the impression of being an altogether spinier plant. The new spines on R.526a are a reddish brown

colour which changes to a pale buff after about a couple of years, unlike the creamy-yellow spines on the standard *L. grandiflora*. In 1993 it decided to put out a single flower for the first time, which came from an areole not far from the growing point. Up to the time it opened, the external appearance was virtually the same as the flowers seen previously on *L. grandiflora*, although it was certainly growing into a somewhat taller flower. What an astonishing surprise when it did finally open - instead of the uniform deep red colour of *L. grandiflora*, here was a flower with a tinge of bluish-purple to the inside of the petals, just the same sort of shade that I had disdainfully ignored on a previous occasion on the even stouter and un-named plant.

No longer did it seem possible to regard this purplish tinge to the red petals as merely the result of some indiscriminate cross pollination in cultivation. Both in the G.O.K. 1975 Rausch field number list, and in Rausch 1,2,3, R.526a was identified as *Lobivia purpureominiata* Ritter. This was not a bad start, if the specific epithet was intended to make any reference to the purplish tinge in the petals. In his description of this species nov. in his *Kakteen in Sudamerika*, Ritter does indeed say that the petals have a tinge of "violet red". He also observes that this species is remarkable in having the interior of the flower like a typical *Lobivia* combined with a *Trichocereus* characteristic of the scales on the flower tube. The flower on my R.526a did have quite long scales on the flower tube, not pressed close to the exterior wall of the tube; their appearance was rather similar to the scales on those *Trichocereus* blooms which have flowered in my own collection. However, I would have been inclined to regard this feature as common to the standard *Lobivia grandiflora*. The description for *Lobivia purpureominiata* is a fair match for R.526a; my own plant has 12-16 ribs, Ritter gives 12. His flower section, Fig.325, appears to be full size as it closely matches the 80-90 mm flower length he gives, of which 33mm is the petals. My own flower measured 112 mm., the tube length being virtually identical to Ritter's Fig 325, but the petals distinctly longer.

Along with the offset from R.526a I had also received from R. Moreton an offset from R.525. This, too, grew and offset in turn, but produced a clump with each head growing more or less upright. Although each head took on an elongated form of growth, this was very slow and the whole plant remained quite low-growing, barely achieving a height of 8 cm. The bodies are again a deep green colour, not yellow green, but the spination is fairly short. Not to be outdone, this plant also decided to put out a flower for the first time in 1993 and, as if to emphasise this question of flower colour, also displayed quite clearly the tinge of purple in the inner petals.

It only needed my British Standard *Lobivia grandiflora* to flower to provide a nice selection of flowers from this group of plants, but it failed to produce any signs of bud. In paying a call on Whitestones, however, I was very fortunate in finding one of these plants carrying a couple of fully open flowers, one of which was forthwith removed. All four sorts of flower were sliced in half and pressed, then mounted and put up on the display board at the 1993 Chileans' Weekend.

In his *Lobivia* 3 Rausch says that "north of Catamarca,...in the direction of Aconcagua...*Lobivia grandiflora* becomes shorter with thicker stems.... with shorter, thicker stemmed groups like *Helianthocereus crassicaulis*". Rausch also illustrates *Helianthocereus crassicaulis* in flower; his plant has a far more depressed-globular body than the commonly cultivated version of *Lobivia grandiflora*. Rausch says that *H. crassicaulis* is found at Estancias and at Las Palmas, near Andalgalá. A slide from John Hopkins of his *Helianthocereus crassicaulis* in flower is a good match in both body habit and flower for this illustration by Rausch. Further slides of this flower from John Hopkins show a stigma which stands above the topmost anthers and appears to have twelve lobes; there also appears to be a throat circle of stamens. Generally the flower seems to be a pretty good match for the flower on my own *Lobivia grandiflora*. Thus it would appear that this *crassicaulis* might be considered as part of the same species complex. In his work on *Trichocereus*, Kiesling opts to call *Helianthocereus crassicaulis* Bckbg by the name *Lobivia crassicaulis*; he notes that a specimen to which he gives this name was collected at Los Narvaez in Dept. Andalgalá in 1977. Ritter chooses to give a new name of *T. catamarcensis* to this plant.

It is only quite recently that I have been able to establish that this *Lobivia grandiflora* was also found by Fric in the course of his last visit to South America in 1928. Of this plant, it was said by Fric "the appearance and size of the bud reminded me of *Notocactus concinnus*. Later in the hotel it opened its large purplish flowers. For myself, I would not know into which genus I ought to allocate this plant. The flower tube is too short for *Echinopsis*, the plant is too small for *Trichocereus*, and for *Lobivia* the flower in its 10 cm diameter is immensely large." The problem of 'to which genus to allocate this plant' is still with us.

PHYSIOGRAPHIC STUDY OF THE SIERRAS OF TUCUMAN By F. Kuhn & G. Roehmeder. Translated from *Universi. Nacional Tucuman Mono. Institu. Est. Geog.* 3 1943, by H. Middleditch.

Orography

The Sierras of Tucuman lie between the faulted region of the Puna to the north and that of the outlying Sierras to the south. The outlying sierras that are found in parts of the provinces of Tucuman, Catamarca, La Rioja, San Juan, San Luis, and Córdoba, all have a common geological origin. They emerge like islands from the lowland around, separated by level terrain of varied extent, described either as Pampas, Campos, or valleys.

In the southern precordilleras of these sierras of Tucuman, relatively gentle slopes extend outwards from the high summits, but deeply serrated by fluvial erosion. Southwards from the Quebrada Canas appears a sequence of parallel divisions running roughly NW-SE, forming a sequence of raised blocks separated by longitudinal valleys, as well as antecedent and renewed transverse valleys. The southern slope towards the Campo Andalgalá is characterised by a radiating group of elevated spurs of some 4000m altitude. From about 3000m the slope becomes steeper, but from the uniform level of the spurs the ground level which previously connected them may be clearly seen.

To the south of the R. Cochuna the body of the sierra broadens out appreciably and undergoes a division by virtue of lengthy tectonic trenches more or less parallel, whose axes run nearly north-to-south. In this way the basin of Campo Pucara - Valle de Suncho is formed, and that of Chavarria-Escaba. In consequence there are three orographic zones, a western one (Aconquija), a central one, and an eastern one, which all rejoin at their northern end, to the south of the R. Cochuna, then take on divergent alignments towards the south.

The basin of Campo Pucara is an extensive depression in the shape of a pear; the broad semi-circular shaped part in the south is some 10km across followed by a narrowing which is gradual at first and then (more or less from Suncho) more pronounced in such a fashion that the northern section acquires the form of a valley. The length as far as the Estancia Suncho is about 25kms, the average altitude of the broad section is some 1850m, and Suncho lies at 1620m. To the east, the depression is bounded by a long chain of level summits which carries various local names and as a whole is usually called Sierra Narvaez. This has an average altitude of 2500m. Crossing this sierra by the track that leads to

Suncho from Chavarria by way of the Portezuelo de Condorguasi, one may obtain a panorama which takes in a fine section of the mountain territory, extending over four provinces - Tucuman, Santiago del Estero, Catamarca and La Rioja, a view both magnificent and at the same time informative. The Nevados de Aconquija arise opposite there, separated from the viewing station only by the valley of the Campo de Pucara river. The altitude of 2230m at this spot allows the eye to sweep over all the details of this flank of immense dimension from the foot up to the summit, a culmination of varied slopes at over 5000m.

Turning to look more towards the north, the eye travels over the northward prolongation of Aconquija to the hills and mountains lying between Tucuman and Tafi. One may see that the Nunorco Chico is the last southward spur of that northern section which arises to the front of the principal mountain chain. Between that Cerro and the Cumbre de Santa Anna, the plains advance right up to the foot of Aconquija.

Turning now to the southward continuation of the Aconquija, we see from the southern peak of Cerro Medanito a long slope descending as far as the saddle of Chilca, which leads on to the Cerro Carreta, northern rampart of the Serra Ambato. Its spurs surround the Campo de Pucara to the south, between Piscoyacu and the Quebrada Pucara. Behind the low hills of Chilca occurs another great depression of the Pampean Sierras, but at a much lower level than the Campo Pucara; the Campo de Andalgalá, of an average elevation of 1000m. Above this great plain arises the Sierra Velasco to the southeast and finally behind that again it is still possible to make out the Nevado de Famatina, whose long and completely white hump lies at more than 250km from our viewing point. In fact there are few places in the Argentine Republic which can provide such extensive and such varied views as the Portezuelo Condorguasi.

Taking a turn more towards the south, the upper peaks of the Sierra Ambato are to be seen, the granite dome of the Machado which rises behind the mass of the Carreta. Then passing on more to the east by the Cuesta Singuil, there comes into view the Escaba basin, between the Cerro Quico and the Silleta Escaba, the southern end of the Cumbres Santa Anna, which bulks large over its length up to the Morro de los Chorrillos in the north. Behind this last Sierra appears the wide open plain, crossed by the meanders of the R. Marapa, and finally on reaching the horizon there may still be seen the small Sierra Guasayan in Santiago del Estero, the last outlyer of the Pampean Sierras in the Chaco.

From the summit of the Morro Canas at 2020m, facing the ranch-house of the Estancia Yunka Suma, one overlooks the whole of the sweep of the Nevados Aconquija. The line of summits describes an arc having various spurs running in an E-W direction. To the south may be distinguished the group of peaks of Cerros Overo 5350m, Candado 5450m, and Pabellon 5200m. In the depression to the north of this group originates the headwaters of the rivers Portrero, Casa de Piedra, Chiqueritos and Minas. To the north of the next valley, the R. Chacras, arise the central group of peaks, divided into two sections by the R. Vallecito.... More to the north, the summits descend steadily from an altitude of around 5400/5500m to about 4600m where they join the Cerro de las Animas.

What strikes the observer of this chain and catches his attention is not only the almost alpine shapes which appear as a result of glaciation, but also the change in the strata of the chain, readily visible on account of the brown colour of the southern granitic group of summits on the one hand, and the black appearance of the northern summits, where the mantle of metamorphosed pre-cambrian strata has been retained. And then there is the distinctive fringe of woodland of Aliso which covers the lower slopes of the chain, an encroachment of the upper part of the highland flora of Tucuman into the valley of Suncho. This dense woodland conceals the rugged relief of the ridges which run eastwards from the chain of the Nevados, with some peaks projecting above the steady slope, such as the sharp-pointed Nunorco Suncho, 2600m, which faces the Morro Canas.

The Campo Pucara falls within the province of Catamarca, since here in the south the provincial boundary no longer follows the line of the peaks of Aconquija (as it does more to the north) but leaves it in the direction of the central ridge. I have already stated that the broad depression of the Campo changes more to the north into a valley, in which runs the R. Campo between high terraces of alluvium to the west and the rugged scarps of the great fault to the east, by which the central chain is characterised in its western flank. Then at its junction with the R. Portrero, the R. Campo suddenly takes a turn towards the east and at the same time enters the quebrada that crosses the Canas, an impassable erosion gorge. But at this spot, the longitudinal depression does not terminate but continues northwards with a reverse slope up to the immediate vicinity of the river basin drained by the R. Cochuna; this extension is occupied by the R. Quintas, which joins up with the other two rivers at the entry to the Quebrada Canas. The source of the R. Quintas probably represents the extreme northern orographic limit of the great depression which extends over a length of about 40km. At the Loma Atravesada, between the R. Quintas and the R. Vallecito-Cochuina, is where the secondary chain separates from the axis of Aconquija, connecting the Aconquija with the 2000m high Clavillo, northern rampart of the eastern chain, which comes to an end at the transverse valley of the R. Cochuna. The fault line can be recognised by the fluvio-glacial detritus which is found among the last eastern foothills of Aconquija and Clavillo, and by the characteristic profile of this latter; escarpment to the west, dip slope to the east.

Up to the Quebrada Canas, this secondary chain forms a single body, divided into a northern part or Clavillo and a southern part, the Morro Canas, by the stream Portezuelo del Clavillo, tributary to the R. Canas. But immediately to the south of this transverse quebrada, the eastern chain is divided into two ridges by another longitudinal fault-depression. It is a lengthy basin, in which there are three separate rivers. In the northern part, close to the Quebrada Canas, occurs a watershed at 2000m called Portezuelo Alisos from which the R. Alisos runs to the north to discharge into the R. Canas, while to the south runs the R. Chavarria. The depression, with an axis NNW-SSE, widens out appreciably towards the south, attaining its greatest width at a level of some 550m at Escaba. From this place it continues towards Cerro Balcosna rising up to about 1000m altitude and this part is occupied by the lower course of the R. Singuil. Near Escaba the R. Singuil joins the R. Chavarria to form the R. Marapa which immediately starts its sinuous route across the eastern chain via a narrow erosion gorge. The depression as a whole extends more or less to a length of 40km similar to that of Pucara, but lies at a much lower level than the latter. Near Escaba the same hydrographic feature is repeated which we have become acquainted with at the entrance to the Quebrada Canas; two rivers in the depression, running in opposite directions, join together to form immediately a transverse valley crossing a mountain chain, the work of renewed erosion along a pre-existent route. In the Quebrada Canas may be readily recognised the deepening of a riverbed from a broader valley located at a higher level: in other words, we have there the effect of continuous erosion newly accelerated by a steeper gradient within the depression - an antecedent valley.

The Chavarria-Escaba depression divides the southern elevations into two chains, which are the central and the eastern parts. The central chain between the Quebrada Canas in the north and the Cuesta Singuil in the south is usually called Sierra Narvaez; it has various local names attributed to it, which from north to south are: Cumbres Suncho, Condorguasi, Alisos, and Casa Viejas. Its ridge displays a fine example of a very mature peneplain. The cross-section of the Sierra is the classical one of the Pampean Sierras: a scarp towards the Campo Pucara, specifically to the R. Campo,

forming an abrupt descent of some 600m and all the trails which ascend this flank are pretty rough. The Cienega Condorguasi presents an almost perfectly level altiplano, an excellent alpine meadow at an altitude of 2200m, arising out of the development of the slope in two stages. From the summit the first stage descends about 100 to 200m, exposing the outcrops of the Suncho gneiss of which the sierra is composed, and then across the Cienega towards the west, is met the edge of the main slope which falls precipitously down to the Campo Pucara.

The eastern chain takes the name of Cumbre Santa Anna and stretches between the Quebrada Canas in the north to the Marapa in the south. Its main peak, the Morro Chorrillos, is found in the north facing the portezuelo Alisos mentioned above and reaches a similar altitude to the Cumbre Suncho. The slope towards the Quebrada Canas, called Las Cuchillitas, exhibits a sharp gradient. Around this section arise tributaries to the R. Chavarria and to the R. Alisos. To the south of the entry to the Quebrada Escaba the eastern chain continues as the Cerro Quico and Cerro Balcosna, and where it splits into two to form the Sierras Graciana and Ancasti it is divided by the valley of Paclin.

Soil and Geology

The woodland vegetation which covers a considerable part of the Sierras of Tucuman, conceals the terrain and does not allow the traveller to stray off the beaten track. This zone is bounded by a line running along the slopes of the Aconquija from the provincial boundary with Salta in the north, as far as the basin of the R. Portrero and from there via the Quebrada Canas to the valley of the R. Chavarria. To the east of this line the slopes below some 2000m are generally covered with Monte and as a result have a smoky soil, usually quite deep. Only in the quebradas, whose flanks are far too steep to allow the development of this soil cover, do the basal rocks outcrop - in erosion gorges or on fault faces. However, in addition to and outside the domain of the Monte, above its margin and more to the west, there is the grass vegetation (the alpine meadows) which extends to the climatic boundary between the humid zone and the arid one. In general it is so dense that it covers slopes and summits with its compact mantle. The substrate is a fine earth, sandy-silt similar to loess, which covers all the slopes having mild gradients as well as the semi-plains of the summits within the rainy zone. It occurs up to 3000m which is roughly where the Puna vegetation begins, which is far more open and occupies stony ground.

When crossing the climatic boundary between the humid east and the arid west, the consequences of the changed conditions can be observed. The intensive transformation of the original products of disintegration, which in the east is the combined work of heat, humidity, and vegetation, results in the fine character of the soils either grey-black (humus type), yellowish (loess type), or reddish (lateritic), is absent in the west where, under the influence of the arid morphology cycle it exhibits a soil with the features of a semi-desert: - gritty, large sand particles and gravel. This covers the terrain and makes huge alluvial cones, bare of vegetation, at the mouth of the quebradas, reflecting the regime of irregular torrents of water and the absence of any protective vegetation cover.

In the middle reaches of the river valleys, that is between 2500 and 3500m, the profile of the continuous curve of the valley is interrupted by a horizontal or only slightly inclined surface, bordering one or both flanks of the valley with an enormous terrace, continuing along to a "landing stage" further upstream, along a pretty steep rise e.g. in the R. Canado valley above 2500m. Its previous size has been even greater; often its outward-facing margin forms an abrupt wall, cut out by torrents and by the course of the river which has deepened its bed, or between "mesedas" and the rocky flank of the valley, or by the lines of major dip within the debris filling the valley. Both features may be seen in typical forms in the "mesedas del R. Chacras" and in the R. Vallecito, and in the "Corral de los Choyanes". In an epoch of greater production of debris, this material has been deposited in the mouths of the valleys, forming broad and level alluvial cones which eventually built up into a very faintly inclined surface, with the beds of their respective rivers wandering along them. With the approach of today's climatic conditions, and the resumption of fluvial erosion, especially through the great antecedent quebradas (Canas, for example), this uniform superface was cut up into separate pieces, partially scalloped from terraces like a product of an epoch of greater lateral erosion by the river concerned. In the valleys of the rivers which descend into the broad Suncho valley, into the Campo Pucara and into the northern fringe of the Campo Andalgala, there exists such systems of terraces, some still with broad surfaces, which lead away like tongues from the more inclined slopes of the terminal spurs of the sierras, or now cut back by active erosion into the shape of a narrow longitudinal ridge between two rivers, or pushed aside into an elbow of the valley, where the lateral erosion has gradually deposited it, as for example in the valley of the R. Cochuna, at the "Pena Celeste".

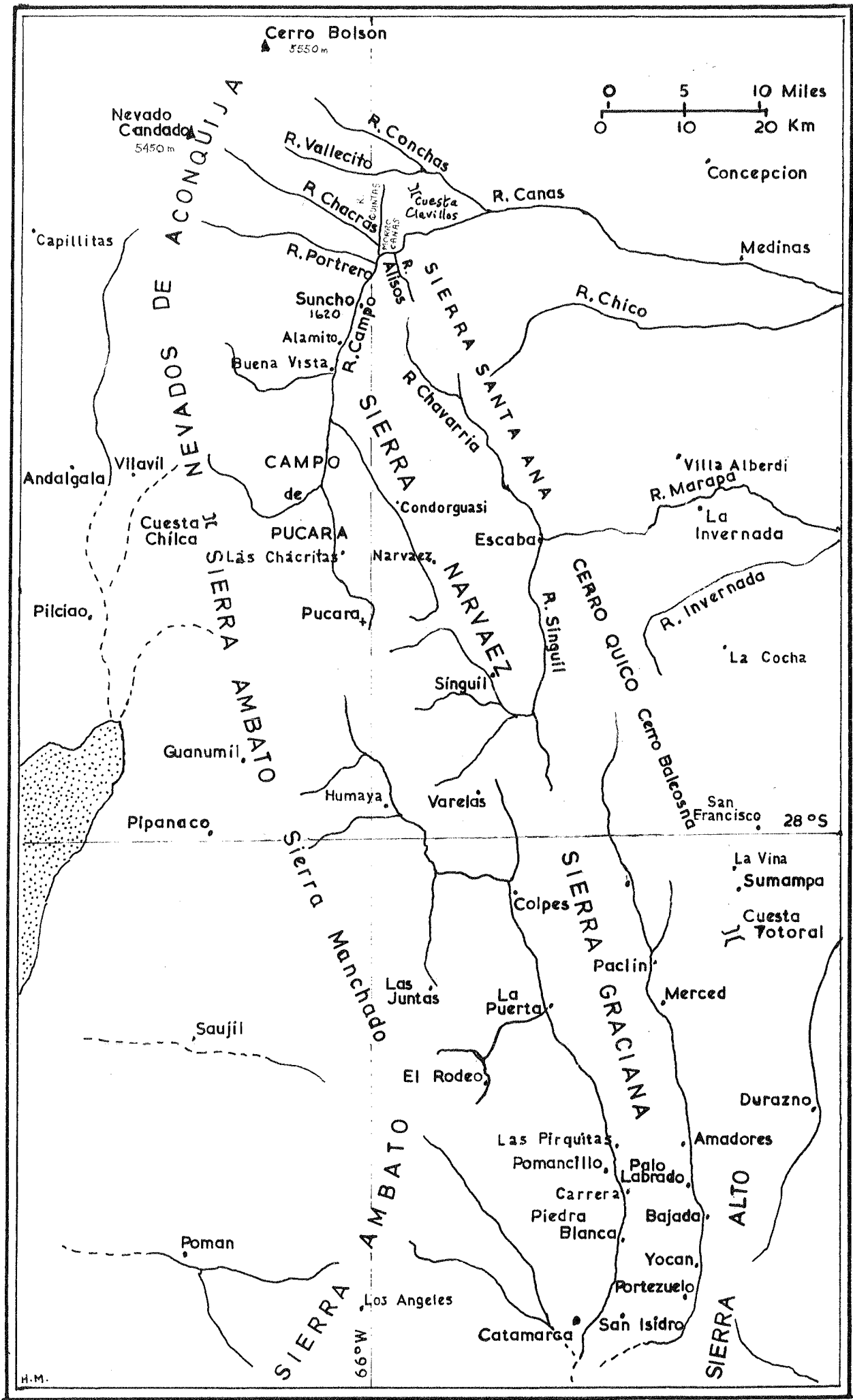
Passing now to a general study of the rocks of the region, we can classify these in a summary fashion into the following groups 1. Crystalline metamorphosed schists, which make up the nucleus of the sierras 2. Granitic batholiths 3. Sedimentary strata 4. Volcanic outflows. Rocky outcrops are to be found:-

1. Above the upper limit of the closed vegetation of Monte and alpine meadowland, i.e. on the high summits to the west, as much on the slopes and quebradas as on the uppermost semi-plains, where they often outcrop amidst a covering of debris, in the form of lomas and crags, sometimes changed into heaps of huge boulders.
2. In batholiths or monadnocks.
3. In the valleys within the zone of dense vegetation, where the base crystalline rocks appear in the case of erosion quebradas, and in the case of draining tectonic depressions, it is the sedimentary strata deposited there.

Climate

The individual climatic character of the Tucuman sierras arises from the fact that they face the general system of atmospheric circulation in the north of the Argentine republic. The winds originating from the Atlantic, moist and hot, which cross the Chaco region in a south and south-westerly direction, are forced to rise up the eastern flank of these sierras, producing the well-known phenomena of the condensation of their humidity. Naturally the eastern flank of the sierras is favoured by the rains, the western flanks almost lack them. Within the system of parallel chains in the southern part of the sierras, this typical distribution is repeated. In these minor elevations, the eastern slopes receive a greater amount of precipitation than the western slopes, a feature which is exactly mirrored in their vegetation, in a manner which also produced within the general E to W reduction in rainfall, a gradation with ascents and descents in quantities.

The rainfall reaches its maximum amount in the lower third of the external eastern flanks, most commonly between 1000 and 1500m altitude. Further uphill the precipitation takes on the character of a dense and humid fog. It occupies a zone between 1500 up to 3500m above sea level and sometimes remains settled for whole days at a time, limiting the visibility to 200m or less. The next zone above is much drier and generally lacking in rainfall. This horizon between 2500 and 4500m receives only occasional rainfall from the uppermost pall of condensation, but does not benefit from proper rainfall. It is a transition zone distinguished by drier air and more hours of sunshine than that enjoyed by the other two rainfall zones.



The uppermost condensation zone rises from 4500m upwards. At these altitudes precipitation occurs as garua, snow, sleet, or hailstorms. A second source of moisture for the Tucuman sierras that should be noted is the frontal rains which are produced as a result of invasions of polar air as far as the region of low barometric pressure in the central part of the country. These fronts advance northwards from the south and southeast over the prairie, accompanied by storms and gales ("pamperos") precipitating moisture particularly over the southern and south-eastern slopes of the Nevados Aconquija and the eastern precordilleras.

Vegetation

The Tucuman sierras afford excellent opportunities for studying local variations and their dependence upon climatic conditions. The reduction of temperature in step with altitude generates belts of different forms of vegetation superimposed one above the other. The tall luxuriant selva, in which evergreens predominate, with a layer of undergrowth; the deciduous mountain woodland; the alpine meadows; and the puna. But this vertical distribution by temperature zones is not repeated in regard to humidity. The greater or lesser amount depends upon the degree of exposure of the site to the rains, i.e. to the predominant winds which originate condensation in the form of clouds; in turn that depends upon the topography of the terrain. However one such area is not separated from the next, but intergrades, according to the local topography.

To recapitulate the general situation in regard to atmospheric humidity, the basic rule is that only the eastern slopes of the Tucuman sierras are favourably disposed in regard to rainfall, whilst the western slope is dry, with the division along the highest peaks of Aconquija. This line likewise represents a division between hygrophilic and xerophytic vegetation. In addition to this different exposure of the flanks on a grand scale, there exists a reduced scale within the eastern flank as we have seen, of relief subdivided by secondary sierras which run more or less parallel to the main cordillera, each ridge having one flank more humid to the east and the other flank less humid to the west. But the distribution of humidity is even more specialised: along the same flank of any one sierra are local changes in the character of the vegetation. This is explained by the relation between the direction of the winds which produce the rainfall and the lie of the transverse valleys into the eastern slope. The winds which generate the condensation, which is responsible for the clouds and the rains, predominate from the SSE direction, whereas the transverse quebradas run mainly in an west to east or northwest to southeast direction. This results in those valley slopes which face towards the south to south-east having a more favourable situation in regard to the amount of precipitation that they receive, than the opposite slopes which face to the north or north-east. So in those quebradas a notable difference may often be seen in the vegetation of the opposing slopes. Then these same south-facing slopes enjoy a greater shade than those which face north and north-east; in this way the two favourable effects add up - more humidity and less evaporation.

In addition it may be noted that the monte always grows on slopes of a definite gradient, whilst on those parts of the terrain which exhibit only a slight inclination, those are occupied by meadows - such as surfaces on the summits, the gentle slopes, the mesedas, and the terraces. A quite common picture is of a gently inclined slope covered with grasses, whilst all the erosion gulleys are occupied by compact groves of "gallery forest" without a single tree straying beyond this strict boundary. In this case there must be a greater soil moisture in these quebradas but the atmospheric humidity too must exert an influence, especially that fine precipitation in the form of mist (garua in the local tongue) which is produced by the clouds when they are in contact with the ground.

The selva (tropical forest) is found at the eastern foot of the Serra Santa Anna and along the Quebrada Marapa. At Escaba the upper end of this narrow quebrada opens out into an extensive level basin, surrounded by wooded mountains. The ground is covered with meadow and in moist parts there are clusters of Baccharis; low trees of Churqui and Molle are scattered over the terrain, isolated or in small groups. In this way the character of the formation is that of a savanna. But immediately on entering one of the quebradas which discharge into the basin, one is immediately in the midst of the selva.

In the valley of Chavarria, a fine woodland is made up of a dense and almost pure association of *Eugenia cisplatensis*, surprising to the traveller there who has hardly entered the quebrada. It is a tall tree, with a smooth trunk; it is a species which is found only in a few places in pure stands. In addition it may be seen in the quebradas which descend to the north and west to the plains of Tucuman. Excepting this woodland, the monte in the Chavarria valley is a typical basic selva, composed of Laurel, Nogal, Palo Blanco, etc. Higher up in the same valley, around Chorro de las Petacas, on the slope of the Cumbre Santa Anna at 1600m altitude, there is a fine woodland in which *Blepharocalyx montanus* abounds, as well as Nogal, Cedro, Mato and Arrayan. Higher up still, the two latter are associated with Sauce and Aliso and this predominates from 1900m in all the side quebradas of both the Cumbre Santa Anna as well as the Cumbre Alisos (Narvaez). The selva of the Chavarria valley, more or less above 900/1000m, also contains an abundance of bamboos. In these parts where the valley becomes widened out, the selva proper moves off the level, on to the slopes and the valley is then occupied by meadows and savanna, formed by groups or small copses of Churqui.

The Sierra Narvaez, on the western side of the valley, has moderate slopes covered by grass with a few isolated subtrees of Churqui, whilst its quebradas are always occupied by woods of Aliso; thus this flank carries much less woodland than the opposite slope of the Cumbres Santa Anna which carries thick woods all over.

Ascending the Sierra Narvaez at Portezuelo Condorguasi, there is found from about 1800m altitude, a few pines *Podocarpus parlatorei*, forming a copse in a quebrada by the side of the road. The thick trunks, not very tall, bushy, stand out right away from a distance on account of their dense dark-green foliage amongst the Alisos. It seems that they are the most southerly representative of this species, which occurs in groups and as isolated individuals at the altitude from 1600-2500m along the eastern flank of the Tucuman sierras, here and on the Cuesta Clavillo. The Cumbre Narvaez (de Suncho, de Condorguasi, de Alisos, de Casas Viejas) exhibit rich alpine meadow at 2200-2500m altitude; on its western slope it also displays an intermingling of bushes of Baccharis, Solanaceae, Eupatorium, etc. down to the foot, where the extensive grassland pampa of the Campo Pucara commences.

The association of Alisos is strictly limited to the eastern flanks of the Tucuman sierras; they do occur also on the southern part of the western slopes of the precordillera on the Monte Clavillo, Loma Atravesada, Morro Canas, and at the foot of the spurs of Aconquija, as far as the spot where the Suncho valley widens out into the Campo Pucara at Los Alamitos at 1620m. Of the components of this association, only the Sauce extends to the more southward slopes, limited there by the same conditions of minimum precipitation and level of temperature which control the extent of the Alisos to this boundary. In the valley of the R. Andalgala occasional specimens of the Sauce are found from 1500m up to as far as 2500m where they are the highest representatives of the arboreal vegetation. On this slope the Alisos and Quenoa are absent altogether.

The woodlands of Alisos appear on the eastern flanks of the Nevado Aconquija, in the Suncho valley, from 1400m

as far as 2600m as the upper limit, its disposition characteristically influenced by local conditions. In addition, in the Suncho valley, the alisales only occupy certain parts of the slopes which face to the south, within the Loma Atravesada, the Morro Clavillo and the Morro Canas, just the same as the northern gulleys from the mesedas, leaving the flat surfaces to pasture and cultivation and the other slopes to dense thickets.

This characteristic disposition extends westwards up to the sharp rise of the mesedas from the lower spurs of the high sierra; there, the Alisos form a fairly continuous woodland over the slopes as may be seen in the accompanying panorama. In these valleys up to 1900m there occurs the first Sauces, forming stands on somewhat flat and moist spots, without extending much above 2300m. The quenoa enters into this association at 2200/2400m and it is this tree which extends, in isolated specimens, up to an altitude of 3100m where the exposure is favourable. Between 2200m and 3000m where higher meadows occur in some valleys, there is to be seen a strong preference for specific locations by the different species. In the mesedas of Vallecito, for example, between 2400 and 2800m, it may be noted that the Alisos are restricted to gallery woods and to the immediate vicinity of the gully. The quenoales occupy the slopes of the Loma Vallecito facing to the S and SE, going up to 3100m, whilst the slopes to the north are similar to the flattish areas which are clothed with a flourishing cover of grasses drenched with moisture in summer, growing as high as 1.5m tall. The arboreal vegetation in these high zones is restricted to slopes of specific gradient; when the gradient decreases below that, approaching the horizontal, meadows abound. It happens that this circumstance even works in opposition to the effects of exposure, in such a way that a slope facing toward the south, of slight inclination, bears a pasture, whilst a slope at the same altitude facing towards the north, but steeper, carries arboreal vegetation.

The zone of alpine meadows does not descend below an altitude of 2200m on these eastern slopes.

A JOURNEY THROUGH THE ANDES OF SOUTH AMERICA IN 1858 By J.J.v.Tschudi.

Translated from Petermann's Geographischen Mittheilungen 1860 by H.Middleditch.

It was originally my intention to travel directly from Catamarca to Chile, probably towards Copiapo, but the extraordinarily harsh winter of 1858 made this impossible. So I decided to travel further north towards Bolivia for a more snowfree pass. The only choice seemed to me to travel from Catamarca towards Antofagasta [de la Sierra - H.M.], to follow the trail between Colorado and Leoncito to Copiapo, or to follow the Calchaquis valley northwards and to travel from Molinos over the Cordilleras and through the Atacama desert to Cobija. I decided to take this latter route and left Catamarca at 3 in the afternoon on 5 July.

The road passed through the widely cultivated valley of Chacras, initially quite broad, but later becoming narrower. Four leagues from the capital is Piedras Blancas named after some white quartz rocks in its vicinity. At 6 in the evening we halted at the Hacienda Pomancillo. Around midnight a bold Puma came for some mutton fat out of the yard close besides where I was sleeping.

From Pomancillo the valley became steadily narrower. The road is usually stony or sandy and follows the foot of a steep slope. Eleven leagues from Catamarca at a particularly marked narrowing of the valley is La Puerta. Close to the latter ford the R.Chacras receives an inflow from the Rodeo de Ambato. Beyond La Puerta the valley sometimes widened out, sometimes narrowed again; it is less productive and less populated, but is still more or less cultivated. The trail goes uphill and down-dale for four leagues to the hamlet of Colpes. Between Catamarca and Colpes the R.Chacras must be crossed 21 times. During the rainy season this is fraught with danger since the river although being fairly broad in most parts is deep and runs strongly at that time. Even when crossing in the dry season myself the water came up to the animals' bellies in most crossings. The worst part is that the riverbed is covered with large polished rounded stones on whose slippery surface the animals find no hold and tumble down all too easily. Only rarely is there a sandy ford and there is no bridge over the whole length.

Beyond Colpes two rivers join together to form the R.Chacras. The largest one comes from the west from the Quebrada Guanumil and the other from the general run of the valley, out of the Pucarillo valley. The water from each stream is of a different colour. The former seems to be in a stony bed and the latter flows in a sandy bed. The road then goes for two leagues through the narrow Pucarillo valley, then turns to the west to ascend a low ridge and then leads to the north again to Hacienda La Repressa. The now broadened valley ascends for two leagues up into the Alto de Singuil.

In this locality the Sierra de Alto carries the name Sierra Escaba. The Alto de Singuil forms the watershed between the largest rivers of Catamarca province. The trail follows the gentle gradient of the northern declivity towards the hamlet of Singuil across a so-called Pajonal, a plain covered with short straw-like grass which has just the same character as the Peruvian Puna. It was pitch black night when we reached Singuil. It was biting cold. The snow was already falling in thick flakes at 5 o'clock; it snowed the whole night and uninterruptedly for the following morning, so that it was impossible to continue our journey since a foul road lay before us.

Singuil is an extraordinarily productive and healthy locality with a European climate. A half a league beyond there the road left the high plain and made another half a league through a narrow and occasionally dangerous quebrada, climbing up and down to the so-called Casa Piedras, an overhanging rock under which travellers often passed the night. From here began the unusually steep Cuesta Singuil. One struggled uphill with panting beasts, hoping to reach the top, but behind the first rise towered up a second, and behind that a third, even more difficult to ascend. After an extraordinarily difficult climb of several hours duration the last mountain ridge was crossed, a spur from the Sierra Ambato, and one arrives at the so-called Cienega, a plateau overgrown with short grasses. I estimated the height at 10,000ft above sea level. Since the soil covering the southern scarp of the mountains was completely sodden by the previous day's snow, the ascent of the height was doubly difficult; the animals perpetually bunched together, unable to find a foothold. The attempt to reach the foot of the other side of the ridge was hindered by similar problems. We were enveloped in dense cloud on the Cienega so that we could not see the Sierra Narvaez lying not far away to our right.

From here there started an extraordinarily stony and steep narrow gully, through which the steep trail went rapidly downhill. I got off my animal to ease its load and to warm myself up. The quebrada lay full of snow, the Chilcayacu stream frozen solid in its narrow bed. The mule-track often runs so close to the perpendicular edge of the rock face that it seemed impossible for a laden mule to be able to pass along it without stumbling into the abyss below. Around 5 o'clock in the evening we arrived at the first hut in the broadening and somewhat less steep gully, which from here carries the name Pucara.

Close besides this spot arose a fairly steep hill. On its flat ridge lay the ruins of an ancient extensive indian fortress, surrounded by ruined battlements. From here the gully (there it does not deserve to be called a valley) started to broaden out and become less steep. Some 1½ leagues further on I met a north-american who had come across the Cuesta Chilca a

few days previously, when a packmule had slipped into an abyss and his indian guide had suffered frostbite in his feet from the fierce cold. This was not a particularly comforting piece of news for my present day's trip.

Around about here the valley opened out into a real plateau, the Campo de Pucara. A marvellous picture presented itself, of the Aconquija massif with three snow-capped peaks. A mass of cloud lay at the foot of these mountains. After we had crossed the Campo de Pucara from southeast to northwest, we arrived at the foot of the Cuesta Chilca, whose ascent was a hard piece of work. The extremely steep trail was coated with ice and snow. About half way up the gradient was so severe towards an abyss that the animals could not get a foothold on the polished ice. They skidded back the way they had come and were finally so demoralised that we could not risk a refusal so they had to be unloaded. After a lengthy search we found a side valley covered with broken boulders and under great difficulty succeeded in driving the animals through this, so eventually attaining the summit. From here a wild picture presented itself. Between the ridge we had just climbed and the Aconquija chain there arose mountain after mountain, separated by gorge after gorge, with the steepest sides and rugged tops, a chaos of indescribable splendour. After almost two hours of descent we reached a quebrada with a small spring and we had to make our night's stop here under an overhanging rock, since there was no more water to be found over the next seven leagues.

Early in the morning all the water was frozen solid and our night's camping place was coated with ice. We could scarcely keep ourselves warm during what seemed to be a long wait for the sunrise. For two leagues we followed the narrow stony gully, until it opened out into the plateau of Andalgala, which has closely-spaced low-growing bushes on the sandy ground.

TRAVELS THROUGH THE LA PLATA STATES - 1861. By H. Burmeister Translated by H. Middleditch

(Travelling south from Tucuman...) On January 29th we arose with the sun in order to continue our journey, readied our animals and set out on our way. Today we had only a short trip to the Estancia Invernada. The snow covered peak of Aconquija was clearly visible away to the northwest. The area we were travelling over was pretty flat grassland, with patches of woodland. Eventually we came to a river and enquired at a house by the wayside for the best crossing place, as it looked difficult to cross. The banks were thirty feet high at both sides, the water roaring between them with high waves foaming over imposing boulders and uprooted trees. I took off my boots and stockings, hitched up my clothes, and rode down into it. The water came almost up to the saddle and the waves broke noisily over the body of the animals, who had to be constantly urged forward. In this way I arrived with my companions at the far bank of the R. Marapa, the largest tributary of the R. Tala; it rises within the mountains and follows a longitudinal valley at the foot of the main chain, behind the wooded forehills.

Just here on the banks of the Marapa, or possibly even a little earlier, the laurelwoods ceased to surround the river course. Now the trees were mainly slim-leaved Legumes, such as Algarrobo (*Prosopis dulcis* and *P. adstringens*), the Ceibu, the Quebracho colorado and Q. blanco, the Garabato, the Guayacan, and the Mistol. After travelling across more grassland, we arrived at the Estancia Invernada. After resting here for one day, we set off at half past six in the morning, crossing open country and the R. Invernada to reach Coche; we rested there for about two hours during the heat of the day and set off again at 2.00 p.m. under a clear sky with some clouds. The clouds became darker and darker behind us and shortly we saw the rains pouring down at both sides, but leaving us dry. At 4.00 p.m. we came to Estancia San Francisco; from here the road started to go uphill along a pretty broad valley of the R. Guacras, which carried but little water. After passing through some woods we reached Arroyo Sunumpa, 11 leagues from Invernada, but by this time it was so dark that we had to halt here for the night.

On 1 February we left Sunumpa, quickly entering thick woods in quite hilly terrain, the track leading up the mountain. We followed a wooded valley for about an hour until we reached the grass covered treeless heights where we had a fine view over the plain behind us. As far as the eye could see there was nothing but green fields like a sea of green grass reaching as far as the blue horizon. At intervals appeared dark strips of dense woodland snaking over the plain marking the course of the rivers, winding away from the woodland on the hills below us. Neither dwelling nor town was to be seen between the groups of trees - everything lay at our feet in the original state of Nature.

To reach the open heights I had to clamber up a pretty steep trail in order to take a thermometer reading at the top; but there was no wood there for lighting a fire, the wind blew keenly around us and made a lengthy stay uncomfortable. So we jogged along the crown of the Sierra towards the west, until the prospect to the east was lost to view. But in the selfsame instant there opened up at my feet something quite different, more surprising, the broad valley of Catamarca. Cultivated fields and well-built houses followed the river. Contrasting sharply with that was the bare yellow sandy or clay earth of the mountainside enclosing both sides of the long valley from north to south. A stunted, scanty vegetation, apparently dry, clad the mountain ranges, in which the tall cactus columns are extremely eye-catching and provoke great interest. As if by a magic spell the landscape to the east and west of the mountain changes; there everything is soft greenery overflowing with plenty and here only poverty and apparent sterility is offered to one's eyes.

The mountain whose very steep slope we now ride down, is not really the Sierra Aconquija but a much lower branch which is called the Sierra Alto here and the Sierra Ancasti more to the south. Insofar as I have become acquainted with it on this journey, it is composed entirely of metamorphic rocks, namely gneiss and thinly laminated mica schist. The strata lies principally in a NNW to SSE direction and forms several ridges lying one alongside the other which diverge somewhat towards the south to form independent chains. The ridge on which we stood is bare and bushless, that to the west is lower and clad with stunted bushes.

The track remained arid and treeless as we rode in hairpin bends down to the plain below. Finally we came into the bottom of the valley and rode forwards from the eastern side, surrounded by an open brushwood that afforded neither shade nor coolness. Small low trees with short stems and open foliage surrounded us; most of the high bushes which could almost pass for trees had slender pinnate leaves and stiff woody thorns, suggesting these were Legumes. Everywhere in between them stood straight, perpendicular, columnar cacti 15 to 20 feet high. When not so tall they had only a single multi-ribbed stem; upon the serrated ridges of the corners arose shoots covered with clumps of spines. When taller and older they put out perhaps one, two, or at the most three quite similar branches parallel to the main stem. Above, on the very top of these arms, is set 3, 4, or 5 palm-size horn-shaped snow-white flowers each borne on a long stalk. Their shining flowers widespread over the landscape were as delightful to the eyes as the scent which emanated from them was pleasant to the nose. Unfortunately these were so high up that it was not possible to reach them even when mounted on a horse. But this fine flower did not escape me; the only one I was able to get hold of greatly surprised me as

I found deeply hidden in the receptacle a nice beetle, a fine *Gymnetis*, black with orange coloured spots.

By about 10 o'clock we had crossed the valley floor diagonally and come to the river, which ran through from north to south - a small clear water splashing over boulders and accompanied by green grassy banks. We rode through it here without any difficulty near a pair of houses, then followed the river downstream for about an hour to another hamlet which lay on a hillock slightly away from the river, where some large Algarrobo trees grew. We rested here in their shade until the heat of the day had passed. Only later on did I learn that this was the R. San Antonio. We had left Sunumpa six leagues behind us and Catamarca was still 14 leagues away.

This time once again the sky began to get cloudy towards 2.00 o'clock so we were able to set out on our further journey in the shade. At first we remained well away from the river, in just the same surroundings that existed at our entry to the valley; on all sides sparse bushes surrounded us above which rise the upright columnar cacti. Here and there arose an occasional large tree among the multitude and covered the adjacent bushless ground with its elegant broad canopy. Smaller low growing cacti with oval stem members reminded me of Mendoza, where I believed I had seen this selfsame sort. Towards three o'clock we arrived at the river again and followed its course for some time. Here, as before, it had a broad level bed with fine gravel, containing but little water which wound in broad sweeps through the gravel flats and looked quite transparent. Continuing down the western side for an hour we arrived at Amadores, but as there was still daylight left we went on for one more league to Palo Labran which lay only ten leagues from Catamarca, an easy day's journey. About 5 o'clock we reached that spot without a change of scenery. Palo Labran lay more onto the mountainside than Amadores. The vegetation on the slope decreased proportionately, the bushes were more sparse, the tall trees disappeared entirely; the shrubs got further apart and the bare rocks were to be seen everywhere between them, especially on the ridges of the slopes. The mountain peaks remained at the same height, without displaying any substantial change.

On 2 February we were ready to start out at 5.00 a.m. There were two alternative routes, one easier but longer following the river in a wide arc around the Sierra Graciana, the other more difficult but shorter, crossing over the mountain branch to the main river valley running in a straight line to Catamarca. The former suited the heavily laden troop of mules, the latter the individual rider. Naturally I preferred the shorter way. Scarcely was the last house of the village left behind us when the track turned straight into the mountain and went into such a narrow gully that really two laden mules could scarcely not stand side by side. No water flowed in the gully but great boulders covered its bed all the way and made the ride extremely difficult. The entrance was so pleasant because of the extremely striking - one could almost say luxuriant - vegetation on the steep sides of the high and almost perpendicular rocks enclosing this narrow crevice-valley. Never had I seen such an interesting sort of forest in the whole of the land of Argentina, as this one. The barrel tree surprised me most of all; a species of *Bombax*, related to *Bombax ceiba*, whose trunk swells up in the middle with advancing age and then assumes a fully spindleform shape. I saw here numerous examples of this curious growth in all sizes. There was no other tree with special peculiarities that was obvious to me. Cacti were not prominent here although numerous elsewhere and likewise I noticed the absence of the Algarrobo. Up till now everything seemed to be greener, more succulent, and fresher but at the same time still in the whole arrangement just as elegant as in the main valley itself.

We only made slow progress among the many obstacles we rode over, the boulders deposited on top of each other, the smooth water-washed rock walls and the great volumes of debris collected on the less inclined slopes. Yet after two hours we reached the crest of the gully and were cheered up here by a splendid view over the wooded valley to both sides. Behind us disappeared the settlements in the brushwood below, but in front of us Catamarca loomed fairly clearly at our side of the foot of the opposite mountain chain. We could distinguish several of the larger impressive buildings among the general mass of house despite it still being 8 leagues away. The crest of the ridge was, as usual, bare and bushless, of naked rocks partly overgrown with fine grass, but the dense woods absorbed us again just after we started to descend.

The track down this valley was a great deal more difficult for me than that by which we had ascended. Now large blocks of rock obstructed us, over which the animals must scramble away looking for a suitable spot on which to set down their feet. Now the smooth water-washed rocky walls appeared over which it was more a case of skidding down than going down. Again and again my horse crouched on his hind legs at such slides, but he must be accustomed to this sort of going for he was always prepared to get up again. Sometimes I saw the path underneath me so near to the edge of the precipice that I was afraid that the animal might slide down there on account of the friable ground upon which he walked. At other spots I became dizzy myself when the steep precipitous trail gave the animal such a leaning forward attitude that I found his head underneath my feet. Never have I made such a hazardous ride as this: the Peon behind me rears so high on his horse because he fears that his animal may slip; but my loyal servant rides in front with his good mule to seek out the best places and my horse follows him confidently. So we all come successfully down to the bottom.

Reaching the valley, we saw a broad, well-built road in front of us leading to a nearby settlement which appeared out of the bushes and lay on a well-inclined plain a short distance from the foot of the mountain. It was called Piedra Blanca; no sooner had we reached it than we left it behind us. Meadow followed meadow, on all sides rose fruit trees and grape vines. Seldom had I seen a better settlement in the whole of the country than this. It reminded me of my surroundings at Mendoza. From here to Catamarca was still 5 leagues. The road ran uninterruptedly all the way, through various settlements; the next one was San Antonio. One league further on, we came to the river which we had to cross.

This was without question the most difficult crossing of the whole journey. High waves rolled down the river, foaming and tumbling with restless speed. As we arrived two riders were in the middle of the water, the waves towering high up in front of the horses and spilling over the rider up to the saddle. Our enquiry ascertained that the river had risen steadily since early morning, probably because it had rained vigorously during the night on the mountains above. It was also advisable to ride into it the sooner the better, for if not and the rise continued, the crossing would be impossible today. That decided us to go to work at once. Again I took off my socks and boots, rolled up my trousers as far as possible and rode into it; the gauchos on the bank had already reckoned on my tumbling into the waters and then getting themselves a fine reward for hauling me out. Luckily it did not come to that. This time, too, my horse carried me confidently. I was pretty wet of course, but suffered no damage. Only when we got close to the opposite bank at the deepest spot and in the roughest water did my horse need every encouragement to get him to keep going. My trunk was less fortunate as it was submerged in the water, but my collection was not damaged. On the opposite bank we stopped in the woods and rested for an hour, drying our wet things. During this period several others tried the crossing but not all of them got to the other side.

About one o'clock we set off again in pretty much the same surroundings: after some time the road bore off to the right and ascended a terrace which rose a fair way above the level of the river. After a while we could see the town of Catamarca from the highest point of the terrace. Immediately the terrace started to slope downwards, the settlements and

their surrounding cultivation diminished. A completely bare region commenced, in which the town of Catamarca lay. On all sides of it lay sandy earth, scattered with stones and carrying a sparse bush vegetation.

I stopped in Catamarca for eight days, from 2 February to 9 February. During the whole of this period the sky was clear and serene up to about one o'clock. Then cloud used to march out from the Sierra Ambato and hide the sun from view, but there was no rain released from the clouds, nor a storm. I was told that only darker clouds coming out of the south brought rains, but that these fall neither often nor incessantly. However the last Spring had also been uncommonly dry here (as in Tucuman and the entire Argentine provinces) and had done great damage to the livestock because of the very delayed fresh sprouting of grass. More than a third of the herds had been lost through hunger and weakness. Many proprietors had lost over half their stock, some the whole of their livestock. Also during the 8 days I was there it was very hot and the air was always oppressive. The thermometer already stood at 20° at 6 a.m., rose to 28° by 10 a.m. and peaked at about 30° over noon in the shade of the house. It stayed at this high level until about 3 p.m., then started to drop until it sank to 22° by 10 p.m. The north wind blew incessantly, but only moderately. After 8 days residence in Catamarca, I took leave of my hosts and set out on the road for Copacabana.

.....from F.Vandenbroeck.

From Catamarca we went to the foot of the Cuesta de Portezuelo, where I came across *Stetsonia coryne*, an *Eriocereus* sp., and *Gymnocalycium nigriareolatum*. The foot of this Cuesta is comparatively lush and where we found these plants it was drizzling. *Stetsonia* was growing amidst bushes and low trees. The *Stetsonias* were not very impressive specimens, not of the colossal stature that I saw to the north-east of Cruz del Eje. As to the valley from Catamarca to La Merced and further to the Cuesta Totoral I remember it to be almost completely under cultivation as it looked fertile and pretty green. Haciendas could be seen all through the valley. We saw no columnar cacti in this valley.

.....further from H. Middleditch

So does that mean that almost all the *Stetsonias* seen here by Burmeister have now given way to "civilization", or are there still *Stetsonias* right at the foot of the valley sides, amongst the trees?

.....from G.Charles

After a day's drive from Famatina, travelling via Mazan and the Cuesta Cebila, our party entered Catamarca city from the south west and stopped there overnight. On the following morning we drove out of Catamarca city to the east. We passed a great many fairly low, tree-covered hills which rose barely 100 feet or so above the plain on which the city was built. We stopped at one of these which might have been a quarter of a mile across, looking more or less like all the other low hills we could see. There was no agriculture of any form on this hill, and probably not on any of the other hills, either. We found that there were tall bushes of *Acacia* and *Larrea* which were well spaced apart, but rather than having a single trunk they usually had a number of relatively thin stems from ground level. They also branched out again at below head height, touching each other, so that in most places there was an effective barrier to walking, unless one was able to wind in and out of slightly more open spaces. The ground was pretty bare, little or nothing in the way of grasses or herbs growing in the shade, so there was no great difficulty in ducking under the branches or crawling uphill. It took us half an hour to struggle through these bushes and trees to get to the top of the hill. In another two months or so, when these trees would be in full leaf, it is likely that it would be almost impossible to get through them, even though there seemed to be few spiny bushes.

Stems of *Cleistocactus*, probably *C.baumanii*, were fairly frequent, growing between and up into the trees and bushes, as did the *Eriocereus* sp.. Before starting our climb of the hill, we did see a few *Stetsonia* standing up above the trees, but we probably found more of them when we were inside the wood, although they were certainly not numerous. Had we simply driven along the road and past these hills, we would have probably gained the impression that there were very few *Stetsonias* indeed. When we made a trip westwards out of Catamarca, we again saw *Stetsonia* in the woods in the lower part of the El Tala valley. When we left Catamarca city to continue our travels, we made a stop at Pomancillo, in the valley to the north of Catamarca, where the road passed some rocky sloping ground with a cover of low trees. Once again we found the *Eriocereus* sp. growing among the trees, as well as *Cleistocactus smaragdiflorus*. Probably we never saw *Cleistocactus* growing out in the open, wherever it was seen. There were *Stetsonia* growing here, too, several of them with flowers that were still open as well as quite a few with fruit.

Incidentally, on the outing from Catamarca to Cuesta Portezuelo, we had to use the old road and the old bridge at Tres Puentes, as the new bridge over the Rio de Valle, due east of the city, had been washed away by a flood.

.....from H.Middleditch

The washed-out bridge would be no great distance from where Burmeister had a struggle to cross this self-same river.

OBSERVATIONS By FRIEDRICH SCHICKENDANTZ on a JOURNEY from CATAMARCA To ANDALGALA. From H. Burmeister

Translated from Petermann's *Mitteilungen* 1868 No.2 by H.Middleditch.

The charming valley of Catamarca is the best tract of land possessed by the province of Catamarca, supporting meadows, orange and fig plantations and innumerable fields of maize. The road via Singuil to Andalgala goes through this well-cultivated region. Above Piedra Blanca the river which flows through the valley is crossed to reach the hamlet of Pomancillo. From here the valley becomes so narrow that to reach Puerta one is obliged to cross over the river a score of times, riding now on one side, now on the other. This is no mean undertaking when the river is swollen and impossible when it gets as high as when you crossed it lower down where it is wider, because of the boulders which cover the bottom of its bed and cause the cargo mules to lose their footing. Where room remains for vegetation, there is glorious shade to be found under willow trees and *Pacaras*. The corpulent *Palo borracho* is also particularly frequent here.

Halfway to Puerta there are some large farms called *Puestos*; from there one takes a broad track on the left bank of the river. If it is very swollen, then from Catamarca one must take the Quebrada Choya running northwest over the lower mountain ridges known as the Sierra Brava. The village of Puerta is well known because it lies at the gateway where the Catamarca river enters the narrow gorge. It is formed out of two rivers, the more westerly one coming from the heights of Machado, the other coming from due north, arising near Humaya. On the former lies the hamlet of El Rodeo. Following the river coming from the north, on whose banks lie the settlements of Guaicama and Colpes, then curving northeastwards along a side valley going towards *Puesto de Bazan*, one finally reaches the highest part of the valley, pasture land thickly overgrown with grass. At about five leagues beyond *Puesto* one arrives at a ridge which forms the

watershed between the waters flowing north to Tucuman and south to Catamarca. To the right of this ridge lies the farm of Pucarilla, to the left that of Bolsan. On the other side of the watershed flows the R. Singuil, which has to be crossed. It comes from the north, from the heights behind Estancia Narvaez and near here enters a gorge in the eastern mountain chain through which it flows towards Escoba, where it joins the river Chavaria.

About one league further to the north along this river begins the community of Singuil: around the village there are extensive clover fields and pasture land covers the nearby mountains where many thousands of livestock are kept. About one league from Singuil is the entry to the gorge out of which the river comes from the N.N.W. After one further league this gorge is completely blocked by huge boulders between the mountains rising high above it. Up to this point the route has been in the water but here it ascends the mountain slopes of Cuesta de Singuil. This part of the trail rises gradually to the peak and is rather tedious in dry weather but in the rains it is hazardous and sometimes even impassable, because the clay on the mountain slopes is in the habit of changing into such a mud that the cargo mules either sink up to their knees in it or slip on it and lose their footing. An alternative trail leaves Singuil up a very steep ascent and joins this one about half way up the mountain.

From Singuil to Pucara is about 6 leagues. Once on the mountain top, the route first descends over a small plateau, called Cienega, near which lies Estancia Chicoyaco. At the northwest margin of this plateau it goes steadily downhill through a narrow gorge by a steep stony track besides a rivulet, on whose bank lies the miserable hut called Pucara. On a rugged hilltop to the right of the track, about half way between Cienega and Pucara, lies the ruins of an ancient indian fortress. The Quebrada Pucara opens into the large basin called Campo de Pucara. Similarly situated to Tafi, but appreciably more extensive, it is pasture ground for innumerable cattle, horses, mules and donkeys. I would estimate that the basin of Pucara lies at about 4000ft above the plain of Pilciao.

There are various routes from Campo de Pucara to Andalgalá. From Humaya, near the northwest source of the Rio Catamarca, a steep pass crosses to the western side of the mountains by the Cuesta Guanamil, ending up in Pipanaco. The principal route is over the Cuesta Chilca, a rough ascent, stony and hazardous. Not far away is the Cuesta Carrizo, just as poor. Yet another route is further to the south over the Cuesta de Moye which is much less steep and hazardous but also significantly longer; it reaches the plain opposite Pilciao. A track called Carapunco is used by travellers from Andalgalá to Tucuman; it starts in as narrow valley above Vilavil and is the lowest of all.....

In November 1864 I had to make a trip from Pilciao to Tucuman, which would usually have taken me over the Cuesta Canas and then followed the river of that name. Since it had been raining in the mountains for all of four weeks, it would be out of the question to get through the raging torrent, which must be crossed some three times. So I headed for a cowshed on the eastern margin of the Campo near to a place called Condorguasi. From that spot the route climbs the jagged crest of the Sierra Escoba which runs to the southeast, and reaches a wretched, neck-breakingly steep trail down to the valley in which Escoba lies. Here the R.Chavaria and the R. Singuil join together to form the R.Marapa. The eastern facing slopes of the mountains are covered with alder to an appreciable height, a pleasant change from seeing Algarrobo woods all the time [at Pilciao - H.M.]. From Escoba the route goes over the ridge of the foothills lying to the east of the R. Chavaria and down through fine woods to La Invernada, on the plain. An alternative route from Escoba goes to Nachi and then meets the Tucuman road from Campo Pucara at Villa Medina.

.....from H. Middleditch

The three parallel ranges of mountains present a very definite set of barriers to travel in an east-to-west direction. They also constrain most of the rivers, outside the basin of Singuil and the basin of Pucara, to a generally north-to-south course. But there are two exceptions, both mentioned by Schickendantz. The first is where the Rio Canas cuts its way right through the northern extremity of the Sierra Narvaez to leave the Morro Canas as an isolated mountain; at this point the river gorge is so deep and narrow that the river bed is the only method of travelling this route. The second is from the junction of the R.Singuil with the R.Chavaria, whence the R.Marapa cuts right through the main body of the front range; today there is a dam and man-made lake at Escoba. Both these rivers must now be following courses which existed before the uplift of the present mountain ranges. As the frontal ranges rose, the fall of the river would become steeper, its cutting power would increase and so it would be able to cut its way down as the mountains rose and form the present deep, narrow gorges.

A TRIP TO THE PROVINCE OF CATAMARCA By L.R. Parodi

Translated by H. Middleditch from Revista Museo La Plata: Seccion Oficial 1941

During the month of February 1941 I made a trip to the province of Catamarca, with the objective of collecting specimens for the Botanic Department and also to study the types of vegetation in this area. The most appropriate time was not selected for this trip, since February is one of the driest months; in spite of that, it was possible to collect arboreal plants in fruit and a considerable number of grasses with floral organs, in fine condition for study. The places visited were the Catamarca valley, El Rodeo, Pomancillo, the Sierra Ambato, Andalgalá, Ancasti, the Cuesta Totoral and the Quebrada Sebila.

As may be seen from the data given below, the aborescent vegetation which is predominant in the valley to the east of the Sierra Ambato rises to more than 1200m up the mountain slopes; it is a mixture of species from the Chaco and the Monte, designated eastern Monte by Lorentz. The Sierra Ambato, running north to south, represents the boundary which separates the eastern Monte from the western Monte. From its floral composition, this is a transition woodland between the Monte properly speaking (or western Monte) and the Chaco. Included from the former are typical species such as jarillas (*Larrea divaricata* and *L.cuneifolia*), the retamo (*Bulnesia retamo*), the brea (*Cercidium praecox*), the horse-crippler (*Tricomaria usillo*) etc. and from the latter the red quebracho (*Schinopsis lorentzii*), the white quebracho (*Aspidosperma quebracho blanco*), the mistol (*Ziziphus mistol*), the palo borracho (*Chorisia insignis*), the coco (*Fagara coco*) together with various species of tall *Cereus* and *Opuntia*.

Vale of Catamarca

The sandy soil, over a subsoil of alluvial debris, very open and porous, favours the growth of trees. Naturally it is covered by woods of xerophytic trees associated with bushy species and herbs in limited numbers; the surface of the soil is covered in a proportion which varies between 35% to 40%. The most frequent trees are usually of Chaco origin, such as *Schinopsis lorentzii*, *Aspidosperma quebracho blanco*, *Celtis spinosa*, *Gourliea decorticans*, *Ziziphus mistol*, *Schinus polygamus*, *Acacia moniliformis*, the white flowered palo borracho (*Chorisia insignia*) notable for the almost spherical shape of its swollen trunk, and some species of *Prosopis*. These are associated with various bushy Monte species such as

Acacia furcata, *Tricomaria usillo*, *Larrea divaricata*, *L. cuneifolia*, *Bulnesia retamo*, *Gymnosperma spinosa*, etc. In certain places the trees are absent but in their place extend associations of tall *Cerei* (*Cereus* aff. *peruvianus*), often in a crowd of individuals which convey a fantastic appearance to the landscape. In such places two species of *Jatropha* are common (*J. excisa*, *J. sp.*) with palmate leaves and fleshy stem, usually less than 1m in height, as well as isolated shrubs of *Sphaeralcea miniata*, *Senecio deferens*, etc. Between the sparse trees and in the clearings grow various isolated xerophytic herbs, annuals for the most part, such as....

El Rodeo

An excursion to the picturesque highland residence of El Rodeo at 1400m altitude, located in the valley of the same name, was of interest for the study of the vegetation of the hills and valleys of the Sierra de Ambato. From the city of Catamarca a good road climbs upwards in a continual series of bends, often spectacular, which set off into the Cuesta Infiernillo. Up to 1100m altitude, a vegetation similar to that in the valley but somewhat more open, grows on the slopes of the hills. It was made up of the Palo borracho with gaudy white flowers, which grew as individuals on the rocky slopes; the horco-quebracho, a variety of the red quebracho, of 7 to 9m in height, (less than the type which is found on the prairie), usually branching from the base, which Cabrera calls *Schinopsis lorentzii* v. *marginata*. This ground is associated with various arboreal species of the western Chaco, which often grow up to an appreciable altitude above sea level on the slopes of these hills, such as the molle (*Lithraea molleoides*), the cebil (*Piptadenia excelsa*), the higuera (*Carica quercifolia*), the white quebracho (*Aspidosperma quebracho blanco*), the chanar (*Gourliea decorticans*), a maiten (*Maitenus* sp.), the jarilla (*Larrea divaricata*), *Caesalpinia mimosifolia* together with various xerophytic grasses characteristic of the Chaco, such as *Trichloris pluiflora*, *Stipa ichu*, *Pappophorum elongatum*, etc. as well as species typical of the highlands such as *Stipa polyclada* etc.

At 1400m a.s.l. the silvery pasture of *Stipa ichu* forma an almost pure whitish blanket over the hillocks; scattered over it, imprinting upon it the character of a savanna, grow isolated dwarf trees of *Prosopis nigra*, *Lithraea molleoides*, *Acacia cavenia*, *Lippia lycioides*, *Celtis spinosa*, etc. This savanna continues to cover the slopes and crowns up to 1600m, giving rise to a landscape which is reminiscent of the woodland of the central pampas. At the mouth of the streams, great beds of cortadera are often to be seen, displaying their handsome pale violet flower spike. The ichu pasture often rises up to 1650m, sometimes covering slopes whose abrupt gradient is some 45°, associated with various other typical highland species such as *Stipa cordobensis*, *S. pampagrandensis*, *Aristida subulata*, etc.

From the summits the road drops gradually down to El Rodeo, continuing to traverse the unending ichu pasture, which in particular patches looks as pure as if it had been cultivated. El Rodeo is a small village in a fertile valley which has a temperate climate; in winter it rarely hails and snows, lying only for a short while before the sun despatches it. In full summer, the temperature at noon is quite agreeable. It is a typical feature of the savanna to be dry in winter and to grow during the rainy season of spring and summer.

Cumbre de Ancasti

The western flank of the Sierra Ancasti is ascended to its summit by a very winding road which rises sharply. The scarp is very arid, very steep and with sparse vegetation, nevertheless an appreciable number of herbacious species grow in the fissures of the rocks and in the depressions where fine material accumulates.

At 1500m there was to be seen *Stipa ichu*, *S. pampagrandensis*, *Diplachne dubia*, *Trichachne friesii*, *Aristida adscensionis*, *Cottea pappophoroides*, *Briza stricta*, *Bouteloua aristidoides*, *Panicum molle*, *Flourensia campestris*, *Zinnia peruviana*, *Schkuhria pinnata*, *Solidago chilensis* etc. This vegetation disappears completely at 1750m to be replaced by the grass steppe which covers the gently undulating summits at 1800m. The sandy soil, somewhat compact, is approximately 70% covered by the herbs which form the steppe. The surface is generally disturbed by the erosion produced by the water from rainfall. The characteristic species here is *Festuca hieronymi* associated with *Stipa tenuissima*, *Muhlenbergia circinata*, *Eragrostis ingens*, *E. virescens*, *Piptochaetium napostaense*, *P. chaetophorum*, *Schkuhria pinnata*, *Histerionica backeri*, *Oxalis* sp., *Sisyrinchium* sp., etc.

In order to reach the little town of Ancasti one crosses from west to east over the extensive crown, passing Los Morteros, an oasis in a gay valley at 1600m, and next comes to a savanna of *Stipa tenuissima* with isolated dwarf trees of *Prosopis nigra*, *Jodina rhombifolia* and greater or lesser patches of piquillon (*Condulia lineata*), *Duraznillo negra* (*Cestrum parqui*) and clumps of *Festuca hieronymi*, *Stipa ichu*, etc. This undulating steppe, with a gentle overall gradient towards the east, stretches for many leagues made up of *Stipa ichu* and *Stipa tenuissima* which turns the horizon white.

Further towards the east, descending to 1500m altitude, an arboreal vegetation dispersed over the hilly pastures starts to put in an appearance, becoming thicker as the altitude decreases towards the east. At 1200m some woods, still open, become made up of *Fagara coco* as dominant tree, with *Acacia cavenia*, *Prosopis nigra* (often parasited by a *Loranthus - Phoradendron liga*), *Schinus polygamus*, *Lithraea molleoides*, *Celtis spinosa*, dispersed in the ichu pasture. At about 1000m altitude, the tiny village of Anquincila is encountered in a picturesque valley, on the edge of a broad river having very little water. Ancasti is located at about 900m altitude, surrounded by the savanna of *Stipa ichu* with isolated trees of *Prosopis nigra*, *Celtis spinosa*, *Fagara coco*, *Acacia cavenia*, and various species of *Opuntia* and *Cereus*.

The subtropical vegetation properly speaking of Laurels, Myrtles, and other hygrophilic species, does not reach as far south as this latitude but ceases in the humid quebradas more to the north. The impoverished xerophytic Chaco vegetation penetrates into this region, ascending to about 1500m. In general this summit was entirely covered with a steppe of *Stipa ichu* and *S. tenuissima* whose white mantle stretches over many square kms. At some 10km to the east of Ancasti, on the slopes of the Sierra, there began to appear the upper limit of the so-called Cebil region, an association of mesophytic trees, which is the climax of the western zone of the Chaco, for the prairie which extends up to the sierras of north-west Argentina rises up to 700 to 800m, according to latitude. This woodland is made up of trees of 8 to 10m in height, usually with leaves made up of leaflets, or simple and sclerate and of reduced size, casting scant shade over the undergrowth, on which account the ground is partially covered by rough pasture. Amongst the trees there is a predominance of Cebil (*Piptadenia excelsa*), the red quebracho (*Schinopsis lorentzii*), the chanar (*Gourliea decorticans*), the mistol (*Ziziphus mistol*), the viruru (*Ruprechtia excelsa*), odd specimens of palo borracho (*Chorisia insignis*) and various species of bushes often entangled and spiny. The mantle of herbs exists as a rough pasture with *Stipa ichu*, *Bouteloua curtipendula*, *Leptochalora filiformis*, and very infrequent ferns. At two in the afternoon at the height of summer, the sun is scorching and the heat is suffocating.

In its general appearance and by its floral composition, the vegetation of this Sierra is very much like that of the Ambato, especially in the area around the road from Catamarca to El Rodeo.

From Catamarca to Andalgala

From Catamarca it is possible to reach Andalgala with difficulty, crossing the Sierra de Ambato by the saddle of Chilca. The ascent starts off in the foothills at La Puerta, by a very winding road on easily eroded slopes, covered with xerophytic vegetation, made up of a mixture of species from the Chaco and the western Monte, with very few herbaceous plants.

The road starts up the mountain slope at the one-horse town of La Puerta at 900m altitude, traversing transition woodland, similar to that in the Catamarca valley but more impoverished. It continues via Varela, a fertile valley at 1000m altitude where alfalfa, maize and various sorts of fruit and vegetables are grown. Changes in the woodland become steadily more marked in proportion to the distance one moves forward. Certain species disappear, and others such as the black algarrobo become abundant at some places to the extent that they make up almost pure stands which are valuable for repairs around the estate. Perhaps this is due to changes in the soil as a result of ranching.

At two hours out of Catamarca lies El Bolson at 1200m altitude. It is a wide fertile valley cultivated for walnuts, peaches, figs, mulberry trees, maize, pumpkins and beans. At 1400m the arboreal vegetation comes to quite an abrupt end and a fairly undulating plateau commences, covered with a savanna of *Elionurus tripsacoides*, with occasional bushes of chanar, espinillo and *Eupatorium* scattered over it. The tiny hamlet of Singuil lies at 47km from La Puerta and at 1550m altitude. At this point the arboreal vegetation of the Monte has almost completely vanished and on the hills there now occurs a flora rich in grasses, where *Festuca hieronymi* abounds in association with *Stipa ichu*, *Elionurus tripsacoides*, *Paspalum elongatum*, *Panicum bergii*, *Eragrostis lugens*, *Bouteloua curtipendula*, *Baccharis coridifolia*, *B.gillesii*, *Lathyrus macropus* and great clumps of *Cortadera rudiusscula* at the margins of the streams.

In moist gulleys at about 2000m there occurs copses of aliso (*Alnus jorullensis*) which are most interesting on account of the hygrophilic species of which they are composed. The aliso is a tree of 15 to 20m in height in this area. It is always associated with the willow (*Sambucus peruvianus*), a tree which is usually no taller than 5 or 6m. In the copses, among the herbaceous species *Festuca hieronymi*, *Polygogon interruptus*, *Agrostis montevidensis*, *Calamagrostis hieronymi*, *Jungia* sp., *Eupatorium* sp. and *Calceolaria* sp. abound. More to the northwest the hilltops are covered by an extensive xerophytic pasture made up largely of *Festuca hieronymi*, *Stipa tenuissima* and *Aristida spegazzini*, etc. The western slopes of these hills are drier, less grassy, and treeless.

From these elevated pastures one descends into the Campo de Pucara at 1700m altitude. This is a broad, gently undulating valley, whose soil of sandy alluvia exhibits occasional isolated patches of rubble and is about 70% covered by a herbaceous and xerophytic vegetation. Most prominent is *Muhlenbergia gracillima*, *Pappophorum mucronulatum*, *Aristida subulata*, *Eragrostis lugens*, *Evilvulus* sp., *Baccharis gillesii*, etc. From the Campo de Pucara an undulating area is crossed which rises up to 1920m where the Chilca saddle is encountered. From there the western slope of the Sierra Ambato leads then to the Andalgala basin. It is a very steep slope and relatively arid. From the top the road winds down in impressive fashion nearly a thousand metres to the floor of the Andalgala basin. From about 1700m it is possible to gaze towards the west over the extensive valley of Andalgala and to the south over the Salinas de Poman with its great shining lake. At 1400m on the descent are to be seen the Algarrobos which are most typical of this region (*Prosopis chilensis* and *P.nigra*). At this point they occur as low, gnarled bushes, generally below 3m in height.

The saddle of Chilca exhibits a mountain flora rich in bushy species and in xerophytic herbs; many of them are typically highland plants such as various Bromeliads, *Azorella* sp., *Cottea pappophoroides*, *Porophyllum* sp., bushes of *Senecio scetilis* fairly abundant on stony ground at 1500-1600m altitude. In addition others grow in the valley - *Prosopis* sp., *Bougainvillea* sp., *Aristida mendocina*, *Andropogon macrothrix*, etc.

The valley of Andalgala is reached at 1050m altitude and its vegetation is typically western Monte. The sandy ground, boulder-strewn in many places, becomes intensely heated on account of the sunshine during the months of summer. The bushes forming the vegetation are spread well apart and their ground cover is usually quite open, attaining barely 10% in many places. Bushes of no more than 3 to 4m in height predominate among which must be noted *Larrea cuneifolia* as the characteristic species, associated with *Cercidium praecox*, *Cassia aphylla*, *Acacia moniliformis*, *A.furcata*, *Prosopis nigra*, *P.torquata*, *Tricomaria usillo*, *Atamisquea emarginata*, *Bulnesia retamo*, and some herbaceous sp. such as *Nicotinia noctiflora*, *Heliotropium mendocinum*, various cacti, portulacas and very sparse grasses, among which may be quoted *Aristida adscensionis*, *Bouteloua aristidoides* and *B.lophostachya*.

The jarilla (*Larrea cuneifolia*) usually occurs here at 0.90 to 1.30m in height and forms globular bushes: the roots do not usually go down below 50cm depth and extend horizontally outwards for some 50 to 80cms. The main differences between this western Monte and the transition woodland (or eastern Monte) is the absence here of the red quebracho and the algarrobos are low and gnarled; in addition the herbaceous plants are very sparse here. In the Monte climate of Andalgala in full summer, it was only possible to find *Bouteloua aristidoides*, *B.lophostachya* and *Aristida adscensionis*, all annuals and scattered in small groups; they are desert species which only start to grow with the summer rains and very few bloom in this season - the middle of February.

Cuesta de Totoral

The last trip was across the Paclin ridge in order to take note of the highland formations. The road out of Catamarca towards Tucuman was taken, going through San Isidro, El Portezuelo, Yocan, La Bajada, Palo Labrado, Amadore, and La Merced at 750m altitude where the climb of the Cuesta Totoral started. Over the pass the route went on to La Vina. As far as Amadore and La Merced the route crossed an area of transition woodland where the algarrobo, the mistol, the white and red quebrachos, the chanar, the jarilla, the espinillo, the tala, and one or two species of *Jatropha* were prominent.

At La Merced the woodland was formed mainly of *Fagara coco*, *Acacia visco*, *A.cavenia*, *Carica quercifolia*, *Celtis spinosa*, some of them with semi-parasitic Lorantheaceas as well as epiphytic orchids along their branches, and lianas which cateniered from their panopies. This woodland was similar to that on the western slope and came to an end at about 1000/1100m altitude where it is replaced by a grassy steppe with a predominance of *Stipa ichu*, *Festuca hieronymi*, associated with *Paspalum elongatum*, *Baccharis coridifolia*, some oxalis, verbenas, etc.

In the humid gullies down the eastern slope grew the subtropical hygrophilic vegetation characterised by the existence of Laurels, Myrtles, Begonias, etc., noted around Agua de Mato at 1200m. The descent to the northeast is by a gentle slope. At some 600m or thereabouts the hygrophilic subtropical species become scarcer and are then replaced by the species of the Cebil zone which occupies the eastern slope as far as this altitude and stretches into the Chaco plain. Passing the country house of Guacra, at the foot of the mountain, the river of the same name is crossed which serves as the boundary between the two provinces.

.....from H. Middleditch

This account provides an appreciation of various vegetation associations in that section of this mountainous area which fall within Catamarca province. It does record the bottle tree in the Catamarca valley, just as Schickendantz noted it on the route to El Rodeo, and Burmeister recorded it in the side gully on the ascent of the Sierra Graciana. It also refers to the dominant columnar cacti in the Catamarca valley but says that these occur where trees are absent.

.....from K.Preston-Mafham

It also says that "northwards from Singuil the arboreal vegetation has nearly vanished and on the hills there occurs a flora rich in grasses ... in moist valleys there occur copses of Aliso". This is not the way I would describe this particular patch of landscape, as the woodland was dense, moist, and with fairly tall trees, for quite a stretch alongside the road.

.....from H.Middleditch

The opening remarks about February being "one of the driest months" is rather puzzling. In his "Phytogeography of the Monte", Morello states that the maximum rainfall at Andalgala, Colpes, Pilciao and Poman occurs in the summer. Available figures are (in inches):-

	J	F	M	A	M	J	J	A	S	O	N	D	Total
Tucuman	6.3	7.5	5.5	3.1	1.2	0.6	0.3	0.5	0.6	2.3	4.2	5.9	38.0
La Rioja	2.6	2.7	2.2	0.8	0.5	0.2	0.1	0.2	0.2	0.8	1.4	1.8	13.5
Pilciao	3.2	2.0	1.0	0.5	0	0.2	0.8	0	0	0	0.7	1.2	9.6

All this data suggests that there is something very odd indeed about Parodi's comment that February is a dry month in this area.

As far as it is possible to judge, the author appears to describe as trees those growths which exceed some 5 to 8m in height whereas bushes appear to be below this height. Bushes apparently between 3 and 5 m in height occupy the dry, steep western slopes of the two front ranges, as well as scattered in grassland to form the savanna type of vegetation which occurs at heights above the bush and woodland. Now in the basin of Andalgala the bushes are stated to be no more than 3 to 4m in height; from other accounts (see Chileans No. 40) a height of 1½ to 2m may seem to be more general. Also in the Andalgala area the ground cover is far more open than on wooded slopes of the Sierra Graciana and Sa. Narvaez, the figure quoted by Parodi being more or less in line with other accounts.

Parodi attributes the heat and aridity in the Pipanaco basin to the sunshine, but additional important factors are the major climatic feature of descending air, together with a minimum of cloud cover. Andalgala itself lies within the climatic influence of the huge Aconquija massif. In consequence it enjoys a rainfall which is far superior to that received in the Pipanaco basin as a whole or even to places in the adjoining mountainous area, as demonstrated by figures from Morello for annual rainfall: Andalgala 293mm, Pilciao 130mm, Poma 157mm, Colpes 152mm. This beneficial local area of improved precipitation could explain how the *Lobivia grandiflora* complex has penetrated to the west of the Sierra Ambato, albeit but a short way, in the form of species *crassicaulis*.

LOBIVIA GRANDIFLORA. By Ernesto Vatter

From the National Cactus & Succulent Society Journal 1952 Vol.7 No.4

I set off very early from Tucuman by bus going to Catamarca, towards my ultimate goal, the bluish looking mountain chain just visible in the distance. At last we reach the first of these mountains and from now on the bus climbs and dips, twists and turns, ever higher, round innumerable curves flanked by hair-raising abysses on the one side and dense primordial forest on the other. There is still no sign of cacti. The forest bars one's view like a wall.

Higher and higher we go - curve follows curve. Then we start coming to occasional places where the vegetation is a little sparser and at last, just by a bare rock face, the first prickly youngsters! A specimen of *Eriocereus tortuosus* welcomes us silently, its massive, thick, long joints sprawled over the sunny bare corners of the rock. Way up in the heights, in the forks of branches deep in the crown of a forest giant, I can see *Rhipsalis pfeifferi* growing pendant making thick bushes up to 6ft long. The green curtain becomes less and less dense and the much sought after plants put in more frequent appearances. There stands a sentinel - *Cleistocactus smaragdiflorus* - it has secured a whole granite block all to itself on which to spread its growth. Soon after, the forest is replaced by dwarf trees and scrub which just manages to subsist and only a little further on we reach the mountain pass. Here bare rock becomes the feature of the scenery. In sheltered spots some isolated rocks are covered by lush, green, alpine vegetation. This looks likely cactus terrain, so here in the middle of the wilderness I decide to get off the bus and start my search.

Further along the road are mountain tops, all bare and rocky. This is the watershed between Tucuman and Catamarca. The forest stops so abruptly that it is almost as if a dividing line had been drawn between the dry and the wet area. I look around and almost immediately find the first plants, adhering to the rock face, almost near enough to touch. It is *Parodia rubriflora* which grows here in the cracks of the rock wall, at times forming whole rows like pearl necklaces.

After I have collected enough of these plants, I climb further towards the mountain top and presently a glowing red spot comes into sight. As I get nearer I find, hidden between herbage and rubble, a beautiful little group of *Cerei*. The small branching stems do not grow longer than 12 inches or more than 3 inches thick. All are delightfully decorated in the crown with silver-grey buds. Unfortunately only one of them has opened to show a very large, beautifully deep red flower, a typical *Trichocereus* flower. In my view this is the smallest *Trichocereus*. It flowers when relatively quite tiny. Stems little more than two inches high are already studded with flower buds. I would say that this is what Fric called *Lobivia grandiflora*, but it is certainly not a *Lobivia*. As I have already stated, by its growth, its bud, its flower construction and its fruit, it is a genuine *Trichocereus*.

After more intensive searching I also found the small *Gymnocalycium venturii*=*Echinocactus sanguiniflorus*.....I was unfortunately not successful in finding the species I really set out to collect, but I felt well rewarded with the plants of the other two species that I did gather.

.....from H. Middleditch

There are two routes by which Vatter may have travelled by bus from Tucuman towards Catamarca. Route Nacional No.38 runs over the plain of Tucuman down to the Cuesta Totoral, the pass which lies on the "watershed between Tucuman and Catamarca". Alternatively routes 65 and 62 via Campo Pucara leaves Concepcion and climbs up the valley of the R. Canas. In order to bypass the gorge of the Quebrada Canas (where the R. Canas passes the Morro Canas) the latter road runs northwesterly for some way towards the R. Vallecito and then turns over the Cuesta Clavillo into the

valley of the R. Quintas. In Revista Geografica Americana (Buenos Aires) No.143, 1945, C & M.S. Romana describe the El Clavillo road as "all hairpin bends and dizzy curves....Along this road daily there travel the buses between Tucuman.....and Catamarca". A little further on, at La Banderita, lies the frontier post between Tucuman and Catamarca; this is definitely not the watershed, but did Vatter know that? At the alternative location, once over the Cuesta Totoral, the road commences to drop towards La Merced; access to the mountain tops would best be gained from the pass. But the rocky humps and spurs on the west or dry side of the pass might, with reporter's licence, be described as mountain tops. On the other hand, once over the Clavillo pass, there are likely to be plenty of bare and rocky places, but the mountain tops proper are a great many miles away. We do know that *Lobivia grandiflora* comes from near Cuesta Totoral; is that really where Vatter also found it?

.....from F. Vandenbroeck

From the Catamarca side the ascent of the Cuesta Totoral is short and goes through a bleak landscape. The descent from the Cuesta Totoral towards the plains of Tucuman is long, winding, and steep. During this descent you travel mostly through forest exhibiting interesting epiphytes such as *Pfeiffera*, *Rhipsalis*, ferns and orchids. Once in the plain there are endless fields of sugar cane and numerous human settlements as far as the city of Tucuman.

.....further from H. Middleditch

The photograph which accompanies Vatter's article is of what might be described as the "commonly cultivated sort" of *Lobivia grandiflora*, which Rausch says comes from Cuesta Totoral. Thus the balance of probability would seem to lie with the Vatter plant also having come from Cuesta Totoral. My own plant of R.525 offsets from the base, but the stems grow upright, not sprawling, and so it does bear some resemblance to the plant illustrated by Vatter in the NCSS Journal. Hence I suspect that R.525 could originate from the Cuesta Totoral. It is however not possible to establish this from the Rausch field number list.

.....from G.Winkler

Following receipt of your request I paid a call on W.Rausch and he tells me that his R.525 was collected on the Cuesta Totoral.

A.V.FRIC IN CATAMARCA.

Translated by R.Allcock from Lovce Kaktusu, By K.Crkal

From Uruguay A.V.Fric arrived in Buenos Aires which had already been his base earlier for a journey around southern Argentina and the neighbouring provinces to the north. This time he set out across all the northwestern territory into the region of the mountainous zones, hoping to reach the frontiers of Argentina with the states of Bolivia, and Chile. It was here where he wrote down his experiences as a hunter of cacti. His discoveries, which in many ways surpassed his expectations, evidently increased the difficulty of his subsequent position, because he was unwilling to reveal the relevant data about the locations of the finding places. Let us look at a letter from Fric, dated Catamarca 23/12/1928:

"I would wish to advise the reader that he should obtain a map of Argentina; or better still a map of South America, since I hope that I shall proceed even beyond the Argentinian frontier. My last letter was from the mountains of Uruguay. After that I took the night ferry across the broad mouth of the La Plata, and already before noon I had cleared the customs formalities. For some days I engaged in visits to my friends and to the museums. I have established my headquarters, the starting point for my explorations, in Tucuman, 1156 km from Buenos Aires". En route to Tucuman, Fric made a stop of only a day or two at St.Iago del Estero.

Fric then left Tucuman and travelled via Villa Alberdi and La Cocha to Catamarca. At La Cocha, Fric set out by car across the Cordillera of Catamarca, but was alarmed by the endless hairpin bends. At 600m above La Cocha there opened out in every direction an endless 1000 km wide plain, grassy and windy. How high they went he could not say, because he forgot to read the altimeter. Here and there masses of bare rock projected and, ignoring the protests of his driver, he proceeded to scale one of these:

"In my whole life I did not see so intense a red colour as the flowers of the *Parodias*, which I found there. It was the colour of blood, but glittering and shining, as when blood spurts from a wound. It occurred to me later how to name this member of the rich genus. Provisionally I am naming the discovered plant as *Parodia sanguinea* Fric n.n.

"I had with me no apparatus, nor a rucksack, and so there was nothing else for it but to take off my shirt, and in it to wrap up these seven plants, which I had found. Besides this *Parodia* I found yet another cacti, which I at first took for *Echinopsis calochlora*, even though they formed many-headed clumps. Afterwards however I found a plant in bud, which in the appearance and size of the bud reminded me of *Notocactus concinnus*. Later in the hotel it opened its large purplish flowers. For myself, I would not know into which genus I ought to allocate this plant. The flower tube is too short for *Echinopsis*, the plant is too small for *Trichocereus*, and for *Lobivia* the flower in its 10 cm diameter is immensely large."

In a letter headed "La Rioja 26.12.1928" Fric describes the hotel at which he stayed at Catamarca. From here "On the first day we rode out by a road from which a flat hillock was in sight. Between the hillock and the road, however, was a damp region, thickly wooded, whose width could not be judged. No path could be seen in the wood. One very kind traveller, of whom we enquired, was willing to show us the way. Beyond the wood this man had his own rancho and was going that way. That which had appeared as a hillock, was in reality a low mountain range, composed of many straight-running transverse ridges, all of which were invegetated by columnar cacti. They were my long-familiar cardons of St. Iago del Estero, but much more robust and much more spiny. I consider them as a deviant variety, which I shall designate as *Stetsonia coryne* v.*robusta*. As well as the columnar cerei, there stretched off into the distance a thorny scrub. *Prosopis*, *Acacia*, *Mimosa* and very unusual *Euphorbiaceae* with very thick branching stems, with broad leaves resembling *Aralia* and with round three-partite fruits - *Jatropha macrocarpa*.

"It is hardly necessary to mention that the ground in these mountains is everywhere covered with plants of *Opuntia sulphurea*. They grow all over the place, wherever there is a patch of dry, stony, sunny ground. At the first stop I was however agreeably surprised, that I found here a cactus which I would little have expected here. It was a new species of *Gymnocalycium*, the first example of which I had admired while on a visit to Haage jnr. It is a very flat, dark green, almost black *Gymnocalycium*, which grows down among the bushes, so that to collect it is very troublesome, even worse than with *Astrophytum asterias*. Had it not been armed with three black and beautifully curved spines, I would have taken it for *A.asterias*. If this plant has not meanwhile become known and described, I suggest to call it *G.occultum* sp. nov. Also the seeds of this species are different from those of all other species of cactus. They are small, lustrous, coloured yellow-brown, but with a grey lid [hilum] which in all other seeds of the genus *Gymnocalycium* is noticeably smaller than the seed, but in this species is far larger - like a miniature hat - and is at first sight reminiscent of the seed of

Astrophytum asterias. I later collected superficially similar *Gymnocalycium*s, at La Rioja, but with much longer spines, and still later in Nonogasta with very long and interlaced spines, but only several examples. Both varieties, however, have different seeds. Also a single example of *Gymnocalycium*, which I found at an altitude of 1700 m at Guanchin, belongs to my present interesting discovery. These species I call *Gymnocalycium lariojense* sp.nov., *Gymnocalycium nidulans* sp.nov., and *Gymnocalycium guanchinense* sp.nov. In the country around Nonogasta I found one three-headed and one unbranched example, which both by seed and by appearance are identical with *G.occultum*, so that I infer that this species is very widely distributed. Nevertheless it remains very difficult to find them because of their hidden manner of growth. The bulk of the examples which I found, come from the region "Am vista larga", whither I went later to collect seeds of *Tephrocactus*.

"It is worth mentioning that these *G.occultum* which grow under cover, had certainly attracted my attention earlier, at which time I took them to be a large group of *G.mostii*, which covers the ground everywhere. That plant is sold under the name *G.kurtzianum*, and for this reason, that *G.mostii* is incorrectly illustrated in the work of Britton & Rose. It suffices however to look at the colour plate of *Echinocactus mostii* Guerke in the work "Bluhende Kakteen", in order to know that the two plants are the same. However the resemblance with the old *Echs.ourselianus*, now extinct in collections (to which the name *Echs.monvillei* was incorrectly attributed as a synonym) is so great that I reckon these two as one and as this species.

"This plant not only changes much according to the soil and moisture conditions, but also according to the bushes under which it dwells. I came upon a group of a metre's height out of which several heads had adressed radial spines, others high up had projecting and straight central spines. One should not, however, speak here of natural hybrids. I came upon only one example, which was decidedly a hybrid of *G.mostii* and *G.occultum*. It had features of both species. Alas, this plant was too tall and too damaged so that I was unable to take it with me. After that I found a splendid example of a cristate *G.mostii*, which I dragged along with me, notwithstanding its large dimensions. The catch of crested forms on this expedition was most satisfactory. Besides those already mentioned I found during the following three weeks cristate forms of the spp. *Cleistocactus nigrispinus*, *Gymnocalycium curvispinus*, *Microspermia sanguiniflora* sp.n. and a fine crest of *Stetsonia*. A cristate plant of *G.saglionis* was so large that it necessitated the preparation of a special box.

"On the second day I bought the rail tickets as far as the terminal station at Mercedes, since I was not certain where I should disembark. On the train I spoke with the native travellers and I found that the white form of the cardon (*Trichocereus pasacana*) was known by all. I listened eagerly to these fellow-travellers, and I alighted from the train at the halt at Cervina, where one of my new friends introduced me to the station master." Here they used a lasso and a wooden fork to pull down two heads of *Trichocereus pasacana* f.*picta* or f.*aurea*, this being said to be a white form of the species. They also saw there *Trichocereus huascha* v.*rubriflora*, whose lustrous red flowers ranged from carmine to vermilion.

They also went into the nearby highlands and collected there some fruits of pasacana. "Here also plants of *G.mostii* were plentiful, and better spined than at Catamarca; but because it had already rained in this region, the plants were too wet and distended with water like mushrooms, so I did not collect any. Also because it was 200 m higher in altitude than Catamarca, and more cloudy, the fruits were for the most part not ripe. Similarly unprofitable was the search which we undertook during the next two days on the high ranges on both sides of the river. Young plants of *T.pasacana* were more plentiful here than elsewhere, but it befell me to come upon scarcely twenty handsome examples capable of transportation. Only when I finally return to Prague shall I be able to compare them with young cardons from Tucuman (*T.terscheckii*)."

After this, and having sufficiently dried and packed the sawn-off heads of the two cardons, they set off again in the direction of Catamarca. "We were riding again by rail to Catamarca. I sat by the window and while Martinez conversed with the other travellers, I looked at the countryside."

"Eventually I saw the station of Portezuelo. Quickly I got out", whence Fric went by bus into the nearby mountains. "The mountain consisted of massive layered rocks. Only the top layer was disintegrating and penetrated by the roots of a few bromeliads. The ascent was very difficult over the jagged and sharp rocks. All the bushes and all the leaves had thorns. But it paid off - again a new *Hickenia*. *Hickenia*? I named this *Microspermia rigidispina* Fric sp.nov. on account of its shortish, but yet crooked, strong and stout spines. I found only examples with the flower withered. It appeared that the dried state of the flower was yellow. At noon, tired to death, hungry and thirsty, we returned again to Portezuelo. From one inhabitant we learned that in the village are two shops". A meagre supply of food, some of which turned out to be contaminated, was all that they could forage here and as soon as possible they rode off again. In the heat of the day they alighted at the highest mountain. Fric was exhausted and unable to proceed. "Battered and tired we waited for the evening train and returned again" (presumably to Catamarca).

"The next day was lost, because both of us were vomiting. Also the following day was lost in a vain search to the west. Nevertheless the third day was most fruitful and the most profitable of the whole expedition. We rode by autobus into the neighbouring small town, where we hired a car and set out into the *Tephrocactus* habitats. We filled both rucksacks with them. There were two species. One from the relationship of *Opuntia papyracantha* v.*calva*, but with one straight, dagger-like, 4-5 mm long [?cm - H.M.] and 0.5 cm wide spine at each areole. The second was a new, very interesting species, of which I had seen a specimen in Erfurt and which Dr.Roeder wished to describe as *Opuntia strobiliformis* (like a bread roll). In the habitat no example appeared so roll-like as the dry, freshly arrived imported joints.

"I found joints which were 60 cm long and 10 cm stout. They were in full growth and so smooth that they resembled grey green Ukersko sausage. Also we found individual white flowers of a diameter of about 4 cm and also unripe fruits. But among the joints here and there were also dry fruits from an earlier flowering time, which contained viable seeds. I obtained more fruits from the roll-like *Tephrocactus* than from the dagger-spined *Tephrocactus*, but I only cleaned the seeds from the former. For when I undertook this task under running water with gloves, the gloves soon became covered with glochids like a toothbrush and I had to finish the work barehanded. However, I did not have the courage to clean the seeds of the second species, and several days passed before I managed to pull out all the glochids from my fingers. On the following day I had put some items of clothing inside the rucksacks and I had then to leave soaking in water for several days both the rucksacks and also these items of clothing, for I could find no laundry brave enough to wash them. Consequently even for two weeks we were pulling out individual glochids from our skin. Two baskets were filled with cuttings. I think that I shall hardly ever again collect seeds of *Tephrocactus*. Also here, under the bushes, we found some examples of *G.occultum*.

"Yet in the afternoon we returned again, left there the full baskets and by another car rode between two mountainous zones into Carrera". The mountains were high, the bushes very thorny, walking ahead difficult. After climbing up out of the valley, "The aneroid barometer indicated 220 metres above the valley. I also collected several *Microspermias* with very long, thin, hooked spines. Unfortunately they had finished flowering. *Echinopsis aurea* assumed

here a columnar appearance, and grew among groups of its own offsets, whereas the globular form down below developed groups of independent seedlings”.

They also collected *G. mostii* during the next day. Then “later at night we returned to our inn. The next two days were spent in packing and putting in order the herbarium. The boxes of plants were sent to Buenos Aires and the herbarium to Tucuman. We ourselves then travelled to La Rioja and since the train did not have a connection, we stayed there.”

In La Rioja “Most interesting was the chain of cliffs about 700 metres above La Rioja (1200 m. above sea level). All the species of cactus which we found there had the spines three to four times longer than did those a few hundred metres further down. Especially *Opuntia sulphurea* and *Trichocereus pasacana* had this splendid armament. Is this the influence of the high or low location?”

After La Rioja, Fric went on to Nonogasta, following erroneous advice that *Denmozas* were to be found there. “On the mountains of Gualinchoy I found another species of this genus *Gymnocalycium*, but in two searches I found only one gigantic plant with many fruits. I designate it provisionally as *G. gualinchoense* Fric sp.n.

“I saw that travelling in these parts of the Cordillera is futile, and therefore I have given up the planned expedition to Tinogasta. It is the same mountain formation, the same vegetation. I also had to give up the journey to Andalgalá, during the onset of the rains, because the link across the cordilleras was cut off by swollen rivers and by rail the journey is too long.

“From the whole collecting the only item of any value in cultivation were the blood-red flowering *Microspermias*, but of these I found only seven plants. I acquired a similarly small number of *Lobivia grandiflora*. I resigned myself to return to Tucuman across the Cordilleras by that same route by which I had come. At La Vina, on the return journey, I found one example of *Gymnocalycium* in full flower and I was very surprised to find that, as with the two preceding species the flower was blood red. It is a new species which I have designated as *Gymnocalycium venturianum* sp.nov.”

On the 8 January 1929 Fric wrote a letter in Tucuman. He noted that he had not had time to work on the write-up of his travels and further says that he wanted to try to extract something from his over-filled memory, following his travels in La Rioja and his sojourn in Catamarca. In this letter he observes “I shall shortly be awaiting Martínez, who may at any moment return from the exploration of the Cerro del Campo, whither I sent him forth. I would wish to start out by the first train for the journey to the north”

.....from C. Backeberg, *Cactus France* Vol.10 No.46 - 47, 1955

Helianthocereus grandiflorus is the plant which Fric called *Chamaecereus grandiflorus* and which is sold under this name. Fric told me that he had found this plant in the district of Tucuman when he was searching for *Soehrensia bruchii*. But the data provided by Fric were not always worthy of confidence.

.....from H. Middleditch

In this account Fric tells us that he travelled from Tucuman to Catamarca via Villa Alberdi and Cochás, from where his vehicle climbed over a high ridge. At that time, and until fairly recently, there was only the one route over this outlying sierra for wheeled vehicles travelling from Tucuman to Catamarca, and that was via the Cuesta Totoral. At 600 m above La Cocha, Fric tells us that “there opened out a wide plain, grassy and windy”. We are told by Burmeister that when he crossed this same crest from Sumampa “we followed the track leading up the mountains until we reached the grass covered treeless heights”. When Burmeister crossed the crest of the ridge, he would be no great distance from the Cuesta Totoral, possibly even at the same pass. Kuhn & Rohmeider also tell us that there are rocky outcrops on these uppermost semi-plains. So when Fric left the vehicle to scale an adjacent rocky outcrop, it does seem most probable that he was on the Cuesta Totoral. Hence we can with reasonable certainty identify this location as the finding place for his *Microspermia* (*Parodia*) *sanguiniflora* and *Chamaecereus* (*Lobivia*) *grandiflora*.

Fric tells us that he went back to Tucuman from Catamarca by the same way that he had come, stopping at La Vina, which is but a short distance from the Cuesta Totoral. Here he found his red flowered *Gymnocalycium*. However, in an article entitled “*Microspermia*” which appeared in *Kaktusar* 1932, Vol.III, (reproduced in part in *Lovec Kaktusu*), Fric writes: “It was a rare and happy day indeed when I discovered *Microspermia sanguiniflora*. It was real dog’s weather. It was rainy, the wind hurled us against the edges of sharp rocks, it had already begun to go dark and we had to hasten, lest a stormy night should catch us on the mountains. Yet some *Microspermias* had red flowers, and quickly I collected them and put them in my rucksack. Along with them grew clumping *Echinopsis* and unimpressive *Gymnocalycium*. When we were already wishing to come down from the mountains I found both in flower, and the flowers of both were red. They were the most beautiful plants of all my discoveries, *Chamaecereus grandiflorus* and *Gymnocalycium venturii*. Indeed a happy day, as seldom befalls in the life of a collector.”

In the earlier account we are told that only the *L. grandiflora* and the *Microspermia sanguiniflora* were found here on the outward journey, and only *G. venturianum* on the return journey; one might suspect that the later account, in which all three were stated to grow together, had been improved by time and the telling.

.....from J. Piltz

When we stopped on the Cuesta Totoral we did indeed find P 158 *Parodia sanguiniflora* and P 165 *Gymnocalycium baldianum* growing not far from each other, but we did not find *L. grandiflora* growing together with these two sorts.

.....from K. Preston-Mafham

When we made a day trip from Catamarca city to La Merced, we went to the Cuesta Totoral, north of La Merced. The top of the pass is not as high as most of the others we crossed on our various travels out of Catamarca city. As such, it is not high enough for moorland, but has a mixture of trees and grassland. When we first arrived there we wondered where on earth the cacti could be as it looked so green and unsuitable. In the event, the cacti were on the rocky/earthy roadsides and on rocky outcrops in the grassland, although the *G. baldianum* were also actually in the grass. The *Parodia microsperma* were in flower with red flowers, but R. Ferryman also saw yellow-flowered plants mixed with them higher up. None of the *L. grandiflora* here look anything like the plants I know in cultivation, so much so that when I first saw them I failed to recognise them. They never grew under bushes, always in the open. These *Lobivia grandiflora*, the *G. baldianum*, and the red flowering *P. microsperma*, all grew in close proximity to each other.

.....from G. Charles

By the time we reached the Cuesta Totoral we had climbed out of the really thick subtropical forest, but we were certainly not out in uninterrupted grassland. There was a lot of grass but also there were still patches of trees here and there - but only very few tall trees. It struck me as being much wetter than any of the other passes we crossed around Catamarca - most of the grass was up to knee height. We did find a few small, short, clumps of *L. grandiflora* here. They were not easy to see on account of the height and thickness of the grass. The red-flowering *Parodia* were probably

growing in shallow soil over rocks, because the grass in their immediate vicinity was very much shorter than it was away from the rocky patches. Where the road had been graded through a cutting the sides were usually solid rock. It was on these bank sides that *Pfeiffera ianthothele* had gained a hold.

.....from H.Middleditch

So Fric's tale of finding all three red-flowering sorts growing together on the Cuesta Totoral could well be correct!

It is on p.224 of *Lovec Kaktusu* that Fric is quoted as having found his blood-red flowered *Parodia sanguinea* on the crest of the ridge after leaving La Cocha i.e. at the Cuesta Totoral. On p.233 of the same publication, Fric puts forward his proposal for instituting the generic name *Microspermia* in place of *Parodia* - "Known to me are these species" followed by a list of eight epithets, including *Microspermia sanguiniflora* Fric sp. nov. but no mention of any *P.sanguinea*. On p.398 of *Lovec Kaktusu*, the author tabulates a comprehensive list of Fric's species names for *Microspermia* Fric = *Parodia* Speg, including the entry which, not too surprisingly, reads; *sanguiniflora* Fric n.n. = *M.sanguinea* Fric n.n.

From the above account by Fric of his stay in Catamarca, it appears that he used his time as follows:

Day 1. Catamarca - cross woodland, find *G.occultum* and "*G.mostii*".

Day 2. Catamarca - by rail towards Mercedes, as far as Cervina; find more *G.mostii*.

Day 3. and Day 4. "Two more days were spent at Cervina"

Day 5. By rail to Portezuelo, climb ?Cuesta de Portezuelo, return to Portezuelo for lunch, re-ascend mountain p.m., Fric exhausted; back to Catamarca.

Day 6. Lost due to stomach upset

Day 7. Abortive search west of Catamarca.

Day 8. Bus to adjacent town, hired car to collect *Tephrocactus* seed a.m.; "returned again in afternoon" then to Carrera.

Day 9 Again collected *G.mostii*, return to Catamarca late at night.

Day 10 and Day 11. Packing plants and setting herbarium specimens in order.

When Fric records his collection of cristate plants from this particular expedition, he speaks of them being collected over a period of three weeks. He wrote a letter from Catamarca on 23.12.28; from there he went on to La Rioja and thence to Famatina. From Famatina he returned via La Rioja to Catamarca and thence to Tucuman, writing a letter from Tucuman on 8.1.28. Allowing for travelling, he could have been at La Rioja for just two or three days. His stop at Catamarca, then at La Rioja, together with his visit to Famatina, would have probably amounted to the three weeks which he mentions.

On the Argentine Automobile Club map of Catamarca, received from J.Lambert, there is a place named La Carrera. It is situated along the road which runs north from Catamarca city along the main river valley, in the direction of Singuil, perhaps 15 km or 10 miles from Catamarca city. It lies on the east side of the valley i.e. at the foot of the Sierra Graciana. On another day, Fric took the train running to Merced and he got out at Portezuelo; there is no longer any rail line running up the valley on the east side of the Sierra Graciana via Portezuelo to Merced, but there must have been one there in Fric's time. However I can find no place with the name Cervina along this route.

.....from W.W.Atkinson

It is clear that the railway line between Catamarca and La Merced takes a wide sweep to the east before bending northwards, but I find no intermediate place names. There is no longer a passenger service on this line - if indeed the line survives at all.

.....from J.Piltz

I am not aware of any place by the name of Cervina along the river valley which runs from Catamarca to Merced, but there are still tell-tale signs that a railway line did exist along this route at one time.

.....from J.Lambert

I am not aware of the exact location of Cervina, or for that matter of "Am Vista Larga" which means "At the big view", and certainly applies to quite a lot of locations. However, if Fric took the rail line from Catamarca to La Merced, we may infer that Cervina was situated somewhere along the slopes of the Sierra Graciana. Hence, apart from the correct mention of *G.occultum*, the species which he mistook for *G.mostii* is most probably *G.nigriareolatum*. Indeed, if one looks at Guerke's plate (No.93) in *Blühende Kakteen*, a well-developed *G.nigriareolatum* (at that time undescribed) would bear some resemblance to *G.mostii*. However, on the same trip, or shortly afterwards, Fric must have been aware that there occurred a different species there, as he proposed the (invalid) name of *G.curvispinum*.

LOBIVIA GRANDIFLORA From R. Mottram.

We also have a plant here of *Lobivia grandiflora* which flowers pretty regularly. It is in a 4" pot and started to flower at between 3" and 4" in height. This plant offsets fairly readily from the base. It was grown from seed rather than being a vegetative propagation. Seedlings do show quite a considerable variability in habit of growth and spination, but always they are freely caespitose at quite an early age.

We also have seedlings of Rausch 525 which came as *Lobivia grandiflora*, from near Catamarca, and they are clearly the same species as the preceding flowering plant. This flowered for the first time about six years ago and it was also persuaded to set fruit. This fruit started off as the usual small green berry and gradually enlarged to about 3.5cm in diameter, being almost spherical and a rather washed-out orange in colour. The areoles on the fruit were about 10mm apart and each one carried a small, slender, almost colourless scale together with a bunch of grey-brown hairs. The flower remains were also about 3.5mm in length, with the dried-up perianth just projecting from a shank of brown hairs. The fruit split quite soon after it reached its mature condition, with a single vertical split that exposed the small black seeds embedded in a stiff white pulp.

.....from H.Middleditch.

The ripe fruit of Rausch 525 was acquired from R. Mottram; it proved quite a slow job to remove the seed from the pulp and just as slow to count the seed. The total amounted to 1470. No doubt there would be a few others that were lost in the process.

.....from J.Piltz

We found two forms of *Lobivia grandiflora* in the Catamarca region. We found the smaller form, which I take to be *Lobivia purpureominiata*, below El Rodeo at about 1400m. My wife found the taller form with the shorter spines in 1980 at a spot not far above El Rodeo, likewise at about 1400m. Certainly both plants do not conform to Ritter's descriptions, neither for *Lobivia purpureominiata*, nor for *Trichocereus lobivoides*. This does not really mean much, since this group

of forms around *Lobivia grandiflora* have a very extensive area of distribution. Only a few kms after leaving Catamarca the road enters the valley which leads up to El Rodeo with trees at either side for much of the way. There are even *Tillandsias* growing on the trees. We found both our plants P134 and P188 above the edge of the forest, in grassy hills which still carried some bushes and small trees here and there. The grass grew in tufts and was quite tall. Whilst my plants remain smaller and offset very readily in cultivation, my wife told me about clumps whose main stem reached 60cm in height (24").

.....from H.Middleditch

Presumably it will be the taller plants between La Puerta and El Rodeo which Rausch in his *Lobivia* 85 quotes as up to 40 cm high and places under *L. grandiflora* v. *lobivoides*, conveniently overlooking the form which "becomes stronger in all parts between La Puerta and Las Juntas - *Lobivia purpureominiata* Ritter" in Rausch *Lobivia* 1,2,3.

.....from J.Lambert

The *Trichocereus rowleyi* is a species which I did collect at El Rodeo, north of Catamarca city, under my number JL-213. Here the plants grew on a steep cliff, but not far away we found some younger specimens among the bushes, in company with *Cleistocactus smaragdiflorus*.

.....from H.Middleditch

The photograph of JL-214 taken at this site by J.Lambert is of a single plant growing where a rock outcrop meets the grass - and indeed the height of the grass dwarfs the height of the plant. It has four or five stems, which grow outwards and upwards, somewhat sprawling, stems quite stout for their height, spination apparently not quite as short as on the British Standard *Lobivia grandiflora* but certainly nowhere near as long as on *L. huascha*. My own plant of R.526a displays virtually the same habit as the plant photographed by J.Lambert. However, the Rausch Field Number list is not explicit as to the finding location for this number.

.....from G.Winkler

Following your enquiry I have been able to pay a call on W.Rausch and he tells me that R.526a was found at El Rodeo.

.....from J.Lambert

I also found the variety *longispina* (JL-216) at Condor Huasi, on stony ground among abundant herbs, where there were only scattered bushes. A *Parodia* species grew in the same locality. This place is not very far from Agua de las Palomas, from where Rausch mentions *L. grandiflora* v. *longispina*, and also the features of the plant I saw matched his description (Rausch '85). These plants were multi-stemmed and there remains the possibility that this may really be *Trichocereus andalgalensis*. Both species are closely related, and when Ritter speaks of the "true" and "false" *L. grandiflora*, the latter is probably *T. andalgalensis*.

.....from H.Middleditch

The photograph taken by J.Lambert of his JL-216 is of a single stemmed plant, which is nevertheless not growing upright. Almost the whole height of the stem is leaning sideways, only the very top is almost upright. To judge by the six ribs which can be seen the plant may have ten or eleven ribs; the top of the stem is somewhat pointed, not blunt as in *L. grandiflora*, whilst the thickness of the body in comparison with its height is quite positively more slender than would be expected on *L. grandiflora*. The out-standing spines are about as long as half the body diameter. All these features together would place this plant into either *L. andalgalensis* or *L. huascha*.

.....from J.Lambert

The original description of *L. grandiflora* by Britton and Rose mentions a pink-flowered plant, collected between Andalgalá and Concepción, my finding place for JL-216 being on that route.

.....from H.Middleditch

Indeed Britton & Rose do describe *L. grandiflora* in this manner. Which poses a problem, since all the plants in cultivation under the names of *grandiflora*, *crassicaulis*, *purpureominiata*, *lobivoides*, or *rowleyi*, are reported to flower red.

.....from F.Vandenbroeck

In December 1991 we travelled from Andalgalá to Catamarca. Between Buena Vista and Singuil we found a short-stemmed *Trichocereus* which I identified as *T. schickendantzii*. The flowering of these plants was most impressive; we found groups of plants with more or less twenty large white flowers, fully opened. One specimen displayed salmon-pink flowers! Just south of Buena Vista this species grows together with *Lobivia grandiflora* v. *crassicaulis*. The habitat of these plants is not really barren - there were isolated bushes and I remember tufts of large white lilies. Growing sympatric with *Trichocereus schickendantzii* was *Platyopuntia microdisca*.

.....from H.Middleditch

Of the colour photographs in Backeberg's *Kakteenlexikon*, Fig.166 is of a plant with a body and flower both of *Trichocereus* habit, but the flower is a rosy-pink colour. Backeberg observes that it is probably a hybrid between *L. grandiflora* and *T. schickendantzii*, implying that it is a cultivar hybrid. But it is not entirely impossible that this is the same plant reported above by F.Vandenbroeck.

.....from G.Charles

In November 1992 we stopped in Catamarca for a couple of days with the aim of visiting several locations in the area. Firstly we went to Cuesta Portezuelo, climbing up through the damp forest until we began to leave the trees and bushes behind us and came into what I would describe as moorland, at about 1700 m altitude. Here one of the party came across *L. grandiflora*, which I did not see myself. This is not too surprising since we each went off in different directions and also this plant was not very abundant wherever we found it.

On the following day we set off westwards out of Catamarca, along route 4. We entered the El Tala valley, with woodland on either side, with *Stetsonia coryne* in the lower parts which gradually gave way to *Trichocereus terscheckii* as we climbed higher up the valley. At the north side of the pass, near El Rodeo, at about 1700m, there was a transition area between the shrubby slopes with *T. terscheckii* and the higher grassland with tussocks which was very similar in appearance to the moorland at the head of the Cuesta Portezuelo. Here we found clumps of an Airampo type of *Opuntia*, as well as *G. carminanthum*, growing on the rocky outcrops with *L. grandiflora*, which was only 10-15 cm tall at this locality.

Leaving Catamarca for the last time, we set out to travel further northwards into the higher area of the Andes. This took us up the main river valley from Catamarca, again with the valley floor almost entirely given over to agriculture, but with woodland on the sloping sides of the valley. Once more we saw *Stetsonia coryne* at the foot of the mountain slopes. Going past Singuil there was a lot of woodland and greenery. We stopped at about 1300 m altitude where there was a grassy hillside with rocky patches. Here we found *G. baldianum* and a yellow flowering *Parodia* which tended to hide

among the rocks. Out in the open grew *Lobivia grandiflora*. We took this to be the *v.lobivioides* as the plants were far more substantial than any we had seen elsewhere around Catamarca. The main stem grew upright to about 300 mm tall and some 120 mm in diameter; they offset from the base, although I did not see any sprawling plants. Several were in bud, but we were obviously just a little early to see the flowers open.

No great distance before we reached the junction with the road from Concepcion to Andalgalá, we stopped at a place where a number of cacti grew on rocky hills. We took one of these to be *Lobivia crassicaulis* as it formed clusters of short, fat stems. They were in bud, the buds displaying their red petals, but none of the flowers were open. There were long sprawling stems of *Lobivia huascha*, with fairly long, golden, spines, which were also in bud, but again none of the flowers was open. In addition there was yet another sort which resembled the short, squat, *Lobivia grandiflora*, on which there was a fruit.

From here we joined the main road to Andalgalá, which shortly started across the Campo Pucara, which is virtually flat for a dozen miles or more. It was all divided up by fences and we saw a great many domesticated animals. After a steep, but short, climb we came to the Cuesta Chilca. From the top of this pass we had a magnificent view out over the basin of Pípanaco, which lay below us down a long, steep and winding descent.

.....from F.Vandenbroeck

From Catamarca we went along to the Cuesta de Portezuelo, This Cuesta is comparatively lush and at the foot of the Cuesta it was drizzling. Here we found *Stetsonia*, *Eriocereus* sp., *Gymnocalycium nigriareolatum*, and a plant we took to be an *Echinopsis* sp. Higher up the Cuesta it was a dense fog, so that we did not venture to pass up to the Sierra Ancasti that day.

.....from G.Charles

Whilst we were in the area of Catamarca, and certainly at the places where we stopped on the Cuesta Portezuelo, none of our party saw any plants which were considered to be *Echinopsis*, either at the time or on later reflection. From the slide of the supposed *Echinopsis* sp. which was taken by F.Vandenbroeck on the Cuesta Portezuelo, the plant appears to be a short cylindrical shape, perhaps slightly barrelloid, and I imagine it may be four or five inches high and possibly a couple of inches broad. It has four or five offsets from close to the base. It does not differ greatly from some of the plants of *L.grandiflora* which we saw. But was this slide taken in the damp forest zone? And how far up the Cuesta? What size was the plant in reality?

.....from F.Vandenbroeck

We are just about to leave for an eight week trip to Patagonia and will let you have a reply after we return.

.....from K.Preston-Mafham

During the two days we stopped at Catamarca, we made several trips into the surrounding area. Our first outing was the climb up the Sierra Ancasti by the Cuesta Portezuelo, to the east of Catamarca city. We passed some plants growing on rocky walls in the lower part of the climb, which I am assuming was *L.huascha*. It was certainly not *grandiflora*, but we only saw it from the car and did not stop to check it out in detail. Once we were above the woodland, near the top of the Cuesta Portezuelo, we found *L.grandiflora* at rocky places in the grassland. At first I had taken the *L.grandiflora* to be a very sparsely-spined and unimpressive cylindrical form of *L.aurea*. At this particular location the very small and upstanding *L.grandiflora* looked very like the *L.aurea v.dobearna* which also grew there. On the following day we followed route 4 from Catamarca in the direction of Las Juntas, and we stopped near the crown of the pass at El Rodeo. Here the cacti were all growing only just below the moorland, in rocky grassland, where there were no trees. Here the *L.grandiflora* were again very small, often under 15 cm high. They grew in company with *G.tillianum*.

Our four-man party left Catamarca city on 17 November, following route 62 northwards along the valley of the Rio del Valle. The floor of the valley was given over to agriculture, but we were able to see the well-wooded slopes at either side of the valley. We made a stop just before reaching Singuil, at 1300 m altitude, where there were patches of both woodland and grassland, with rocky outcrops. Here there were *Cleistocactus smaragdiflorus*, typical yellow-flowering *Parodia microsperma*, *Gymnocalycium baldianum* in flower, also a giant form of *L.grandiflora* with long thick stems.

Beyond Singuil the road runs into woodland, interrupted in places by more open and lower vegetation. Some 10 to 15 km beyond Singuil at 2000m we spotted a rocky outcrop and a grassy slope above the woodland. It was here that we stopped when we saw a bunch of white flowers not far from the road on the rocky outcrop. These proved to be on a clump of flattened globular heads which looked rather like the bodies of the *L.crassicaulis* that we found later on that day, but this plant was carrying white *Trichocereus*-like flowers.

The road continued in the forested zone. This was real sub-tropical forest with ferns growing among the trees and water dripping down the roadside cliffs, not the sort of place where any cacti other than epiphytes are to be expected. Once again we were following a river valley, going downstream, and as we descended the trees gradually disappeared. There was still plenty of green grass in places, occasionally scattered bushes, but mostly it was what I would describe as moorland. We were getting closer to the junction with the road which runs from Concepcion to Andalgalá when we spotted the first rocky outcrop for some kms. At this spot we found several different cacti, growing quite close together. Over a small area of perhaps half a hectare with small outcrops of rock we found perhaps a couple of dozen plants of *Lobivia crassicaulis*, in bud, but with no open flowers. These formed closely-packed clumps of short, fat, stems with a short spination. These were accompanied by dozens of *Lobivia huascha*, which branched from the base with several sprawling columnar stems each over a foot long, which bore thin projecting spines a good inch in length. These too were in bud but again there were no open flowers. These plants were just like the *L.huascha* found in thousands after crossing the Cuesta de Chilca and descending towards Andalgalá. There was yet a third sort of plant which had a semi-*huascha* body i.e. tallish and slimmish, but smaller in all its parts than the typical *huascha* around them, and with less inclination to form clumps. One or two of these plants carried buds. At this locality there were also *Gymnocalycium baldianum* in flower as well as *Opuntia corrugata* with red flowers. From here it was only three or four km to the river crossing and almost immediately afterwards we joined the road to Andalgalá.

After leaving the other three members of the party at Salta, I continued my travels on my own. These shortly took me south again, through Tucuman to Concepcion, which lies on the edge of the Chaco lowlands in an area given over almost entirely to agriculture. From here I took the road to Andalgalá, which leads westwards towards the high mountains that can be seen when leaving Concepcion. As the road started to climb I found myself travelling through sub-tropical forest, which continued right up to the pass at Cuesta Clavillo. On looking back from the top of this pass, I was surprised to see just how far the forest stretched away down to the plain below. Looking in the opposite direction, the nearest hills and valleys were also covered with woodland but the highest ridge in the distance looked quite arid. It was surprising to see how the vegetation changed from forest to almost desert in such a short distance, presumably because of the effect of the rain shadow. Even on the descent from the Cuesta Clavillo, there was still a great deal of woodland and everything

was still very green. Where the valley opened out there were farms and much less woodland, possibly because it had been cleared for agriculture. There was certainly no expectation of finding cacti along this stretch.

At the junction with the road which we had come along from Catamarca, I turned off for the short distance to go back to where we had stopped a couple of weeks earlier. The plants which had then been in bud were now full of red flowers. One of these was easily identified as a typical *L. huascha* both in flower and body. The flowers were at least twice as large in all dimensions as the flowers on *L. crassicaulis* and of a paler red colour - more a post-office red. The second red-flowered plant corresponded precisely to what we cultivate these days as *Lobivia crassicaulis* and displayed typical *grandiflora* flowers. The semi-huascha plant also had typical *grandiflora* flowers. The white-flowered plant we had seen about 35 km further south was also present, growing with the *crassicaulis* and looking just like them except that the heads were bigger and there were fewer of them. It was these plants which were in fruit when we had stopped previously at this spot: a more or less globular fruit, green, roughly 28 mm in diameter, with longish straggly black hairs. There were also red flowers now open on the *Parodias*, making a total of at least five species of red-flowering cacti in bloom together.

When we looked over the slopes around there were no other plants of this sort to be seen in the surroundings - not just by the naked eye, but also by using the binoculars, which are essential if one is not going to waste a lot of time tramping along just in the hope of finding some cacti. Nor were any other cacti to be seen. Just these plants at a very isolated location.

....from H.Middleditch

During the course of his stay in and around Catamarca city, Fric paid a visit to Cervina, which lies between La Merced and Portezuelo. Here he mentions that he found *T. huascha v. rubriflora*. It seems to be most unlikely that Fric climbed from Cervina in the valley up through the forest zone to the grassland on the crest of the Sierra Ancasti, since this would have involved a climb of some 1100 m (about 3300 ft). Consequently it appears to be quite likely that he found his *T. huascha v. rubriflora* on the lowermost parts of the mountain slopes. Such a location would be a fair match for the sighting reported by K.Preston-Mafham since the nature of the terrain and the vegetation are likely to be rather similar at the two locations.

In his review of *Trichocereus* from Argentina in *Darwiniana* Vol 21 No.2-4, 1978, Kiesling deals with *T. schickendantzii*. In more northerly locations and in what are probably more humid conditions, *T. schickendantzii* grows columnar, making large mounds. Kiesling gives the distribution of this species as "Tucuman, Salta and Jujuy provinces, on humid mountain slopes between 1500 and 2000 m altitude, at the upper margin of the sub-tropical forest or on rocky ground among the forest". Having excluded Catamarca from the distribution area, Kiesling then lists herbarium specimens of this species. He quotes collections from Salta and Tucuman as well as one from Catamarca. It does seem to be quite possible that the Catamarca collection was made at one of the above sites between Singuil and the junction of the Singuil road with the Andalgalá-Concepcion road. Hence the plant seen to the north of Singuil which had a clumping *crassicaulis*-like body and a *Trichocereus* flower was probably *T. schickendantzii*.

Then there is the "semi-huascha plant, smaller in all its parts than the *L. huascha* around them" found at the stop north of Singuil, just before the junction with the Andalgalá road. In Rausch *Lobivia* 85, *L. huascha v. andalgalensis* is said to be distinguished from *L. huascha v. huascha* on account of being "smaller and slimmer in the stem, with more and yellower branches, spines feebler and less in number". Kiesling in his review of *Trichocereus* says that *T. andalgalensis* is to be distinguished from *T. huascha* by its less height and stem diameter, by the more regular disposition and colour of the spines. The Kiesling diagnosis for *T. huascha* quotes spines dirty yellow to reddish to brown, becoming grey, body greyish green with age; for *andalgalensis*, spines yellow, body clear green. Ritter does not express any comparison between the two sorts. Taking the foregoing data into account, it could be suggested that the "semi-huascha plant" might reasonably be called *L. andalgalensis*.

On one of the journies made by Schickendantz across the Campo Pucara, he crossed the Serra Narvaez by the pass at Condor Huasi. To judge by the map of this area prepared by Burmeister and published in the 1868 Petermann's Geographische Mittheilungen, Condor Huasi lies almost due east of the junction between the Andalgalá-Concepcion road and the route to Singuil and Catamarca. More accurately, slightly south of east. If J.Lambert travelled along the Andalgalá-Concepcion road and turned off towards Catamarca, then stopped after no great distance to look at his JL-216, then Condor Huasi would be virtually due east up the mountainside. In the absence of any named habitation or feature at or close to this site, the name Condor Huasi might have been the nearest possible identification for this location.

....from J.Lambert

The form of *Lobivia grandiflora* which I collected at Condor Huasi, JL-216, was slightly south from the road junction, towards Singuil off the Andalgalá-Concepcion road.

....from H.Middleditch

It would appear that the location for JL-216 (as Condor Huasi), the location quoted by K.Preston-Mafham for the *L. crassicaulis*, *L. grandiflora*, and *L. huascha* growing almost side by side, and the location for *T. schickendantzii* quoted by F.Vandenbroeck, are all at no great distance from each other.

The large white-flowering *Trichocereus* and those *Echinopsis* outside the *leucantha* group, all display one common feature which is also seen in *Selenicereus* and *Mediocactus*, but is otherwise pretty uncommon in other cactus flowers. The stigma and style, together with a fairly large body of stamens, tend to lie or slump to one side of the tube - usually leaning the same way as the flower, so that they tend to lie on the lower part of the tube. In *Lobivia*, as in the majority of cactus flowers, the style and stigma is usually held more or less upright in the centre of the flower and the stamens take up a fairly regular disposition around the style. The stamens do not lie to one side in a bunch, as they do in *Trichocereus* and in the non-*leucantha* group *Echinopsis*. In his *Lobivia* 1,2,3, Rausch lumps together into *Lobivia huascha* all the various names which form the *Lobivia grandiflora* complex (then re-separates the *grandiflora* group, without any clear explanation for so doing, in Rausch 85). Do the flowers in Rausch's *huascha* group display an erect style and stamens, as in the *Lobivia*, or a leaning style and stamens, as in *Trichocereus*?

....from R.Mottram

A *Lobivia huascha* has flowered here and appears to be characterised by having flowers with a nectar chamber which is very small or almost absent, and the stamens which are inserted below the throat circle form a cluster in the lower part of the tube, displaced to one side. I have never seen any other cactus flowers with this character other than in *Echinopsis*, which usually hold their flowers at an angle of some 30° to the vertical, and in *Trichocereus* where the flowers are held horizontally.

A plant of FR 426 *Trichocereus vatteri* was acquired from S.G.Laurence in 1976 under the name of *Trichocereus de Famatina*. This also flowered, the bud bursting through the epidermis in the manner of some *Echinocereus*; it produced a fairly large red flower, measured 12.7 cm long and 6 cm diameter at mid-morning on the second day of opening. Here

again there was no nectar chamber and again the stamens inserted below the throat circle were leaning to one side of the tube.

Both these plants hold their flowers nearly vertical, and there seems no obvious reason why the stamens in a vertical flower should behave in this way. Another character of interest is the small, almost vestigial, nectar chamber, as though the plants were only offering pollen to the pollinators.

.....from H.Middleditch

In his *Lobivia* 1,2,3, Rausch equates FR 426 with his *L.huascha*. He also provides a sketch of a cross section of a flower on *L.huascha*, which shows the style centrally in the flower, although it could just as well be leaning away from the viewer and resting on the wall of the tube, together with stamens regularly disposed at either side of the style. Three of his photographs include flowers, in each of which the style and stigma may be seen to be leaning against one side of the tube, but the stamens appear to be regularly disposed within the tube, and not clustered to one side. Similarly, the photographs of *L.huascha* in Rausch 85 all display a leaning style, but do not appear to show leaning stamens. In contradistinction, a photograph taken by F.Vandenbroeck in the Famatina area of a close-up of two red flowers on a *T.huascha* displays fairly clearly a set of stamens slumping to the lower part of the tube; even the tops of the lower (and uppermost?) stamens appear to be turning upright, as is so common in *Echinopsis* and *Trichocereus*.

In his review of *Trichocereus* in *Darwiniana* Vol.21 No.2-4, 1978, Kiesling regards this Rausch *huascha* group as five species, viz: *T.vatteri* FR 426, *T.huascha*, *T.andalgalensis*, *T.rowleyi* (= *L.grandiflora*), and *Lobivia crassicaula*. For *T.rowleyi* (= *L.grandiflora*) he quotes "style leaning" but makes no reference to any leaning style elsewhere in his descriptions of this group. He provides a flower section for *T.huascha* only, with style and stamens regularly disposed i.e. no leaning or clustering shown. In Ritter's *Kakteen in Sud-Amerika* there does not appear to be any reference to leaning styles or clustering stamens in the descriptions of the plants which come within this group.

Thus as far as it is possible to establish from the data provided in the literature, no attempt has been made to clarify this quite important characteristic for the plants in this group. On this account one must question the value, if any, of the writings of those authors who have shifted a number of these plants between *Lobivia*, *Echinopsis*, and *Trichocereus*, apparently without concerning themselves with this particular feature. Clearly there is a wide-open opportunity here, for those of us who have any flowering plants of this group, to make observations on the existence or absence of leaning styles and especially leaning stamens.

In general terms one feels obliged to echo the comment made by Fric that it is difficult to decide on a suitable name or names for this particular group of plants. In the absence of further data on stamen slumping, any argument over allocation to *Lobivia*, or to *Trichocereus*, would appear to be irrelevant.

TPE MOUNTAINS ROUND CATAMARCA By H. Middleditch

The article by Kuhn and Roehmeder provides a pretty thorough description of the terrain, climate, and vegetation of the sierras which lie in the southern part of Tucuman province and the adjacent parts of Catamarca province. These mountains lie in three roughly parallel ranges, as shown on the accompanying map, with the prevailing winds coming from an easterly direction. In consequence each of these three ranges has a moister, east facing slope and a drier, west facing slope. Going from east to west, each mountain range is rather higher than the range to windward, so that the east facing slopes of the two more leeward ranges are not deprived of moisture from the rain-bearing winds. But because of the increased altitude, each range has its own rainfall-temperature regime.

The moisture bearing winds also tend to come from a south-easterly direction so that south-facing slopes of gulleys and cross valleys tend to benefit from a rather better rainfall than north-facing slopes. South-facing slopes will receive less direct sunshine than north-facing slopes so that insolation and consequent transpiration will be reduced. In addition, the two main valleys which run northwards out of the plain on which the City of Catamarca stands, are exposed to moisture bearing winds coming from a southerly direction, as are several parallel-running valleys in the same mountainous area. As a result, zones of woodland vegetation follow the lines of each of these valleys, along the slopes at either side. In consequence, there can be a zone of woodland on both the east-facing and the west-facing slopes of the Sierra Ancasti and Sierra Graciana. It appears that the intermontane valley sides are covered with woodland up to a point not far to the north of Singuil, and no further. The gully on the flank of the Sierra Graciana climbed by Burmeister supported a hygrophilic vegetation with an occasional bottle tree, a plant not reported from either the woodland on the ascent of the Cuesta Portezuelo, nor on the wooded hills a short distance out of Catamarca. The dry thickets on the low hills between Catamarca city and the Rio del Valle contrast sharply with the damp underfoot conditions in the woodland on the Cuesta Portezuelo, where care had to be taken not to slip on the steeper parts.

There is a basic pattern of moist east facing slopes and dry west facing slopes, most evident on the Sierra Ancasti and Sierra Ambato; to this is added the moist east and west side slopes of the intermontane valleys running north from Catamarca. The combined effect of altitude, rainfall, and insolation tends to produce an overall pattern of dry, Chaco vegetation on the lower plains, woodland on the intermediate slopes, lower bushes above the woodland, and finally grassland. To this is added the effect of exposure which produces moorland-like grassland on the crowns of even the lower mountains. The influence of orientation will modify not only rainfall, but also insolation and transpiration, whilst the nature of the terrain will alter the shelter effect. The combined result of all these factors is to produce a basic pattern of vegetation to which is added a patchwork of different rainfall-transpiration-temperature-insolation-shelter regimes. The account by Parodi provides some impression of this situation. It would not be unduly surprising to find that the cacti respond to these variations by producing a variety of body habits and forms. This would indeed appear to be so in the case of *Lobivia grandiflora*, for one.

If a comparison is made of the routes which were taken over this particular mountain area by the various authors whose articles are reproduced above, it will be found that they all follow two or three well-defined tracks running roughly north-south, and two or three equally well-beaten tracks running roughly east-west. Some of these routes have been followed by visiting speakers to the Chileans' weekends - by R. Kiesling, by J. Piltz, by J. Lambert, by F. Vandenbroeck, and most recently by the four-man party of G.Charles, R.Ferryman, and C.Pugh in company with K.Preston-Mafham. The available literature suggests that the mountains are no-man's land beyond a couple of stones-throw from the roads, known only to the local shepherds. It is quite possible that we have in our collections only certain of the various forms of cacti which survive in this particular range of mountains.

At the latitude of Catamarca the predominant feature of the earth's climatic controls is that of descending air, with consequent adiabatic heating. This is the cause of the major southern hemisphere deserts of central Australia and of the

Kalahari in Africa, both at a similar latitude to that of Catamarca. On a global basis, the forest which fronts the Andes in Tucuman and Catamarca, and the woodland in the valleys to the north of Catamarca city, is out of place here. But Burmeister (and Parodi) tell us that the laurels and other representatives of this forest are not to be found to the south of Invernada, which lies at the same latitude as Andalgalá. South of here, local factors no longer enable the tropical forest to grow on the eastern front of the Andes, in opposition to the major global climatic controls.

From the front ranges of the Andes in Bolivia in the north, right down to those in Tucuman province, at a higher altitude above the tropical forest there is a zone of Aliso (alder) and of Sauce (willow) whilst at higher altitude still, there are Quenoa bushes. But these formations only occur as far south as Alamitos on the slopes of Aconquija and nearly as far south as Singuil on the east-facing slopes of the Sierra Narvaez. Hence the Aliso extends just about as far south within this mountainous area as the tropical forest does on the east facing frontal slopes. The damp forest which has been reported by several writers to occur on the well sloping sides of the three river valleys running north from Catamarca, was found to extend as far north as Singuil by the four man party visiting this area in late 1992 i.e. on the ostensibly "dry" side of the Sierra Narvaez. As with the lower-altitude forest, and with the Aliso formation, again we find a significant change at approximately the latitude of Andalgalá-Invernada.

Schickendantz mentions that the mule trains going from Andalgalá to Tucuman encounter blood-sucking bats on the descent of the R.Canas, but there is no evidence that blood-sucking bats are to be found any further south or west of this location. Thus we appear to have a southern boundary for this particular fauna roughly coincident with the foregoing change in vegetation. Although no data has come to light regarding the entomology of this mountainous area, it appears to be possible that there may also be some change in the insect life at this same latitude.

The distribution of *Notocactus mammulosus* extends over a surprisingly wide area, from Uruguay on the Atlantic coast, north to Paraguay, south to the Sierra Lihuel Calef not far from the Rio Colorado, thence as far west as Manzano Historico in the foothills of the Andes, and north-west to the Sierra Cordoba. The most northwesterly part of its distribution lies in the southern part of the Sierra Ancasti, almost into the area under consideration here. But not into the area of the laurels, of the Aliso, or of the blood-sucking bats. The reported distribution of *Parodia* on the eastern front of the Andes does extend as far south as the Sierra Ancasti, but it does not appear to overlap the distribution of *Notocactus*, although the dividing line is a little further to the south than the latitude of Andalgalá.

Taking all these factors together, it does appear that there is a major change in the underlying environmental controls which lies very approximately at the latitude of Cuesta Chilca - Condor Huasi. This may also represent some form of zoological boundary where a change of pollinating agents may occur. It is in these mountain ranges, and only in these mountain ranges, where we find red (as opposed to pink-) flowering *Gymnocalycium*s. From here, too, comes the red flowering *Lobivia* (or *Trichocereus*) which so puzzled Fric.

It would now appear that plants of the *Lobivia grandiflora* complex are found between about 1400 and 1800m altitude above the woodland zone, as at El Rodeo, Singuil, Cuesta Totoral, and Cuesta Portezuelo. Looking further to the north, but in similar phytogeographical conditions on the front ranges of the eastern Andes, in the provinces of Tucuman, Salta, and Jujuy, there is found the white-flowered *Trichocereus schickendantzii* at altitudes between 1500 and 2000m (Kiesling). Looking further to the west, in the Pipanaco basin the climatic regime is much hotter and dryer, ameliorated somewhat only in the vicinity of Andalgalá by a slightly better localised rainfall, where *Lobivia crassicaulis* is found.

The junction between the Andalgalá-Concepcion road and that leading to Catamarca, ("Condor Huasi"), lies approximately at the southerly limit of blood-sucking bats and of the laurels at the base of the east-facing slopes, as well as at the northern limit of the intermontane forest on the "dry" side of the Sierra Narvaez. Within this mountain area, this appears to be the northern limit for *Lobivia grandiflora* and the southern limit for *Trichocereus schickendantzii*, whilst the edge of the Campo Pucara basin may offer conditions not vastly dissimilar to those enjoyed by *L.crassicaulis* on the Andalgalá side of the Cuesta Chilca. The somewhat slimmer *L.andalgalensis* and the rather more robust *L.huascha* also appear to have colonised this same location.

The huascha type plants are widespread around the Pipanaco basin, growing under a fairly severe climate regime which does not vary to any appreciable extent over this comparatively large area. The crassicaulis type are apparently restricted to the somewhat less severe conditions in the one part of the Pipanaco basin which lies around Andalgalá together with the Campo Pucara. The grandiflora sort are found growing in less onerous circumstances in the mountains between the Sierra Ambato and the Sierra Ancasti. As Fric, and later Ritter, observe, these plants display features associated with both *Lobivia* and with *Trichocereus*. Up to the present time no great amount of work has been done on seed and flower morphology, which might indicate a preponderance of characters towards one or other of these two genera. The question of stamen disposition, which might show a distinction between *L.grandiflora* and *T.huascha*, does not appear to have been effectively investigated.

A NEW CACTUS GENUS? By A.Hofacker

In the midst of the Chapada Diamantina in the Brazilian federal state of Bahia, some plants were found a few years ago which were initially described only as "Species nova Bahia". It is unclear as to which genus they belong. In the August of 1992 the author was able to examine these plants at two habitat locations and wishes to present some observations here for the first time.

The Chapada Diamantina is a range of mountains in central Bahia. The highest elevation is the Pico das Almas 1850 m high. The "sp.nov. Bahia" occurs only in a mountain region of strictly limited extent. Between about 1000 and 1100 m these plants grow in the clefts of steep sandstone rocks. It is remarkable that their distribution is restricted to this altitude zone. Only a few metres below and above these levels the plants are no longer to be found. And this despite the landscape being entirely unchanged and the other accompanying cactus vegetation (*Austrocephalocereus purpureus*, *Pilosocereus luetzelburgii*) also grows within, above, and below this zone.

On account of the altitude it is climatically one of the cooler areas of Bahia. In the Brazilian winter the temperature certainly falls below 10°C on some occasions but of course this is only for a limited time. Since flowing waters extend throughout the whole range of mountains the atmospheric humidity is pretty high and the landscape is covered with a great number of bromeliads, orchids and palms.

The "spec. nov. Bahia" grows both in full sun (as was observed at the first habitat location) as well as in the shade in the grass (at the second location). It must survive on the quite small amount of almost black humus from the rotting leaves and grasses which collects in the clefts in the rocks.

The "spec. nov. Bahia" attains a height of about 1 to 1.20 m and is 10 cm in diameter. As soon as the plants attain a

columnar form, they become decumbent, as is often to be seen in the genus *Coleocephalocereus* which occurs at a distance of 800 km from this site. Even the remaining habit of the body is reminiscent of this genus. At the second of the habitat locations visited by the author, the plants only attained a height of some 30 cm, but that seemed to be accounted for by the area being burnt off at frequent intervals.

The "spec. nov. *Bahia*" hardly ever offsets and is very soft-bodied. Only older plants produce branches. The flower is certainly most remarkable. It originates from near the crown and forms a wreath of flowers. The outer petals are dark pinkish-red, the inner yellowish-white. The form of flower is reminiscent of the genus *Arrojadoa* or *Micranthocereus*, as well as in being only some 1-2 cm in diameter and 4-5 cm long. The "sp. nov. *Bahia*" is differentiated from both these genera however on account of the absence of any cephalium. Whilst the genus *Arrojadoa* possesses a terminal cephalium and the genus *Micranthocereus* a lateral or side-cephalium, there is a complete absence of any cephalium in the "sp. nov. *Bahia*". Not a vestige is to be seen. The pinkish-red fruit attains a diameter of 2-3 cm, it is slightly barrelloid and equally reminiscent of the fruit of *Arrojadoa* and *Micranthocereus*. It is at the same time however softer and filled with abundant white and also more juicy pulp. The seeds are small and black. Comparison with other genera has not yet been possible. Possibly it may even be placed in relationship with the genus *Floribunda* (= *Cipocereus*).

On the basis of the absence of any cephalium it is not possible to assign the "spec. nov. *Bahia*" to one or other of the already well-known genera. In the opinion of the author a new genus will need to be erected for these plants, unless one wishes to ignore the diagnoses of existing genera.

.....from H.Middleditch

The plants which are described above by A.Hofacker were recorded under the field numbers AH 307 and AH 310. A small sample of habitat-collected seed of both field numbers was received for examination, together with samples of habitat collected seed of both *Arrojadoa* and *Micranthocereus*. These were all examined under the microscope. Note was also taken of a number of seed sketches which accompanied several descriptions of species of *Arrojadoa* and of *Micranthocereus*.

.....from G.J.Swales

The seed of AH 310 is a shiny jet black and that of AH 307 is a dark reddish brown, but otherwise the size and shape of the two samples of seed are virtually identical. The seeds are approximately half as tall again as they are broad, with the hilum basal or almost so. In side view the seed widens out from the hilum in an approximate urn-shape, but not symmetrically; the maximum width is not quite half as much again as the width at the hilum. Apart from a band immediately above the hilum, the testa is composed of slightly humped cells, whose raised profile can be seen quite easily close to the profile of the seed. No lacunae whatever could be seen, nor was there any sign of minor pits at the points where three or more cells came together.

The seed of *Arrojadoa* displayed a lustrous testa surface, again lacking any lacunae or pits. The seed of *Arrojadoa* AH 293 was asymmetric (or, put another way, the hilum was oblique). On the seed of *Arrojadoa* AH 280 the hilum was so oblique that it was almost a continuation of one side of the seed.

The seed of *Micranthocereus* were slightly asymmetric (i.e. hilum slightly oblique), the testa surface being shiny black with fine intercellular pits. To judge by the appearance of the surface of the testa as well as by the absence of humps on the profile of the seed, the testa was probably uniformly smooth over most of its area.

.....from H.Middleditch

In addition to the foregoing microscope examination, over a dozen seed sketches or SEM photographs of *Arrojadoa* and *Micranthocereus* seed were consulted, which have appeared in K.u.a.S or *Succulenta* accompanying first descriptions of new species of these two genera. There did not appear to be any great affinity between the seed of *Bahia* sp.nov AH 310 and AH 507, and the seed of either *Arrojadoa* or *Micranthocereus*. Thus the separation of *Bahia* sp.nov. from these two genera is supported by this seed comparison, as well as by the absence of a cephalium.

In those cacti which produce a cephalium, the flowers arise, as a rule, from the area of the cephalium. The cephalium itself can be regarded as formed from an assemblage of the cauline zone of individual flower stalks. A number of cephalium-bearing cacti are known to produce flowers before there are signs of the cephalium starting to form. It might have been possible to suggest that this occurred with "Spec. nov. *Bahia*" but it does seem rather improbable that this would occur in a whole population, presumably of different ages. Hence the possibility of this plant belonging to *Cipocereus* should not be neglected. Were there quite a large number of plants seen at the two habitat sites?

.....from A.Hofacker

The plants are not easy to find and are quite rare in habitat. There were six of us walking round for some hours over both habitat locations and altogether we found only about 30 plants.

.....later. It would appear that this plant has now been described, as *Floribunda bahiensis*, in *Pabstia* for April 1993.

FLORIBUNDA BAHIENSIS sp.nov. by P. Braun and E.E.Pereira

Translated by H.Middleditch from *Pabstia*, Boletim do Herbario Guido Pabst, Universidade do Estado do Minas Gerais Vol IV No.3 April 1993.

In 1988 E.E.Pereira travelled through Bahia in order to study various cactus habitats, mainly to locations in the central and southeast part of that state. One of the discoveries was a small columnar species which grew on the Chapada Diamantina which displayed some similarity with *Uebelmannia pectinifera* Buining or *U.flavispina* Buining & Brederoo, or also with young plants of the genus *Echinopsis*. When young, the more or less globular plants are also difficult to distinguish from others which grow in the same habitat, such as the so-called bottle cactus *Pilosocereus leutezbergii*. Another similar more or less globular plant, originating from another habitat (Pico das Almas, Harley et al. 24522) was photographed and discussed by Taylor & Zappi. (Bradleya 7, 1989).

In the course of recent years it has been possible to study the flowers, pollen, fruit, and seeds and it has become clear that the plant belongs to the tribe Cereeae, without any doubt whatsoever. At the same time, it has appreciable comparability with and similarity to *Uebelmannia* Buining, although the reproductive features of the flower, fruit, and seed do not display a close relationship. In contrast to *Uebelmannia* the flowers are thick and fleshy, naked and tubular; the fruit has thick fleshy walls, bare, and a dark wine colour. Looking only at these features and seeds, this species seemed to belong to one of the following genera: *Arrojadoa*, *Micranthocereus*, *Cipocereus*, or *Floribunda*.

Arrojadoa Britton & Rose is clearly defined as slim, columnar, displaying at the apex a circular cephalium out of which the flowers and fruit appear.

The plant described here grows for some time with a globular form and starts to produce flowers quite early, without possessing any form of cephalium or pseudocephalium, such as that which occurs in *Micranthocereus* Backeberg 1938 and *Austrocephalocereus* Backeberg.

The small, tubular, coloured, flowers, diurnal and directed towards bird pollination, do not possess a canalised zone between the nectar chamber and the primary filaments, as is typical for pollination by bats, as in *Cipocereus* Ritter 1979. In addition, it does not have small scales (staminodes sensu Werdermann, diaphragm sensu Buxbaum) above the nectar chamber, as in *Micranthocereus*. In addition the fruit and seed are not typical of the *Micranthocereus* and differ completely from the large bluish fruits of *Cipocereus*.

The vegetative growth form and in particular the spination at the crown is reminiscent of *Floribunda pusilliflorus* Ritter 1979, which grows more to the north in the high parts of the Serra Espinhaco, not far from Monte Azul in Minas Gerais. Reading the diagnosis of *Floribunda*, all the characteristics fit very well: plant more or less short; ribs numerous, rounded, not very tall; areoles numerous and small, spines numerous, erect, needle-like; lacking cephalium or pseudocephalium; flowers actinomorphic, small, cylindrical, fluted, naked; pericarpel diminutive, naked; receptacle tubular, naked, with few scales; nectar chamber closed by primary filaments; lacks canalised zone between nectar chamber and primary filaments; filaments not leaning on the internal wall of the receptacle and do not reduce in the higher part; no gap between insertion of primary and secondary filaments; stigma lobes clasped together; perianth diminutive, barely reflexing; fruit more or less globular, not green, small, indehiscent when ripe; flower remains not deciduous, enveloped by an upswelling from the top of the pericarpel.

Taking all these similarities into consideration, this new plant appears to be a northerly relative of the species *Floribunda pusilliflora*. Both *Floribunda pusilliflora* and *F.bahiensis* produce tubular flowers, bicoloured (receptacle reddish pink and perianth white) which are habitually pollinated by humming birds, according to observations made by the authors at the habitat locations of both of these species. By contrast, *Pilosocereus leutzelbergii* which grows at the same habitat and in youth looks like *Floribunda pusilliflorus*, has nocturnal flowers which are pollinated principally by bats, and moreover, have large and different blue fruits, which sometimes dehisce. Recent literature considers *Floribunda pusilliflora* as an aberrant species derived from *Cipocereus* Ritter 1979. Now, since the discovery of this second species with many similar characteristics, it seems to be practical to keep *Floribunda* as a separate genus.

[Fully detailed description follows, together with comparison table between *F.pusilliflora* and *F.bahiensis*]

Habitat - Brazil, high parts of the Chapada Diamantina. Grows among rocks, together with samambalas, phylo dendron, vellozia, bushes, bromeliads, orchids, and other cacti e.g. *Rhipsalis*, *Mediocactus*, *Melocactus*, *Micranthocereus*, *Pilosocereus*

.....from H.Middleditch

When we were shown slides of this plant at the 1993 Chileans' Weekend by A. Hofacker, it gave an immediate impression of being an *Uebelmannia* with *Arrojadoa*-like flowers. The discussion which took place on that occasion as to its possible identity followed somewhat similar lines to the alternatives reviewed in the above article, considering external features of *Arrojadoa*, *Micranthocereus*, and *Uebelmannia*. In addition, seed comparisons were made, using SEM slides of the seed of *Floribunda bahiensis*, helpfully provided by R.Bregman.

The table of comparison between *F.pusilliflora* and *F.bahiensis* quotes (respectively) plant height up to 40 cm/ 110 cm; diameter 4-5 cm/ 8 cm; ribs 14-18/10-14. This implies that *F.pusilliflora* is a smaller plant than *F.bahiensis*, but with more ribs. This means that the ribs will be closer together on *F.pusilliflora* and wider apart on *F.bahiensis*. The photographs which accompany the description of *F.bahiensis* do indeed show a plant with the ribs spaced well apart, whereas the photograph of *F.pusilliflorus* which accompanies the article by P. Braun (below) is of a plant with shallow ribs packed much more closely together. This is precisely what might be expected from the comparison of the two descriptions. However, the authors refer to the features of *F.bahiensis* being comparable with those given in the diagnosis of *Floribunda*, to which comment they add a list of those very features. One such feature is "ribs numerous, rounded, not very high" which hardly seems to apply to those *F.bahiensis* which they show in their photographs. Their photographs of *F.bahiensis* are of a plant with very deep intercostal grooves, straight-sided ribs, and outwardly-pointing spines forming a "fence" down the rib, all very reminiscent of many *Uebelmannia*.

The authors describe the external appearance of the fruit of *F.bahiensis* and give the size as 12 mm in diameter but do not say anything about the interior, except in their comparison between the two species, where the fruit is said to be aqueous for *F.pusilliflora* and dry for *F.bahiensis*. This is in stark comparison with the observation by A.Hofacker that the fruit of *F.bahiensis* "attains a diameter of approx. 2 to 3 cm, and is filled with abundant white and juicy pulp". We do know at what time of year this observation was made, but at what time of year was the fruit seen at 12 mm diameter and dry internally? Long after it had ripened? A fruit of 2-3 cm in diameter is the size of a large grape and compares favourably in size with the fruit of *Cipocereus pleurocarpus* 16-26 mm diameter, and *C.minensis* 25-40 mm diameter, as quoted by Ritter.

.....from P.Braun

In the course of 1988 I travelled in the north-east of Brazil and also in the south of that country; but we did not go to Bahia in that year. Earlier in that same year E.E.Pereira did travel to the northern parts, but I do not know the exact dates of that trip. In June-July 1993 I visited some of the habitats of *Floribunda bahiensis* in company with E.E.Pereira - the type locality, two other locations as well as that visited by K.I.Horst and A.Hofacker. Many plants were in flower and it was a magnificent sight to observe the humming birds visiting the slender flowers in the early, very misty, morning. I also saw the fruits and very soon realised that the pulp is normally juicy. At this moment we are preparing some short articles for some journals to provide a translation of the description and also a correction of the data regarding the fruit of this species. All the fruits that I saw were more or less globular of about 10-15mm in diameter. I never saw a fruit of 20-30mm as reported by A.Hofacker. If he made this observation in the field, we should mention this with an additional note in the forthcoming articles.

.....from H.Middleditch

The habitat for *Floribunda bahiensis* is quoted above as Chapada de Diamantina. This location has no geographical connection with the city of Diamantina. The mountain range which runs for a distance of almost 1500 km between, and roughly parallel to, the course of the Rio Sao Francisco and the coast, is called the Serra do Espinhaco. The greater part of this mountain range which occurs within the state of Bahia is also called Chapada de Diamantina. It effectively extends from the boundary between Minas Gerais and Bahia in the south for some 200 miles (300 km) or more to the north. To quote "Chapada do Diamantina" as a habitat location is consequently rather imprecise. No doubt it has been done bearing in mind the apparent miniscule number of plants at the one known habitat location in the hope that it will avoid depredation of the site.

FLORIBUNDA PUSILLIFLORA sp.nov. By F.Ritter

Translated by H.Middleditch from Kakteen in Sud-Amerika, by F.Ritter.

[From the Latin] Body 30-50 cm high, erect to semi-prostrate, 4-5 cm thick, bluish-green, blunt crown, ribs 14-18, very blunt, 2-3 mm high; areoles 2 mm diameter, circular, with pale brown wool, 3-4 mm apart; radial spines 10-12, brown, 3-6 mm long, radiating; centrals 2-4, projecting outwards, up to 1-2 cm long; flowers close to crown, numerous, ca. 16 mm long, with rounded flutes; pericarpel very short and broad, nectar chamber ca. 2 mm high, 4 mm broad, closed; receptacle tubular above, white internally, purple externally, filaments white, becoming shorter from below, anthers yellow, style white, 9 mm long, stigma yellowish, not projecting above opening of tube; petals white, small, interior ones obtuse, exterior ones acuminate; fruit globular, 6-13 mm diameter, dished by growth of the outer wall by 1.5 to 2 mm depth, 5 mm wide at the base of the flower remains and 2 mm wide at the aperture; membrane between seed chamber and flower remains ca. 1/4 mm thick; seeds ca. 1.3 mm long, 1.0 mm wide, 0.5 mm thick, curved dorsally, with a very obtuse indent ventrally, testa slightly glossy, black. Habitat in mountains above Monte Azul.

[From the German, excluding repeat of latin] Cereiform, branching from the base, stem 30-40 cm high; ... spines needle-like, straight, sharp; ... flower actinomorphic, pointing upwards to horizontal in cramped conditions, ... pericarpel naked and bare ... nectar chamber without wall thickening above. Tube wall with some small scales above. Stamen insertion without gap, not leaning against wall of tube. Fruit scale-less berry, the outer walls growing upward to enclose the base of the floral remains in a flask shaped hollow, like *Micranthocereus*. The photograph with ripe fruits shows by comparison with the photograph with unripe fruits the further overgrowth of the fruit wall above the base of the flower remains; in addition it shows that some of this upper fruit wall has been eaten away, so this thick fleshy growth of fruit wall is evidently readily accepted by small fruit eating animals. On account of the wadlike black floral remains under the extended fruit wall, the animal is then turned away from the fruit contents situated below, so that the seed enclosure is better protected from animals. On the ripe fruit only a slender 6 mm long floral remnant remains protruding out of the fruit. The unripe fruit is purple, much broader than tall, with fluted ribs; ripened it is smooth and white below, purple and fluted above; the outer wall is reflective, very thin below, the upper growth thick; within, the fruit is very juicy and translucent, not pulpy, not sour. Seed testa scattered with very small, almost flattened tubercles, without lacunae ... hilum somewhat oblique, oval, slightly sunken.

Habitat; a small patch in the mountains above Monte Azul, Minas Gerais, of very limited extent, in bushy thickets on pure leafmould, lying over rocks. I am obliged to A.F.H.Buining for the photographs and data concerning the flowers.

....from P.Braun, K.u.a.S 42.10.1991

This species was discovered by F.Ritter as early as 1964, but only after a recollection by A.F.H.Buining and L.Horst was a valid description possible (Ritter 1979). Coming into European collections this species is found under the field number HU 400, whilst the genus to which it belongs remained unclear for a number of years, and even today is disputed. The closest relationship shown by *Floribunda* is undoubtedly with the species that have been described as *Cipocereus*. The coloured, largely day-opening flowers appear to be close to *Cipocereus pleurocarpus*. That characteristic displayed by *Floribunda pusilliflora* of a short, narrow, tubular humming bird flower, finds a parallel in the *Coleocephalocereus/Buiningia* and *Micranthocereus* which are to be found in the same area, in contrast with the bat-pollinated flowers of *Pilosocereus*.

On the basis of a broad generic concept both the closely related genera *Cipocereus* Ritter and *Floribunda* Ritter could be placed in a single group under *Pilosocereus*.

Occurrence: Brazil, in the north of Minas Gerais state, in high mountains near Montes Claros, in bushy thickets on small rocky clearings, together with *Leocereus*, *Melocactus*, *Micranthocereus*, *Mirabella* and other *Pilosocerei*.

....from H.Middleditch

This article is accompanied by a photograph attributed to W.Uebelmann which is of the flowering head of a *F.pusilliflora*, which is carrying a dozen or more flowers and fruit in close proximity to the growing point. It shows quite clearly the fairly shallow and well rounded ribs.

In his discussion of *Cipocereus* in his *Kakteen in Sud-Amerika*, Ritter refers to the existence of hairs, even bristly hairs or occasionally bristle-like spines, in the areoles of the flower receptacle on *Cipocereus*. Evidently it is this feature which he regards as setting *Cipocereus* apart from *Pilosocereus*, which has a completely naked pericarpel and tube. His photographs of *Cipocereus minensis* show a *Cereus*-shaped flower, whilst *Cipocereus pleurocarpus* has a tubular flower with the petals forming an extension of the tube. Hence this single genus has one species with tubular flowers externally akin to *Micranthocereus* and *Floribunda*, and a second species with flowers somewhat similar in shape to *Cereus* or *Pilosocereus*. The fruit of *Cipocereus* is also very similar indeed to that of *Pilosocereus*. Clearly it is perfectly reasonable to regard *Cipocereus*, *Floribunda*, and *Pilosocereus* as a fairly closely related group of cereiform plants.

DISCOVERING WHAT SORT OF TEPHROCACTUS? From D.J.Ferguson

In the course of travelling through western Argentina we came across quite a few populations of *Tephrocactus articulatus*. The variations in the *T.articulatus* complex in nature are so diverse, and stick so little to patterns, that they defy classification. There are blackish-spined and white-spined plants both with wide papery, curly, spines growing together with totally spineless plants, and everything in between. The narrowness or wideness, length, thickness, colour and number of spines all varied widely within populations. Sometimes plants approaching *T.paediophylla* in habit grew with wide-papery-spines, (especially in Catamarca and La Rioja), again in company with spineless plants and again with all sorts of intermediates.

There were tendencies towards two types, and these are the only varieties I could see being recognised taxonomically, as they are the only types showing any biological consistency in nature. But both types may vary from totally spineless to extremely spiny within any population. One type is larger, mostly with stiffer, thicker, narrower, darker spines - this includes *T.paediophylla*. Its spines may be quite wide and nearly flat to triangular in section, to absent, in any population, varying from pale tan to nearly black. This type often had joints 5 cm and more in length; it does tend to have proportionately more elongate joints, but this feature is not stable. The plants typically stand over 30 cm tall, sort of like miniature trees, but one good jar and they dissolve into a pile of fragments. This type occurs mostly in the desert flats of the lower, hotter areas from San Juan, and parts of San Luis, northwards through La Rioja into Catamarca.

The second type seems to occur mostly from Mendoza and San Luis north to La Rioja, overlapping and intergrading

somewhat with the first type. In San Luis and eastern Mendoza it moves out into the desert flats, but elsewhere it occurs almost entirely at the bases of mountains and in rough terrain, where it occupies rocky slopes and gravelly alluvial fans. It has joints mostly under 5 cm in diameter and the plants are rarely over 25 cm tall. Towards the southern limit of this type the plants tended to be smaller, with thinner, wider, spines. This second type may be quite spineless as well, but when with spines these are quite papery, and on most plants spines are white, though some do vary to brown. This type commonly has curly, twisted, spines whilst the first type rarely does.

Both types seems to be white flowered, although only a few were seen in flower, and pink is quite likely. Let me emphasise, weakly spines to spineless plants could occur anywhere - lack of spines means absolutely nothing. The two varieties show a great deal of intergradation and are not always clearly distinguishable - which is normal for geographical or climatic genetic varieties. Taxonomic units, in order to mean anything, cannot be established on cultivated selections, but must be based on natural populations. Plants growing together as part of one gene pool cannot be considered as separate varieties, even if they look different.

.....from F.Vandenbroeck

I cannot agree with the assertions of your correspondent on *Tephrocactus articulatus*. When he writes that this species "can be found with a range of spination from wide, tapering and papery to narrow and stiffish, to virtually no spines at all, growing all together in one population" this does not correspond with my own observations. All the above mentioned forms may occur in nature but they cannot be found in one and the same population. In my recollection, populations were pretty homogeneous. Near Mazan, for example, all the plants are densely spined with broad papery twisting spines. Near Ulapes the plants are nearly spineless.

.....from K.Gilmer

In travelling through La Rioja we found this one of the most interesting provinces because of the many different forms of *T.articulatus*. Plants of this group are very frequent in La Rioja and Catamarca provinces and in many more different forms than you would imagine after having had a look at the literature. Nearly every time we stopped and got out of the car we saw another form. Today I think that there is not a single publication about the systematics of the *T.articulatus* group which deals adequately with the real relationships between all the different forms. This may not even be possible, bearing in mind how often transition stages between the different forms are to be found. There is no real dividing line between one form and the next. It is possible that the *Tephrocacti* of the *articulatus* group are in the midst of an evolutionary process of development into different species and hence one can become very confused when standing in a field full of *T.articulatus*.

Kiesling subdivides his *T.articulatus* into two varieties: *v.articulatus* and *v.oligacanthus*, on the basis that some have spines and some have not. But this is not a natural division, it is man-made. What about specimens with spines 3 or 4 mm long? How are they to be named? *Var.articulatus* or *v.oligacanthus*? And what about the clump of plants, or perhaps the clumping plant, of which I took a photograph; are the stems on the left side *v.oligacanthus* and the stems on the right side *v.articulatus*? No, I think we should forget about the spines as a determining feature, as in my opinion this feature is quite useless for this purpose. On the other hand, if I am discussing *T.articulatus* with other collectors of this genus, then we will use the well-known names like *v.articulatus*, *v.polyacanthus*, etc., so that everyone who is party to the discussion knows what is being talked about.

.....from H.Middleditch

In the cactus literature one not infrequently finds quite different viewpoints expressed about the same plant or group of plants, even by authors whom one might imagine are pretty familiar with the plants as they are to be found on the ground. Just the same range of views is expressed above, and possibly for somewhat similar reasons - it is not altogether practicable for a cactus hunter to spend a few days at a locality, combing almost every square metre, in order to be able to find and take note of such variation as may exist there, and whether transition forms to a species in a neighbouring area are to be found. Likewise it is not common for cactus writers to have had the opportunity to observe a considerable number of populations of the same sort of plant in habitat. The consequence is, that each writer can carry away his own impression of a species, even a different impression from someone else who visits the same locality.

There is a version of *T.articulatus* in cultivation in this country which possesses joints which are almost twice as long as they are thick, thus somewhat more elongate egg-shape than most other plants of this sort seen in collections here. The epidermis is also a much darker green colour whilst the spines are sword-shape, stiff, and a dirty grey colour. It also gives the impression that it flowers more readily than the commonly cultivated sort. What do you think of the cutting taken from one of these sort of plants?

.....from D.Ferguson

Your cutting of this *Tephrocactus* arrived O.K. The plants in Catamarca and near Andalgalá and Belén seem to come closest to your own cultivated specimen. But if the small size of the segment is normal, it is surely from a different population, as the plants from the Andalgalá/Belén area are mostly quite large in their proportions and overall size, although their joints are often proportionately slender. The brown spines, spine orientation and spine thickness are all duplicated in specimens through most of the species distribution.

.....from H.Middleditch

The views expressed above by D.J.Ferguson to the effect that a great many *Tephrocactus* names can really only be regarded as forms or varieties, which should all be encompassed within one species, does not appear to be entirely new.

.....from "Tephrocactus" by G.Leighton-Boyce and J.Iiff 1973

The earliest recorded names in the *Opuntia diademata* group appear to be four in number which are listed without any description by Otto in 1833:- *O.ovata* Hort. Angl., *O.platyacantha* Hort. Angl., *O.articulata* Hort. Berol. and *O.polymorpha* Hort. Angl. The first attempt to give them validity was by Pfeiffer in 1837. He not only separated them from *Opuntia* and placed them in an enlarged genus *Cereus*, but he also confused his description of *Cereus articulatus* by giving *O.polymorpha* Hort. Angl. as a synonym, which it manifestly could not be as his description was in terms restricted to a spineless plant.

Lemaire came forward in 1838 with four names of his own under *Opuntia*. He had no difficulty in voiding *Cereus articulatus* Pfeiff. for self-contradictory uncertainty. Our researches have not discovered any validation of *O.articulatus* to this day. In turn, Lemaire seems to have failed to establish his own *O.calva* properly. This was treated subsequently by Weber as *O.diademata v.calva*.

A note by Philippi (*Gartenflora* 21, 1872) reports that *O.diademata* is found in two forms, "one of these with leaf-like spines, the other quite bald". This report accords with our view that lack of spines in this group is not in itself necessarily a decisively distinguishing character. Spegazzini provides valuable information on *O.diademata* in his *Cact. Plat. Tent.* 1905; he observes that growth is "exceedingly deceptive" due to polymorphism "in size, colour, form of stem

segments, spines, etc.”

It remained for Schumann & Spegazzini to construct what we now see as a complete and correct account of this group. In view of the polymorphism which is evident to a greater or lesser degree throughout all the above material in this group, we are entirely in sympathy with the direction of the broader interpretation of *O. diademata* Lem. which was finally adopted by Schumann, which he expressed in the following synonymy: - *O. diademata* Lem., *O. turpinii* Lem., *O. papyracantha* Phil., *O. calva* Lem., ?*Cereus articulatus* Pfeiff., ?*Opuntia articulata* Link & Otto, and *O. polymorpha* Hort. This list of synonyms omits *Cereus syringacanthus* Lemaire (Cact. Gen. Nov.) complains that Pfeiffer's description of this species is too vague. We feel that *Cereus syringacanthus* is best regarded as a *nomen dubium*.
.....from H.Middleditch

In his *Die Cactaceae* Vol.I, Backeberg also followed Schumann in placing all previous names for plants in this group under one species, but he chose to put them all as varieties of *T. articulatus*. Presumably he chose this name in preference to *diademata*, because Otto published *O. articulatus* in 1833 whilst Lemaire published *T. diademata* in 1838. It was suggested by Leighton-Boyce and Iliff that the name *O. articulatus* “has not been validated”. Presumably they meant that a mere appearance of the name in print without any further amplification, did not validate the name. This view would not be questioned in respect of a current or recent description, but is their comment justified for a name which appeared before the ICBN rules were even thought of?
.....from R.Mottram

The requirements for valid publication include a description. That description may be of any length - even one word, theoretically. The Code does not specify that a description must be of a particular length. In the case of *Opuntia articulata*, Otto merely listed it without description in AGZ 1833. Pfeiffer validly published the name as *Cereus articulatus* 1837, and the fact that he included *O. polymorpha* as a synonym does not affect its validity. It does seem that J. Iliff believes that questionable parts of a description can invalidate it. Before 1935, priority of publication is the only thing that counts.
.....from H.Middleditch

Having looked up the name *Opuntia articulatus* in Forster-Rumpler, Schumann, and Britton & Rose, I find that this name is only quoted as a synonym, by these authors. Hence if we take the observation by J. Iliff literally, it does appear that *Opuntia articulatus* has not been validly described. On the other hand, in his *Die Cactaceae*, Backeberg published *Tephrocactus articulatus*, quoting both *Opuntia articulatus* AGZ 1833 and *Cereus articulatus* as synonyms. Thus it would appear that proper references have been given for the basonym. If the names published in the 1833 AGZ are to be regarded as “descriptions” as understood at that time (i.e. not as understood today) does it mean that *articulatus* has priority as the name for this group of plants?
.....from F.Ritter, Kakteen in Sudamerika

***Tephrocactus articulatus*.**

The most eye-catching feature of this species is not always developed - it is the long papery spination, a few up to 10 cm long and ca. 3-9 mm broad, very thin and pliant, parchment-like. Each areole can develop up to about four such spines of various lengths, the shorter ones being narrower. In many places all the plants have such spines on all the segments; elsewhere the spination is less well developed, or it can be entirely absent from many segments or with many complete plants. At other places the plants are predominantly spineless. Very often one and the selfsame plant has segments with spines and others lacking spines. Hence the presence or absence of spines is an entirely variable feature, which merits neither species nor varietal status, but only that of a form.

The *Opuntia articulata* published by Pfeiffer in 1833 represents the spineless form, the *Opuntia clava* erected by Lemaire in 1839 was a synonym of this *O. articulata*. Correspondingly the single spined segment of *O. turpinii* established by Lemaire in 1833 is a synonym for the multi-spined *O. syringacantha*. The French and German authors of that period paid no heed to whether anyone had already published a newly imported species in another country, but simply published regardless. So *O. syringacantha* Pfeiff. 1837 was once again published by Lemaire in the following year under both the names *O. diademata* and *O. turpinii*, the first name for a segment with several spines, the latter for one with a single spine. In the following year the same species was once again published under the name *O. calva* for a segment without spines, even though one such had been published earlier in Germany as *O. articulata* Otto.

In 1872, even Philippi in Chile had described under the name *O. papyracantha* Phil. the same *O. syringacantha* which had been brought to him by Burmeister from Argentina out of Mendoza and Catamarca (both habitat locations known to me) 35 years after its first description by Pfeiffer, taking it to be something quite new and attracting attention on account of the papery spines. “This singular growth-form occurs abundantly and in two varieties, one with these leaflike spines, the other quite spineless”, reported Burmeister about this species, well known for a long time in Europe under an earlier description.

The Type location is Mendoza. I regard as a regional variety of *T. articulatus* the form from Catamarca, which has considerably smaller segments than those from the Type locality. Likewise with long papery spines. Being unaware of any other differences, I do not give it a varietal name. Likewise that coming from Lujan, San Fernando, and Quines in the Prov. San Luis is worthy of a characteristic regional variety. It has 1-2 short and narrow papery spines standing straight out sideways, from a few of the uppermost areoles, but these are very often absent; the segments are also small. Nevertheless despite this data I do not make a varietal name for it.
.....from D.J.Ferguson

The form known as *Tephrocactus inermis* (=strobiliformis) is in my opinion a distinct species. It is a plant with more elongate joints, more closely spaced areoles, and usually (but not always) spineless. *Tephrocactus inermis* is somewhat variable, with a few plants bearing short *articulatus*-like papery spines, mostly brown to blackish. In nature the joints look almost continuous, with the articulations not as noticeable. The joints seem to be indeterminate as long as good conditions last in the growing season, but this may not be true. They are up to at least 15 cm long, but usually under 3 cm thick; they tend to taper upwards slightly. I think it has smaller flowers, but we saw so few flowers that I may be wrong. There was obviously reproduction by seed, as there was obvious individual variation, but vegetative propagation predominates. It grows from La Rioja (Villa Union) to Mendoza intermixed with *T. articulatus* and shows no signs whatsoever of integration, with no intermediates. All plants could be placed in one or the other species with ease, regardless of presence or absence of spines. I have never seen an intermediate cultivated specimen either. No “*articulatus*” that I have seen so far ever looks like an “*inermis*” unless deformed by poor conditions, and even then is separable.
.....from “*Tephrocactus*” by G.Leighton Boyce & J. Iliff, 1973

Opuntia diademata v. *inermis* Spegazzini (Cact. Plat. Tent. 1905) seems to be a distinctly different and reliable entity. Some shrewd observers have regarded it as a separate species, as which it was described by Berger (Kakteen

1929); "Stem segments longish, matt grey-green, 7-8 cm long and 3¹/₂ cm thick; lightly tuberculate; the tubercles defined into roundish - rhombic areas by transverse curved lines fading off crosswise. Areoles small, scarcely felted. Glochids not numerous, grey; spines lacking (invariably?). Younger segments with conical wart-like tubercles six-sided at the base, brownish at the point. Areoles small, with white flaky woolly felt hanging out and light to dark brown glochids". The elongation of the segments on *v.inermis* is characteristically considerable.

.....from H.Blossfeldt, Kakteenkunde 1936 No.4. "A cactus collecting trip in South America"

From San Luis we drove along the only road going further to the west, which was in a dreadful condition, into the province of La Rioja. Generally it was an unspeakably parched and empty land. Here we found a completely waterless landscape of tremendous extent, where only a few ruined houses were witness to long forgotten human settlements. Here we faced a great scarcity of water. In the plain the plant growth was poor and stunted. Here and there the ground was thickly covered with *O.diademata* which is almost spineless here, and with *O.strobiliformis*.

.....from H.Middleditch

From this very brief observation it might be assumed that Blossfeldt was able to distinguish between an almost spineless *T.articulatus* and those spineless plants which both D.J.Ferguson and Leighton Boyce regard as *T.inermis*.

.....from F.Vandenbroeck

The so-called "strobiliformis" which we believe we have found near Poman had very elongated spineless segments. We only found a few specimens of these sort amidst a population of more normal looking *T.articulatus*. These "strobiliformis" specimens were very different from all the rest and very conspicuous. To my eyes they are quite enigmatic plants and they are certainly rare.

.....from K.Gilmer

Now at one place along the road as we were approaching Nonogasta from the south, we found varieties of *T.articulatus* like *v.papyracanthus*, *v.diadematus*, and *v.calva*, all growing together and with them was *T.articulatus v.inermis* (or *v.strobiliformis*). The *v.inermis* can be recognised by their thin and longish segments, up to 20 cm in length!

.....from F.Ritter

Tephrocactus strobiliformis

We are dealing here not with a variety of *T. articulatus*, as is generally accepted, but, as Berger recognised earlier, with a separate species. Near Mendoza this species is to be found growing in great numbers intermingled with *T.articulatus*, although both retain their typical habit, without transitions between them. Even near the city of Catamarca I saw both species growing close together, and near the city of La Rioja, *T.articulatus* grows together with a short-segmented variety of *T.strobiliformis* approaching the segment length of *T.articulatus*. Near Chilecito is found *T.strobiliformis* with a very typical habit, likewise in company with *T.articulatus*.

These plants form upright bushes up to over half a metre high, whereby the segments are disposed in a line one after the other, being about 3 cm thick and about 10 to over 20 cm long, somewhat bluish grey-green. A particular difference from *T.articulatus* lies in the smaller areoles which are significantly closer to each other, which are spineless in the Type variety. The flower has not been described up to now; the corolla is white. The forms from Mendoza are somewhat less typical and somewhat more closely approaching *T.articulatus*, but without hybridisation between the two. The stems are here 3-4 cm thick and 6-11 cm long, and very occasionally with a small papery spine above. Somewhat closer still to *T.articulatus* are the plants from Serrezuela (Prov. Cordoba) and from near the city of La Rioja. They have just the same typical bush form, the segments are mostly spineless, but one often finds on the ends of the upper segments a very flat, 1-2 cm long and 12mm wide, parchment like spine, pointing downwards from the base to the tip, grey. The glochids are blackish-brown, as with the species Type (reddish brown in *T.articulatus*). The fruit is ca. 17 mm long by 12 mm thick - in *T.articulatus* ca. 20 mm long by 17 mm thick. The seeds have a somewhat rougher surface. The arillus hoop is overgrown by a peripheral swelling, and obscured from view. Still closer to the typical *T.articulatus* is the un-named variety of the latter from the province of San Luis.

.....from H.Middleditch

In the original description of *v.inermis* by Spegazzini the stem segments are described as "cylindrical, 50-100 mm long, 20-35 mm broad". These figures are repeated by Backeberg in his *Die Cactaceae*, whereas Berger chose to quote a length of only 7-8 cm. and Ritter of 20 (+) cm.; Ferguson indicates segments of up to 15 cm in length and Gilmer quotes segments up to 20 cm long. None of these compare with the 60 cm long quoted by Fric, who is renowned for his employment of poetic licence. However, armed with this data I had a look at my own motley collection of *articulatus* forms and discovered that I had not the slightest difficulty in separating the sausage-shaped segments of *v.inermis* from the spineless egg-shaped segments of *articulatus*.

However, Kiesling in his treatment of *Tephrocactus* (*Darwiniana* 25 1984) acknowledges the great variation which is displayed by plants in this group as a whole and places them all under the name of *T.articulatus*, with *v.articulatus* as the spineless variety and *v.oligacantha* as the spined variety. For his spineless variety he gives segments as "globose to cylindrical" and "globose to ovoid" for the spined sort. This view appears to differ from the conclusions drawn by other authors and travellers.

.....from D.J.Ferguson

The taxonomy of *T.articulatus* is highly confusing. Few of the old names have any sort of type locality. Kiesling's two varieties are based upon the extremely useless trait of spine absence or presence. His neotypes for the two varietal names he uses ("articulatus" for spineless, "oligacanthus" for spiny) come from the same location. Since both the *articulatus* and *inermis* species can be spineless, and both occur at this locality, there is no way without further communication with Kiesling to tell which type he used for the neotype of his "articulatus". Since spineless plants of the short jointed type are rare at this locality, I suspect that he used an "inermis" specimen. If so, he is incorrect, violating the protologue. The Pfeiffer description under *Cereus* which validated *articulatus* in 1837 is not of the *inermis* type. In this situation a new neotype must be designated. Based upon Kiesling's neotype description, if both were the plant with subglobose joints, then they are exactly the same variety. Kiesling's names would then be based upon minor variation within one genetic population - it would be like setting up a taxonomic variety for bald men!

.....from H.Middleditch

Reverting to Fric's description of *strobiliformis* with segments 60cm long, he likens these to "a sausage from Ukersko". What are the sausages from Ukersko like? This sort of length and stoutness?

.....from R.Allcock

Regarding the Ukersko sausage, I have written to my contact in Czechoslovakia who replies as follows (my translation): "Ukersko sausage" The book Lovec *Kaktusu* puts before you the sentence "I found joints which were 60 cm long and 10 cm thick". The slicing sausage from the Ukersko region is about 50-60 cm long and about 6-7 cm in

diameter. The sentence "They were in full growth and so smooth, that they resembled a grey-green Ukersko sausage" is intended rather as providing a comparison with the surface, which in the case of the Ukersko sausage, is almost smooth (grooved, but only slightly, in a lengthwise direction) than as an indication of the size, which is already specified in the preceding sentence".

.....from H.Middleditch

Although it is perfectly understandable that Fric would draw a comparison between the general external appearance of the segments of *T.strobiliformis* and the Ukersko sausage, it is difficult to avoid having reservations about the actual length of the specimens seen by Fric in the wild. From reading his published correspondence an impression is gained that Fric did not take actual measurements in the field, nor keep notes of such details, other than by subsequent recollection.

.....from K.Gilmer (At The Chileans' 1993 Weekend)

You will see on this slide there are two plants growing side-by-side so as to be almost touching each other. They are of very nearly the same height and they both have a single stem at ground level which branches and re-branches above, so that they both look rather like small bushes. The first one has segments of an obconical, barrel-shape, or even almost globular, and the segments carry a few short, flattened spines. The other plant alongside has no spines whatsoever and the segments are cylindrical in shape, many being of appreciably greater length than the segments on the spined plant.

.....from R.Allcock

Now I really have seen a plant with segments that look just like an Ukersko sausage!

.....from H.Middleditch

The slides of the various forms of *T.articulatus* which we were shown by K.Gilmer at the 1993 Chileans' Weekend, showed very clearly the great variation in shape, size, and form, of the spination which can be seen in habitat. There were straight spines, wavy spines, twisted spines, narrow spines, broad spines, long and short spines, spines of white, buff, or dirty grey colour, and all intergradations between. It remains a matter of convenience to use one or other of the traditional names to designate this or that variety so that discussion between cactophiles can be effective, whilst recognising that the varieties form one species with an indefinite range of transitions.

It can be argued that the *v.inermis* is merely a spineless form of *T.articulatus* so that the name *T.strobiliformis* could be appropriately used for the plant with the sausage-like segments. However, what is possibly the most important distinguishing feature of *T.strobiliformis* seems to have evaded the attention of authors. The *Tephrocactus* of the *articulatus/diadematus* alliance share with those of the *sphaericus/dimorphus* group and with all the hummock-forming *Maihueniopsis/Cumulopuntia*, the one characteristic of producing new offsets or segments on which all the areoles of the mature segment are present from the start. In other words, there is no growing point (other than by exception at the seedling stage or on abnormal growths). By contrast, *T.strobiliformis* does appear to have a growing point, like *T.weberi* and *T.subterraneus*.

WE FIND GYMNOCALYCIUM CARMINANTHUM From F.Vandenbroeck

On our way to the city of San Fernando del Valle de Catamarca in April 1985 we passed through part of the Sierra de Ambato. I remember two distinctly different types of landscapes and corresponding habitats. The lower slopes were rather bare, dotted with a sparse bushy vegetation, bromeliads, and *Tephrocactus*. It was very hot. The ground was sandy and stony. Here I met with what appeared to be two different forms (or species) of *Gymnocalycium*. There were plants with long, straight dagger-like spines and others with shorter, somewhat upward-curved spines. There was only one plant with a somewhat withered whitish flower. These plants were globular and measured up to more or less 13 cm in diameter. I brought home two plants from this location but unfortunately they did not survive their first winter in Europe.

Higher up in the mountains we reached a plateau with a fairly dense vegetation and magnificent stands of tall cereoid cacti, possibly forms of *Trichocereus terscheckii*. Here we found *Gymnocalycium* of an amazing size, up to 25 cm across. These plants remained globular and displayed a dense, long, curved spination. They grew on sandy patches, sometimes together with large spiny bromeliads, completely exposed to the sun.

I have been thinking of *G.tillianum*, *oenanthemum*, and *ambatoense* as possible identities for these plants, but I do not have the original descriptions.

.....from H.Middleditch

The original description for *G.oenanthemum* appeared in *Kaktusar* for August 1934, followed by a description in *B.f.K.* in September 1934 (reproduced in *Chileans* No.26). This latter is fairly typical of descriptions of the time in several respects - it was brief, it disregarded any degree of variability, and it gave an incorrect habitat location (of Mendoza).

Gymnocalycium carminanthum was described by Borth & Koop in *KuaS* for April 1976 and *Gymnocalycium ambatoense* was described by Piltz in *KuaS* for January 1980. Both descriptions include photographs which demonstrate effectively the fairly wide degree of variability in habit of both species. The plants illustrated by these photographs display a preponderance of dagger-like spines curving round the body for *G.carminanthum*, (central spines absent) but one plant is pictured with more or less porrect, curved spines, and one central. On the other hand, the spination on *G.ambatoense* preponderantly stands away from the body, and there is usually one central.

.....from F.Vandenbroeck

Even after comparing the copies of the original descriptions which you sent me with the plants we found in the Sierra de Ambato, I am still uncertain as to their identity.

.....from H.Middleditch

Is it any help to note that *G.ambatoense* is reported to occur at altitudes of between 900-1100 m and *G.carminanthum* at altitudes of between 1300-1800 m?

.....from J.Lambert

During my 1986 visit to Argentina I ascended the Quebrada de Cebila and came across some plants of *Gymnocalycium ambatoense*, JL-180, growing at an altitude of around 1000 m. Travelling up the Cuesta de Los Angeles in 1988 I found what appeared to be two sorts of *Gymnocalycium* growing in the same locality and I brought back with me examples of both these sorts. After some deliberation I felt inclined to consider JL-210 as *G.ambatoense* and JL-211 as *G.carminanthum*. The *G.ambatoense* have recovered first and their appearance is similar to that of a greenhouse grown specimen. It has also now confirmed its identity by flowering in cultivation although *G.carminanthum* has yet to flower. I did notice that JL-210 was growing rather more in the open whilst JL-211 seemed to appreciate more shelter under a bush. These two sorts did look different, although the difference is not exactly easy to define, especially as they were

greatly shrunken under the prevailing habitat conditions.

.....from H.Middleditch

At a Chileans Weekend some years ago we heard from J.Piltz that the *Gymnocalycium spagazzinii* which he met with growing under bushes tended to be less robustly spined than the same sort which grew out in the open exposed to full sun. The above observation by J.Lambert is rather similar, but this time for two sorts of plants. The two original descriptions gave a clear altitude separation between the two sorts but here we seem to have both growing more or less side by side. The question remains, where do *G.oenanthemum* and *G.tillianum* fit into this group?

.....from F.Vandenbroeck

In the course of our 1991 trip to Argentina we visited the Sierra Ambato again, to the east of Mazan. Here we came across a population of *Gymnocalycium* which were all carrying flowers or buds, but it was most frustrating as not a single flower was open. So we cut off some of the flowers and when we examined them, some seemed to be completely red - even the anthers were red, other flowers seemed to be whitish. It is possible that we may have been looking at two species, but then the plants displayed a great deal of variability in body and spination.

.....from G.J.Swales

One of my plants carries the label *G.weissianum*; this has a whitish flower and the anthers appear to be a cream colour when they are covered with pollen. However, when the creamy coloured pollen is dusted off the anthers - it can even be blown off - the anthers themselves turn out to be a red colour. There does not seem to be any reliably recorded location for this particular name.

.....from D.Metzing

Now in regard to *Gymnos* from the Sierra Ambato which have red anthers. In the description of *G.ambatoense* Piltz wrote that the flowers had anthers of "dirty lilac colour". From the original descriptions of *G.tillianum* and *G.carminanthum* you will see that they both had red anthers - and, of course, red petals.

.....from H.Middleditch

The description of *G.ambatoense* does indeed include "Antherae - sordide brunneo-rubrae" in the latin and "Antheren schmutzig lila" in the german. The first description for *G.tillianum* is in K.u.a.S 4.21.1970 and for *G.carminanthum* in K.u.a.S. 27.4.1976. In the description for *tillianum* I can find "staubfaden karminrosa" and "filamentis coccineus"; in that for *G.carminanthum* I can find "filamenta ... coccinea,antherae albicantes" and also "staublatter scharlachrot, ... antheren weisslich". In the description of *G.tillianum* there does not appear to be any reference to staubbeutel (anthers) and the anthers for *carminanthum* appear to be defined as whitish. Where do the red anthers come from for these two species?

.....from F.Vandenbroeck

On our second trip to Argentina in December of 1991 we were looking for *Lobivia grandiflora* a few km above Las Juntas (north of Catamarca city) when I found my first specimens of *G.baldianum*. They were growing together with another red flowering *Gymnocalycium* which I took to be *G.oenanthemum*. Later on we found *G. baldianum* in the Sierra Ancasti, where we saw red-flowering as well as pink flowering specimens. At the other two locations, we saw only dark red flowers. Much later on, during a somewhat difficult trip from Tucuman to Andalgalá, we came across other specimens of *G.baldianum* to the south-west of Buena Vista. Some of them were in flower. These plants occurred rather sparsely and were more strongly spined than the ones we saw in Ancasti. The habitat locations for *G.baldianum* are mostly grassy slopes with little or no bush vegetation.

.....from M.Capenhurst

The flower colour on my plants of *G.baldianum* is consistent to a plant but varies greatly between plants - some flower red, some pink. On one plant the red is quite deep, on another the red is rather less intense. The plant body and spination also varies greatly, all of which makes me wonder about the authenticity of the names.

.....from H.Middleditch

In Chileans No.26 there is an account by D.J.v.Vliet of an ascent of the Sierra Ambato from the west side, in company with Rausch. This started from Poman and this outing resulted in the discovery of the red-flowering *G.tillianum* (original description reproduced in Chileans No.26).

When R.Kiesling was on detachment to Kew, he came to The Chileans' Weekend and among the slides which he showed to us there was one of a *G.tillianum*, taken above Las Juntas. Could this have been the second red-flowering specimen seen by F.Vandenbroeck in that locality?

.....from R.Moreton

The flower on my *G.tillianum* always seems to be a brick red colour, with none of the mauve or purple tinge that I have seen in other red flowering *Gymnos*.

.....from "South American Safari" slide talk given to the Austrian Cactus Society Sept. 1966 by Markus & Rausch

An extensive research and collecting expedition was undertaken in Argentina in 1965 By Ernst Markus and Walter Rausch. Later they journeyed northwards and on to Bolivia. It served no commercial purpose but was solely for studying cactus populations in their natural habitats - the distribution of individual species and the establishment of the species status of plants that have been carelessly described in recent years and decades. The two men were ten months on the trip, covered about 2,000 km - mostly on foot - and were able to find about 200 different good species. They observed that only a few species occurred in pure stands (e.g. the *Tephrocacti*). In by far the greater number of species scarcely one plant was the same as its neighbour. Further, it was found that a particular locality rarely yielded several species of the same genus. Perhaps *Gymnocalycium baldianum* and *G.asterium* frequently occur together, but bloom at different times, so that hybridisations scarcely happens in nature.

There was great variation within a species, particularly in *G.baldianum* (this was illustrated by slides). There was *G.baldianum* with the usual blood-red flower colour, then again in a paler red, some with a pink flower margin and finally even white flowered plants (*G.baldianum* v. *albiflorum*, collection No. 141). The perianth leaves are on one occasion lancet shaped and splayed out, on another broad and rounded. These were differences in flower colour and form which, without a knowledge of the population in its habitat, could easily lead to the setting up of varieties or even of new species. E.Markus repeatedly condemned the frequent occurrence in the past, and still now, of making descriptions of 'new' species on the basis of a single specimen from a commercial importer which produces a jumble of names but which on later investigation in the natural habitat proves to be completely valueless and false.

.....from H.Middleditch

From the Argentina trip undertaken by Rausch and Markus from December 1964 and through into 1965, there came a batch of field numbers in the 150's, under the subheading of Andalgalá-Hualfin. Within this batch, R.152 is *L.shaferei*, reported by others from north of Andalgalá; R.151 is *L.grandiflora* v. and R.151a is *L.crassicaulis*, both reported from

north-east of Andalgalá; R.150 is *G.baldianum*, so that one could suppose that this plant was found to the east of Andalgalá, over the Cuesta de Chilca, in the area where it is reported to have been seen, above, by F.Vandenbroeck. Together with the Piltz P.165 from Cuesta de Totoral, this might suggest a distribution for *G.baldianum* from the Sierra Ancasti northwards through Cuesta Totoral to the Campo Pucara and south from there to Las Juntas, where it appears from the observation by F.Vandenbroeck to overlap with *G.tillianum*.

The above excerpt from the talk by Markus certainly bears out the observations made both by M.Capenhurst and F.Vandenbroeck regarding the variation in flower colour of *G.baldianum*. However, it is not entirely clear to what the "collection number 141" refers. The Rausch field number list records R.141 as *G.uebelmannianum*.

.....from G.J.Swales

My understanding is that the white-flowered *G.baldianum* was subsequently described as *G.uebelmannianum*. Hence I would imagine that the "collection number 141" refers to the Rausch field number.

.....from F.Fuschillo

It was some years ago that I learnt from J.Donald that he had acquired about twenty imported plants under the name *G.stuckertii*; in cultivation these produced a typical deep red *G.baldianum* flower. I was fortunate enough to obtain a couple of these plants, including one which according to J.Donald produced white flowers. Despite it having grown fairly well for several years it has not yet flowered for me, so I have finally decapitated it which has led to it producing a couple of offsets, which I intend to root down.

.....from J.Lambert

In the course of my journey through the north-western part of Argentina in 1981, our route took us southwards from Tucuman and thence via La Merced to Catamarca, where an overnight stop was made. From here it is only a short distance (barely 10 km) across the fairly level valley floor to where the road climbs the steep face of the Sierra Ancasti. This is the Cuesta de Portezuelo and from near the top we have a vast panorama over the valley to the city of Catamarca with the Sierra de Ambato rising behind. At 1800 m we reach the top of our climb, from where the mountain slopes more gently to the east. At Anquincilla (before reaching Ancasti itself) we come across an abundant population of *G.baldianum* on a rocky slope. These are growing in narrow clefts and crevices in the rock, so that the plants are compressed sideways and distorted. The colour of the flowers in this one population varies from carmine to brick red, with all possible intermediates, which raises the validity of *G.venturianum* as proposed at an earlier time by Fric.

.....from G.Charles

About 20 km to the east of Catamarca city we drove up the Cuesta Portezuelo. At the top of the climb we stopped in an area of grassland with tufty grass amongst which were many rocky patches. Here we found *Gymnocalycium baldianum* growing in deep peaty ground. It was so wet that it was almost like a peat bog. Another outing took us to the west out of Catamarca, up the El Tala valley, up to the pass near El Rodeo. When we stopped just beyond the top of this pass we came across both *G.carminanthum* and *G.baldianum*, where the soil was nice and black with plenty of humus. But these two *Gymnocalycium* did not grow in exactly the same micro-conditions. The *G.baldianum* grew in the grass, although not in the middle of the long grass, whereas *G.carminanthum* preferred to grow close to rocky patches where presumably the soil was rather shallower - in the same way that the *Parodia* and the *L.dobeana* grew at the top of the Cuesta Totoral. The distinction between the preferred growing spots for *G.baldianum* and *G. carminanthum* was similar again at the site near Singuil. On the Cuesta Totoral the *G.baldianum* did not grow in the very thick, long, grass, but on a slope where the soil cover was probably thin so that it did not support either trees or even rank grass.

.....from K.Preston-Mafham

We saw dozens of *G.baldianum* in flower at five different sites between Catamarca and Andalgalá, all with the typical bright red flower.

FRIC IN SOUTH AMERICA. From Lovéc Kaktusu, by K.Crkel Translated by R.Allcock

At the village of Vina, Fric found a *Gymnocalycium*, which he considered to be somewhat similar to *G.spegazzinii*, the habitat of which had been reported as La Vina. Fric himself writes: "Only later did I become aware that these are two different places in two provinces. On the return journey to Tucuman, however, I found one example in full flower, and I was very surprised to find that, as with *Lobivia grandiflora* and a *Parodia* of *microsperma* affinity, the flower was blood-red. In this genus we know white, green, rose, and yellow flowers. Till now we knew of no blood-red flower. All the *Gymnocalycium*s in the neighbourhood on both sides of the highlands flower white. We have to do here maybe with a climatic factor (height, soil, wind), or with the habits of certain fructifying insects which, driven on the strong and ceaseless breezes are thus allured, and would otherwise pass the plant all unawares. On all accounts it is a new species, which I have designated as *Gymnocalycium venturianum* Fric sp.nov. Don Santiago Venturi is one of the most able of the collectors of herbarium specimens, and he specialises in the flora of Tucuman and of neighbouring provinces. His wonderfully complete herbarium is full of precious examples. He is the greatest expert on the Argentinian region. I am much indebted to him for hospitality and much good advice.

Of this species I also found and gathered several plants and several ripe fruits. Unhappily all these three species were much damaged in the digging out, so that the greater number must be grown on, in order to be able to grace any collection."

GYMNOCALYCIUM SANGUINIFLORUM Werd. By B.Doelz Translated by G.J.Swales from K.u.a.S. Vol.3 1938

One of the finest *Gymnocalycium*s is *G.sanguiniflorum* Werd. com.nov (= *E.sanguiniflorus* Werd. 1932) having deep red flowers. This well known and much sought after species caused a sensation in the year 1932 being the only red-flowering *Gymnocalycium*. Werdermann stated in his description that it could be distinguished from all other known species of the genus by means of the deep blood-red perianth segments.

The assumption made then that *G.sanguiniflorum* was the only known red-flowered species of the genus was, however, not correct. It was overlooked that Spegazzini in his important work "Cactacearum Platensium Tentamen" 1905, described in detail an *Echinocactus* with beautiful red flowers, namely *E.baldianus* Speg., which he himself, later in 1925 (*Nuevas Notas Cactologicas, Anales de la Sociedad Científica Argentina* Vol.99) placed in the genus

Gymnocalycium. From the above statement of Werdermann's, it is obvious that he had not taken into consideration this species of Spegazzini when describing *E.sanguiniflorus* in 1932. This must have resulted from Britton & Rose who, strange to say, quoted the Spegazzini species as a synonym of the white-flowering *G.platense*, so that since then *E.baldianus* no longer appears as a valid species in the literature. But Spegazzini had, incidentally, reclassified his plant into the genus *Gymnocalycium* and explicitly pointed out the error made by Britton & Rose, but unfortunately it has, until now, gone unheeded.

Once a check shows that *E.baldianus* as described by Spegazzini in 1905, and later in 1925, cannot be said to be identical to *E.platense*, a comparison of Spegazzini's and Werdermann's original descriptions leads to the other conclusion that *G.baldianum* and *G.sanguiniflorum* are identical. [A detailed comparison, feature by feature, follows]. In connection with the evaluation of the small differences between the type plants, it must be borne in mind above all, that Werdermann had based his description on a well nourished plant which had been in cultivation for several years. This accounts for the differences in body size and height as well as the preservation of some woolfelt. From Werdermann's coloured illustration in *Bluhende Kakteen & andere Sukkulente* plate 33, it may be established that the spine colour is essentially pale grey. A comparison of this picture with other examples found in cultivation shows in addition that Werdermann's description was based upon a particularly strongly spined specimen. The author had at that time, only one plant at his disposal. When it is considered from what variety of habitats a large group of imports may come, and when it is borne in mind that by choosing two extreme examples one can convince oneself that one has two separate species, when in fact a batch of imports produces all the possible intermediaries, then accordingly it is possible to write descriptions of two specimen plants without achieving a stereotyped similarity between the two. When it is considered above all that the author was without further examples other than the type specimen, then an absolutely accurate description must inevitably be incomplete; the carefully described species characteristics may well be accurately described but for the species proper, are not entirely typical - on the contrary, they are the variations shown by a single example. Both descriptions show two further small differences which I consider of importance. The scales of the ovary and flower tube are, in the type specimen of *E.baldianus* somewhat looser compared with *E.sanguiniflorus* but it is only a matter of degree. The flower tube of *E.baldianus* has not nearly such widely separated scales as many other *Gymnocalycia*. A further difference between the two authors is that of the number of stigma lobes.

I can make accurate statements about the scales of the flower tube of *E.baldianum* because we now have, fortunately, an authentic picture of the species. Britton & Rose III. Fig 178 give a photograph by Spegazzini (under the name *G.platense*) that, according to a note on their p.176, is of *E.baldianus*. The body of the illustrated plant is naturally flatter than most well-nourished cultivated plants, but the length, strength, and arrangement of the spines match completely some plants found in other collections. Spegazzini's features are not particularly well displayed, but the picture shows further agreement with Werdermann's description, in that the "spines are in pairs, one unpaired, brown at the base".

The picture accompanying this article shows the offset of a mother plant, that today is still in my possession and well nourished and cared for by me for the past six years, which agrees to some extent with Werdermann's picture. On the other hand the offset illustrated remains flattened and agrees almost completely with the picture in Britton & Rose.

The plant from which that illustrated comes, I received a number of years previously as "*G.venturii*". Precisely because of the Werdermann illustration I had previously doubted whether *G.venturii* or *venturianum* Bkg. were identical to *G.sanguiniflorum*. In addition I knew that Oehme, who was inclined to consider the Werdermann plant as a variety of *G.venturianum*, now regarded it as *G.baldianum*. I was persuaded to this belief on account of the above material considerations about the diversity of forms of the species. I agree with the completely predominant opinion (e.g. Backeberg 1935 in *Kaktus ABC*) that *G.sanguiniflorum* and *G.venturianum* are the same plant. Nevertheless, it must be emphasised that Spegazzini's description and illustration, and also the illustration and description in B.f.K. 1934 No.9 (*G.venturianum* Bkg.) come very close to the *G.venturii* plants of Fric.

To summarise, in spite of marked variations, *G.sanguiniflorum*, *G.venturianum* and *G.baldianum* are identical. The trifling differences between the type plants of Spegazzini and Werdermann referred to are only of minor importance and often more or less variable features, so it must be a question of a variety of habitats. The differences by no means justify a varietal or specific name. The correct name is *G.baldianum* Speg; synonyms *E.baldianum* Speg., *E.sanguiniflorum* Werd., *G.sanguiniflorum* Werd., *G.venturianum* Bkg., and *G.venturii* Fric n.n.

I have informed the members of the governing body of the Cactus Society of the central research authority of the D.K.G. of this statement. I spoke to Backeberg in the autumn of last year about *G.baldianum* as I still had some doubts about the synonymy. He agreed immediately and I wish to record that he was the first to come to the right conclusion. I have set out a draft manuscript of my thesis to Werdermann as co-author. I am therefore in the position to state that Werdermann, as author of the species name *sanguiniflorus*, himself agrees with the results of my investigation.

Especially useful to me was the availability of the illustrated material in the illustration archives of the D.K.G. It was produced just as the announcement was made by Herr. Gaesners, that in the trade white flowering plants had been falsely named as *G.baldianum*.

In addition a word about other red-flowering *Gymnocalyciums*, amongst which I do not recognise the distinct pink-flowering forms. We have today, a second well pronounced red flowering species in *G.oenanthemum* Bkg. (B.f.K. September 1934). The *Echinocactus spec. nov.* red-flowering illustrated in the catalogue of Haage in the year 1932 p.51 is undoubtedly identical to this, particularly as Herr Haage in a letter to me likened the normal body form of *G.oenanthemum* to a weakly spined *G.kurtzianum*. Likewise, the Haage plant occurred in an imported batch of *G.kurtzianum*.

By means of the picture collection, my attention was drawn to a plant under the catalogue name of *E.sutterianus v.rubriflorum* in Haage junr's catalogue of 1928. Herr Haage told me that this originated from a batch of imported plants sent to him from Prof. Hosseus - a pale green plant distinguished from the remainder by its red flowers. The specimen was placed amongst those sent for sale and carefully inspected. This is possibly a third species of red-flowering *Gymnocalycium* about which at present we can say nothing with certainty. Until it has been established and propagated, and all the red flowerers have been compared with *Gymnos* of other flower colours, I believe we shall get no nearer to an agreement on this problem.

.....from H.Middleditch

Having open in front of me as I write, the 1932 Haage catalogue at p.51 at the photograph of his red-flowering *Gymno*, whilst alongside is the illustration of *G.oenanthemum* in the Backeberg B.f.K., both plants have sharpish well defined ribs notched into prominent chin-like tubercles; the areoles bear a few short but stoutish spines. From this

comparison it is quite understandable that the two could be equated. The original description of *G. oenanthemum* quoted a habitat of Mendoza which is probably what Backeberg was told by Haage; a typical ploy to put the competition off the scent and keep a monopoly of a good sales line. It was evidently four years later that Doelz was told that the plant came with a batch of imported *G. kurtzianum*, a species which is found in the Sierra Cordoba. If that consignment of imports had been dug up when not in flower the collector involved would be quite unaware of any possible difference in flower colour.

.....from G.J.Swales

The photograph on page 51 of the 1932 Haage catalogue does seem to me, from the appearance of the plant, to be *G. oenanthemum*. However, on the basis of the flower colour I would have been inclined to regard it as a short-spined form of *G. mostii*, rather than a short-spined form of *G. kurtzianum*. *Gymnocalycium kurtzianum* was described as having a white flower with a pink throat, whilst *G. mostii* was described as having a pink flower; those plants of *G. mostii* and *G. kurtzianum* which have flowered in my own collection conform with these two flower descriptions. These two species seem to me to be quite clearly distinguishable on the basis of their flowers alone.

.....from H.Middleditch

In the original description of these two species, by M.Gurke, the flower of *G. mostii* is stated to be "pallide rubris" i.e. pale red, whilst *G. kurtzianum* is distinguished from *G. mostii* by its white flowers with a much deeper red throat. Hence it does appear to be reasonably logical to regard *G. oenanthemum* as a *G. mostii* with a deeper red flower colour. These plants all come from the highlands of Cordoba, where there is also found the *Gymnocalycium* of the multiflorum, horridispinum, achirasense group. In this latter group we have a well recognised range of flower colours from creamy-white to deep pink, from the creamy white of multiflorum to the deep pink of *G. schuetzianum*. The environmental influences exerted on the multiflorum group which have resulted in this colour range could equally have brought about the same range of flower colours in the kurtzianum group.

.....from I.Milt, "Gymnocalycium with red flowers" Gymnofil No.39, 1983

Gymnocalycium oenanthemum was described by Backeberg in 1934 in his "Blatter fur Kakteenforschung" based upon plants which he had bought in Buenos Aires from the collector Stuemer.

.....from H.Middleditch

On at least two occasions Backeberg terminated his trip to south america in Buenos Aires before returning to Europe by ship, as may be seen from the map inside the front cover of his "Stachlige Wildnis".

.....from J.Lambert

My very first trip to Argentina was in 1981 when I started my journey from the city of Cordoba. From Cordoba I travelled westwards into the Sierra Grande, where we soon came across *G. multiflorum* near Tanti. We also found *G. multiflorum* at several other locations before leaving the Sierra Cordoba to travel further to the west. Towards the end of my 4,300 km round trip, when I was back in the Sierra Cordoba, we came across *G. multiflorum* once again at other locations. As a result of my observations on this trip, I came to the conclusion that *G. multiflorum* is the most widespread *Gymnocalycium* in Cordoba province.

The colour of the flowers of *G. multiflorum* varies from pure white to a more or less pronounced pink. It has been suggested by Piltz that plants of a more flattened shape and bearing white flowers are predominant in the northern part of the distribution area, whilst taller specimens with pink flowers tend to occur more in the south. This does not seem to be absolute, though. For instance, at Sauce Punco, which is more to the north, we found plants with a flower more pinkish than in Tanti. In addition, this spot is at a higher altitude, whereas Tanti lies at 700 m altitude. We were able to confirm these observations fully when returning to Tanti in 1983 to check on the *Gymnocalycium* populations there.

In view of its fairly wide distribution area, it is not surprising that that *G. multiflorum* should be quite a variable species. Hence the description in 1981 by Till and Schatzl of the species *G. schuetzianum*, FR 430, from Cruz del Eje, which might well apply to nothing more than a local form of *G. multiflorum*.

After making another round trip through western Argentina in 1983, the return trip from Neuquen to Cordoba was made via San Luis. We stopped the night at Mercedes and the next day took the road to El Morro. The first stop was at Loma del Plateado, from where we turned westwards towards Juan Llerena. Here we found an interesting *Gymnocalycium* which should be a topotype of Ritter's *G. villamercedense*. However, we are now convinced that this is but a synonym of *G. achirasense*, as the descriptions match exactly.

We now proceed to La Toma and from there towards Carolina and San Francisco de Monte de Oro. As we climb towards Carolina, a stop at Cerros Largos allows to note another form of *G. achirasense*. A bit further on, at Cerritos Blancos, we are lucky enough to encounter a flowering plant of this same species; it is distinguished from *G. multiflorum* by the fact that the stigma does not protrude above the anthers. Here too the flower colour is a more intense lilac-pink than in the ordinary *G. achirasense*; this shade was already observed by Schutz, who published a colour-photograph of it (*Kaktusy*, XVI, (3) 60, 1960).

In the same way that *G. multiflorum* is found in the Sierra Cordoba with white flowers at a lower altitude and pink-flowered at a higher altitude, white flowered *G. achirasense* are to be found around Achiras at an altitude of less than 800 m whilst the pink flowered forms at Cerritos Blancos grow at 1650 m.

.....from H.Middleditch

And *G. mostii* at lower altitudes in Sierra Cordoba with *G. oenanthemum* at higher altitudes, perhaps??

The similarity of the seed of *G. oenanthemum* and *G. mostii* was commented upon in Chileans No.26; at that time the Doelz article, indicating a close association between *G. oenanthemum* and *G. kurtzianum*, was not to hand. However, in Buxbaum's seed grouping, both *G. mostii* and *G. oenanthemum* were placed in the same group; this might suggest that Buxbaum could have been aware that the original *G. oenanthemum* did appear in a batch of imported *G. kurtzianum*. He may also have been familiar with the above article by Doelz.

.....from F.Fuschillo

The group of plants around *G. multiflorum* i.e. multiflorum, horridispinum, achirasense, schuetzianum, eventually grow into quite large plants and the flowers are also really quite large, too. On the other hand, the mostii group i.e. mostii, kurtzianum, valniceckianum do not grow into such large plants and the flowers are not as large as those of the multiflorum group. Consequently I would have been inclined to have placed *G. oenanthemum* in the mostii group, not only on the grounds of body and flower size, but also because the seed fits nicely in the mostii group. Incidentally, on the basis of the seed, I would also include *G. tillianum* and *G. carminanthum* in the mostii group.

GYMNOCALYCIUM SCHUETZIANUM By H.Till and S.Schatzl
Translated by H.Middleditch from K.u.a.S. 32.10:1981

It is well known to us, and we also accept as correct, that a new species should not be described from cultivated plants and also without knowledge of the plants in habitat. That we should choose to do so on this occasion is because of exceptional reasons.

Friedrich Ritter wrote in Vol.2 of his "Kakteen in Sudamerika" p.477 about his new discovery FR 430 - *Gymnocalycium* sp. from Cruz del Eje - that he had still not seen any flowers on these plants. For more than 20 years plants grown from Ritter's seed of this *Gymnocalycium* FR430 have been observed by well-known *Gymnocalycium* enthusiasts in Austria, Germany, and Czechoslovakia. As with most *Gymnocalycium*, FR430 is a variable species but on account of its overall habit can hardly be confused with any other species. Although H.Fescher on the occasion of a visit to Attersee (Austria) in the summer of 1979 contended that he had seen this species in the course of his collecting trip in the Sierra Cordoba (but without a specific location), we have no knowledge of any imported plants being brought to Europe as a result. Similarly a trip to Argentina in March of 1981 by three members of the Upper Austria Branch of the Austrian Cactus Society was intended to make a search of the habitat location quoted by Ritter near Cruz del Eje. Unfavourable circumstances in the country made this impossible, however. Furthermore we have referred to the cultivated plants that always display constant features over several generations and we are convinced that a 20-year observation of this material (independently of one another by several *Gymnocalycium* enthusiasts) must be adequate for the recognition of a new and valid species.

This species belongs in the seed group *Microsemineum* in the Fric-Schutz system and in the group around *G.monvillei* (Lemaire) Britton & Rose, from which it is differentiated on account of the somewhat paler body colour, more upright ribs (like *G.achirasense* or *G.horridispinum* Frank), and more brownish spines. The flower form, the fruit, and the seeds are very similar in the three foregoing sorts. The depth of colour in the flower is also influenced by the weather, but not to the extent it is in the other three sorts of this group. We name this fine species after the best known *Gymnocalycium* expert of our time, Dr. Bohumil Schutz of Brno, whom we thank for much data concerning FR430 and who was probably the first to regard this taxon as a valid new species. [Full description in German and Latin follows].

GYMNOCALYCIUM SCHUETZIANUM By Jiri Kundelius
Translated by R.Allcock from Kaktusy 5,XXII:1986

There are very few plants which have been described without knowledge of their natural habitat. These plants then give much trouble regarding the accuracy or the verification of the description. The description of such plants is uncertain and problematic. Consequently *Gymnocalycium schuetzianum* has invariably been of borderline interest in the hobby and among gymnophile specialists.

In the year 1978 Dr. Schutz wrote an article about "*Gymnocalycium* FR 430", together with a photograph, which added yet further complication. In the photograph is to be seen a flower with fully developed stigma, but the stamens do not carry anthers. This feature is not referred to in the description.

Gymnocalycium schuetzianum was described on the basis of acquaintance with plants under the field number FR 430 friend Fleischer ordered seed under this number from Winter. The seeds germinated nicely and the seedlings grew well, some faster, others more slowly. Some with central spines, some without them. Because these plants were similar in habit to *G. monvillei*, *multiflorum*, or *oentanthemum* there was but little interest in them. At least, until the time came when they first flowered. And that was a surprise, in colour much resembling the flower of *G.horridispinum* or *G.achirasense*. But such a size! According to the description 60 to 80 mm in diameter, but by ruler, up to 100 mm. The flower is a rich rose colour and very variable. On some plants it is broad, towards the top it broadens out, and therefore also the flower is large, broad and for the most part containing several series of petals, so that it gives the impression of a double flower. Other buds are narrow throughout their whole length and with these the flower is smaller and endowed only with one series of petals. Also the fruits are of various sizes, with various seed counts. Young plants have 7-8 ribs, in middle age 10-12, and old plants up to 17. There are 5-7 radial spines and with some there is an additional central spine which may be curved upwards or downwards or may literally stand straight out and may transform the appearance of the plant. The assertion that all old plants have central spines is not correct. For several years I have made use of *G.saglione* for fertilisation and thereby obtained healthy and germinative seed. The seedlings show as yet no sign of hybridisation. It is too early to assess them, until they flower abundantly.

Till and Schatzl described *G.schuetzianum* and they give an approximate general habitat in Argentina, in the province of Cordoba, near Cruz del Eje. In the same finding place there also grows *G.carminanthum*

.....from H.Middleditch

It will be patently evident that the author has mis-stated the habitat location for *G.carminanthum*. In addition, he does not seem to be familiar with the occurrence of flowers on various spp of *Gymnocalycium* which display atrophied anthers. Despite the opening observation, a great many cacti have been described in the past without knowledge of their habitat location.

GYMNOCALYCIUM SCHUETZIANUM Till & Schatzl By D.Metzing
Translated by G.J.Swales from K.u.a.S. 43.10:1992.

Gymnocalycium schuetzianum that comes from the Argentinian province of Cordoba, is closely related to *Gymnocalycium monvillei* (Lem) Br.& R., differing from it, in particular, in the spines which are at first brownish but which later become grey. The plants have 9-11 (-17) ribs which run straight down the plant; there are 5-7 radial spines per areole and occasionally a central spine. The flowers are pink and open to a diameter of 60-80 mm. On the basis of the seed, this species belongs in the sub-genus *Microsemineum* Schutz, or in Buxbaum's system, in the series *Horridispina*. Using a wider concept of species, *G.schuetzianum* must be considered as the most southerly population of *G.monvillei*.

The original material for the description of *G.schuetzianum* were cultivated plants that had been raised from seed collected by F.Ritter under his number FR430. Ritter, in his *Kakteen in Sudamerika*, also stated that the plants came from Cruz del Eje. In his (unpublished) field notes, Ritter records for this region three species of *Gymnocalycium* that he collected there on the 7 March 1955. At that place, it is a matter of *G.schickendantzii* (Web) Br. & R., *G.quehlianum*

(Quehl) Hoss., and it is clearly about the third sort (FR 430) that Ritter noted only: "Gymnocalycium species very similar to Catamarca No.12. Occasionally fruit, ripe and unripe." *Gymnocalycium guanchinense* is close to Catamarca No.12 but differs from it, however, by the different reddish-brown seeds.

The seeds were distributed by the firm of Hildegard Winter, Frankfurt and were first offered in the seed list for 1956 with the notes: "Gymnocalycium FR 430 from Cordoba. Fine species, similar to *G.valniceckianum*. Seeds, however, different. Flowers unfortunately not seen." Many cactus enthusiasts ordered seeds at that time and raised plants from them that showed in their appearance, however, no similarity to *G.valniceckianum* Jajo. They were more comparable with *G.carminanthum* Borth & Koop, or *G.monvillei*. The similarity to *G.valniceckianum* mentioned in the seed list is much more in keeping with a form of *G.bicolor* Schutz, later found by other collectors near Cruz del Eje, and might possibly be the result of a mistake. *Gymnocalycium bicolor* was, of course, collected by Ritter near Capilla del Monte and received the number Fr 433; seeds of both numbers were also offered in the trade by Frau Winter in 1957 as "Gymnocalycium species from Cordoba".

There was great surprise at the time when the first of the plants produced large, deep-pink, partly semi-double flowers. It now appeared clear that the plants were associated with no hitherto known species. A wider treatment by Ritter himself did not follow because he lacked further material of it and had only seeds. So there followed in 1987 the original description of *G.schuetzianum* by Till & Schatzl. Although a species description that derives only from cultivated material appeared suspect, this step was justified by the 20 year observation period, during which several generations of plants bred true.

In spite of repeated searches by another collector, up to the present time *G.schuetzianum* has not been re-discovered near Cruz del Eje. One can therefore only speculate whether this species has, in the meantime, been exterminated in its original habitat or simply not been re-collected. In either case, it is advisable that the plants of *G.schuetzianum* in cultivation at the present time be cherished and further propagated.

I wish to thank Wilfried Mueller for the helpful manner in which he placed at my disposal the field notes of F.Ritter for the purpose of this article.

.....from H.Middleditch

If the very last remark does indeed mean precisely what it says, the Ritter field notes might be a gold mine for those cactophiles who wish to clarify some of the apparent anomalies arising out of Ritter's published material.

A couple of years ago I received from G.J.Swales a spare seedling of a *Gymnocalycium*, which was without either name or record of origin. The spination is somewhat reminiscent of my plants of *G.multiflorum*, as are the rather angular chins into which the ribs are divided. This plant has now produced a pink coloured flower, which makes me suspect that it may be *G.schuetzianum*.

In conclusion, it would appear that *G.oenanthemum* can be regarded as the pink-flowered component of the *G.raostii* and *G.kurtzianum* group, with a homeland of the Sierra Cordoba. Similarly, *G.schuetzianum* forms one of the pink flowering members of the *multiflorum-horridispinum* group. This leaves open the question as to whether *G.tillianum* and *G.carminanthum* are two different sorts, or not.

ANOTHER PROBLEM PYRRHOCACTUS From D.Ferguson

During our trip to Argentina we stopped near Marayes, where we were able to collect a number of plants of *Pyrrhocactus* which we took to be *P.meglioli*. It now appears that these plants are really two different things. One of those we collected is flat, nearly subterranean, strongly glaucous, blue-green with black spines which do not curve noticeably upward. Flowers similar to *P.straussianus*, but shorter-tubed, smaller, orange-yellow with purplish stigma lobes. The fruit is also like that of *P.straussianus* being stiff, fairly thick-walled, drying up and dehiscing as an *Austrocactus*. The seeds are thick, rounded, with a deeply pitted rounded edged hilum much as in the La Rioja plants which are near to *P.straussianus*. Could this sort be the real *P.sanjuanensis*? Is this plant properly called *P.meglioli*, or should that name be applied to this next sort?

The other *P."meglioli"* has a bulbocalyx stem, spines, flowers, fruits and seeds, but red or purplish stigma lobes, together with the same body and spine colour as the first plant. This sort is supposed to be from San Juan, too! Since the *P."straussianus"* from La Rioja reaches nearly into (and perhaps into) Catamarca, could this second sort be the true *P.catamarcensis*? The Britton & Rose photograph, (Vol.3 Fig.212) is clearly of the bulbocalyx type plant. Our plants from European sources under the names *bulbocalyx*, *sanjuanensis*, and *catamarcensis* are identical to one another. Of these three, only *bulbocalyx* seems not to be a dubious name.

In the field I could not tell where the true *P.straussianus* stopped and where the La Rioja type took over. The only difference that I can find is in the seed, and this was little help. I still do not know if they are sympatric, allopatric, or if they simply intergrade. As you can tell, I am still highly confused on the applications of names to *Pyrrhocactus*. I know the plants fairly well, but cannot come to any conclusion as to which name is proper on which plant. We saw no specimens of the *bulbocalyx* types, and I do not know where to look on account of the confusing literature. None of the plants we collected on our second trip made it back home, unfortunately.

.....from H.Middleditch

This is not the first time that the variety of *Pyrrhocactus* to be found in the vicinity of Marayes has been recorded. In the review of *Pyrrhocactus* in *Chileans* No.45 pp.156 et seq., it was observed by J.Lambert that "at least two forms of *Pyrrhocactus*' were to be found near Marayes, ... I suspect there are actually three forms viz; *P.meglioli*, *P.marayense*, and *P.bulbocalyx*". In the same review (p.163) there are references to imported plants under the name of *P.(umadeave v.) marayense* which are evidently not that sort at all, but really *P.bulbocalyx*. Doubtless the collector concerned did not distinguish the two sorts at the collecting place. In addition, it is not entirely clear if D.Ferguson is still using the name *P.straussianus* in the sense mistakenly used by Britton & Rose, for plants from the area of San Juan - Mendoza - Tupungato, which should be called *P.catamarcense* (see Ritter - *Kakteen in Sudamerika*).

AUSTROCYLINDROPUNTIA VERSCHAFFELTII From D.J.Ferguson

The plants of this sort which we saw in Argentina were all basically identical, always very compact with the globose type of joint prevalent. Those brought home all produced cylindrical growth in the greenhouse, quite like Bolivian plants. None has flowered yet. The habitat elevation was always high, at the bottom of the Puna vegetation or at the top of the

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Special interests

Austrocactus	A.Johnston, 11 Malvern Rd., Scunthorpe DN17 1EL
Cereanae	G.J.Charles, Briars Bank, Fosters Bridge, Ketton, Stamford PE9 3UU
Cleistocactus	T.Lavender, Kalanchoe, Market Place, Tetney DN36 5NN
Copiapoa	A.W.Craig, 32 Forest Lane, Kirklevington, Yarm TS15 9LY
Discocactus	R.Moreton, 91 Umberslade Rd., Selly Oak, Birmingham, B29 7SB
Echinopsis	M.Muse, 32 Fielding Rd., Birstall, Leicester, LE4 3AJ
Lobivia	M.Lowry, 18, Haydon Close, Willerby, Hull HU10 6AB
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, Nichelia, The Street, Stonham Aspal IP14
Opuntia	R.Crook, 35 Cardinal Close, Worcester Park, Surrey KT4 7EH
Rhipsalis	A.Hill, 8 Vicarage Rd., Grenoside, Sheffield S30 3RG
Tephrocactus	R.K.Hughes, 16 Ashbourne Ave., Bootle L30 3SF

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