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Austrocyllindropuntia vershaffeltii

Muyuquiri, Bolivia

Photo - J.R.Kirtley



SORATA VALLEY
Below Sorata village,
above waterfall.



SORATA VALLEY
River and gorge,
approaching caves
of San Pedro.



SORATA VALLEY
From entrance to caves
of San Pedro.

COLLECTING WHICH CLEISTOACTUS? From R.K.Hughes

My very first visit to South America was in 1978 when I went on a package tour to Peru and Bolivia. This tour started from Lima and visited Inca sites at Ayacucho, Machu Picchu, Pisac, Ollantaytambo and Sillustani before going on to Bolivia. In Bolivia the first visit was to an Inca site at Tiahuanaco, close to the shore of Lake Titicaca, which was following an overnight stop in La Paz.

Our next objective was Sorata. This village lies to the northwest of La Paz, so it is in a river valley which runs to the north to join one of the tributaries of the Amazon on the other side of the watershed to the Titicaca basin. Consequently, in order to reach Sorata we had first to climb up to the mountain pass from Achacachi. The Bolivian handbook (1970) from the Liverpool Bolivian Consulate says that Sorata lies at 2697 m altitude and 153 km from La Paz. The South American Handbook (1982) says that Sorata is at 2695 m and 105 km from La Paz - 5 to 6 hours away by bus. We took a long morning to get there by tourist minibus with three short stops. It was not hectic, just a long, tough, grind to keep the bus going however low the gear. The stops were at Achacachi, close to the shores of Lake Titicaca, and at the pass. It was not until later that I realised the white hairy cacti seen on this last stretch were forms of *Tephrocactus floccosus*. At the pass the ground was covered with low alpine plants growing flat to the ground. This was above the bunch grass formation that stretched upwards from Lake Titicaca but we were still below the snowline of Illampu, the peaks of which towered above us on our right hand side, gleaming in the bright sunshine against a clear blue sky.

The steeper descent to Sorata was made longer by the tortuous route of the road as it zig-zagged back and forth. However, protected now from the winds which blew over the Altiplano, we were soon to find a much heavier, lush, vegetation along the roadside, including tree-like shrubs in places. A combination of the early start, the long journey, the unexpected warmth as we descended, and the lack of good views from the bus ensured we all dozed until we reached Sorata. Here we found the bottom of the valley had been divided into fields by stones cleared from the surface and piled up around the edges of the fields. There were plenty of large bushes among the fields as well as tall eucalyptus trees. The bushes often had *Tillandsias* in their branches.

We had a long wait for our rooms in the empty Prefectural hotel at Sorata, where there was no electricity after the generator was switched off at 9.30 p.m. Meals were taken in a small cottage, the El-Toro hotel, on the opposite side of the road to a large neglected garden. The next day, after breakfast in the dark, our walk started early, when the valley was still full of swirling fog. It was chilly until the fog was cleared away by the sun and ere long it became quite hot. The route of our walk out and back followed the river valley, and so missed all the roads and habitations. The valley was fairly shallow to start with. The river was not deep - it could have been forded on foot without any great difficulty. Some time after we left the village, the river ran over a waterfall, or more correctly a series of cascades, and from there on the river ran in a steadily deeper and steeper sided canyon cut along the centre of the valley.

The nature of the valley changed from farm fields and gum-tree woodlands as it narrowed to the gorge where river fell over the cascades. The vegetation had become more jungle-like with plants growing over the path and dripping with moisture. The path zig-zagged down the side of the cascades among bushes through which the occasional tall thin columnar cactus could be seen. Beyond the falls the path continued along a gentle slope which fell steeply into the ravine on our left, whilst on our right it became steeper and steeper as it blended into the mountainside. Also the ground seemed to have now become much drier with occasional scree slopes at the side of the path. There were far fewer plants which were smaller and less luxuriant. At this point cacti and bromeliads were seen on the cliffs at the other side of the river.

The objective for our walk was the cave of San Pedro, which led to an underground lake. It was only years later that I found out the name of the cave, as we saw no sign of the chapel or village of San Pedro. The gently sloping shelf which our path had followed only appeared at some distance from the falls, but it gradually broadened out as the valley itself became wider. This meant that as we approached our turning point, the path was some distance from the dangerous, nearly vertical, drop to the river below. The view upstream was still dominated by the snow-covered peak of Illampu, as indeed it had been for much of our morning's trek.

Here the most obvious vegetation was some well scattered bushes mainly up to 4 feet in height but with a few up to 8 feet high. This was the area where I came across some cacti, but with the constant harassment from the guide to hurry up, there was no time to stop and study them. We ate our packed lunches and drank a small bottle of coke each at the entrance to the cave, which was quite a stiff climb above the path. While we took advantage of the view from this vantage point, our guide cut three staffs from the bushes. To one end of each he wired a bunch of old rags, which he then doused in kerosine. All our group entered the door-sized opening to the cave and groped along in the darkness until any light from the entrance could not reach us. Only then were two of these torches lit to light our way to the lake deep inside the mountainside, the third being kept as a spare just in case it was needed. Once this objective of our expedition had been achieved, it was back out of the cave, down the hillside to the path and follow back along the route we had already taken. This allowed me to have a better look at the cacti.

There was a *Platyopuntia* RKH 15 with medium sized pads that were carrying red fruits; also a cereioid species, the largest specimen I found being of 5 feet or more in height with many spreading branches, RKH 14, which was probably a *Trichocereus*. It may possibly have been *Trichocereus clavatus* Ritter. There was also a cereioid species, RKH 13, usually clumping, with fairly slender stems, with fine yellow spines, and at first sight looking like a small yellow *Cleistocactus strausii* in the bright sunshine. The stems were upright but leaning, between one and three feet tall. Often the lower, older parts of the stems were black or damaged and in some cases covered in miniature *Tillandsias*. The taller stems had a vertical cephalium 6" to 8" long, which ran down from the growing tip on one side of the stem.

Many of these plants were searched before finding the remains of a seed pod with some seed in it, among the dead flowers of the cephalium. This plant was growing up out of the undergrowth, on the gentle slope. So first of all I had to look round for a stick, so that I could reach out behind the tall stem to make it lean over more towards me. Then, whilst holding the seed envelope underneath the fruit, I poked at the fruit until the seed cascaded out and I was hoping that it would fall into the packet. This really was a three handed job so therefore I was lucky to get as much seed as I did. Even then, a fair amount dropped into the undergrowth. As the only cactophile in this particular party I was very much on my own. The guide and the hikers had tramped off along the path with the walkers trailing along at a slower pace. However, with my interest in the cacti I was soon left well behind.

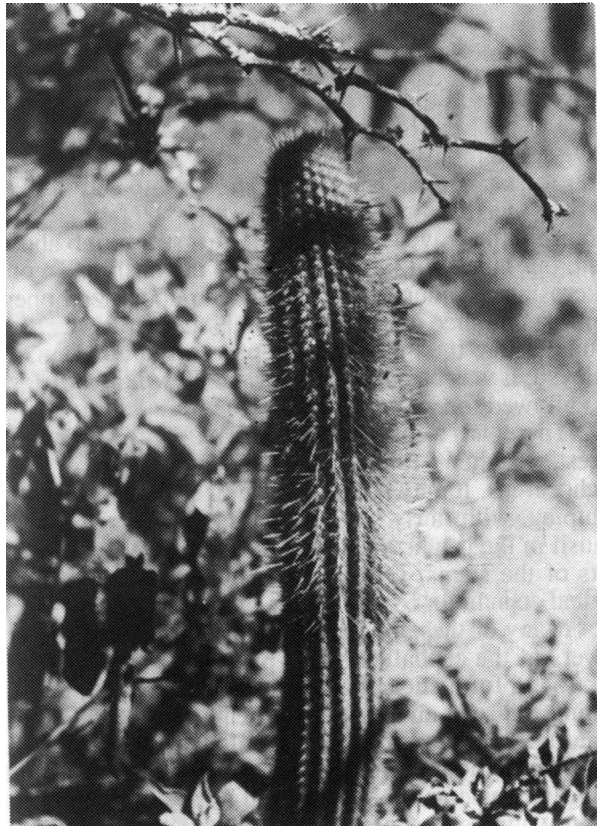
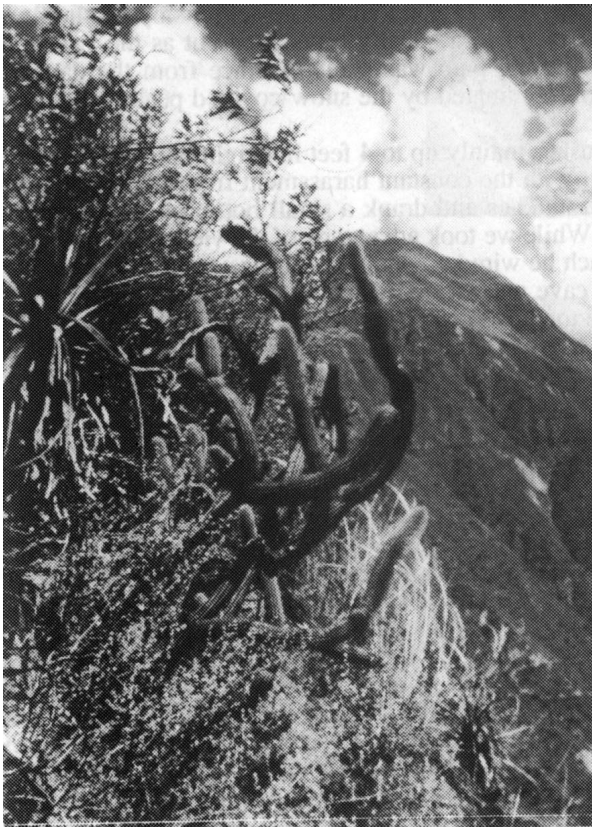
Here the canyon was so deep in comparison to its narrow width that the sun must have had to be overhead before it could shine down to the river in the bottom of the valley. As we returned uphill to the village, the shadows were cast from left to right. It took about three hours for the walk down, but over five hours to climb back up the valley to our starting point at Sorata.

When I collected this seed, *Cephalocleistocactus* and *Seticleistocactus* were just names that I had perhaps passed by



SORATA VALLEY

Upstream from the location
of the Cleistocactus (below),
downstream of the waterfall.



CLEISTOCACTUS sp. in the Sorata Valley

in seed lists. When I got a look at Backeberg's *Kakteen Lexikon*, I came across the picture of *Cephalocleistocactus schattatianus*. This was a well grown plant although much larger than any I had seen below Sorata, but probably closest to the best growing specimen at that site. On looking up *Cephalocleistocactus* in the text, both *C.pallidus* and *C.ritteri* could have matched my own discovery. As *C.pallidus* was from higher up the Consata gorge than the area of the Yungas, it became the obvious choice of name when I saw the map of Lake Titicaca in *The Chileans*. Before then, I had not known the name of the river which we were following.

But I found myself somewhat confused by the discussion in Ritter's *Kakteen in Sudamerika*, which put forward different views on these species. In addition, his photographs did not help me very much. *Cleistocactus ritteri* (Fig 659) shows wispy hairs that do not seem to grow in a regular cephalium-like manner. *C.palhuayensis* (Fig 669) shows some longer bristly spines in the flowering area but they are not very obvious; whilst *C.palhuayensis v.camachoensis* (Fig 670) shows no bristles round the flowers. *C.chrysocephalus* (Fig 671) looks very hairy rather than bristly but in Fig 674 the top left cephalium does look bristly. *Cleistocactus variispinus* (Fig 677) looks most like the plants which I saw below Sorata, although I found only single plants which were well scattered. The vertical cephalium or bristly strips were only to be seen on the mature or taller stems, of up to one metre tall on some plants. The photograph of *C.variispinus* (Fig 678) shows a plant in flower without a cephalium, whilst the supposed synonym *C.schattatianus* in the *Lexikon* does have a cephalium.

..... from H.Middleditch

From La Paz there are only a few practical routes by which the traveller may cross the Cordillera Real and then descend towards the Amazon basin. One of these routes has been used for centuries by those going to dredge for gold from the river at Tipuana. The route runs via Achacachi and Sorata, thence over a pass, followed by a descent down the valley of the R.Tipuana. The section of this route from La Paz to Sorata was taken by R.K.Hughes and it has been used by other collectors.

..... from R.K.Hughes

In the University Library I have discovered a book which includes a map of Lake Titicaca by R.E.Baluarte, dated 1893. This also covers Sorata together with the river system downstream of Sorata. The main river is marked as the R.Mápiri but it appears to be the same river that is referred to by others as the R.Consata. On this map the road from Achacachi going north passes through Huarisana, then via the pass and down to Sorata. This looks as if it is the road we took for that particular trip.

..... from H.Middleditch

The map in Conway's "Travels in the Bolivian Andes" 1901 identifies the pass beyond Huarisana as Hualata pass, and this is confirmed on the map which appears in Petermann's *Geographischer Mitteilungen* 81.1935. This particular piece of terrain seems to be shown in a fairly similar manner on each map which has been consulted, possibly because it is an old-established and well-known route.

JOURNEY IN BOLIVIA AROUND LAKE TITICACA By A.W.Hill

From *Scottish Geographical Magazine* Vol.21 1905

We arrived at Copacabana on 2 February and made the place our headquarters for about a week. We were ferried across the lake with all our goods at the narrow straits of Tiquina, and after crossing the watershed of the eastern range of the Andes, we arrived at the town of Sorata. The change in the character of the country and the abundance of vegetation on the eastern flanks of the Andes is very remarkable, a journey of some six hours taking us from the arid plateau into a region of semi-tropical luxuriance. Whilst here I made an expedition up the mountain Illampu as far as the snowline, here about 16,500 feet, in search of plants. On this, as on other occasions when I ascended to high altitudes, I found many curious plants of considerable interest, nearly all of them being peculiar in showing a very compact habit of growth with minute linear leaves and long tap roots.

The town of Sorata is situated on the headwaters of one of the branches of the R.Beni, at an elevation of 10,000 feet and is one of the centres of the rubber trade of the upper Amazon. Large quantities of rubber are brought here on pack mules from the forests lower down the river, and are then carried in the same way over the pass of the eastern Andes to Lake Titicaca, shipped across to Puno, and thence are taken by rail to Mollendo on the Pacific coast.

MEMOIRS OF A NATURALIST By M.Cardenas 1972

Translated by H.Middleditch

In regard to the wild potatoes of Bolivia, I wish to refer here to a trip which I made with Sr. Gandarillas in February 1946 to Sorata to look for two wild species which were collected by Gilbert Mandon in 1864. Mandon, of french nationality, although not a professional botanist, made an abundant collection of plants, many of them new species, in the vicinity of Sorata when he dwelt there for several years whilst he was manager of a gold extracting company at Tipuani.

One of the species which we were looking for, *Solanum circaefolium*, originating from Monte Iminapi, was described by Bitter and there are almost no duplicates of the type, not even in the herbaria of Europe. In the Natural History Museum of Chicago there is a fragment and one other good specimen in the New York Botanic Garden. The peak of Iminapi is not far from Sorata and we reached the foot of it by following the road which runs from Sorata to Tacacoma and by taking a branch road for some 6 km. On the slopes of the mountain there were some shacks and some cultivation. On climbing the slope we came across this curious wild potato growing in loose sandy soil, with its thin stem supported among the low brushwood.

Since Mandon discovered this species in 1864, we ourselves had collected it 82 years later, in the type locality. The other species, which is even rarer, we discovered by chance on leaving the Hotel Prefectural in the direction of La Paz. Mandon collected this same plant in Manaypata, near Sorata, and Bitter described it as *Solanum bolivianum v.virgultorum*. At Cambridge University, we examined with Hawkes the duplicate specimen, which seemed to us to be quite different from *Solanum bolivianum*, a species discovered by D'Orbigny in the neighbourhood of Sucre - that is, at a location far removed from Sorata and so in 1945 we published the new combination *Solanum virgultorum*, a year before our rediscovery of the taxon at Sorata.

.....In March 1951, our courses at the University commenced, but by taking advantage of the holiday of saints

week, we straight away left Cochabamba again for some faraway places. We left Cochabamba by air for La Paz, where I rejoined Ing. Segundo Alandia who worked in the University as a phytopathologist and Sr. H. Borda, specialist in grasses from the Ministry of Agriculture. We left La Paz heading for Tacacoma in search of wild potatoes. We slept at Sorata and continued the following day in the direction of Tacacoma. At the height of the 10 km post, we took the diversion to Cerro Iminapi, location of the type species of *Solanum circaefolium* and this time we found it at the edge of an irrigation ditch, situated half way up Iminapi, thriving examples of this curious sort, with flowers and fruit. On this same slope, we found various specimens of the wild boreal tobacco, *Nicotiana tomentosa*.

On the descent with the car and already close to the road to Tacacoma, my attention was attracted to some plants with large lilac-rose flowers which correspond to the species *Tarasa mandoniana*. We continued the journey to Tacacoma and at the ascent of the Cuesta de Anilaya, collected a new "Kayara" with yellow flowers which was afterwards described as *Puya ctenorhyncha* by Dr. L.B. Smith. Half way between Sorata and Tacacoma, we passed a river of clear water on whose banks grew and attractive vegetation with elements of the "ceja de monte" flora. Following a long slope above 3000 m altitude, we arrived at the town of Tacacoma which was at a height of 3400 m, in a more humid zone. From here we went down a most precipitous path to the Gran Poder mine, where a little gold was extracted. At our feet, we found two species of *Calceolaria*, with large yellow flowers and lobular leaves; *C. lobata* and *C. herzogiana*. The office for the mine was situated on the edge of a river of clear and freezing water which on its banks exhibited a flora really from a humid locality; conspicuous here the genera *Barnadesia*, *Stevia*, *Oxalis* and *Lyabum*. In the middle of this vegetation we also observed a large colony of *Solanum circaefolium* as if it had been sown there, just like some specimens of medium height of the other wild potato of this region which is *Solanum candolleianum*.

We went back to Tacacoma by the same path, except this time to the rise. The slope is such that in some places we could not climb without holding on to shrubs which we came across and hauled ourselves up with them in order to climb this 300 m of path, in a distance of some 6 km. At Tacacoma we collected various sorts of cultivated potatoes and returned as far as the Agricultural Station at Belem, passing Sorata on the way. It is fitting to record that in 1949 the botanical collector Miss Brooke got as far as the Gran Poder mine from Tacacoma, by mule and by night and by the same path which I have just mentioned. From Belem we continued on the following day to La Paz and thence to Cochabamba.

..... About the middle of March 1957, I flew to La Paz in order to begin the collection of the lesser tuberous plants. The Interamerican Agricultural Service supplied me with a vehicle in very good condition as well as the company of Ing. Moises Zavaleta, who became well versed in the work of collection which I performed, by the end of the trip. In addition, Senorita Ana Maria Kruger was able to come on this trip, in the role of botanical assistant, being at the same time employed in the Department of Botany of the University of Cochabamba, of which I was Honorary Director.

The three of us met up together in La Paz and began our survey through the province of Larecaja. After staying overnight in Sorata, we drove the car to Tacacoma, by that road where I had collected before on several occasions. On the road, we collected the escaped form of the garden plant *Tropaeolum tuberosum* with its creeping habit. We stayed all the morning in Tacacoma, collecting some clones of "oca" and "papalisa", besides a fine batch of varieties of cultivated potatoes. Between Analaya and Tacacoma, we had found on the previous day an interesting colony of the wild potato *Solanum candolleianum* with specimens of 60 to 80 cm in height. In the churchyard at Tacacoma we saw spontaneous and low-growing plants of "papalisa" which in one spot covered the clay roof of a burial chamber. Its tubers were small and the colour green, which then turned into purple-magenta with the passage of some days. After noon we returned to Sorata and thence to La Paz.

..... from H. Middleditch

Flowing into the R. Consata are various tributaries, which collectively drain an area which is some thirty to forty miles square. To the north and east of this Consata basin the ground falls in a descending series of spurs and ridges towards the Amazon lowlands. To the south west a watershed, lower than the general run of the Cordillera Real, separates the area drained by the Consata gorge from the shores of Lake Titicaca. At the southeast corner of the Consata basin are the snow covered peaks of Illampu, whilst to the northwest, beyond Charazani, are the snow covered peaks of Apolobamba. Between these two groups of peaks, what had originally been the high cordillera has been cut and carved into ridges and valleys by the R. Consata and its tributaries, which fall about 4000 m or so in a distance of about fifty miles from their headwaters to Consata itself.

To the west, another relatively low watershed separates the Consata basin from the drainage of the R. Suches, which falls only 1500 m between the Apolobamba and Lake Titicaca. Consequently the waters of the R. Suches have less valley cutting and deepening capability than those rivers which flow into the R. Consata, and hence the watershed between the two drainage systems has become established much closer to the R. Suches than to the R. Consata. On its western side this watershed has not been deeply serrated by the side valleys feeding the R. Suches and so it represents the most convenient route for access to the heads of those much deeper river valleys which flow eastward into the Consata gorge. This route was also utilised by Cardenas in the journeys described in the following account.

..... from M. Cardenas, *Memoirs of a Naturalist*, 1972

Having been relieved of the functions of Rector of the University of Cochabamba, I was enabled to devote myself to more frequent botanical trips having the objective not only of the collection of examples of the general flora of Bolivia, but also of plants of economic value and in particular wild and cultivated potatoes. In the March of 1947 there came to Bolivia for the third time the American botanist Hugh C. Cutler, at that time in charge of the Department of Economic Botany at the Natural History Museum of Chicago. I rejoined him at La Paz and from there we departed in the direction of Charazani in a truck from the Ministry of Agriculture.

On the first day we arrived at the Experimental station at Belen. Our intention was to go to the territory of the "Kallaguayas", the legendary indian medicine-men who come to La Paz to offer their medicines and also to study the types of maize which they cultivate. In the whole course of our journey we collected representative flora of the places visited and took photographs in colour and in black & white, of all subjects which we came across which were of interest from the ethnobotanical point of view.

On the second day we passed through Ancoraimas on the margin of Titicaca and arrived at Escoma in order to then leave the lake on one side and climb the pass for Italaque, called Huallpacayu. Between Escoma and the Hacienda Cariquini we came across various clumps of bushes characteristic of this zone, the "Kishuara" or *Buddleia coriacea*. The descent from Huallpacayu to Italaque by a narrow and very steep road scared us considerably. In the late afternoon we arrived at Italaque, ancient town of muleteers and musicians, where we were lodged by the Corregidor in a school.

On the following day, in the morning, we collected various sorts of *Tropaeolum*, *Oxalis*, and *Fuchsia*, which grew in the midst of moist thickets. We came across some species of *Oxalis* which grew in a thick bed of very damp moss in the

walls of the church in the town. Near to these plants hung the flowers of *Fuchsia leptopoda* with red calyx and purple corolla. We also discovered in the outskirts of the town, the handsome *Salvia dombeyii* with large dark red flowers which in Cuzco received the name of "nucchu".

At about 9 a.m. we left Italaque in the direction of Huallpacayu and proceeded via a damp plateau as far as the crossing to Charazani, called Socosani. This deserted section was very muddy. Our vehicle fortunately crossed all the bad patches there without any problems. Now with the afternoon advancing, we left our truck in Socosani because there was no road to Charazani at that time. We descended on foot with Dr. Cutler, leaving the vehicle in the care of the driver, and arrived at Charazani when it was already dark. We looked for lodgings in some private house, because it had no inn and we were hospitably accommodated by Sr. Tudela, a former refugee from Paraguay during the Chaco war. Our beds were better than those in a town hotel and the meal which we were served was excellent, because we were in the season of the choclos [maize cobs] and the arracachas - *arracacia xanthorysa*. These roots of the ceja de monte had flesh that was white, yellow, and purple. The humitas [maize-cakes] and arracachas from the oven were exquisite. Sr. Tudela took us next day to the road which goes to the Yungas of Camata. We crossed the torrential river, with enormous stones, and arrived at a formation of the "ceja" where we discovered some specimens of *Floripondio* with white flowers - *Datura aborea*, apparently growing wild, together with a rose with fruits of intense red and flowers with only five petals, also red. The panoramic view of this plant formation was wild and magnificent. On the return to, and at the town of Charazani, we came across a shrub of *Buddleia andina* with yellow flowers and lanceolate leaves.

After three days of pleasant residence in Charazani, we departed towards Socosani, diverting to Canlaya and Chajaya, the well-known districts of the Kallaguayas. We went on hired horses and we took as guide a quechua indian of Curva who had to take back the horses. This indian wore a shirt of dark blue wool, short trousers down to the knees in the same material and colour, a brown sombrero with a small crown, over a mass of long hair, plaited into a pigtail which fell over his shoulders, and sandals of leather. We had been informed that Canlaya was the home of the young kallaguaya and Chajaya that of the old ones. In Canlaya we found only one old kallaguaya named Mariano Mamani, who wore a large poncho, a straw sombrero, wool stockings, and sandals. We questioned him about the plants which were used in his treatments. He showed us a handful of dried plants which he said came from the snow-covered heights. They were in fact a *Phoradendron* which grew in the cejas de monte. Mamani naturally showed himself uncommunicative and evasive with us because he saw that we collected plants for our herbarium press.

At our arrival at the summit of Socosani I collected a hedgehog cactus with long acicular spines and handsome yellow flowers, which was described much later as *Lobivia charazanensis*. From the summit of Charazani we continued in our truck as far as Belen, where we stayed for the night, so as to arrive next day in La Paz, after this very interesting trip to the homeland of the Kallaguayas.

.....In March of 1957, immediately after our visit to Sorata, we were in La Paz. At the end of a day of rest, we three [Cardenas, Zavaleta, Kruger] set out again, Zavaleta taking the vehicle in the direction of Italaque. We took the road to Achacachi in order to continue thence to Ancoraimas, Caraburo, and Escoma, native towns situated on the edge of Lake Titicaca. From Escoma, we took the road to Charazani, passing through a hacienda with a beautiful grove of "Kolli" or *Buddleia coriacea* and another former private estate of the Rea family up to the crossing of Huallpacayu, situated at 4150 m altitude. From here we went down to Italaque by this dangerous steeply sloping road, which I had travelled with Dr. Cutler in 1947.

In Italaque we were lodged in the house of the hacienda of Sr. Rea, who received us most hospitably and he made bearable this very cold April night which we passed there. The whole of the following day we continued as far as Mocomoco, passing through an extremely interesting section from a botanical point of view, because from Italaque the atmosphere is now humid and the vegetation is that of the ceja de monte, located at an altitude of more than 3000 m. The previous year this region had practically drought and frost. On this same day we went back to the Huallpacayu pass and we observed close to there, some rough terraces of stones for retaining cultivable ground and some indians still ploughing the soil with the "tajlla" or primitive foot plough, just as it is depicted in the drawings of Huamon Poma. From Huallpacayu we followed the road to Charazani, arriving in the late afternoon at this town in whose neighbourhood still dwelt quechua indians with a characteristic dress. We took lodgings in a luxurious house with all modern services, which had been built by Padre Rendentorista Carlos, who was very familiar with all these towns.

In Charazani, we spent three days collecting the representative flora of the zone, as well as specimens of the minor tuberous plants. On the next but last day of our stay, we intended to go to Curva, town of Quechua indians, without accomplishing our objective, because we could not obtain petrol in order to return to Charazani. Late on our last day we obtained petrol at Charazani at an inflated cost. We set out from this handsome town where we discovered a new cactus, *Corryocactus charazanensis*, to return to La Paz. We were supplied with petrol at normal prices at Escoma and we continued towards Belen after having purchased a large trout from an indian ferryman at Ancoraimas. We lunched at the Agricultural station at Belen where they prepared it and we finally proceeded to La Paz.

..... from H.Middleditch

In this account Cardenas tells us about three separate trips which he made to Sorata, each one carried out in the month of March. The report of the Percy Sladen Trust Expedition to Lake Titicaca in 1937 states that "... the average rainfall over the northern part of the Lake is in the neighbourhood of 800 mm annually [32"] and some 70% of this falls in the rainy season from December to March."

Although there is more than one mention in this account by Cardenas of a place named Charazani, none of the maps in my possession identify a place of this name. But to judge from the details provided by Cardenas it appears to be no great distance from General Ramon Gonzales and Villa Jose Perez.

..... from J.R.Kirtley

Charazani is an alternative name for Villa Jose Perez.

THE CONSATA BASIN By F.Ritter.

Translated by H.Middleditch from "A 40-year Life of Adventuring" by F.Ritter 1977

Anyone, like myself up until 1930, who had known only Mexico as cactus country, can have no idea of the magnificent scenery which often distinguishes the habitat regions of the cacti in the south america Andes. The highest peaks of the cordillera, perpetually covered in snow, rise up to almost 7,000 m above sea level between Ecuador, Argentina, and Chile and the snowy ridges build up along lengthy stretches into insurmountable traffic barriers. Only two snow-free passes under 5000 m altitude cross over the mighty Cordillera Real, a snowy chain of mountains about 150 km

long lying east of Lake Titicaca and La Paz, both having been crossed by a highway from La Paz. Here, after crossing the pass, a view appears of a magnificent immense landscape with abundant high mountain forests which descend for thousands of metres over rocky slopes and innumerable undulations of the mountains, merging into the primeval forests of the southwest Amazon basin. Here on mosscoated forest giants and between rocky crags is the kingdom of the orchids, which occur in almost inexhaustible profusions of forms. Only in a few spots do cacti prosper, in this thicket of plants, in spite of their low carbonic acid assimilation. But to the north and south of this zone the basins of the east invade deeper into the cordillera region, insulating mountain barriers lying to the east of them, which intercept the greater part of the rain originating from Brazil, so that here a continually dry basin results, which promotes the development of an abundant cactus flora. The northerly basin is crossed by the R.Consata, the southerly by the La Paz river.

My first trip to the quite extensive cactus region of the Consata basin had taken me to Sorata at the end of April 1953. From July 11th to 17th 1953 I made a second and more extended trip. I travelled on a lorry, which is the only regular means of transport to that place for goods and people. It left La Paz in the grey of the morning and in the hours of darkness reached Ayata, a small out-of-the-way town at the very end of the road on an eastern outlyer of the high cordillera to the east of Lake Titicaca. From a pass almost 5000 m high the road zigzags over the southern flank of the mountain spurs in numerous curves down to about 3700 m where this little town lies. From there, one must descend some further 2000 m or more on foot, to reach the depths of the Consata gorge. I stayed overnight with the school-master of the town, who had opened the only lodgings, in which a traveller scarcely ever resides. So even now I was the only one there.

On the next morning I started off on my travels of several days' duration through cactus country which had not previously been explored. Just above the village I found on rocky slopes a new *Cleistocactus* whose grass-green flowers contrast strikingly against the golden yellow spination (later published as *C.viridiflorus*). Whilst the mountain slopes here still support an abundant growth of vegetation, which only allows a modest existence for some cacti on rocky places, in a downhill direction it becomes steadily more arid and warmer and one sort of cactus after another presented itself and joined the foregoing *Cleistocactus*. Ever deeper down into the valley, I continued along paths and over uncultivated fields. I must have descended round about 1700 m when the first banana plantation suddenly appeared. The settlement soon came to an end and steep cliffs of friable rubble drop hundreds of metres further into a side valley of the Consata basin which comes down from Ayata. All the paths come to an end. I looked round for means of climbing down into the gorge, but found none.

Finally I sought out a native hut into which a timber collector had quickly vanished. Perhaps a stranger had never even come this way before. Finally I got out of him, with great toil and trouble and more by signs than by words, that there was no means of getting down into the gorge from here. Only by means of a tremendously roundabout trail would I be able to reach the bottom of the gorge, which meant that I would have to go back for a considerable part of the way along the road down from Ayata, which would have cost quite a few hours. If at all possible, I wished to avoid that, especially since it was already late in the afternoon and I wished to spend the night in the gorge where there was drinking water, a warmer climate, and more likelihood of a refuge for the night.

Again I searched for a descent across the steep face despite it appearing that no-one had ever been successful. It was a crazy scramble down this unstable rubble, where often one had to make sure at each further step not to slip off suddenly into the depths. I have had to tackle a great many such descents in my travels. In particular difficult situations I had to take off my boots and socks and pack them in the rucksack and scramble with bare feet, since then one has the best foothold and the danger of sliding on slippery rocks is least. In addition, however, I was lucky on this occasion - the most unpleasant part was the last few metres above the bottom of the gorge, but even here I finally got down.

After all I had gained several hours and in addition reached the bottom of the valley before dusk. Here I was now in an area in which there was really no road or track any longer and no settlement of any sort. I looked for some sort of shelter for the night, but found none and finally passed the night under the open sky, after I had consumed by the faint light of the moon my supper out of the provisions which I had brought with me. I must have been about 1700 m a.s.l. here. It was the middle of winter and as on my previous trip into the La Paz valley it was only possible to catch about two hours' sleep during the night. Then it was so cold that, freezing, one longingly awaited the dawn of the morning. However, at least I had the good fortune that no rain fell during the night. On the next day I wandered down the little river gorge until I arrived at the main valley of the Consata river and then followed this upstream. Even in the middle of the dry season the river is so considerable that each crossing by foot through the rushing stream of water is a risky undertaking and not an easy job. The river has dug itself down into a steep gorge where it swings to and fro between rocky walls. Here and there I was able to go round the river along the steep faces and so avoid these crossings.

The area is very dry and apart from the abundantly thriving cacti is only sparsely colonised by vegetation. As far as one's view extended, nothing revealed the presence of man, destroyer of the earth. For the whole day I travelled in this manner. More than forty hours of travelling and an overnight stop without seeing a single man or a domestic animal or a trace of their existence, without obtaining sight of a cultivated field or any worked area with its pristine vegetation despoiled by woodclearing, burning, or pasturing. Was there really no sign of human existence? Yes, in the river sands appeared the track of men going barefoot, some indians from the hamlets on the high mountains, which are not visible from the depths of the canyon. Here and there the canyon broadened out, and there were level areas of very fertile loamy ground, which could be converted into highly productive cultivation by irrigation from the river.

At noon I arrived at a spot where the river had cut through a mountain ridge, forming perpendicular walls hundreds of metres high at both sides. What did I see there? On the rock walls appeared small densely spined globular cacti with ochre-yellow flowers. But how could I reach them? I searched around and eventually found a spot where I ventured a dangerous ascent of more or less ten metre high, cutting out for myself small notches from the stone with an iron, as holds for my feet. So I succeeded in reaching a few specimens and acquired a typical one and some seed. I saw immediately that these cacti were closely related to my newly discovered *Parodia* from the La Paz gorge. I published it later as *Parodia borealis*.

The R.Consata recorded on the map is known only under the name of R.San Cristobel by the local inhabitants. Late in the afternoon I came to a spot where a stronger river emptied itself into this valley. My intention was to reach the town of Sorata by going up the valley, from where a good road goes towards the capital city of La Paz, with an almost daily truck service. I was aware that I must follow the main river further up, but it was not easy to decide which of the two was the main river. The map leaves this in the dark, for on it the course of the R.Consata is marked very inaccurately. After pondering for a long time, I thought that the river coming from the north was the main river - it seemed to me to carry more water and its valley was wider. But I was mistaken, as I learned only much later. This northerly river comes out of the vicinity of Chuma and is called the R.Llora; on the map the latter name is not noted. Soon it was twilight and I stopped overnight in a little recess on the rocky bank of the R.Llora.

On the next day I followed the valley upwards. It led ever deeper into the high cordillera, ever narrower became the valley, ever steeper the sides, ever noisier the stream tumbling down. Sometimes I climbed over dried-up and hardened mud-flows which usually get deposited as arid patches in dry areas after heavy storms and landslides, at places where the power of the current is not normally sufficient to carry away the scree. Ever more troublesome became the travelling up the valley. Finally I came to a place where the river had carved itself a canyon with perpendicular walls in a hard stone; here it plunged with great violence and foaming spray in rapids over huge rocks. This place where the rock walls drew close together along both sides of the river, had come to be used as a muletrack with the construction of a bridge which crossed the canyon at about 20 m above its bed.

I must try to reach the muletrack, but how to get up to it? I searched along the walls, but found no possibility at all of being able to risk an ascent. Even by a detour backwards, an exit from the valley was impracticable in order to get to the trail. The only way, it seemed to me, was to climb up over the rapids through the canyon under the bridge. Beyond the canyon a small side valley entered this way from the south, from which the muletrack must be within reach. I now divested myself of all my clothes, packed them in the rucksack and strapped it up, hitching it on as high as possible. Then I went step by step along the canyon wall, making use of each tiny hold on the almost smooth wall, in order to hold myself firmly in place, testing each step on the ground with my feet, in order not to slide on the slippery rocks and so with painstakingly slow deliberate movements I pushed and balance out against the force of the tumbling foam. Woe betide if I lost equilibrium for even only a fraction of a second against the torrent, or slipped; I would be flung against the rocks by the furious rapids and become submerged. Just in this way had Friedrich Sellow met his death in travelling the Rio Doce in his exploration of the Brazilian Flora. But I was again fortunate and came safe and sound out through the canyon, where it was an easy matter to reach the muletrack.

I was under the impression that this trail went in a southwestwardly direction towards Sorata, my objective. I had not walked very far when I came across a troupe of indians with musical instruments, evidently a band for a feast in some place or other. I asked them where the trail went to; they did not understand a word of Spanish, but they told me another place name, not Sorata, and gave no intelligible reply. They went on their way; I weighed up the situation and finally came to the conclusion that I must be on the wrong trail and that I must get back again to that morning's starting point, and reach the other large valley which must be the main valley going towards Sorata. Unfortunately I was not aware that along this trail one could reach the terminus of a much frequented auto route with connections to La Paz - and even quicker! So - back! But how? On no account would I again pass that devil's canyon; nor take the detour to the south, in order to reach the bottom of the valley. I found myself on a terrace which dropped down many hundreds of metres in almost vertical walls of earth and rubble. How to get down? I ambled along the edge of the precipice. Finally I found a spot where a long time ago a path had existed, which terminated at the bottom of the valley. I made use of it. In the lower parts, long stretches of it had slid away into the depths and again I had to practice all my climbing skills in order to descend the steep crumbling sides, but it went off without mishap.

Climbing in this arid area is on that account especially difficult and dangerous since the scree usually remains lying because the transporting force of the water is absent; everything is loose and often breaks off even with the slightest pressure. One must check before each step that one takes and test the spot for its soundness, before one can risk loading it with one's body weight; likewise each hold that one looks for on rocks or plants. I reached the valley of the R.Llorca again and down this to that of the R.Consata. The wasted travelling had cost me a whole day and much hazard to life and limb. For the third night I overnighted alone in the open air.

On the next day I walked further upwards along the main valley where I found in abundance and full of fruit one of the new *Cleistocactus* which I discovered on this tour (later published by me as *C.variispinus*). Then I climbed up the mountain slope to the south, until in the dark of the night after an ascent of 1500 m I reached the mountain pass of Laripota. In a small hut I found a hospitable reception and slept on the floor. The people loaned me blankets, since it was indeed cold at this altitude and frosty at night, and this small hut of only a couple of square metres in floor area offered little shelter from the cold. On the following morning it was but a short stretch from there to the town of Sorata, already well known to me, where I had to wait for a further day to get a lorry to La Paz.

October 1954 As in the previous year I again made an expedition to the Consata basin, from October 9th to 19th. Again I travelled on a lorry from La Paz to Ayata. But this time the journey turned out to be not as smooth as in the previous year. The departure should have been six in the morning, but was delayed by a flat battery until midday. Then came hours of delay in Achacachi while a wheel was repaired. It was not long after that before the engine started to misfire. Eventually this was rectified. Now the battery would not start the engine; each time the lorry made stop where it was not sufficiently steep, the passengers had to get out and push the lorry until it started. Eventually the lorry was stopped where it would move neither forward nor backward. We pushed for several hours with the sweat running down our faces; finally the engine sprang into life and everyone shouted for joy. Unfortunately it started to rain soon after that. All at once the lorry slid sideways and dropped into a ditch and struck the opposite embankment. Fortunately it was only a ditch, for had it been a moderate slope, the lorry would have turned over completely, hurled out the passengers and crushed us. It was about first light of the approaching day. Five hours were needed to get the lorry back on to the road.

It continued to rain as we came slowly and gradually to the crest of the cordillera, the watershed between the Atlantic and Lake Titicaca, where it had already rained for many hours and the road had become muddy here and there. We carried no tyre chains. The tyres slipped continuously on the slippery ground. For hours on end we had to work in the pouring rain, repeatedly getting something solid under the tyres, so that they could get a grip. The cover over the wagon was full of holes and not waterproof, so that nothing remained dry. It was cold, only a few degrees above zero; in wringing wet clothes it was freezing; the rain fell without respite. Suddenly the engine stopped. Everyone stood paralysed, no-one spoke a word. Weary from two days' work and a sleepless night of work, apathetic, resigned to an imponderable fate, soaking wet and frozen, one after another climbed silently under the dripping and trickling tarpaulin over the lorry, until finally everyone sat close together without a word.

After a while I started to consider whether I was just going to stop there. If the dreadful rain had not been in evidence I would have gone on on foot. But did it not appear as if the rain was easing off? As a matter of fact it rained ever more gently and soon had almost ceased. Twilight came. I decided that I would go on by myself on foot. Everyone warned me that I would get completely lost up here in the high cordillera, for not a living soul would be met with for many hours. Nevertheless I got out of the lorry with my belongings and set off.

Scarcely had I gone fifty metres from the lorry when one of the indian passengers came after me. He did not understand a word of Spanish but in contrast to most other indians communicated by signs. He gave me to understand that he was shivering with cold in the lorry. He also made signs that he too was going forward on foot and would find food and lodgings; if I wanted to go with him, I could. So I gave him to understand that I would do so. He in turn gave me to

understand that that we must get on as fast as possible so as not to be too late for a night's lodgings. Youthful and unburdened and a true child of the mountains, he walked like a hare, always at the same pace, uphill or down. I myself, with my luggage with the weight of a soaking wet cover, in the thin air at well over 4000 m altitude, could only follow up the ascents panting and falling behind, catching up again on the descents. A couple of times when the interval had become too great and a danger existed that I would lose sight of him in the darkness, the indian climbed some high rocks and remained motionless, when the silhouette of the indian against the night sky looked like a statue in the moonlight.

We must have been marching for almost three hours when out of the valley which was directly below us, came a brief clang. The indian listened keenly and indicated that men must dwell below. We descended a few hundred metres - in the darkness we could see only a few metres ahead. We found only a shepherd's shelter, not high enough to stand upright inside. The indian picked up a stone from the ground, signifying to me that among its uses, one would be to gain admission. How that happens still remains a mystery to me. The indian went up to the doorless opening and spoke the word "pata" three times. Nothing stirred. He put his head through the low opening, then crawled in on all fours, soon coming out again and inviting me to have look inside. He meant, whether we should pass the night there. I looked inside; apart from the dry grass, that served as a bed, the tiny room was bare. It was indeed not dripping wet, but the cold wind whistled through it and my sleeping bag was soaked through. I protested that if we stayed overnight there, it would be no better than on the lorry. The indian acquiesced and we moved on again.

After a further hour we came to a real indian dwelling, built of stone, with a grass roof. Once more the indian picked up a stone from the ground, went up to the closed door of the hut and spoke the word "pata" softly three times. Immediately the door was opened from the inside. The indian went inside and exchanged a few words with the inhabitants of the hut. Then I was invited to step inside. The small room with earthen floor served equally as living room, bedroom, storeroom and kitchen. It had neither a window nor a stick of furniture. On the left was a metre high erection of stone and earth which was covered with sheepskins. Upon it slept man, wife and children, all higgledy-piggledy under blankets. It was an indian shepherd family. At these heights, where there is no more arable cultivation because of the harsh climate, one exists by herding llamas and sheep. On the floor lay a freshly slain sheep, blood still trickling from its throat. The man cleared a couple of square metres of floor where we could lay down, and gave us blankets.

I wrang the water out of my coverings. One was now half-dry; I covered myself with that first, then spread the quite wet one over that, so that I was not frozen cold and could sleep a few hours. Here it was a couple of hundred metres lower than the lorry, the room was warmer than the outside temperature and it was out of the wind. I slept until some of the goatkids also occupying the room spent the rest of the night leaping around me, apparently for their amusement. Naturally there was then no more sleep to be had.

In the first light of the morning the woman of the home boiled some coffee upon an open fire on the floor. It was boiled only with hay since far and wide there was no brushwood but only grass and a couple of herbs. The hay burned up rapidly so all the time it was boiling up the woman remained at the fire and lay one handful of hay after another on to it. The water boiled remarkably quickly and the coffee was ready. The indian now wanted to be away to where the autoroad passed by, in order to wait for the arrival of the lorry. On our night's march I had kept a close eye on the road as far as we had kept to it ourselves, and gained the impression that the lorry would repeatedly get stuck and would not arrive all that soon. I decided to keep going on foot and took leave of my friendly indian.

Now I would be able to explore the cactus flora, which was not possible from a moving lorry. To be sure I scarcely expected to be able to find any cacti in an area which did not support even a single tiny shrub. And yet, right behind the huts on some rocky slopes clung globular cacti with vermilion flowers. They looked like *Lobivia maximilliana*. The small indian settlement was called Bacobamba. The vegetation dripped from the moisture-laden clouds, so that a snapshot was not possible. From here the road now went once again several hundred metres upwards, up out of the valley, until the habitations disappeared completely from view. Close to an almost 5000 m high mountain pass, cacti are again to be seen; at a distance on the slopes to the south already gleam the huge cushions of the handsome *Austrocylindropuntia floccosa*, which is covered with a dense coat of white hairs. Towards the east it again drops several hundred metres down from here into a valley. The road then leaves the valley, once more climbing up to a pass of almost 5000 m in height. Above here, where there are patches of perpetual snow close to the route, a view over the huge arid basin of the R.Consata is finally attained.

It had however become dusk in the meantime. Still I had some thousand metres descent in front of me before Ayata. In numerous hairpin bends the route snaked down the steep slopes. I followed a trail going off to the right, which I took to be a short cut, cutting off the tremendous loops in the road. But the path petered out eventually when I arrived at a marshy, rugged valley and among impassable rocky slopes. I was indeed going in the direction of Ayata, but in the darkness it was impossible to get down that way, even with a flashlamp. There was nothing else for it but to climb back up the hundreds of metres again in order to reach the pass once more. So in this way I lost several hours. Finally I got back again on to the road, which I followed downwards, shortening various loops since the moon gave me good service.

It was almost two o'clock in the night when I eventually arrived in Ayata. The small village was as quiet as the grave, but eventually I again found (even without enquiry) the residence of the schoolmaster with whom I had found accommodation on the previous year. I drummed on the house door. Eventually an upper window opened and a head poked out. I enquired about lodgings. The master shouted down that he regretted his hotel had been closed in the meantime by the local authorities. What should I do? It had again started to rain, besides having nothing in the way of lodgings, for three nights now I had only had a couple of hours of decent sleep on the previous night. After the repeated marches over the mountains and climbing for about sixteen hours with heavy baggage of almost half a hundredweight, I was certainly not exhausted, but still weary enough. I yearned for rest and sleep. I explained my situation to the man; he was reasonable, opened the door to me and gave me a bedroom with bed and clothes. I hung up my soaking things over the furniture to dry and then slept once again in a dry, warm, bed.

The following day was occupied in putting my baggage in order. The lorry did not appear in Ayata this day. I learnt that the day before it had got as far as halfway between the two elevated mountain passes; there it had run out of fuel and a mule trip was being made to seek more fuel. I thanked my lucky stars not to have listened to the toad-croakings of my fellow passengers but to have continued further on my own.

From Ayata I wanted to investigate the cacti of the Consata basin once again and to collect plants and seeds. The question was, how would I then get back to La Paz? Furthermore it had rained in the high mountains so that the roads remained choked with mud. Accordingly I would not trust myself to that misfortune-ridden lorry for the return trip. Whether some other lorry would arrive and whether it would be able to make the return trip without any problem, remained in doubt. It would be best then to cross the complete basin by foot in a southwesterly direction to a point where there was a better road and regular traffic to La Paz. In the previous year I had walked from Ayata to Sorata. I now knew

that there was an autoroad with regular traffic to La Paz via Achacachi from a spot named Chacajahuira in the upper reaches of the R.Palhuaya, which was not marked on the map. I resolved to walk from Ayata towards that terminal of the autoroad. Naturally if it had been a direct route to there it would have been practicable to seek a serviceable mule for riding, but since I wished to hunt for cacti, for which I must go through much pathless terrain, I walked on foot again.

The day of my departure from Ayata, I left my teacher on the best of terms. I set out in the morning on a usable trail which went in the direction of Mollopampa, an indian village to the south-west of Ayata; it was still under construction and would be going through as far as Sorata. For the whole day I climbed up and down slopes, investigating and collecting. In a small valley, where I found drinking water and which I reached only by a tiring and difficult climb, I stopped overnight on broken shrubs as a mattress and dried-up cow-dung as a pillow.

[To judge by the subsequent narrative, Ritter apparently passed through Mollopampa early on the following day - H.M.] .. On the next morning I reached the bottom of the large valley in a few hours. Since the R.Consata and the R.Llora had become impassable, I would have to cross over the R.Llora by means of the bridge described above, under which I had made a crazy ascent in the previous year. My hope of being able to get to the bridge along the mountain slopes at a lower level, unfortunately proved to be mistaken. I got along the mountain flank and after crossing difficult gorges I finally got to one last gorge, which debouched into the Llora valley just below that bridge and which on account of its terribly wild nature was absolutely impassable. Meanwhile darkness had fallen. I had to look for a place for the night's camp and overnights on the bare ground, since neither shrub nor grass nor even a bed of plant scraps was available to ward off the cold of the ground. Worse still was the lack of water. For the sake of saving weight I had brought no water with me from the deep valleys, since I expected there to be drinking water in this valley, but it turned out to be completely dry. I had acquired a keen thirst from the day's work and much sweat on account of the ascent with the baggage, so that the lack of water meant at the same time foregoing anything to eat, since I was not able to take dry food. In fact I only found drinking water on the following day after further sky-high climbs; after a 24 hour fast I could then have a meal again. In order to get to that bridge, which had been a couple of minutes away as the crow flies, I was obliged to detour round the rugged obstacle of the gorge and surmount the enormous mountain from which the gorge takes its origin, and so return with about 2000 m ascent to my starting point of the previous day, Mollopampa. In this way the one km to the bridge cost me a complete day's journey. Anyone who has never seen such terrain would not have the least idea of the fissuring and the wildness.

However, the day's trip was not entirely in vain, since on the high ascent and still more on the subsequent long descent I discovered a new and interesting cactus which had escaped me until then, a small profusely offsetting globular cactus (which was published by Backeberg as *Lobivia schieliana*). Late in the afternoon, after a seemingly endless descent, I eventually came to the bridge over the R.Llora and, further westwards in the valley of the R.Palhuaya, to the muletrail which I had abandoned there in the previous year. I stayed overnight in the open air in a small side valley underneath a rock shelter.

In the course of climbing up along the Palhuaya valley, I found my third *Cleistocactus* from the Consata basin, from which I was able to harvest seeds (published by me as *C.palhuayensis*). For the whole day I ambled up the valley where it became ever moister and the vegetation ever more plentiful. Various hamlets and habitations were passed on the way. It was on a Saturday and I had been told that each Saturday afternoon a wagon from La Paz arrived in Chacajahuira, my objective for today's journey, and then went back to La Paz. But even on the way I learnt that the lorry had not arrived. Shortly before dusk I arrived in Chacajahuira, after an ascent of 2000 m from the bridge over the R.Llora. Many indian smallholders from near and far were there with their products, waiting in vain for the arrival of the lorries. After first of all striving in vain I eventually found a good shelter for the night at an indian farm lying not far away.

I was told that on the next day, on the Sunday, a market day was to be held for the natives from a large area, in a village on the other side of the watershed of the cordillera, also on the descent towards Lake Titicaca. Various lorries came there from La Paz and then went back again early in the afternoon. I resolved to wander further along to that village on the following day. Eventually I came to the market village, but the lorries had already driven away, earlier than I had been told. But on the way I had met up with a lorry which was late in going to Chacajahuira, so I waited for it coming back. I must catch this lorry since it was painfully cold here and there was no chance of any lodgings and no prospect of any further lorry within a few days. Eventually the lorry came back, heavily overladen. I did not ask first if I could go along, but simply climbed aboard. The driver did not want to accept a single extra passenger. But I declined to budge and so went as far as Achacachi. The driver had his revenge however in that he demanded from me ten times the normal fare. The drive was a martyrdom as I was almost crushed by the numerous passengers in the overloaded lorry.

..... from H.Middleditch

This is a very personal account of the difficulties and hardships facing the wanderer in this part of Bolivia; but it may well give a better impression than a text-book description of the rugged terrain, deeply cleft by river valleys, and the contrasts between the chilly, dry, highlands and the warmer valley bottoms. To know just whereabouts Ritter did walk, and where he found which cacti, we need to refer to a map of the area. How do we lay hands on a suitable map?

..... from R.K.Hughes

Normally on all my trips abroad I bring back one or more maps of the country I visit. Whilst I was in Peru I got maps of all the southern departments of that country. It is unfortunate that Bolivian territory beyond the departmental border of each map is just plain grey. In Bolivia I could not find any maps, so I feel rather deprived of knowledge of this countryside. The map curator in the Geography department at Liverpool University tells me that it is difficult to get maps of Bolivia, but that they can be obtained from the Geo Centre in Stuttgart. The maps available from the Geo Centre are produced by the Geografic Militar in La Paz, the Bolivian Pentagon.

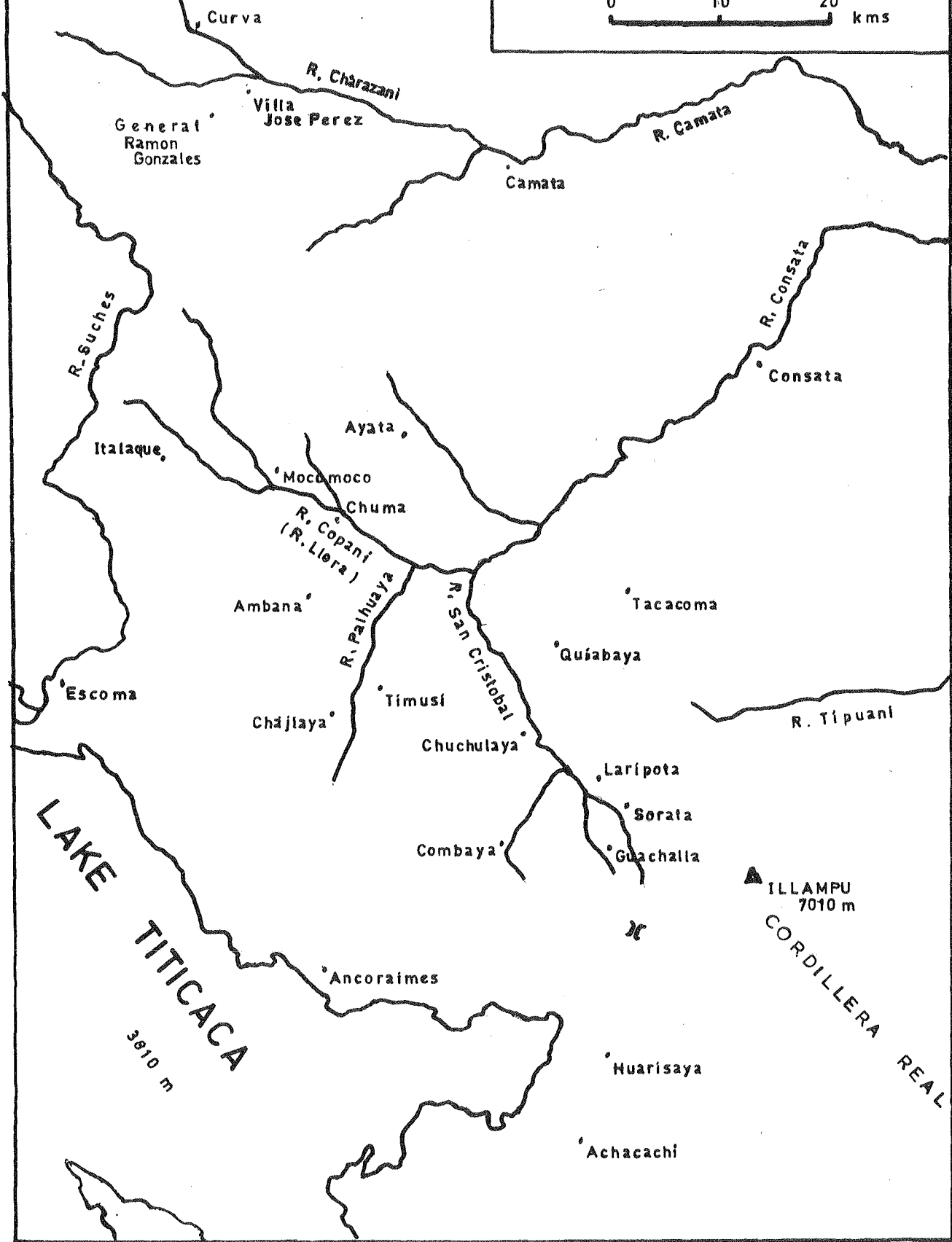
..... from H.Middleditch

A large part of Bolivia is covered by the maps produced in La Paz which are available from the Geo Centre, but unfortunately this does not include the area around Sorata and the Consata gorge. From Ritter's account of his travels, it is evident that any one trying to carry out a survey in order to make a map of this area would occupy a great deal of time just trekking, with not much to show for it in the way of results. This may well explain why the surveying work required to produce a map of this area has not been undertaken.

The map of the Bolivian Andes which originally came from F.Brandt may well have been based on the work of Steinman, Hoeck, and Bistram, but details of places, features, and routes in the area of the Consata river basin are far from clear. Also in my possession are two satellite photographs of the area (one taken from the Gemini spaceship, the other by Landsat satellite) which do show the main drainage lines quite well, but it is not possible to strike a correlation between these and the ex-Brandt map.

CORDILLERA
APOLOBAMBA

CONSATA BASIN



LAKE TITICACA
3810 m

ILLAMPU
7010 m
CORDILLERA REAL

..... from R.K.Hughes

There is a book about backpacking and trekking in Peru and Bolivia produced by Bradt Enterprises at Chalfont St.Peter. These people also lead hiking trips there and have maps available which they bring back with them

..... from H.Middleditch

They do indeed offer a map of the La Paz Department at 1:500,000 scale. What is more, on receipt it proves to be made up of Landsat satellite mapping images. Whatever view one may wish to adopt as to the accuracy of the placing of the names on this map, there can be no doubt that the basic hydrography is correct. Just to the north of Ayata there is a river which runs down to the Consata gorge, so that it could well be the river valley which was followed by Ritter when he walked away from Ayata. Turning upstream, as Ritter did, from the confluence of the Ayata and Consata valleys, the next major feature is the meeting of two large river valleys to form the Consata gorge. It is probable that this is where Ritter stopped a while to ponder which valley to take. That to the south goes to Sorata, that to the west comes from Mocomoco and Chuma - "This river comes out of the vicinity of Chuma and is called the R.Llorá". On the 1893 map, and on the Landsat-based map, this is the R.Copani.

Ritter went up the valley of the "R.Llorá", but not as far as Chuma, until he came to the R.Palhuaya, which he followed in the general direction of L.Titicaca i.e. roughly southwards. This river is not identified by name on the landsat-based map, on which the habitation Amabana lies on the left hand side of the river. On the 1893 map, Amabana lies on the left hand side of the R.Amabana, which joins the R.Copani before the junction of the latter with the river from Sorata. On the ex-Brandt map there is a small place named Palhuaya almost due south of Chuma. The balance of probability seems to lie with this R. Amabana being Ritter's "R.Palhuaya". No Chacajahuira can be found on any map in my possession, but the landsat-based map of La Paz Department shows a road (as opposed to a trail) coming from Achacachi and terminating at Chajlaya which lies not far off the headwaters of the "R.Palhuaya".

From the foregoing it may be deduced that the *Cleistocacti* found by Ritter and subsequently named as *varispinus*, *viridiflorus*, and *palhuayensis*, all occur within a relatively small compass, which also takes in the location of R.K.Hughes' collection of *Cleistocactus* seed. Did any of this collected seed germinate?

..... from R.K.Hughes

There was good germination from the *Cleistocactus* seed that I collected in the Sorata gorge. Quite a lot of seed was distributed to Liverpool branch members at that time. I was able to grow on twelve plants, but when I did not have enough heat during a cold winter spell, these were reduced to three. Two of them have been passed on to G.Charles; he put them in a bed with free root run so I expect they will be more advanced than my own plant, which is now 23" tall and 1.25" to 1.5" in diameter. It has not yet started to produce a cephalium, or flower buds.

CLEISTOCACTUS RITTERI FLOWERS From K.Wood-Allum

In my earlier cactus collecting days I wanted to buy a plant of *Cleistocactus baumanii* and eventually I had three plants with this label but not one of them had been correctly named. But the last one was well worth having and proved to be quite interesting. This plant was purchased in a 3" pot, from Gordon Foster in 1974. It is still with me. The plant body is dark green with 16 ribs. The areoles are brown when young, later becoming yellowy white. Radial spines are about 40, glassy yellow, 50 mm long. There are occasional central spines, one per areole, 5 mm long, yellow when young, becoming light brown with age.

Within a year of its purchase this plant had reached half a metre in height and in the middle of May the plant started to produce 20-40 mm long white hairs, interspersed with glassy yellow spines up to 30 mm long, over a height of 100 mm down from the growing point. This development was rapid, taking only two weeks and occurring initially over the north facing side of the plant, with a slower and weaker development around the rest of the stem.

At the end of the same month, three buds were observed, widely dispersed throughout this "cephalium". The first flower opened in June, others following later. The flowers were 40 mm long, lemon yellow with lime green tips. The scales were also yellow and were bare. One flower was slightly zygomorphic at the base and the others were not. On day one of flower opening the petals are more or less in line with the tube. At day two the petals were slightly expanded and were in a marginally zygomorphic formation in having an oblique mouth. The stigma was lime green with six lobes and was fully exerted on day one, but by day two it was completely retracted. The stamens were creamy white. The flowers opened in the afternoon and lasted more than 24 hours.

Subsequently further flowers appeared from the "cephalium" and one or two have grown out from below it. The "cephalium" remains unaltered during the winter. It is clearly not a cephalium in the true sense - perhaps a pseudocephalium? The following year the plant grew higher but the new top growth was without any cephalium growth, whilst the side shoot continued to grow, also without a cephalium. But this did develop in the following year.

It was suggested by T.Lavender that this plant might be a *Cephalocleistocactus* (Backeberg) and it is now clear that it is *Cleistocactus ritteri*. The slide which came from Mrs. D.Malcolmson in New Zealand is of a plant which has flowers that are identical to those on my own *C. ritteri*. This plant certainly seems to like a little water during the winter. When the stems get to half a metre plus in height they tend to die off from the top, and the fresh branches take over, so that it has never really become any taller.

..... from Mrs.D.Malcolmson

My *Cleistocactus ritteri* has been in my collection for quite a few years. It does produce some extra bristly growth up one side of the stem as it grows taller, but I would not have said that this extra bristly growth was confined to the same side of each of the stems. Most of the flowers appear from this extra bristly area of the stem. The flowers are all yellow but there is a little bit of green at the very tip of the flower.

..... from T.Lavender

We came across a plant of *Cleistocactus ritteri* in flower when we last paid a visit to the Jardin Exotique in Monaco. This plant had a mass of long, fine, hairy, straw-coloured bristles at the top of the stem and all but one of the flowers and buds were growing out of this "cephalium" zone. The flowers were a very pale butter colour, the young buds having a light green tip, but this was less evident when the flower opened, with an orange-red zone immediately behind the green

..... from R.Zahra

In my collection I also have a large plant of *Cleistocactus ritteri*. Before flowering for the first time, each branch starts to produce long hair-like bristles about 20 mm long. Then in the following year these hairs get longer and form a collar around the stem about 100 mm below the crown. During this period a few flowers appear below this collar. The

following year, many bristles are produced on the north side of the stem and now hundreds of flowers are produced throughout this zone. However, every summer a ring of bristles is produced all round the stem giving the plant a collar of bristles all round the stem every year, together with a line of bristles running all along the north side of the stem.

As in most *Cleistocacti*, the flowers of *Cleistocactus ritteri* are produced on that part of the plant facing north. This is not very noticeable in potted plants, but only on the very large plants growing in the ground with tens of flowering stems will it be noticeable that flowers are only produced away from the sun and point north. The flowers are yellow, but they are completely lemon yellow without a trace of any other colour except a little green.

Like most *Cleistocacti*, *Cl. ritteri* is self-sterile, and so I cross-pollinated it with *Cleistocactus tominensis* in order to obtain fruit. All the flowers which were pollinated did produce fruit and, once again, the fruit was identical with the fruit of other *Cleistocactus*. I did notice one difference, and this is that the fruit of *Cl. ritteri* has a very strong fruity smell, something between strawberry and melon.

..... from J.Forrest

Both my plants of *Cleistocactus ritteri* came from Clive Innes as seedlings, possibly about twenty years ago. These plants tend to have a rather more sprawling, untidy, habit than *Cl. variispinus*, or *Cl. pallidus*, for example, as if requiring some other support to keep them upright in the wild. They have produced a great many extra bristly spines along the sides of the stems, which are up to one inch longer than the rest of the spines, and the flowers appear from this brush of longer spines. On each stem the flowers only appear on the side which faces away from the sun.

The flowers are slightly bulbous at the base, with a parallel tube, and of a greenish-yellow colour on one of the plants of *Cl. ritteri*, and a red colour on the other plant!

..... from I.le Page

Many of my older *Cleistocacti* were obtained over the course of several years from Dennis Sargant and some of them were raised from seed from the same source. But I am not that happy about the naming of some of these plants and I am sure that several of the names are incorrect. For example, I have a *Cleistocactus ritteri* from Sargant which cannot be that species as it is red flowered with gold-green tips. From the pictures of *Cl. schattatium* the flowers could be that species, but the body remains *ritteri*. All very strange.

..... further from J.Forrest

In addition I have a plant which came to me as *C. ritteri* some 14 or 15 years ago, but this is slimmer than my original pair of *Cl. ritteri* and it also has a longer central spine, and will flower in any direction, not just away from the sun. The stems also branch dichotomously, a feature which does not occur on any other of my *Cleistocacti* - except for a *Cleistocactus lauii* which came from Uhlig two years ago, and does look rather like my odd *Cl. ritteri*.

..... from H.Middleditch

In his *Kakteen in Sudamerika*, Ritter states that *Cl. ritteri* was "found by me in 1953 in the border area of Sud Yungas and Loazya provinces". These two provinces have but a fairly short common border, which follows the bed of the Rio La Paz, approximately from the point where this river cuts through the highest part of the Cordillera Real, as far as the junction of this river with the R. Miguilla. The use of the phrase "border area" might suggest that it was found on the slopes above, possibly well above, the actual river, so that it probably grew under conditions not greatly dissimilar from those *Cleistocacti* reported from the Consata basin.

..... further from J.Forrest

In addition to my plants of *Cleistocactus ritteri*, I also have plants of *Cleistocactus pallidus*, *viridiflorus*, and *variispinus*. By comparison with *Cleistocactus ritteri*, these three sorts all have a fairly rigid, upright, habit. In addition, there is no growth of extra-long bristly spines on any of them, and the flowers will appear from any side of the stem.

One of my *Cleistocactus viridiflorus* was raised from Ritter seed, obtained from Winter in the late 1950's. Now it will be about 8 ft. tall with five or six stems. It starts to flower early in April and continues to put out flowers until late in the summer. When it is in full bloom it must be carrying several hundred flowers. The flowers are very nearly straight, without any visible kink, and stand almost straight out at 90° to the stem. The flowers are a greenish yellow colour. On *Cleistocactus pallidus* the flowers are of a very similar colour and again lack any kink, but they seem to incline slightly upwards, perhaps at about 70° to the stem. Again the flowers on *Cleistocactus variispinus* are rather similar to these other two, but with perhaps a more yellow colour rather than a yellowish green.

..... from R.Mottram

In his 1966 *Kakteenlexikon*, Backeberg published *Cleistocactus pallidus* sp. nov. citing FR324 as the type. In his *Kakteen in Sud Amerika*, Ritter published *Cleistocactus palhuayensis* also citing FR324 as the type. Since both names are evidently based on the same type, then they are synonymous, the name of *pallidus* being published earlier having priority.

Cleistocactus pallidus sometimes produces a region of longer spines around the flowering zone (but not bristles), but that is not common. Mostly it flowers from completely unmodified areoles, anywhere on the upper stems. Both types may occur on the same plant, and I have an example behaving this way at the moment.

..... from H.Middleditch

I have a plant which is named *Cleistocactus pallidus* which is over half a metre tall, but relatively slim, and with a very neat short spination. The flower buds appear in early summer, tending to point to the north, but not exclusively so. At first they are only tufts of chestnut brown wool and are getting on for 8 mm long before it is possible to see the yellow tube through this wool. They grow straight, but inclined upwards to some degree, for a length of about 15 to 18 mm, by which time the flower colour becomes more obvious as the brown wool is no longer so tightly packed together. The flower then turns to become more or less horizontal, so that there is a slight kink in the tube above the nectar chamber. By the time the flower reaches its full length of 40 to 45 mm, it appears as a very yellowish green with a slightly greenier, pointed tip. Because the short brown hairs are now well spread out over the tube they no longer catch the eye. Since the short buds which are just showing their yellow colour through the brown wool all seem to incline upwards slightly from the horizontal, it is odd that quite a number of flowers give the impression that they stand straight out from the stem, with only the faintest indication of a kink, if any.

When the flowers have reached their full length, the outer petals curl outwards over a distance of about 10 to 15 mm from the mouth of the flower. The innermost petals only open slightly and I would almost have said that they do not even open to a cylindrical shape; in this condition it is very difficult to see into the flower, where the stigma is positioned several mm inside the mouth of the flower. However, on one or two occasions I have actually found the innermost petals opened out to a cylindrical shape, or just very slightly wider than that. This has afforded an opportunity to apply some foreign pollen to the stigma with a small brush in an attempt to persuade the flower to set fruit. On glancing at the flower barely a couple of hours later, the inner petals were found to be closed up to a point once again. Fortunately there were only four full length flowers, pointing in diverse directions on the stem at that time. Had the stem been carrying a large

number of flowers, it would have been very difficult to be certain that the same flower was being looked at.

In order to try and relate flower colour to species name for each *Cleistocactus* from the Consata basin, I decided to take a look at the descriptions of these species provided by Ritter in his *Kakteen in Sudamerika*;

Cleistocactus viridiflorus Stem 30-50 mm diameter, ribs 14-17. Areoles 4-7 mm apart 2 mm in diameter, reddish brown felted. Spines about 20 of which several are yellow to brownish-yellow, of which 1-2 are stronger, 20-30 mm long, the others markedly shorter. Flower about 40 mm long, inclined upwards. Pericarpell and tube yellowish-green with numerous small pointed yellowish-green scales and abundant brownish-red wool. Tube with a slight to marked downwards kink a short distance above the nectar chamber. Opening narrow, not oblique. Filaments white, of varying length, anthers ochre yellow. Style yellowish with about 6 pale green stigma lobes, not projecting. Petals numerous, linealate, grass green or with a trace of red. From the colour illustration Fig.61 in Backeberg's *Kakteen Lexikon* the flower appears to have a marked bluish tinge, which is not natural ... Type location near Ayata at 3000 to 3700 m altitude. It is the highest location known for a *Cleistocactus*. Discovered by me 1953, FR 323.

The scanty diagnosis by Backeberg in *Descr. Cact. Nov.* 1963 refers to a cultivated specimen which he saw in the nursery of Saint-Pie. Remarkably different in the details therein is the stem thickness of up to 22 mm and a rib count of about 12. In nature I counted in 1953 as well as in 1954, 14-17 ribs, and a stem thickness of 30 mm for the flowering stems was a bottom figure (according to Backeberg 22 mm is the upper size). Perhaps the lower figures of Backeberg were due to an effect of cultivation, arising from inadequate light, or careless measuring and counting.

Cleistocactus palhuayensis Stems in nature usually 15-25 mm in diameter, ribs 14-19 with very faint cross-grooves above the areoles and without a down-going notch from the cross-groove; intercostal grooves barely meandering. Areoles with pale brown wool, about 2 mm diameter, ca. 3-6 mm apart. About 20 white radial spines 5-7 mm long, about 10 central spines, somewhat stronger 5-20(+20) mm long, yellowish white to pale yellow. In the flowering region no bristly crown occurs but the central spines are collectively generally somewhat longer. Flowers appearing from one side only, in nature usually 30-35 mm long, straight with straight or only very slightly oblique opening. Pericarpell greenish, with brown wool. Tube more or less citron yellow, 5-8 mm thick, with very small yellow-green scales and brown wool. Filaments white, anthers pale cream. Style yellowish with about 5 short green stigma lobes which remain within the mouth of the flower. Petals 5-7 mm long, pale yellowish green externally, white within, flower opening only slightly wider than the thickness of the tube. Type location - upper reaches of the R.Palhuaya, Prov. Munecas. Found by me in 1954 No. FR 324.

Cleistocactus palhuayensis v. camachoensis Ritter & Shahori Intercostal grooves meander markedly. Flower with only a few dark brown woolly hairs. Outer petals yellowish green to reddish. Type location upper reaches of the R.Palhuaya at about 3200 m altitude, Prov. Camacho. Forms which grow between Quiabaya and Cascabel more or less at the same altitude, must belong to this same variety. These have the number FR 835 whereas the Type of *v. camachoensis* has no individual FR number. The foregoing description of the species and its variety are based upon my notes made at the Type locality and from letters and pictures from David Shahori in Isreal.

In his *Kakteen Lexikon* p.79 Backeberg published a *Cephalocleistocactus pallidus* with the statement "around the Palhuaya valley, Ritter No. FR 324" and with his Fig.52. The description and pictures do not bear comparison with my observations in nature and with the photographs taken by Shahori of a plant raised from seed. According to the data from Backeberg the plant has about 25 spines of 5(-6) mm length without distinction between radial and central spines; for the flowering region however a bristly crown is indicated with 3 cm long bristles, which are seen to be in abundance on both pictures, in contrast to the otherwise short-spined areoles. That feature I cannot corroborate from nature, and also the photographs from Shahori do not show this.

One of the two photographs shows an open flower, which has the exceptional opening breadth of about 15 mm; in the text the flower is stated to be yellow; with the illustration, yellowish-green. Possibly Backeberg's voucher specimen (Photograph by J.Marnier Lapostelle) is a hybrid between this species and a *Cleistocactus* with a bristly crown, or the FR number and discovery location were a mistake by Backeberg, as indeed with him it often is.

Cleistocactus variispinus Stem 30-50 mm in diameter. Ribs 14-18. Areoles 3-4 mm apart, raised, with white felt. Spines all the same colour, pale yellow to golden yellow to brownish yellow, depending upon the plant, rigid, sharp, needle-like, the radial spines transforming into central spines without distinction between the two, 30-40 all told, pointing in all directions, straight, the lowermost as fine as hairs 4-6 mm long, increasing in length and stoutness upwards, usually up to 10 mm, the most central the longest and strongest; in the upper half of the areole are often 1-2 spines especially robust and 20-40 mm long. A peculiarity is that frequently on the flowering side of the stem the spines, specifically all central spines, become lengthened and thinner and more flexible, also more bristle-like; these bristly spines are all the same colour and about 20-40 mm long; at several places they are more often even arranged rather like annular rings around the stem. However this feature is very inconsistent, even among the stems of the same specimen, whilst a number of stems on the same plant can remain without bristles.

The flower appears to be predominantly associated with the existence of such bristly zones, but in addition it can appear at places at which such bristles are absent. Flowers sideways, actinomorphic, pointing only very slightly upwards, lying almost horizontally from the stem, 35-48 mm long, with the stigma visible in the opening. Pericarpell reddish, greenish near the base, with numerous tiny white scales, with an external narrowing above ... tube 7-10 mm thick, cylindrical, almost straight, exterior more or less carmine to orange-red, clothed like the pericarpell, but sparsely; filaments white, closely packed above the nectar chamber then absent up to the throat ring. Anthers citron yellow to cream, standing behind the stigma. Pollen white. Style white to greenish-white with 5-8 grass green stigma lobes, clasped together to somewhat spreading open, which occur from just within to just beyond the mouth of the flower. Flower petals white with pale green tips.

Type location. Mine Cascabel Prov. Larecaja at about 2000 m altitude. Closely related to *Cleistocactus ritteri*. Discovered by me in 1953. FR 108.

In his *Descr. Cact. Nov.* III of December 1963, Backeberg published a *Cephalocleistocactus schattatianus*. According to the description and photograph in his *Kakteenlexikon*, what it amounts to is that this is my *Cleistocactus variispinus* published in April 1964, which Backeberg did not however, perceive, so that in his *Kakteenlexikon* in addition to his *Cephalocleistocactus schattatianus* the same sort also appears under my name of *Cleistocactus variispinus*. In consequence it would be expected that the species name *schattatianus* has priority over my name *variispinus*. This is however not the case, since prior to the publication of the latter name on 29.4.64, there was no possibility of an identification of both names, on account of the erroneous details for *schattatianus*; more especially since no photograph was provided and was only subsequently made available in 1966 in the *Kakteenlexikon*, which could perhaps have

explained the inaccuracy of the diagnosis for *schattatianus*. But over and above that, not once was a Type specimen recorded, which will suffice on its own, a diagnosis not being so recognised....

[Further arguments follow for not accepting *variispinus* as a synonym of *schattatianus*, but *visa versa*]

It now appears that Fig.3354 in Vol.6 of Backeberg's handbook, which is entitled "*Cephalocleistocactus* sp. (*Cleistocactus parapetiensis* Card?)" must likewise be my *Cl.variispinus* and not *Cl.parapetiensis*, but with an unusually kinked flower, which might even be due to some damage. My own Fig. 678 shows an individual case of the widest deviation in spination from the type specimen; a flowering stem with uncommonly long central spines, but without any bristly zone.

..... from G.Charles

The plant of RKH 13 which came from R.Hughes and was grown from seed which he had collected near Sorata, was planted out in my original centre bed with a free root run. It had started to put out some longer bristles in the upper part of the stem. Whilst the new greenhouse was being erected over the top of them, the plants in the centre bed were simply out in the open. Because of the amount of work involved with laying the floor, the erection of benches, the moving of the bulk of my collection back into the new greenhouse from their temporary accommodation in the polythene tunnel, and so on, the collection had rather to look after itself for most of the year. Early the following year the RKH 13 had to be uprooted when the centre bed was replanted. Later in that season, it decided to put out a single flower, which appeared from below the bristly area at the top of the stem. It was a straight greenish flower with a pink tip.

..... from H.Middleditch

From Ritter's descriptions (above) of the *Cleistocacti* which he found in this general area, the only name which fits the flower colour on RKH 13 is *Cleistocactus palhuayensis v.camachoensis*. Ritter says that he did not see any plants of this variety in habitat with the longer growth of spination to be seen on the photographs in Backeberg's *Kakteenlexikon* Fig. 52. Yet such growth of "longer bristles" was seen in habitat by R.K.Hughes and noted by G.Charles on a plant of RKH 13. This growth form does not appear to be a consistent feature of the *Cleistocacti* to be found in the upper Rio Consata basin. As to flower colour, on *Cleistocactus pallidus* (*palhuayensis*) and *Cl. viridiflorus* it is yellow. On *Cl. palhuayensis v camachoensis* the flower is yellow but with outer petals which can be reddish. The flower of *Cl. variispinus* is red. In consequence it would appear that those collectors with a red-flowering *Cl.ritteri* actually have a plant which originates from the Sorata valley.

SOUTH AMERICAN CACTUS LOG By A.B.Lau

From US Cactus & Succulent Journal Vol.53 1981

Sorata can be reached fairly easily through Achacachi coming from La Paz. All are dirt roads. Sorata serves as a tourist attraction and has several good hotels and a grand view of the Volcano Nevada de Illampu rising to 7,014 m east of the town. From there to Quiabaya is a backtwisting experience - hole after hole in this winding, unending "brecha". It is not at all clear yet what lies behind the hundreds of peaks and hills, in inaccessible gorges, and on vertical rock cliffs. Above Quiabaya we found *Lobivia quiabayensis*, Lau 1004, but we did not investigate them in detail. What attracted us most was the Consata gorge of the river with the same name.

The dirt trail came to an end at an old mine and then it was down, down, down. Will we ever reach the river? A lone Quechua indian man insisted that he would join us. As we reached the slate rock and clambered over some very dangerous precipices in order to find a way down, he became scared and left. It was in that very steep situation that we found our first *Parodia borealis*, Lau 999, the northernmost of all *Parodias* - and the first *Parodia* I ever saw in habitat.

That slate rock is probably the safest material to be on in steep mountains since one does not slip or slide on it and it rarely breaks into chunks so a good foothold can be maintained. I later found *Parodia comosa* and *P.echinus* in almost identical situations. *Parodia borealis* has a slightly harder and somewhat more dense spination than *comosa* but the flowers are identical. After ten years of easy cultivation in our greenhouse in Mexico I have a hard time distinguishing between *comosa*, *miguillensis*, *echinus* and *borealis*. Under the modern concepts of taxonomy they would probably become mere forms.

The Consata river was just a barely flowing tiny creek then, but in the rainy season it becomes a swirling and dangerous river. It was hot and we decided to bathe in a small pool.

As we climbed uphill we saw the first *Cephalocleistocactus ritteri* in full bloom, Lau 558. The slender, yellow flowers with their narrow tube protrude horizontally out of a silky, white cephalium. Soon we walked among the colonies of *Lobivia schieliana*, Lau 966,967. These low, very fine-spined, easily branching groups vary from one area to another so I used two collection numbers. The ochre-yellow flowers also come in lighter and darker shades. The light-brown spines covering the whole body are harmless. It has adjusted well to Mexican conditions although it is a shy bloomer here. All my photographs from this unique part of the world were later stolen.

..... from H.Middleditch

Lau describes his Lau 999 *Parodia borealis* as "the first *Parodia* I ever saw in habitat"; yet he lists several *Parodia* at lower collection numbers - such as Lau 305 *Parodia echinus* from the La Paz gorge, which according to the above article he "found later". Very puzzling - perhaps it made good reading? Travellers tales? Again the *Cleistocactus ritteri* carries a field number suggestive of a previous collecting date, but from 584 to 599 the field number sequence hardly conforms to a practical itinerary.

This location given by Lau for his L588 *Cl. ritteri*, of "near Quiabaya", lies in the general distribution area of *Cleistocactus variispinus* and *Cl. pallidus*, which Ritter suggests is "closely related to *Cl. ritteri*". Lau comments on the overall similarity of the three *Parodias* which were found in the valleys of different rivers running north-east from the Cordillera Real. Since their locations were separated by no great distance and the climate, altitude, and general environment would be pretty similar in all three cases, their similarity of habit should occasion no great surprise. From precisely the same locations comes *Cleistocactus ritteri* and *Cl. variispinus*, so here again the suggestion by Ritter that they are closely related appears to be logical. It could also help to explain why some *Cleistocactus ritteri* produce red flowers.

When Lau "climbed uphill" from what he took to be the Consata gorge, it is not clear whether he climbed up the far bank, i.e. the one above which Ritter found his *Lobivia schieliana* in the course of walking down from Ayata, or whether Lau was returning up the valley side which he had just descended. If it was the latter case, then his Lau 966 and 967

would be growing below Quiabaya and his Lau 1004 would be growing above Quiabaya.

..... from A.B.Lau

I found the *Cephalocleistocactus ritteri* on the side of the canyon where I had left my car i.e. on the south side, but I did climb maybe 100m on the north side, which is not much. Thus the collected material was encountered either on the slopes or in the canyon itself. I returned the same way as I had descended.

LOBIVIA SCHIELIANA By F.Ritter.

Translated by H.Middleditch from *Kakteen in Sudamerika* Vol.2 1980.

In October 1954 I discovered in the area of Ayata, Province Munecas, Dept. La Paz, an interesting small *Lobivia*. That is to say, at first I was under the impression that that I had discovered two species with hybrids between them, because the most widely differing types among them display so great a dissimilarity of spination, that any cactophile would regard them as unquestionably two species. But a thorough examination demonstrated that only one single species was involved with extraordinary dimorphic spination, as is displayed by the *Echinopsis yungasensis* described below, as well as by many other cacti, concerning which I make a statement in the Foreword. Four years later I also found the same species in the southeasterly adjacent province of Larecaja, and here too the plants display the same dimorphic spination with transitions from one type to the other. Since the notes which I was able to make on the flowers were not adequate for a precise description, to begin with this species remained unpublished by me.

In the meantime Backeberg became acquainted with this species in the collection of W.Schiel in Freiburg, a specimen which had been obtained out of one of my consignments to the firm Winter. In order to secure his authorship to this new discovery, in 1956 Backeberg published a latin diagnosis, without my knowledge, (*Descrip. Cact. Nov.* p.30) which in the absence of sufficient detail and accuracy is very inadequate and equally would pass for many other species of *Lobivia*. It lacks among other things a knowledge of the habitat location, the fruit, the seeds, and the great breadth of variation in the spination. It is moreover quite unsatisfactory for the understanding of a *Lobivia* species when the only flower data included consists of the flower being slender and pale red, the filaments red and the style whitish, since this applies to many other species of *Lobivia*.

In *Sukkulentenkunde* 1963, W.Simon wrote about *Lobivia schieliana*, in which he made careful observations about the great variability in the spination and in the colour of the flower. He suggested that this group might be placed as a variation of *L.tiegeliana*. This last proposition is certainly an error, since *L.schieliana* stands well away in relationship to *L.tiegeliana*. The wide variability within *L.schieliana* involves only the spination, whereas *L.tiegeliana* differs in all essential taxonomic characteristics, above all in the totally different sort of seeds. *L.tiegeliana* belongs to the genus *Hymenorebutia*, which has a distribution area from Argentina only into the south of Bolivia.

Accompanying his article, Simon has two photographs of *L.schieliana*, which almost display the extent of the variation in the spination. What Backeberg published as *v.albescens* is nearly the same as his Type of the species and only a slightly differing form, in no way a real variety. Backeberg was not aware of the breadth of variation of the spination, fortunately, since if he had known, goodness knows how many species he would have erected. Varieties are of a geographical or ecological nature. In cases of dimorphism or polymorphism within such a population and their progeny can only be recognised as forms, not as varieties.

..... from H.Middleditch

in Rausch *Lobivia* 1,2,3, *L.schieliana* is submerged into *L.backebergii* and a seed sketch is provided for this species complex as a whole. A seed sketch is also provided for the group around *L.tiegeliana*. There is little doubt that there is a material difference in these two sorts of seeds, just as Ritter suggests. However, it would be of advantage to have actual seed samples to put under the microscope in order to establish with rather more precision the nature of the differences.

LOBIVIA SCHIELIANA sp.n. By C.Backeberg

From *Descriptiones Cactacearum Novarum* 1956

Parvula, e basi proliferans, aliquid elongata, ad 4.5 cm longa, ca. 3.5 cm diam.; costis ca.14; aculeis radialibus albo-subfuscis, ca.14, ± adpressis, ± curvatis, aliquid intertextis; aculeis centralibus primum deficientibus, deinde 1 perspicuo, sursum curvato, ad 6 mm longo, subfusco; flore tubo gracili; phyllis perigonii claro colore rubro; filamentis rubris; stylo albescente - Bolivia australis?

[from the latin] Small, offsetting from the base, somewhat elongate, up to 4.5 cm long and 3.5 cm diam.; ribs about 14; radial spines white to somewhat brown, about 14, ± lying flat against the body, ± curved, somewhat interwoven; central spine initially absent, then one becoming evident, curved upwards, up to 6 mm long, somewhat brownish; flower tube slender; flower petals clear red colour; filaments red; style whitish - from southern Bolivia?

NEW AND CONTENTIOUS By W.Simon

Translated by H.Middleditch from *Sukkulentenkunde* VII/VII 1963

Lobivia schieliana The discoverer of a plant has the opportunity, not only to get to know the environment as well as the neighbouring and related species, but should also have a chance to provide the basis for the description. Whatever is overlooked in the first description, must be drawn together later by us with painstaking detail.

Lobivia schieliana is an instance in which a premature description has deprived us of a comprehensive survey across a form-rich plant-group. Ritter found *Lobivias*, which stand close to *L.tiegeliana*, to which he gave his field numbers FR 334 and FR 334a. If the description had been drawn up on the basis of information provided by him, the numerous forms and varieties would have found an appropriate assessment. Backeberg saw these plants at his friend Schiel in Freiburg and named them after him, as *L.schieliana*, only a few of which differed in form with white spines and he named them *v.albescens*.

The real characteristic variations were not seen by Backeberg, and these remained unrecorded. Drawing attention to only the most significant, there are the plants with the conspicuously long central spines, which can grow up to 3 cm long, exceptionally up to 5 cm long; at the opposite extreme those with short, stiff, backward curving claw-like spines. Even a form with short, dark brown spines is known.

Not only the spination varies, the flower colour is also very variable. Backeberg quotes only a pale red - the correct colour would be better specified as bright carmine, as far as I can judge from my own plants. In addition to that, flower colour tones to brownish-vermillion are known.

To sum up once again, we must reach the regrettable conclusion that through the description of two of the few typical examples will in no way make allowances for the breadth of form in this plant group and that a new description is necessary. Perhaps it may be best to place this group with *Lobivia tiegeliana*.

LOBIVIA QUIABAYENSIS sp.n. From W.Rausch
From K.u.a.S. 19.2.1968

Solitary to clump-forming, body 3 cm tall and up to 7 cm in diameter, grassgreen; ribs 15-20, folded into 10-12 mm long sharp-angled tubercles; areoles oval, up to 5 mm long and 2 mm broad, white-felted; radial spines 10-14; central spines 0(-3), all 30-50 mm long, yellow to brown, tipped darkbrown, twisted around the body.

Flower appearing from the side of the body, 4.5 cm long and 3.5 cm in diameter; pericarpel and tube olive green, with brown scales and brown or black hairs; outer petals lanceolate, orange or violet; inner petals carmine, interior orange; throat white; filaments carmine red with whiter lower section, insertion commencing 8 mm above the ovary; style green or pink; stigma lobes 4-6, yellow; fruit globular, 8 mm in diameter, reddish brown with brown wool; seeds shining black, dotted with tiny pits.

Habitat; Bolivia, La Paz, near Quiabaya at 3500 m. This species carries my field collection number R 205.

This species looks quite like a small bird's nest. The flower was variable, from orange-red to dark-red.

LOBIVIA SPEC. LAU 1004 (LAU 967?) By G.Fritz
Translated by H.Middleditch from K.u.a.S 12.31.1980

Under his number 1004 Alfred B.Lau listed a *Lobivia*, which he had found near Mina Cascabel, Consata, Quiabaya, north of the Bolivian capital of La Paz, and which was later described as *Lobivia quiabayensis*. In his first description of this species Walter Rausch gave the selfsame habitat location, at 3500 m altitude. In his "*Lobivia*" he combined this plant as a variety of *Lobivia maximiliana* (Heydr) Backeberg.

Rausch wrote about this group: "The whole group is characterised by its flattened caespitose growth. The rib form is from oblique to vertically continuous, the upright inner petals can be found expanding outwards to a funneliform shape by gradual transition from one habitat location to another. Since the "characteristic" of the filaments embracing the style changes gradually from *Lobivia maximiliana* via *L.hermanniana* to become spreading in *L. caespitosa*, I would like to include here *L.quiabayensis*, [as *L.maximiliana* v.*quiabayensis*]. This variety is distinguished from the Type "on account of the spreading filaments and the purer flower colour"

If I now compare the "Lau 1004" with the diagnosis for *Lobivia quiabayensis*, its growth is more cylindrical than quoted by Rausch. His statements about the number of ribs, the areole form and number of spines apply equally to Lau 1004. My own plant is certainly shorter spined; the spines do not reach 30-50 mm as stated by Rausch. Yet in spite of that it is similar to a "small bird's nest". But there is no comparison with the plant whose photograph Rausch selected for his first description.

In regard to the flower, Rausch himself wrote that it was variable. The Lau 1004 has a clear pale orange-yellow coloured flower, somewhat paler in the interior. Since this flower does not have the typical form of *Lobivia maximiliana*, I consider this Lau 1004 to be a form of *Lobivia backebergii* (Werd) Backeberg subspecies *schieliana* (Bckbg) Rausch. This opinion is supported among others by Karl-Heinz Brinkmann.

In answer to my enquiry regarding this question, Dr.Lau wrote me: "When I collected the *L.schieliana*, I was not aware of the description of *L.quiabayensis*. Rausch was in contact with me later, so that I now allocate the number 1004 to my real "*Quiabayensis*" and the number 967 to a form of *L.schieliana* from the habitat location of the type. My number 966 is the correct *L.schieliana*". He has also changed the labelling of his own plants.

Apparently Dr.Lau had also found plants of *L.quiabayensis*. On the other hand it is unclear whether examples of this sort were distributed under the number L.1004 as well as the habitat forms of *L.schieliana* and appear thus today in collections.

LOBIVIA SCHIELIANA - QUIABAYENSIS - LEPTACANTHA. A SINGLE GROUP?

By E.Herzog and K-H. Brinkmann

Translated by H.Middleditch from K.u.a.S. 33.12:1982

By means of his painstaking and thorough field work aimed at getting to know the real relationships and the true detailed morphology of the species of *Lobivia*, and also to express this, Rausch has (1975/76) established species with suitable infra-specific taxonomic categories.

In the course of such a mammoth task, where he dealt with the treatment of some 500 *Lobivia* names all told, not all real relationships appropriate to their natural place were recognised immediately. Only after later scrutiny were such false associations recognised. As an example one can take the case of *L.backebergii* v.*schieliana* (Bckbg) Rausch and of *L.maximiliana* v.*quiabayensis*. The treatment of these species by Rausch was based largely upon a geographical aspect (the distribution area of *L.maximiliana* and that of *L. backebergii* partially overlap one another) and justified his new combinations. However, searching investigation showed that *L.schieliana* was not closely allied to *L.backebergii*. Fruit and seed are different. Equally on account of the different flower morphology *L.quiabayensis* does not belong to *L.maximiliana*.

The first well-known plant here is *L.schieliana*. The authorship was secured by Backeberg, even though he knew neither the habitat location nor the possible variation in form. Accordingly the original description was inadequate, being too short and lacking mention of a series of essential features. Ritter, who found this plant in October 1954 in the area of Ayata and again in 1958 in the adjacent prov. Larecaja and consequently knew its habit best, unfortunately did not publish his observations at that time.

Also in 1956 Backeberg established the variety *albescens* for a slightly different white spined form, which cannot be

justified in the context of the transition forms now available. That also goes for *L.schieliana* v. *unguispina* n.n., v. *caespitosa* n.n., and v. *longispina* n.n. They are all part of a complex of forms, of which several are dominant at specific altitudes in nature. This situation has been met with by Rausch in the course of his journeys in the area north of La Paz and these were appropriately evaluated in his publications. Since the inadequate original description by Backeberg has been updated and enlarged by Ritter (1980), it only remains here to refer to the extent of variation and to certain features.

We would like to try and show how *L.schieliana* differs from the Type of *L.backebergii* (Werd) Backbg. No separation is evident in area of distribution. In the spine structure likewise no significant differences are to be recognised. The flower morphology appears to be quite comparable in the disposition of the petals and the filaments. Differing are the broader base of the flower, the scales of the flower tube and the pericarpel; however, these distinctions are not very large. The fruit in particular differs and fundamentally different are their seeds. In addition to the differing sort of flower scales, the fruit of *L.schieliana* is furnished with more wool. We found the most outstanding difference to be in the seeds. In addition to the lesser size they also have a different form. The hilum region of *L.schieliana* is smaller and oblique; the testa is distinguished by flatter, finer, pits. This difference shows that *L.schieliana* differs in essential characteristics from *L.backebergii* and confirms our surmise of a separate position for the species. Recently yellow flowering examples of *L.schieliana* have been found on more than one occasion in the lower lying places within its area of distribution. This situation is indeed not very significant, but is important insofar as such flower colour variation has not yet been observed in *L.backebergii*.

In the same area of distribution as *L.schieliana* there occurs a further species, *L.quiabayensis* Rausch. In the past the field numbers of both taxa have been mixed up in habitat and for that reason have also got into circulation under false names (Fritz 1980). On his second collecting trip in 1965 Rausch found these plants for the first time, gave them the field number WR 205 and described them in February 1968. In addition to the flattened globular form with the bird-nest-like spination around the plant body there were also more globular specimens, whose spination curved less around the body. Here, too, in addition to the well-known orange-red to dark-red flowering plants, occasional specimens were found later with orange-yellow to yellow flowers.

On account of the bodily similarity with *L.maximiliana*, Rausch placed *L.quiabayensis* as a subspecies to *L.maximiliana* in his new grouping. Current knowledge at that time justified that step. Later thorough comparisons showed that this combination displayed shortcomings. The flower morphology only approximately matched that of *L.maximiliana*. The inner flower petals spread out, which is never the case with *L.maximiliana*. Also the filaments standing clear of one another and the form of the scales on the flower tube likewise were not characteristic of this species. All features pointed rather to an association with *L.schieliana*. Between both there is agreement in habit, in flower morphology, in the disposition of the flower parts, in the form of the fruit and in the seeds, so that a phylogenetic relationship is recognisable.

In 1975/76 Rausch also placed *L.leptacantha* with *L.quiabayensis*. This plant was found by him on his fourth collecting trip, not far from Paucartambo in Peru and described in August of 1972. Up to the present time the surprisingly long distance between the finding places of *L.leptacantha* and *L.quiabayensis* does seem strange. At first sight the wide gap between both their distribution areas makes a close relationship difficult to accept, but at the same time shows how patchy is our knowledge of these plants, even now. Nevertheless all significant characteristics such as the habit, the flower morphology, the fruit and the seed indicate the close relationship with *L.quiabayensis* as well as with *L.schieliana*.

Not far off the the habitat location of *L.leptacantha*, but in another river valley, near to the village of Huanquite, Lau found a *Lobivia* which he recorded with the collection number L.154. In our opinion it likewise belongs to the complex of the foregoing *Lobivias*. The occasional classification of this find with *Lobivia corbula* (Herrera) Britton & Rose in many catalogues is not factual. On the contrary these Lau plants display many characteristics of *L.leptacantha*. From the spination and the flower morphology as well as the variable flower colours between red and yellow a homogeneity exists. However Lau 154 differs from *L.leptacantha* in its larger seeds and in the rougher pitting of the testa.

We are of the opinion that *L.schieliana*, *L.quiabayensis*, *L.leptacantha* and possibly *Lobivia* Lau 154a form a phylogenetically collective group because of the broad correspondence in their significant features.

..... from J.Kirtley

In my own collection I have a fair number of plants which are pretty representative of those discussed above. Of Lau 1004, I have six plants from various sources; one is an ex-habitat propagation from Windyridge, the others are seed grown, the seed coming from Kohres and De Herdt. The flowers are either yellow or a definite orange, the colour permeating the whole flower. In addition I have five plants of Rausch 205 *L.quiabayensis*; one of these plants came from Windyridge, the others were seed grown. The flowers on these plants are red, or red with an orange throat.

The shape and colour of the flowers on my *L.leptacantha* is the same as on R 205, red with an orange throat, but there is also a bluish tinge to the outer petals when these catch the light from the right viewpoint.

Coming to *L.schieliana*, I have a total of eleven plants, under numbers Lau 966 or 967 and KK 1253. The spination of these plants covers a very wide range of variation, from very short and very tightly appressed spider-like spines through longer, twisting, and more projecting spination up to the open spination on KK 1253. One of these plants with the short, white, tightly appressed spines even came to me as a *Sulcorebutia*! Those that have flowered all have flowers of a straightforward red colour.

None of the flowers on any of these plants are like *L.maximiliana*. That is, they do not have the stamens bunched closely around the stigma, nor do the innermost petals form an extension to the almost cylindrical tube, which is the case on flowers on my KK 813, KK 437 and Rausch 286.

..... from H.Middleditch

Herzog and Brinkmann are at pains to keep their criticism of Rausch *Lobivia* 1,2,3 distinctly muted. On the other hand, in his own publication Rausch allowed full rein to his criticism of those who had previously been involved with *Lobivia*. In some of his pages there is more destructive criticism than constructive explanation of his ideas. In the case of *L.schieliana* and *L.quiabayensis* his ideas do not hold together. Was it because he was so busy denigrating others that he got his own act wrong? It rather looks as though too many of Rausch's names simply add to the superfluity of synonyms. It is not only in some 19th century cactus works that we are obliged to have to sift out the facts that are right from those that are not.

To supplement their article, Herzog and Brinkmann provide some very nicely drawn sketches of flower sections and fruit of the various *Lobivia* that they mention. There are clear similarities here but also modest differences, but no reference to these is made in the text. It is also to be regretted that no scale is provided and we are left to surmise that all the flower sections are drawn to the same scale. Here, as with other groups of *Lobivia* spp., ample opportunity remains for those with an interest in these plants to present a wide range of constructive observations.

AUSTROCYLINDROPUNTIA VERSCHAFFELTII. From J.R.Kirtley

In the November of 1989 a one month's journey was made through Bolivia in company with B.Bates. Our starting point in Bolivia was the capital city of La Paz. From there we travelled southwards via Potosi as far as Tupiza, stopping at likely places, or where we could actually see cacti, to look round and take photographs. The return route took us via Impora and then northwards through Villa Abecia to Camargo. To the north of Camargo, as we were driving through the scattered village of Muyuquiri, at an altitude of 3125 m., splashes of red were seen not far off the road. These resolved to be two clumps of almost spineless *Tephrocactus*. The plants grow near a dry stream bed among clumps of tall grass, which had been recently burned, also causing some damage to the *Tephros!* Each plant consists of a large number of stems and branches forming a clump of approx. 30 cm or more in diameter. The flowers are a deep orange-red, 6 cm in diameter, the style and stamens being a matching colour and the stigma lobes purple.

At the time we had very little idea about the identification of these plants. But when we were back at home, a search was made of the literature and the slides which we had taken of these plants were looked at carefully. These plants were then identified as bearing a close resemblance to the detailed description and photograph of *Opuntia posnanskyana* as provided by Backeberg in his *Die Cactaceae*.

..... from H.Middleditch

On the photographs of this plant which were taken in habitat by J.Kirtley it is difficult to see the main stems. To some extent this may be due to the stems being fairly close to each other in the clump, but the view of the main stems is largely obscured by the very great number of globular outgrowths which appear to crown the stems, several to a stem. At first sight it is not clear whether these globular outgrowths are vegetative offsets or an early stage of the flower buds. However, a careful examination suggests that those outgrowths with no sign of red flower petals are most probably vegetative offsets. They are almost globular and bear a large number of small scales, or vestigial leaves. These offsets greatly outnumber the flower buds.

The original description of *Opuntia posnanskyana* by Cardenas is repeated by Backeberg in *Die Cactaceae* Vol.1 under the heading of *Tephrocactus heteromorphus*. It runs as follows: "Small upright plants. Stems up to 12 cm high, from a cylindrical root of up to 10 cm in length and 2 cm thick; segments more or less cylindrical, 6-8 cm long and 2-2.5 cm thick; blue-green at first, later reddish, tuberculated, with globular offsets at the crown, which must change into sterile fruits and even develop branches; leaves cylindrical, only on the new growth, bluish-green, later reddish; areoles in 4-6 spiral whorls, very small, 4 mm apart, with wool and white glochids in new branches, later with fewer glochids and wool becoming yellow; 2-3 thin, hairlike spines, not stiff, somewhat overlapping or curved downwards; flower radial, 6 cm long, 3-4 cm diameter; ovary rather conical, exterior of tube 3 cm [?long], with some areoles and leaves, yellow wool and white glochids; outer petals purple, lanceolate, up to 1.5 cm long, inner petals orange-red, spatulate, 2.5 cm long; numerous stamens, violet-purple; anthers yellow; style thick, white, with 6 stigma lobes, dark violet; fruit unknown. Bolivia, Hacienda Huancaroma near Eucalyptus on the railway line from La Paz to Oruro."

The sketch and the photograph which presumably accompanied Cardenas' original description are also reproduced by Backeberg. In that photograph there are globular vegetative offsets at the crown of the stem and these can be seen even more readily in the sketch. There is very little doubt in my mind that these are indeed very much the same sort of growth as on the plants found by J.Kirtley near Muyuquiri. The altitude of Hacienda Eucalyptus is given as 3728 m; it is not too surprising that the plants from Huancaroma are slightly shorter in comparison with those at Muyuquiri, since this latter place lies at a lower altitude.

The Cardenas' description specifically mentions leaves on the new growth but does not give a length, but the way they are drawn on the Cardenas' sketch suggests that they are nearly half as long as the diameter of the body i.e. approaching 1 cm in length. Taken together with the cylindrical nature of the stem, quoted in the description and displayed in the sketch and photograph, this would suggest an *Austrocyllindropuntia* rather than a *Tephrocactus*. Were there any leaves to be seen on the plants found by J.Kirtley?

..... from J.Kirtley

Bear in mind that we had no definite idea what sort of plants these were when we found them, so we did not go looking for any leaves. But a close examination of the slides would suggest that there could be new growths with relatively prominent leaves. At the same time, it is also evident from the slides that some of the areoles on the stems did carry slender spines.

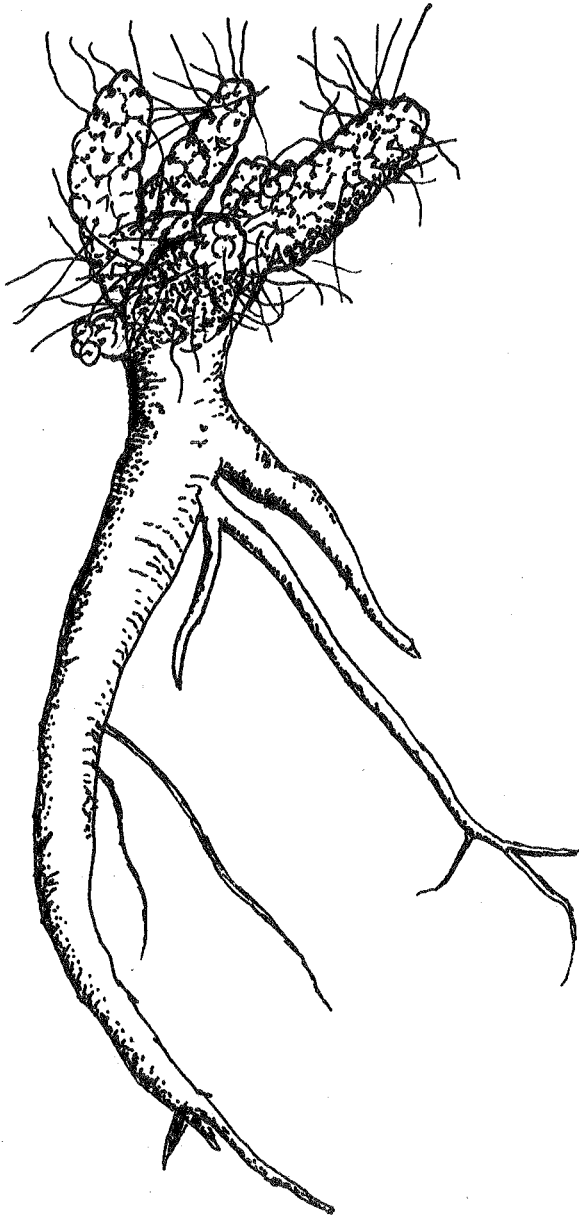
..... from B.Bates

When we were travelling south from La Paz along the main road to Oruro, we made a short diversion at Eucalyptos, in the direction of Panduro. Leaving the vehicle at the roadside, we started to climb up an easy slope, one of many gently rolling hills in the vicinity. There was one of the airampo sorts of *Tephrocactus* to be seen, a hummock forming *Tephrocactus*, a *Neowerdermannia* and a lot of *Lobivia pentlandii*, with various flower colours. Growing in a narrow gap between two or three rocks was a dwarf plant with only the upper part of the segments sticking out about 20mm above ground level. The bodies were a purplish-brown colour almost without even a tinge of green, in sharp contrast to the white wool of the areoles. Spines were mostly short and slender with perhaps an occasional longer spine. When I dug up one or two segments they proved to be short cylindrical in shape. There is no doubt that the spot where we found these plants, at an altitude of 3870 m., is not a great distance away from Huancaroma.

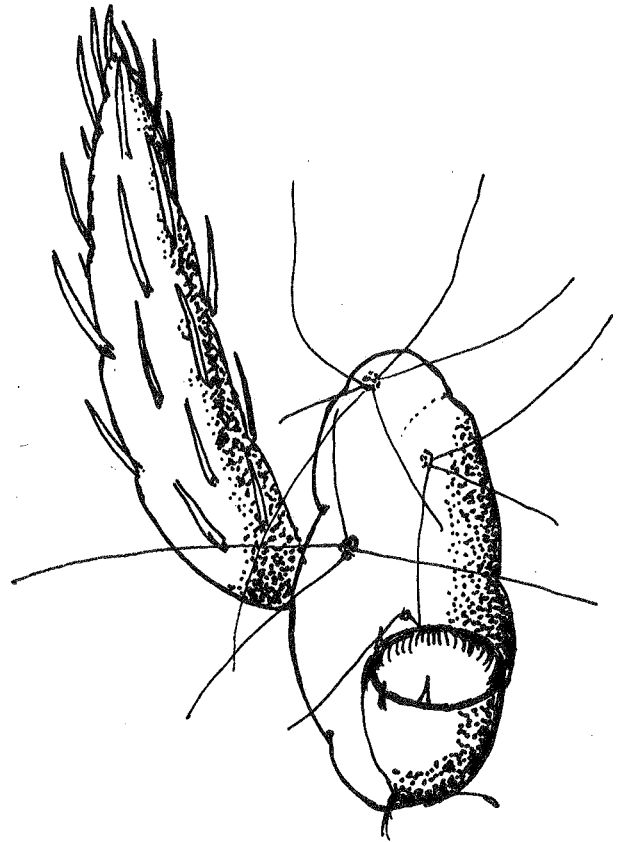
..... from D.J.Ferguson

We saw this particular plant in Argentina where we climbed up into the Puna. They were south of San Antonio de los Cobres in the Nevada de Acay in Salta, also in Tucuman both at Tafi del Valle and at Amaicha del Valle, and in the surroundings of these places, as well as to the north of Andalgalá in Catamarca. I suspect that they occur widely in intervening areas. Off hand I do not remember if we saw it in Jujuy. It would seem to occur only at very high altitudes with such as *Tephrocactus glomeratus*, a small-padded Airampo type of *Opuntia* which was perhaps *O.microdiscus*, *Trichocereus formosa* v. *bruchii* and *grandis*, [*Soehrensia* - H.M.] and *Mediolobivia haagei-pygmaea* and *atrovirens-ritterii* types.

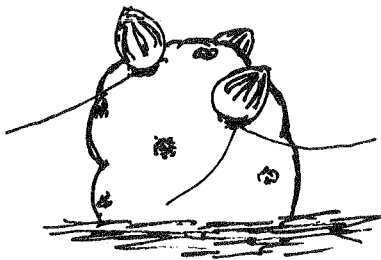
The Argentine plants have spines, few, mostly appressed, pale in colour (nearly white) and very slender, up to perhaps 1.5 cm long, flexible, and often curved and twisted. Most growth was finished in January/February and any leaves present were mostly old and falling off. No evidence of flower or fruit was noticed at all. In the photographs taken by J.Kirtley at Muyuquiri I think most of the new growth to be seen is new joints and not flower buds. If you care to look



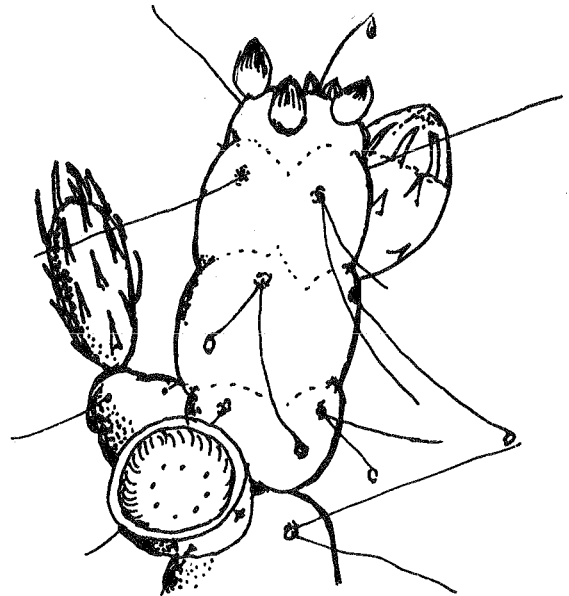
SANTA ANA 3,300m
Photo - M.Nilsson



TAFI DEL VALLE 2,500m
Photo - M.Nilsson



PANDURO-EUCALYPTOS 3,870m
Photo - B.Bates



CUESTA del OBISPO 3,050 m
Photo - J.Lambert

Austrocyllindropuntia Verschaffeltii

carefully at the lower right-hand corner of the close-up, there may be seen the other type of joint growing up behind the "normal" ones, with quite prominent leaves. I think that this longer-leaved cylindrical joint is the norm in greenhouse cultivation. The suggestion that the globose segments might be some sort of modified flower bud is interesting and worth investigation.

These Argentine plants are, I am sure, the same as *Opuntia hypsophila* Spegazzini and I would suspect they may be the same as, or a variety of, *Austrocylindropuntia verschaffeltii*

..... from M.Nilsson

On my first visit to Argentina in 1987 we left the city of Tucuman early in January and took the road which leads to the high pass of Abra de Infernillo. This brought us to Tafi del Valle and not far from there we found *A.verschaffeltii*. There were not many of these plants, which were growing in grasses among stones, but also under bushes, and near to large rocks. *Lobivia bruchii* was growing nearby - sometimes side by side with *A.verschaffeltii*. These were rather untidy looking plants, the larger plants being roughly 15-20 cm high. The habitat, on green, cultivated slopes north of the village of El Pinar, is very moist. It was very foggy weather when I found these plants. They had already finished flowering but there were quite a lot of green fruits to be seen. The new segments all had quite prominent green leaves.

A week later we were on the road from Quebrada Escoipe to Cachi and as we came on to Cachi Pampa near Piedra Molinos, we again found *A.verschaffeltii*. Here it was growing on gravelly ground among grasses, herbs, and quite low growing bushes. This plant was more low growing, hardly up to 15 cm high, mainly with short, ellipsoid segments. The leaves on the new growth were barely half the length of those on the plant we had seen near Tafi del Valle. There were also some small globular segments at the top of some of the stems. Further down the road into the Quebrada Escoipe there are often very moist clouds and the hillsides are green and fresh. These clouds sometimes reach the top of the climb at Piedra del Molinos. The first time that I was there, I could not see more than a few metres in front of me and the air was really wet. Here I only found a few plants, growing fairly close to the main road to Cachi. Certainly, they are not as green and fresh as those from more damp areas in the valleys.

A week and a half later we were in the Quebrada Humahuaca and near Volcan we again found this species, growing among stones and gravel, in the company of dwarf herbs and grasses. It grows together with a *Rebutia*, a *Lobivia* and also with *A.vestita*. Here the leaves on the fresh segments were about as long as those we had seen at Tafi del Valle. No fruit or flowers were seen. This is certainly a very rainy locality. Every time I have taken the bus from Jujuy to Humahuaca I expect to see the first clouds at Volcan, and so far I have always been right.

In 1990 I went off to Argentina again, this time in October. I set off from Libertador General San Martin, getting a lift in a truck to Valle Grande. From there I walked the 8 km to Valle Colorado where I stopped overnight and then continued to Santa Ana. This walk started at 2100 m and finally reaches 3600 m after 16 km. I stayed in Santa Ana for two days but could not climb very high in the mountains because of the foggy weather. But near Santa Ana I again found *A.verschaffeltii*, at 3800 m. There was a small plant with half a dozen heads, barely 10 cm tall, growing next to a rock in a turf of grass. Having had a request from H.Middleditch prior to my departure from home on this trip, I decided to dig up this particular plant and succeeded in doing so. It had a long, thick, tapering rootstock which was almost 25 mm thick just below ground level. There was a much larger plant of the same sort growing closely alongside and in digging up the smaller plant we exposed the root of the larger plant, which was longer, stouter and more woody.

In December we made an excursion up the Quebrada del Toro and near Chorrillos we found yet another *A.verschaffeltii*. There were a few segments starting into growth with fresh green leaves, but this new growth was far less prominent than on the plants which we had come across in the month of January on my earlier trip. But imagine my pleasant surprise when we found one flower wide open, a deep red colour, the first time I had seen one! Here there were quite a number of the small globular offsets at the tops of the stems. I think that the area between El Alisal and Chorrillos is the most humid section of this Quebrada. The altitude of El Alisal is about 1800 m. From Quebrada de Capillas you have a river coming from the northwest which usually makes the road flooded. I have been in Chorrillos twice, Last time, in December, it was very rainy and foggy. At Ing.Maury and Golgota it is becoming drier.

When it comes to the question of fruits on *A.verschaffeltii*, I have found very few seeds of this species and do not recollect having seen any ripe fruit.

..... from H.Middleditch

At the 1991 Chileans' Weekend there were several colour prints on display of *A.verschaffeltii* which had been taken in habitat by M.Nilsson. The plant found at Chorrillos bore a flower which had the same dark purple stigma lobes as the plant found by J.Kirtley near Muyuquiri, but with a flower of a slightly deeper red colour. The globular offsets at the tops of the stems were very similar on the two photographs.

..... from J.Lambert

The plants which were photographed by J.Kirtley at Muyuquiri match fairly well those which I observed in 1988 at Abra del Infernillo, at about 3000 m altitude. This is along the road from Tucuman to Cafayate. At the time these plants were not in the growing stage and did not carry any leaves. But before reaching Abra del Infernillo, we made a stop at Las Carreras, near El Mollar, where we came across some other plants of *A.verschaffeltii* but here they were showing signs of leaves on their new growth. These were at about 2250 m altitude. However, in 1990 I discovered another population of *A.verschaffeltii* along the Cuesta del Obispo, at El Sunchal, which lies at 3050 m altitude. Here the plants displayed definitely more elongated segments, closer to what we observe in cultivation. This is interesting as this place is indeed less sunny and less exposed, and also more moist than at Abra del Infernillo. From entering the quebrada Escoipe the road starts to climb, gently at first, and faster afterwards, until you reach the culminating point at Piedra del Molino. My impression is that the whole stretch of the quebrada is quite humid. Indeed, I met with rain nearly every time I passed through it!. This is not a matter of altitude, but more of exposure. The moisture-laden winds from the east strike the mountains and drop their rains on its eastern slopes, and also partly on the high plateau at the top - the Cachipampa. However, as soon as you start to descend at the other side of the crest, either along the road to Cachi or along the one to Amblayo, the situation becomes much more arid. The plants of *A.verschaffeltii* at El Sunchal did carry many leaves, as it was then their growing season.

To the best of my recollection, I have not seen any ripe fruit on these plants.

..... from H.Middleditch

The plant of *A.verschaffeltii* photographed by J.Lambert at El Sunchal, on the ascent of the Cuesta del Obispo, gives the impression that it might be some 18" across and some stems could be in excess of 8" tall. At the ends of some of the downwards pointing stems there are hanging small white droplets, possibly condensation from the cloud reported by many travellers to be persistent at this level in Quebrada Escoipe. This may also account for the patch of bright green lichen growing in the fence post right behind the *A.verschaffeltii*.

..... from F.Vandenbroeck

During my visit to northwestern Argentina in November - December of 1991, I did come across *Austrocylindropuntia verschaffeltii* on the mountains above Volcan, in the Quebrada Escoipe and also some way above Tafi del Valle. Near Escoipe we found the plants growing together with *Platyopuntia salmiana*. Above Volcan the plants remained very low and small, probably due to the altitude. These plants were in full flower, the scarlet flowers having a bright green tube. There were a host of small globular offsets at the tops of the many individual stems.

..... from H.Middleditch

To judge by what may be seen on the slide of the foregoing plant at Volcan, there seem to be perhaps a couple of dozen reddish coloured pieces lying scattered around the plant; these are about as thick as the stems of the plant, ellipsoid in shape and bearing a number of areoles. Are these fruits by any chance?

..... from F.Vandenbroeck

There were no fruits on or near this plant. What you have taken to be fruits are just globular offsets which have fallen off the plant and have become parched by the sun to a yellowish colour. Some of these offsets take root and make new plants. As a matter of fact we did not see *A.verschaffeltii* fruiting anywhere.

..... from H.Middleditch

Perhaps a search of Ritter's Kakteen in Sudamerika may yield some ideas on the fruit of this *Austrocylindropuntia*?

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

Austrocylindropuntia verschaffeltii Growing in untidy groups, branching from below to above, becoming 15-30 cm tall, with thickened rootstock; stem grey-green, usually 15-25 mm thick, globular to cylindrical and up to about 10 cm long, blunt on top, fairly prominently tuberculated; tubercles roundish, later fairly flattened; Areoles 2-4 mm diameter, white felted, now and again with pale glochids, often sunken; leaves green with red tips, 3-30 mm long, in many places growing less in length, the shorter ones somewhat flattened, the longer ones awl-like with a flattened underside. Spines always very slender, 1-7 longer spines are developed, whitish, yellowish, or reddish, usually 1-4 cm but only very occasionally up to 5 cm long, usually curved; on cultivated specimens they can even be shorter than 1 cm or even entirely absent; in addition some still shorter ones may be seen; in Nature, too, spines are absent or only formed at a few areoles. Typical is the formation of a brood of smaller globular offsets close to the upper end of the branch, which easily become detached and take root; these are often spineless or have only a few short spines, and carry small leaves of only some 2mm in length. There is an illustration in Britton & Rose Vol.I p.72 of a bunch of offsets. There is a flower description in Schumann 1898 and Werdermann 1938 (Bluhende Kakteen Tafel 137) Flower stigma, dark purple ... petals of two mixed colours, brownish yellow and carmine (fire red to orange red according to Schumann and Werdermann). Fruit (in the event of it containing seeds) 25-50 mm long, 20-25 mm thick, stoutest above, narrowing below. With very few areoles, small, 2 mm long, pretty flat, with purple scales, some short pale glochids and at the upper margin some long, obvious half-glochids (described as spines by Werdermann). Berger described the fruit as red.

In the original description Bolivia was given as the habitat and for *v.digitalis* the habitat was Argentina, Prov. Catamarca. To the north the species was well known from La Paz, which is a wide distribution area. This species grows on average at greater altitudes than *O.vestita*. From Volcan, prov. Jujuy, FR 410; from San Antonio, prov. Mendez, Dept. Tarija, FR 410a; from Tafi del Valle, prov. Tucuman, FR 410b; from La Paz, FR 889.

The illustrations 198 to 200 in Backeberg Vol.I, described as *Opuntia posnanskyana*, belong here.

..... from R.Mottram

In April 1992 a consignment of nearly a score of small *Opuntias* were received from J.Iliff, together with about a dozen slides, mostly of these same plants in habitat. Among these was a small plant of *Opuntia verschaffeltii*, which was barely 100mm tall, with slender spines of some 15-18 mm length, and without any leaves. However, the new growth in cultivation has been rather rapid and bears typical cultivar leaves, but no spines. The accompanying note from Iliff recorded a collection date of 5 April 1986, from 3000 m near Abra del Infernillo, also suggesting that the photograph of this sort was taken at a slightly lower altitude, nearer to Tafi del Valle. "After passing the summit of the Abra del Infernillo the ground becomes much moister on the east side, with practically continuous grass cover - even with little streams and rushes. Odd to see huge *Lobivias* growing with rushes!" The photograph is of a plant which appears to be carrying a couple of fruits, which are a green colour tinged with red, acorn-cup shaped.

..... from H.Middleditch

This seems to be the only instance where fruit has been reported on this species by a traveller in the field. But was it really ripe fruit? Since the photograph was taken in April it is quite possible that it may have been a ripe fruit.

On plants of *Tephrocactus*, new segments do not have a growing point, but start out with every areole that they will carry when they are mature. Segment size can and does vary to some extent but on the basis of areole count the segments are of determinate size. By comparison, *Austrocylindropuntia* does possess a growing point which generates new areoles as the stem extends. The growing point can also restart into growth after a winter rest. Thus the length of stem growth is indeterminate. But do the small globular offsets at the crown of the stems remain that size and so display determinate growth?

..... from J.Iliff

As regards those little globose segments at the top of the stems, I do not think that they are the only method of branching and I have found that they do detach rather easily and become lost. However, the question of a growing point is a very vexed one and I do not think that it can be answered in straight black and white terms. A plant like *O.subulata* will recommence growth in its main stem and perhaps its main branches in successive seasons; but it seems unlikely that all the subsidiary branches behave likewise - indeed obviously they do not, otherwise the plant would extend in all directions indefinitely. On a smaller scale I guess the same is true of a plant like *O.vestita*. So even here there is partial determinate growth. On the other hand, plants like *O.verschaffeltii* have segments which are all normally (i.e. in habitat) of a determinate shape and length, but which can be induced under cultivation to recommence growth in a succeeding season, and elongate.

..... from H.Middleditch

There is little doubt that the great majority of plants do possess an ultimate determinate growth - bushes do not grow to the size of trees and a great many shrubs do not grow to the size of bushes. But most plants have a growing point which will produce fresh nodes as it elongates; this growing point will restart into growth the following season, and the season after that. Not ad infinitum, but from one season to another the growth is indeterminate. In addition, the branches on certain plants may well grow through the season, the growing point producing new nodes (or areoles) as they elongate; but in the following season the new growth may only take place by branching and not by restart of the growing point. Insofar as the number of nodes or areoles produced in one season is indeterminate i.e. it will be more in a good growing

season and less in a poor one, growth is indeterminate; but branch length can be determinate, being of one season's duration only. In *Tephrocacti*, unlike any other plant that I know about, the number of areoles (nodes) on the fresh growth in Spring will not be added to subsequently on that segment, because there is no growing point. The growth is thus determinate by areole count from the very start. It may even occur in certain *platyopuntia* for all I know.

..... from J.Illiff

There are two categories of growth which are commonly employed: "determinate" and "indeterminate" and I am coming to suspect that they are too facile. In *Opuntia*, there are a large number of species whose segments have a characteristic shape and (within limits) areole-count, and as a convenience we may call them determinate. But my point regarding spp. such as *O.subulata* was that the ultimate branches must be (again within limits) determinate, otherwise there would be no limit to the extent of the growth. And it strikes me that a more fundamental division might be that between main-stem growth and branch growth. It is a commonplace that certain spp such as *O.brasiliensis* have an indeterminate main stem quite different from the branches. The case of e.g. *O.cylindrica* may be the same. The situation may be that the main stem and probably some of the main branches of certain spp. remain indeterminate while the ultimate branches are more or less determinate. On the other hand, in the case of smaller spp., and particularly in the cushion plants, there is no main stem at all and all the branches are then "ultimate".

Certainly I would not regard *O.verschaffeltii* as a "main stem" species. But it may be on the borderline in the sense that branches may sometimes continue growth in a second season in the wild.

When it comes to *Austrocyliandropuntia* in general, seed morphology would seem to indicate that *O.verschaffeltii* is of a very different lineage - I would have thought isolated - and this is to some extent borne out by the different kind of fruit, and the occasional very long leaves, which are a primitive character. None of the other *Austrocyliandropuntia* seem to be anywhere near as distinct as *O.verschaffeltii*, or for instance *O.inarmata* which is a curious, obviously quite different, little plant, unfortunately at the moment invalidly published.

..... from H.Middleditch

In his *Kakteen in Sudamerika*, Ritter provides an introduction to the genus *Austrocyliandropuntia* in which he describes the fruit of this group as ellipsoidal with the floral scar being distinctly less in diameter than the stoutness of the fruit itself. This basic habit does not appear to be contradicted in any way by his description of the fruit of *A.verschaffeltii*. Hence I remain puzzled by the suggestion from J.Illiff that the fruit of this sp. differs from other *Austrocyliandropuntia*.

In addition, the photograph of *A.inarmata* which appears in Backeberg's *Kakteenlexikon* Fig 24., appears to bear flowers and stigma lobes which are an excellent match for those on *A.verschaffeltii* which have been seen in habitat by the above correspondents, as well as carrying just the same sort of globular offsets at the tops of the stems. Is it the spinelessness that renders it a curiosity? But in the original description of *O.verschaffeltii*, the spines were stated to be "almost always absent". It was Spegazzini who described his *O.hypsophila* as having spines; his description gives 3-5 spines in the latin diagnosis and several lines further on we find "spines typically 7, always one central 5-15 mm long". This species was stated to "strongly resemble *O.verschaffeltii* v.*digitalis* Web in general appearance". According to Spegazzini the variety *digitalis* was distinguished from *verschaffeltii* by the lesser size of the finger-like, dark green segments with smaller, shorter leaves.

At the 1991 Chileans' Weekend there were displayed several photographs of *A.verschaffeltii* which had been taken by a number of the above correspondents at various locations in habitat. These demonstrated the diversity of habit in respect of short or long segments, spines present or almost absent, leaves either shorter or longer or absent. This sort of data was not available to earlier writers, hence it would now appear reasonable to suggest that there is no real distinction between *A.verschaffeltii* and the v.*digitalis*, or *O.hypsophila* Speg., or *A.inarmata* Back.

Recorded habitat locations are as follows:- FR889, south of La Paz; Huancaroma, Cardenas; Panduro - Eucalyptos, 3870m, B.Bates; Muyuquiri, 3125m, J.R.Kirtley; FR410a? Cuesta Sama, Tarija; MN143, 3100 - 3700m, Cortaderos - Santa Ana; FR410, Volcan; Volcan, 2750m, M.Nilsson; south of San Antonio de los Cobres, D.J.Ferguson; Abra del Infernillo, 3000m, J.Illiff; FR410b, Tafi del Valle; MN2, Tafi del Valle, 2500m; Tafi del Valle, J.Lambert; north of Andalgalá, D.J.Ferguson. This distribution area is covered by the map of the Altiplano in Chileans No. 44 on p.108.

SULCOREBUTIA ARENACEA By H.Middleditch

The original description of *Rebutia arenacea* appeared in the U.S. *Cactus & Succulent Journal* Vol.23 No.3 of 1951, where the finding place was given as "Bolivia, Department Cochabamba, Province Ayopaya, near Tiquipaya, about 10-15 km in the direction of Santa Rosa at 2,200 m elevation, collected by E.Rocha, June 1949". This place lies to the north of the high mountain ridge which divides the Ayopaya basin from the Cochabamba basin. When Rausch visited Bolivia in the course of his 1969 trip to South America, he met with *Sulcorebutia arenacea* to which he gave his field number R.460, but as to location his field number list was no more specific than "Cochabamba". In *Ashingtonia* Vol.1 No.4 for 1974 the finding place for *S.arenacea* was stated by J.D.Donald to be Tapacari at 2,200 m. A place with the name of Tapacari lies in a river valley which runs into the Cochabamba basin; this valley is on the south side of the complex of mountainous ridges, rising to some 5000 m altitude, which forms the division between the Cochabamba basin and the Ayopaya basin. Does this species really occur at both Tapacari and near Santa Rosa?

..... from M.Bariatinsky, *Cactus* (France) No.76, December 1962

The score of specimens of *Rebutia arenacea* gathered in 1949 by a student of Professor M.Cardenas have all perished. In his study of the genus *Sulcorebutia*, F.Ritter writes (N.C.S.S. Jnl. December 1961) "I have seen *Rebutia arenacea* in large numbers at the type locality given by Cardenas. The habit of these plants agreeing well enough with Cardenas' description, and given the place of their discovery, they cannot belong to any other species. Yet Cardenas gives the spine length up to 5 mm; this is not correct. The length of the spines is more frequently between 5 & 15 mm, and can even be longer than this dimension in some examples. The photograph published by Cardenas however shows a plant carrying spines of only 2-3 mm in length - it is an atypical specimen. In consequence one gets a quite different impression of this species to that which is presented by the plants found at their place of origin. Presumably Cardenas had no other photograph at his disposal and not wishing to deviate too much from the sample used in his illustration, gave for the length of the spines that indicated by his photograph, although this length was much shorter than that observed on those plants found in the wild."

On this precise point I am fortunate to be able to adjoin here the reply from Prof. Cardenas. I have indeed received just recently a letter from him dated 17 December 1962 in which he writes to me, amongst other things:- "I have read the

article by Ritter about *Sulcorebutia*. I do not know how Ritter could reach the spot where *Rebutia arenacea* was found, because, illinformed at the time by one of my students, the one who discovered this plant, I have stated as the type locality Santa Rosa de Ayopaya. I now know that the finding place is elsewhere and my old student, now an agronomist, admitting of his mistake, has confirmed it to me. On the other hand, I well remember that all the plants collected (about a score) had the same type of spines. As I think that this matter could interest you, I send you herewith the photograph of a *Rebutia arenacea* which is not the plant which served to illustrate the diagnosis published in the *American Journal*".

It is the second photograph, of which I have no need to underline the importance and rarity, which may be found reproduced here [in *Cactus France* - H.M.]. If one compares the two photographs in question, one cannot but verify the perfect similarity presented by the spines of the two plants. It is in consequence probable that the plants discovered by F.Ritter in Ayopaya, plants which he took to be *Rebutia arenacea*, belong in truth to another species.

..... from F.Ritter, N.C.S.S. Jnl December 1961

I have found in a region adjacent to the finding place given by Cardenas for *Rebutia arenacea*, and at the same altitude, a new *Sulcorebutia* species, which closely resembles the *S.glomeriseta* in Cardenas' photograph in body, areole, and spination, but has a larger, but nevertheless yellow, flower.

..... from J.D.Donald

There is no real puzzle as regards the habitat of *S.arenacea* or of any of the complex of yellow flowered *Sulcorebutias* from the Tirquipaya region of Ayopaya province. There is a complete cline between these plants from *S.candiae* to *S.arenacea* to *S.menesesii* and finally *S.glomeriseta*. There is in truth only one species. The so called species are really no more than isolated phenotypes of a once larger population that grew from Santa Rosa - Tirquipaya to Kami. Choros, or really Hacienda Choros is only a convenient access point to the overall habitat from the Independencia road towards Kami. I am quite confident that if it were possible to approach the Rio Cotacajes and its tributaries the R.Negro and S.Rosa etc., from above their canyon rims, you would find all of the complex, one form changing gradually to the other. Cardenas' *arenacea* is the form at the lowest altitude in the short pectinate spined version, which gradually gets longer spines as you climb up to the rim, with *S.candiae* at the top. Similarly going westwards towards Independencia and southwards towards Choros the spines become gradually finer, reaching their finest state by Naranjito, for *S.glomeriseta*.

From this area I have now a very good representative collection of all the intermediate forms, many collected by Cardenas and his students on their mule rides up and down the canyons, a four-day trip from the Independencia road. The so-called plants of *S.candiae* found in many continental collections is a typical intermediate between *S.arenacea* and *S.candiae*. The latest plants from Swobodae also show the various transitions of *S.menesesii*, of which my ill-advised new variety "kamiensis" and Vasquez' *muschii* are but forms. The real problem with our amateur experts is that none of them are familiar with the extent of natural variation which exists on the ground, but are tied to the few selected species in cultivation, that give a rather misleading picture, which is a pity.

..... from A.W.Craig

When we went down to the Isle of Wight to stop with D.Sargant, quite a few years ago, he had been getting a number of consignments of import plants from Lau. I was able to obtain seven separate plants of Lau 974 which had been collected at or near Kami and were under the name *S.menesesii*. These plants were not all absolutely identical and also differed somewhat from plants of *menesesii* which I obtained at later dates from various other sources. When J.Donald was looking at these particular plants he observed that he had not seen quite so many examples of Lau 974 together before and that the divergence from *menesesii* as commonly understood was not quite as distinct as he had previously believed. I gathered he subsequently saw more plants of Lau 974. Perhaps this is what led him to reconsider his establishment of *S.menesesii v.kamiensis* as a separate variety?

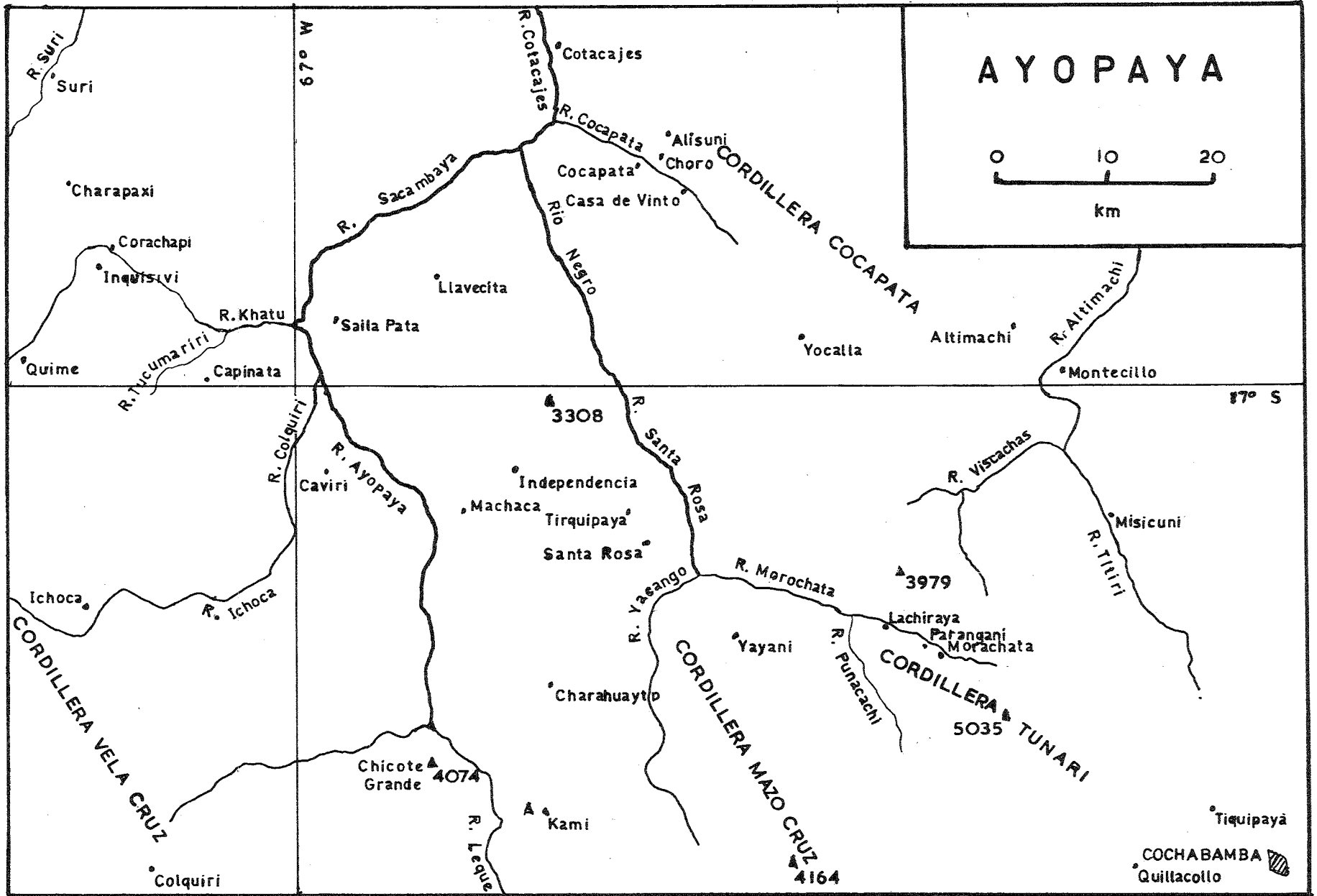
..... from H.Middleditch

In Chileans No.41 there were a number of extracts from travellogues concerned with Ayopaya province. Both Cardenas and van Vliet mention that the highway from Cochabamba via Santa Rosa and Tirquipaya to Independencia is only suitable for vehicular traffic as far as Lachiraya. This spot lies about ten km beyond Morochata. The rest of the journey from Lachiraya to Independencia had to be done by mule, requiring a day and a half. The map of Ayopaya in Chileans No.41 was based to a large extent upon an excellently detailed map provided by F.Brandt. This map was presumably compiled from data assembled by Steinmann, Hoeck and Bistram. Since the publication of Chileans No.41 it has been possible to consult more recent maps of this area, based on Landsat data, at both 1:250,000 and 1:50,000 scale. On my own copy of the 1:50,000 map of Independencia, which I have before me as I write, I see that the Estancia Choros referred to by J.D.Donald as a "convenient access point for this group of *Sulcorebutia*" lies some 20 km to the south of Independencia.

Also in Chileans No.41 an account was reproduced from Cardenas' autobiography, of his visit to Estancia Choros in 1949 and the discovery by his companions, during their stay there, of *Sulcorebutia glomeriseta*. In his autobiography, Cardenas states that they started off from Cochabamba at 4.00 a.m. and drove to Casa Vinto which they reached by midday. They then went by mule to the Hacienda Choros. There are 1:50,000 scale maps of this patch of Bolivia which are available in Durham University Geography Department Library. These maps cover the whole of the road from Cochabamba to Casa Vinto. The location of "Choro" on the map on page 58 of Chileans No.41 is basically correct. Compared with the route between Cochabamba and the Est.Choros on the R.Cocapata, there is not only a far greater distance but also terrain of a much more difficult nature, between Cochabamba and the Est. Choros which lies to the south of Independencia. Between dawn and dusk it would not be possible to drive and ride from Cochabamba to that Est.Choros which lies to the south of Independencia. In addition, the Est.Choros which lies to the south of Independencia is nowhere near the R.Cocapata. It has been mistakenly assumed, by J.D.Donald, that the Est.Choros lying to the south of Independencia was Cardenas's Est.Choros, which lay not far off the habitat of *S.glomeriseta* at Naranjitos.

..... from J.D.Donald

Around 1962 I had some correspondence with my old friend Bariatinsky and Martin Cardenas, when we discussed the localities of the habitats of *R.arenacea* and *R.glomeriseta*. It seems that there are still some puzzles unresolved. In 1962 we wondered about the distance of the *arenacea* habitat at Santa Rosa as given by Rochas to Cardenas as "Tirquipaya, some 10-15 km towards Santa Rosa". As far as we knew then, Tirquipaya was only some 5 km from Santa Rosa, confirmed by reference to the 1:250,000 scale map we had of Cochabamba. Perhaps it was 5 km on the map but allowing for the nature of the ground, perhaps nearer 8km by the winding road. So we believed that Santa Rosa was the probable habitat. Cardenas did mention in his letter to Bariatinsky that Rocha has mistakenly given an inaccurate reference, but we did not get a more accurate one from Cardenas except to say that it was in the region of Tapacari. We did not find Tapacari upon our map and assumed that it was a small village near Santa Rosa. The Tapacari identified by H.Middleditch seems to me to be much too far south and at the wrong elevation. Rausch was also told by Cardenas that



the habitat area was in the Tapacari region, which he believed, as Rocha had been there also. Yet Rausch looked for and found arenacea like plants near Santa Rosa WR 460, which were also found subsequently by Swoboda, presumably on Rausch's directions.

In 1984 we tried to get to Santa Rosa from Independencia but were beaten at the last stage to find a "bridge" broken between Independencia and Santa Rosa and the ford impassable for jeeps. We had no time to hire mules, even assuming we could have done so. We had taken nearly four days ourselves to get from Cochabamba to Independencia via Pongo and Charahuata, because the road was so appalling, even in the so-called dry season. The tracks themselves were deeply rutted by the huge wheels of the lorries. We were constantly stuck on ridges, bottomed on the underside of the vehicle. Thank goodness we had two vehicles each equipped with a power winch to haul each other out.

Now to the problem of which Hacienda Cardenas refers to as "El Choro". I have an updated 1:250,000 Cochabamba map SE-19-8 and also the 1:50,000 maps 6342.3 and 6242.3, (but not the vital 6242.2 and 6242.1) but I am quite unable to pinpoint the Casa de Vinto or the Rio Cocapata, apart from the sketch map in Chileans No.41 as a guide. I suspect that the Hacienda Choro suggested by H.Middleditch on the Rio Cocapata is the Estancia Canto Choro, which is about 20 km north-east from my Hacienda Choro south of Independencia. It seems that the sketch map in Chileans No.41 rather exaggerates this separation. Then there is the question of the time it took Cardenas and party to get to Choros in 1949 when the tracks were better than they are now. The real nub is where is Naranjito - and again there can be more than one Naranjito. Naranjito is little orange; oranges do not grow here at more than 1500 m altitude as far as I saw. Ritter, too, talked about freezing above 2000 m.

..... from H.Middleditch

If J.Donald would care to look at his 1:250,000 Cochabamba map SE-19-8 he will see (as I do on my copy in front of me as I write) the main road going from Cochabamba to Quillacollo. From here a road goes north to the edge of the Cochabamba plain, where it starts to climb out of the plain at about Estancia Bella Vista. According to the figures besides the road, it is a 15 km climb from there to the top of the pass where one road continues forward to Morochata; from the top of that pass, another road branches off to the right, taking 39 km to reach the edge of the map from where it is then 6km to Estancia Yocalla. From this point the road continues on the 1:50,000 map 6423.2 for a distance of some 18 km in a northwesterly direction where it reaches Casa de Vinto. The first part of this section of road, going past Est.Yocalla, climbs up the valley of the headwaters of the R.Caliente (or a tributary thereto) which J.Donald will see at the top of his 1:250,000 map, then goes over a pass and enters the headwaters of the R.Cocapata, which also flows in a northwesterly direction. The total distance from Cochabamba to Casa de Vinto is some 95 km, roughly 53 miles. This occupied Cardenas from 4.00 a.m. to about noon, which means they averaged about 7 m.p.h. They mention that they had to undertake some spadework at more than one place on the return trip to avoid their vehicle bottoming because of the deep ruts left by the lorries, just as J.Donald describes. Under the circumstances I would have thought that an average speed of 7 m.p.h. was not discreditable.

At Casa de Vinto the road branches, as may be seen on the 1:50,000 map, one road going along the left hand side of the river valley for some 9 km to the Estancia Cocapata, the other road turning to the right to cross the R.Cocapata and then going along the right hand side of the river valley for 10km to Estancia Choro, so that the two estancias face each other across the valley of the Rio Cocapata, just as Cardenas states on page 158 of his autobiography which I have open at that page before me as I write. An examination of my own 1:50,000 scale maps of the area between Independencia and Morochata, yields the locations of both of the Estancia Choros mentioned by J.Donald, neither of which are anywhere remotely near any other R.Cocapata or Estancia Cocapata or Casa de Vinto. Nor do these maps locate a place with the name of Tapacari anywhere in the area of Santa Rosa.

It was from Estancia Choro on the R.Cocapata that Cardenas' two travelling companions took the mule track in the direction of Cotacajes, to Naranjito (page 159 of Cardenas' autobiography) where they found *Rebutia glomeriseta*. Both the Rio Cotacajes and the place Cotacajes, downstream along the R.Cocapata from the estancias Choro and Cocapata, are all marked on the map received from F.Brandt. About 20 km or so downstream from the Estancia Choro quoted by Cardenas, the R.Cocapata joins the R. Sacambaya to form the R.Cotacajes. Roughly 15 km further upstream from this junction, the R.Sacambaya collects the waters of the R.Negro, as the lower reaches of the R.Santa Rosa is called. When Ritter walked down the valley of the Rio Santa Rosa to its junction with the R.Sacambaya (Chileans No.41 p.57-59) he passed a banana plantation. Ritter himself suggests an altitude of 1500 m for the floor of the Santa Rosa valley hereabouts. The junction of the R.Santa Rosa and R.Sacambaya will be at a lower altitude than that, and further downstream at the junction with the R.Cocapata it will be a lower altitude still, and further down the Rio Cotacajes, to Cotacajes itself, will almost certainly be orange growing altitude. Hence the Naranjitos (little oranges), as J.Donald observes.

This puts the locality for *S.glomeriseta* some 40 km almost due north of Independencia as the crow flies. By going west from Santa Rosa to Independencia and then south to another Est. Choros you do not reach Naranjito and the habitat of *glomeriseta*, as J.Donald states. The altitude of this Est. Choros, according to my 1:50,000 map, is some 3,350 m, a long way from orange growing altitudes; only by going an appreciable distance from this Est. Choros either west to the valley of the R.Ayopaya or east to the valley of the Santa Rosa, does one even get down to some 2,000 m altitude. The sketch map of the Ayopaya area in Chileans No.41 is not dead accurate but it does not unduly exaggerate the separation of the Cardenas' location for *S.glomeriseta* from the Estancia Choros south of Independencia which J.Donald mistakenly took for the habitat of *S.glomeriseta*. Before I had anything better in the way of a map of South America than a page in an Atlas, I was always puzzled and confused about the proper locations of the place names mentioned as the habitat for this or that species. Hence I can quite understand J.Donald getting mistaken when, as he says, he does not have a map of the area concerned. It would also have been helpful if he had made clear at an earlier date that he did not possess accurate information on the locations of these place names.

..... from A.W.Craig

When I was on a visit to Germany I called in to see one or two specialist *Sulcorebutia* collections and also acquired some very valuable information about habitat locations of a number of these plants, including *S.arenacea*. For HS 29, *S.candiae*, the location was "3 km nach S.Rosa, zwischen 2700-2800 m in Gerollkarger boden, kaum vegetation. Nach weiter 4.5 km kommen die Pflanzen in Gras vor." For HS 30, *S.arenacea*, the location was "wie Nr.29 ganz unten beim Fluss auf 1800-1900 m, feines geroll, keine andere vegetation".

..... from H.Middleditch

That throws considerable light on the apparent confusion over the original location for *S.arenacea* which was given by Cardenas. Setting off from Tirquipaya in the direction of Santa Rosa and travelling for a distance of 10-15 km along accepted mule trails brings the trail either to the Rio Santa Rosa or a main tributary of that river, i.e. the traveller is

standing "by the river" (beim Fluss). The slide which J.Donald showed to The Chileans' Weekend as the habitat area for *S.arenacea* would presumably be looking across this river; it gave the impression of being a fairly substantial river and it seems quite probable that it was the R.Santa Rosa. The further slide shown by J.Donald on that occasion showed *S.arenacea* growing in slate-like scree without any accompanying vegetation; I would have expected this to be described as "in gerollkarger boden, kaum vegetation" and not as "fine gravel". Very puzzling. It might be assumed that Swoboda had also managed to decipher the appropriate interpretation of Cardenas' original habitat data for this species, despite the discrepancy in altitudes. The reference to Tapacari as the habitat for arenacea, given by Cardenas to M.Bariatinsky and J.Donald when they queried Cardenas' original location data, smacks of the sort of answer you are likely to get if you ask the pirates how to decipher the cryptic clue on their sketch map as to the whereabouts of the buried treasure. Was it the altitude about which Cardenas had been misinformed?

Let us consider the two *Sulcorebutia* found by Ritter, one at and the other close to, the location given by Cardenas for *S.arenacea* (NCSS Jnl December 1961). Firstly there was the *S.arenacea* but with "spines between 5 and 15 mm long" and then there was also the "new *Sulcorebutia* but with spination similar to Cardenas' photograph of *S.glomeriseta*". The Cardenas' location for arenacea might have been interpreted by Ritter as between Tirquipaya and Santa Rosa, just as J.Donald (and doubtless many others) originally supposed. In the vicinity of Tirquipaya and Santa Rosa, at the 2,800 m altitude quoted by Cardenas for *S.arenacea*, there grows *S.candiae*. Does *candiae* exhibit spination from 5 to 15 mm long? The HS 29 occurs at 3km from Santa Rosa in "slate-like scree with sparse vegetation" and at 4.5 km from Santa Rosa, in grass. If we wish to accept that the Ritter finds were made when he walked down to the R. Santa Rosa (Chileans No.41) then he may well have reached the same site as HS 30, "by the river at 1800-1900 m".

..... from J.D.Donald

The slides of the habitat location and of *S.arenacea* itself, which I showed at The Chileans' Weekend, were taken by H.Swoboda and I understood from Swoboda that this was the R.Cotacajes, although it might not be so. Cardenas told us that the original collected plants of arenacea had died, but that he had sent more students to the area to collect both *R.arenacea* and *R.glomerispina*, and would send us some plants. This he did, also sending some to Mrs.D.Richardson at Roanoke, to De Herdt, to Marnier Lapostelle, and to several persons in the U.S.A. These plants were mostly very short spined, a dusty or sandy (arenacea) brown in colour, with the areoles very close together. A few had areoles further apart and more open spination, with pectinate spines very similar to the photograph accompanying the original description. The WR 460 plants had only one or two of the very short spined dusty brown plants, but rather more of the more open spined type, per the original photograph. The HS 30 plants on the other hand had none of the very short spined forms, but many of the 'Rausch' type and also, more interestingly, forms with much longer spines sometimes even porrect, which intergrade perfectly with *S.candiae*.

There are also the plants found in continental collections as *S.candiae* feine (FR 775a). They are soft brownish yellow spined plants with larger yellow flowers than the Cardenas form. They seem to fit quite well into the complex around Santa Rosa and occur on the canyon rim above the R.Santa Rosa. The seeds of the Cardenas' plants as I first received them differ somewhat from the Ritter ones, but nevertheless are still *Sulcorebutia* and not *Aylosteria* seeds.

..... from A.W.Craig

Plants of HS 30 *S.arenacea* which I have seen in cultivation certainly display a range of spination, all the way from pectinate adpressed spines barely 2 mm long, looking rather like *Reicheocactus*, to less adpressed spines up to 4 or 5 mm long as well as a porrect central spine some quarter of an inch long.

THE IDENTIFICATION OF TWO REBUTIAS FROM RITTER By G.Gusman

Translated by Mrs. L.Teare from *Dodonaeus* 3.1:65

In a previous article I talked about *Rebutia glomerispina*, at which time Prof. M.Cardenas had also sent me a *Rebutia candiae* Card. At the same time, but from another source, I received two new *Rebutias* from F.Ritter, catalogued under the numbers FR 774 and FR 775.

At first, the similarity between FR 774 and the *candiae* particularly caught my attention. From their external appearance these two plants seemed to be very closely related to each other. Nevertheless, in order to be quite sure about the identity of the FR 774 and of the *R.candiae*, it was necessary that FR 774, grafted on to *jusbertii*, should be degrafted, rooted down so that it would take on its normal appearance again, and then wait for it to flower. During the summer of 1964, both these conditions were realised and after a careful comparison of the two plants and from the original description given by M.Cardenas, I was able to reach a definite conclusion as to the identity of *Rebutia* FR 774 and of the *Rebutia candiae* Card.

This plant, when grown it is grown in the open air and in full sun, is almost completely covered by its splendid straw coloured spines and readily covers itself with beautiful gold coloured flowers during the summer. It is remarkable that among the *Rebutia* belonging to the *Sulcorebutia* group, *Rebutia candiae* is autogamous [self-fertile].

Very similar to that species, FR 775 also flowered abundantly during the summer of 1964. The long spines hiding the body almost entirely, vary in colour from white to pale pink. The flowers have long narrow sepals, sulphur yellow, purple at the tips. These two characters seemed significant enough to me to instigate a research amongst the existing diagnoses. As a result it appeared that the description of *R.menesesii* Card. agreed perfectly with the specimens of *Rebutia* FR 775 which I had in my possession.

As I did not notice any significant variations between my specimens of *R.candiae* Card. and *R.menesesii* Card. from the original descriptions, I did not think it necessary to reproduce them in this article. From a systematic point of view, both *Rebutia candiae* Card. and *R.menesesii* Card. are very close to *R.kreugerii* Card. and *R.arenacea* Card., which also have yellow flowers.

..... from A.W.Craig

I would be inclined to question the suggestion that *S.candiae*, alone among the *Sulcorebutias*, is self-fertile. There is little doubt that *candiae* will set seed quite readily when given suitable encouragement to do so with a brush, more readily than various other *Sulcorebutias* given exactly the same sort of encouragement. But I am not convinced that it is self-fertile. Unobserved chance flying visitors may easily have been the real cause.

..... from D.Aubrey-Jones

In my experience virtually all *Sulcorebutias* are self-sterile and will not set seed unless hand pollinated. A possible exception to this is a plant of *S.steinbachii* v. *horrida* that has set seed for a number of years without my help. But possibly some insects have come to its assistance! I have never found *candiae* to be an exception to the rule and this

species has never been self-fertile in my greenhouse.

..... from H.Middleditch

As far as it is possible to establish within the limits of the information available in Ritter's book "Forty Years Adventuring" and his "Kakteen in Sudamerika", Ritter did not make a trip to the junction of the R.Sacambaya and R.Cocapata and follow the R.Cotacajes down to Naranjito, which is the place given by Cardenas as the finding place for *S.menesesii*. Yet he lists his FR 775 as *S.menesesii*. It does appear to be quite probable that Ritter collected both FR 774 and FR 775 on his trek down to the R.Santa Rosa valley (Chileans No.41), one of them being like *S.arenacea* but with spines 5-15 mm long, the other a new *Sulcorebutia* (NCSS Jnl December 1961). There is always the possibility that plants conforming to the description of *S.menesesii* occur both at Naranjito (near Cotacajes) and in the vicinity of Santa Rosa, but this would be a little surprising in view of the different ecology of the two habitats.

..... from J.D.Donald

On the ground the habitat of *S.menesesii* has been established as the area between Santa Rosa, Independencia, and the Hacienda Choros south of Independencia - WR 603, FR 775, HS 186 etc., Lau 974 and Vasquez' *S.muschii*.

..... from A.W.Craig

Other acquisitions from my visits to *Sulcorebutia* collections in Germany were three or four clones of HS 29, *S.candiae*. These have been carefully crossed and the resultant seedlings have now flowered. I also obtained two offsets from imported plants of HS 30, which do indeed have very short pectinate spines, but not as short as on "Reicheocactus" for example.

SOME HS SULCOREBUTIA By K.Augustin

Translated by J.Brickwood from K.u.a.S. 36.7:1985

To begin with, I will look at two already well-known species of the genus *Sulcorebutia*, namely, *S.candiae* (Cardenas) Buining & Donald and *S.arenacea* (Cardenas) Ritter. Both of these species were originally described by Prof. Cardenas as species of *Rebutia*, in the U.S. Cactus & Succulent Journal; *Rebutia candiae* in 1961 and *Rebutia arenacea* in 1951. Their transfer to the genus *Sulcorebutia* was later carried out respectively by F.Ritter and by A.Buining and J.D.Donald.

The distribution area of these yellow-flowered representatives of the genus was originally cited in the first descriptions as being Bolivia, Cochabamba Dept., Ayopaya Province, near Tiquirpaya. Quite remarkably in the context of these statements as to the habitat areas is the fact that a place called Tiquirpaya has neither been located on any relevant map material for this region, nor even in the field itself. Both species were actually discovered in the immediate surroundings of Santa Rosa in Ayopaya province.

Sulcorebutia candiae (HS 29) was found growing both on stony, otherwise vegetationless ground, and amongst grasses, albeit exclusively at altitudes between 2700 and 2800m. At the habitat location, the established, widely scattered plants correspond absolutely with the descriptions known to us at present from the literature. The spination varies from white, through yellowish, to brown. The sole discrepancy from the observations made in the first description is that of the 'slightly zygomorphic flowers', which we cannot confirm or agree with. At the time of the discovery (at the beginning of October), certainly the first few plants were beginning to come into flower. Most plants were in bud and displayed (as had already been confirmed by plants in cultivation) both brown and green coloured buds.

Sulcorebutia arenacea (HS 30) grows, of course, on the same mountain slope as HS 29, albeit there at a lower location, at an altitude of between 1800 to 1900m, on the steep banks of a small river and in the pure gravel there. In contrast to *S.candiae*, whose population comprises widely scattered plants familiar to us through comparison with cultivated plants, we must paint a somewhat different picture for *S.arenacea*. Foremost in this picture is that the body size and spination in part differs very markedly from that given in the original description. The plants were found up to 10 cm tall and up to 13 cm broad and, moreover, with a spine length of up to 2 cm long.

In spite of these, to some extent very significant, deviations from the original description, in my opinion these plants do not warrant any additionally allocated names to this species, especially since various transitional forms merging into one another were observed at the habitat location.

THE HS SULCOREBUTIA FROM AYOPAYA By K.Augustin

Translated by J.Brickwood from K.u.a.S. 42.8:1991

In the northwesternmost Bolivian province of Department Cochabamba, namely Ayopaya province, the so far westernmost and northernmost *Sulcorebutias* were discovered. Thus from this area, the well known species of *S.arenacea*, *S.candiae*, *S.glomeriseta*, *S.menesesii*, together with the *v.kamiensis* and the *v.muschii* of the latter species, were found to occur, examples of which are already established in our collections. Plant material relating to these occurrences therefore presents no mystery as such to us. However, far less satisfactory is the absence of more precise statements about the topography, climate, and accompanying flora in the habitat areas, or simply even about the variation in form of the individual species themselves.

Already there have been widely differing statements regarding the altitudes of the quoted locations of these species, indicative of just how speculative the habitat information actually is in the literature. To resolve the situation further and to provide this missing information, does one have to go and collect it oneself? Given that position, it was almost a necessity to make a tour of Ayopaya province. This certainly presented terrible problems in trying to pinpoint locations and to correct mistakenly quoted habitat areas, since merely to travel throughout the *Sulcorebutia* habitat area itself proves very difficult and arduous, let alone actually finding the cacti themselves. One could fill several pages merely accounting for our week long journey in Ayopaya province. However, let us concentrate on the *Sulcorebutias* of this area, whose habitat we must study afresh and which occur at such contrasting altitudes (e.g. 1200 m for *S.menesesii* and 4000 m for *Sulcorebutia* sp. HS 191).

The *Sulcorebutias* hereabouts grow as isolated succulent plants in the margins of the jungle areas. Despite the arduous journey, our work was successfully crowned by the discovery, all told, of nine habitat locations of *Sulcorebutia*. This enabled us to record a whole series of observations regarding the habitat locations of all the presently known *Sulcorebutias* in Ayopaya province, whose relationships we consequently began to view in a rather different light. Two of these habitat locations (for *S.candiae* HS 29 and *S.arenacea* HS 30) have previously been reported. Both of these

populations lie, of course, in the vicinity of the settlement of Santa Rosa and are distinguished through a considerable difference in altitude.

At an exceptionally low altitude of only 1200 m (at least for this genus) between Cotacajes and Choro, *S.menesesii* HS 210 was discovered. In the valley sites in this region the local Indians grow agricultural crops and tropical fruits, the few habitat areas suitable for cacti actually occurring hereabouts only as rather tiny 'dry islands' on the margins of the jungle area. Here, accompanying HS 210, there also grows a small, white flowered *Echinopsis* (HS 208) and a *Parodia* (HS 217). The latter appears to be a form of *P.ayopayana*. On the basis of extracts regarding habitat information in all the relevant literature, we can but only conclude that somewhere hereabouts there also grows *S.glomeriseta*, a species which still lacks an HS field number to this day.

The next HS *Sulcorebutia* discovery we made lies just south of Independencia, the main town in Ayopaya province, in the vicinity of the tiny indian settlement of Callasingra - a settlement which was, admittedly, not marked on our maps at least, and a place which we came across purely by chance. As we arrived at the few huts situated at 3500 m altitude, we became something of a sensation amongst the locals, who perhaps still talk of 'those strange visitors' to this day. A question which we immediately (quite naturally) put to the locals concerned the whereabouts of any small yellow-flowered cacti, and we were certainly very pleased when they replied that one grew in the vicinity. However, the term 'vicinity' was evidently loosely used on their part, since it took half an hour to get to the habitat area of the *Sulcorebutia* sp. HS 189 and, as it turned out, also to that of the *Sulcorebutia* sp. HS 189a. These plants grow at an altitude of 3250 m (both populations) on gravelly hills about 500 m apart from one another. Both populations observed certainly only represent one species - the distinct field numbers should merely be taken to represent their slightly separated habitat areas.

Amongst both populations, it immediately became obvious that there was a great diversity of form between individual plants, particularly with regard to growth habit and spination. Especially striking, however, was the fact that the plants often had tremendously long taproots. Such roots up to 40 cm long were commonly attained, and that attached to a plant body only 2-3 cm diameter in the crown. In all truth, there were plants at these two locations equating to both *S.candiae* and *S.muschii*, and everything in between, leading us to have terrible doubts as to the validity of so many "species" said to occur in this area. A similar picture was provided by another habitat area in the vicinity of the village of Charahuayto, at an altitude of 3900 m, a good 15 km to the north of Kami (though south of Callasingra). We had previously learned of this location since it was marked on our maps, and we spent three days hereabouts, albeit days spent very agreeably, of which we have fond memories. We had sufficient time in this area to appreciate the peace and quiet of the surrounding landscape, with the bonus of the following discovery. Somewhat west of this village, at 3750 m altitude and again on a gravelly hill, we discovered the *Sulcorebutia* sp. HS 188. The plants in this population strongly resemble those from Callasingra, although in general they are characterised and distinguished from the latter, by a somewhat daintier spination and growth habit. The plants perhaps here most closely resemble the already familiar *S.muschii*, whose habitat area is so vaguely spoken of. The accompanying flora of this habitat area included a very large population of a dainty species of *Puya*, growing to about 50 cm tall, together with enormous cushions of *Lobivia caespitosa*, though the latter was never observed growing in immediate association with the *Sulcorebutia* plants.

As a result of further exploration in the area surrounding the settlement of Kami, we made more *Sulcorebutia* discoveries. This location is already familiar through the discovery by Lau which bore the provisional specification "*S.kamiensis*", and thus it was a natural area for us to explore. This plant was, of course, later placed as a variety of *S.menesesii* (Lau 974 was the relevant field number) as described by Brederoo and Donald. It soon became apparent that the Lau discovery was not made in the immediate neighbourhood of Kami as such, but instead, in accordance with the literature, has its habitat about 12-15 km southwest of Kami. However, we ourselves found two *Sulcorebutia* locations close to Kami; the *Sulcorebutia* HS 191 at 4000 m and HS 191a at 3600 m. To clarify any confusion, it must be mentioned that there are two places called "Kami" in this region - on the one hand there is the old indian settlement at 3900 m altitude, while on the other there is the much larger mining settlement located somewhat further west. Both HS 191 and 191a come from the area surrounding the mining settlement. Both of these field numbers probably represents a single plant community, which became divided only through the construction of the mining settlement. This supposition is probably confirmed by the fact that the lower lying population of plants is only a very small location as such, and the plants can only really be found growing around the large cemetery located there. The degree of variation shown by the *Sulcorebutias* of Kami resembles that of those found at Charahuayto, but if anything they are perhaps even slightly daintier spines, less robust plants.

Although all the *Sulcorebutias* found in Ayopaya province vary enormously, particularly in their growth habit and spination, they do exhibit overall some similarities and also some distinguishing features. A few of these may be stated as follows: The flower colour is predominantly a homogeneous shade of yellow (only in two cases was a deviation to an orange colour observed); the taproot is often enormous in proportion to the plant itself; finally above all the situation of the individual populations varies in altitude. In fact, nowhere else within the distribution area of this genus does there occur such extreme differences in the altitude of habitat areas as occur in Ayopaya province. This has led us to believe that former opinions on the *Sulcorebutias* occurring hereabouts can be improved upon.

Brederoo and Donald recognised the species *S.glomeriseta*, *candiae*, *arenacea*, *menesesii* and a couple of varieties of the latter from the plants growing in Ayopaya province. On the basis of the precise locations now being better defined and pinpointed in most cases, this is a view which must now be changed. Let us take, once again, *S.menesesii* as an example - the northernmost occurring species and the one found growing at the lowest altitude. The varieties currently placed under *S.menesesii* occur in the southernmost part of the region, and grow at much higher altitudes, whereas in between the populations of the species and its named varieties there occurs *Sulcorebutia* populations suggested to be quite independent species, according to the literature. One must also bear in mind the tremendous wealth of forms (from *S.candiae* to *S.muschii*) which we discovered near Callasingra, which prompted one to recognise that momentary divisions of plants based upon the appearance of a few individuals is not a very good method of naming taxa in reality. It should also not remain unmentioned how great is the variation between plants of both *S.arenacea* and *S.candiae*. Who, prior to this discussion, could have accepted that plants of *S.arenacea* may bear spines up to 4 cm long? But nevertheless, that is actually the case.

Consequently, we need to look a bit closer into the connections between this group of *Sulcorebutias* before we can clarify their evolutionary development and true relationships, which will respectively allow us to make a more accurate statement as regards their status and classification. We already have some fairly concrete ideas in this respect, but this must be saved for the not too distant future.

..... from H.Middleditch

From the remark by Augustin that "S.arenacea bears spines up to 4 cm long" we may go back to the opening section of this review, and note once again the observation credited to Ritter by M.Bariatinsky - "The length of spines [on S.arenacea] is frequently between 5 and 15 mm and can even be longer than this in some examples". And that in 1962!

LA PAZ TO COCHABAMBA By Alcide D'Orbigny.

Translated by H.Middleditch from "A voyage in South America from 1826-1833".

On the 17 July 1830 it was time for me to leave La Paz ... our first stop was at Calacote and on the next day we reached Palca. At six o'clock in the morning of the following day I climbed unhurriedly up the Palca valley, following the slow tread of the loaded mules. Reaching the head of the valley, at a spot called Pjacucho, our troop halted a short while to rest the mules, before the climb up the last stretch which separated us from the summit. I was surrounded by arid mountains whose rocks were hidden here and there either under some patches of turf, or under the permanent snow. Silence reigned supreme. The last stage which remained to be climbed was not the easiest, it was a very steep gradient, which had to be ascended by a path barely traceable on the bare flanks of the granite mountain, whose crevasses were full of ice. After having come to a halt more than twenty times, on account of the greatly rarified air, I caught sight of the stone cairn at the crest, indicating to me that we were about to reach the culminating point of our ascent.

Arriving at the summit of the Andes, admiration swept away the discomfort caused by the biting cold to which I was suddenly exposed and made me forgetful of the afflictions from the rarified air. I was so amazed by the majesty of the panorama that at first I only saw its immense extent, without distinguishing the details. The view of Tacora had surprised me; that of the whole of the Bolivian plateau had astonished me. By contrast, this enchanted me. This was no longer a snowy mountain which I seemed to perceive, no longer a vast endless plateau apparently lacking in vegetation ... everything here was different. Turning round to face in the direction of La Paz, once more I saw the arid mountains under the always clear sky, so characteristic of the plateau. At the height at which I stood, on all sides peaks covered with snow and ice. But, towards the Yungas, what a contrast! Up to 600 or 700 metres below me, mountainsides covered with a rich green carpet of turf, under a clear and calm sky. At that level, a vast screen of whitish clouds, looking like a huge sea which swept against the flanks of the mountains, and over which the more elevated peaks projected looking just like islands.

The whole of the mountains in this latitude exhibit a climate determined by the prevailing winds and the barriers which oppose them. On the whole of the eastern flanks of the Andes, the clouds exist continually, or at least during nine months of the year, only ascending up to a certain altitude. Below the cloud zone, between gaps in the clouds, I could see, at a tremendous depth, the deep bluish green of the virgin forests, which cover the ground there. My guides told me that we had already stopped here too long and obliged me to get on my way, as we were in danger of being overtaken by nightfall whilst still on the trail. So I was prevented from collecting many of the curious plants at this elevated place.

.... we descended to the hamlet of Tajesi where the grass gave way to the cloud zone. We stopped for the night at Cajapi, having eaten nothing since six that morning. Six leagues separated me from Yanacuche, for most of which I went on foot ... thence we went on to Chupe, where I was confined to my room for three days by the continuous rain from there we went on to Chirca, overlooking the Rio Chajro, with Milluhuala and Coropata on the opposite slopes. Three leagues from Chirca we reached Chulumani, where I stayed for twenty two days to put my notes and collected material in order.

It was then five leagues to Irupana, where everything bespoke prosperity. It was eleven leagues from Irupana to Circuata, starting with an ascent of the Coropata ridge, from whose summit I saw the snow-covered peak of Illimani. After a descent through the forest I came to where the Rio de Porocoto debouched into the huge Rio de La Paz. In place of the pleasant shaded banks of all the rivers of the Yungas, to my surprise I found here a beach half a league wide, entirely bare of vegetation, and covered all over with rounded pebbles, carried here by the floods from the other side of the Andes. It is exceedingly difficult to cross this river when it is in full flow. At this time the river is divided into many separate channels running through the pebbles. I crossed diagonally over at least two leagues of this ground, where nothing protected me from the rays of the sun, so it was with considerable pleasure that I arrived at the confluence of the Rio de La Paz with the Rio de Meguilla, where I once again found shade among the trees.

Ascending the right bank of the Rio de Meguilla, for the first time since entering the province of the Yungas, a change came over the vegetation and orography. No longer were there torrents enclosed by sides so steep that one could not follow their banks, no longer was there such high humidity. Here I found the first trees without leaves, where the onset of winter had left its mark. On reaching the confluence of the R.Meguilla with the Rio Canamina, I then followed the latter, leaving this in turn to climb to the village of Circuata. ... from there, after a descent to the R.Suri, came six hours of a very steep, difficult, hazardous, and laborious ascent, the like of which I had never tackled before this day. Having arrived at the summit of Viscachal, an immense panorama extended on all sides, with forest covered mountain tops as far as the horizon. Despite the peaks of Illimani being twenty leagues away, they seemed to be quite close. Next came the de la Cruz chain, some eleven leagues distant, from where the R,Suri descends. Descending as far as the woods, we were enveloped by night and pitched camp. A fire was lit and everyone settled into their saddles. The cold became so intense, especially towards dawn, that the ground became covered with frost; I shivered until the sun dispersed the mist that enveloped the mountain.

The next day I left Circuata behind to go to Suri, from where I had eleven leagues of country to reach Inquisivi. After Circuata the fine vegetation of the humid regions gradually faded away, being replaced by a less varied ensemble. After Suri the countryside became more and more arid, the further we travelled. The face of Nature had changed completely. Here were immense pasturages where I could see flocks of sheep; crossing fields of maize and of potatoes I came to the small hamlet of Charapacce.

At roughly a league beyond Charapacce I arrived at the summit of the Cocasuyo ridge, which separates the provinces of Yungas and of Sicasica. Facing me was the town of Inquisivi. On the first part of the descent I found fairly tall woods, but lower down these were replaced by bushes and by cultivated slopes. On reaching the river the heat made itself very evident but the waters of the river retain the temperature of the snows. On the ascent to Inquisivi the influence of winter was everywhere - the trees had all lost their leaves. Long tails of lichen hung from all the branches, the town of Inquisivi had been devastated during the fourteen year war of independence. ... the higher part of the surrounding mountains are covered with small bushes and with meadows, on which numerous flocks grazed. Corn and maize are grown on the less steep parts. The slopes, so arid in appearance, are visited by magnificent species of humming birds.

Leaving Inquisivi, after two hours' march I reached the summit above the very deep ravine of Titipacha, on the

other side of which lay the village of Capinota. But I struck off to go round the head of the valley, passing fields of corn, cattle, and sheep, and dwellings covered with straw, looking just like our french hamlets in the Auvergne. ... I reached the R.Tucumariri and visited the silver mines then went on to Capinota, whose surroundings presented the same aspect as at Inquisivi. On the way to Cavori I soon came to a summit where I experienced a biting chill. This was nothing like the surroundings of Yanacache and of Chupe. I was completely clear of the forest zone. Looking around from the mountain top I see nothing but clusters of stunted, thorny, woods, close to the mountain summits or in the bottom of the valleys. Elsewhere only small bushes covered with spines are to be seen, which barely exist in a very dry terrain. From this summit I set forth towards the R.Colquiri at the bottom of the ravine. The descent occupied four hours in the midst of scattered quebracho bushes, some tree-like cacti, and spiny mimosas, over a stony ground surface. The countryside was that much more desolate since it had been burned throughout, a short time previously.

This is a general practice in America to profit from the dry season by firing the countryside, in order to renew the pasturage and to discourage the bushes from sprouting. I have observed it in Corrientes and in the Pampas; I must have met with it again throughout the interior of Bolivia. It is thought that in this way a more tender new growth is obtained, more suitable for nourishing the beasts, and it destroys the reptiles together with all the animals which are not able to flee. In consequence it is a real calamity for the naturalist who finds nothing to examine.

Eventually I reached the edge of the river, where the heat was stifling. The river, low in water, twenty metres or more broad, ran forcibly amidst a strip of almost half a league in width, covered with rounded pebbles, entirely uninhabited. I halted for a moment and viewed the route which I still had to follow, which made me quite alarmed. Cavori lay on the other side of the mountain, so I had to climb at least as much as I had just descended, on equally abrupt slopes and by trails just as bad. The march occupied six hours, during which I found the same plants, the same aridity, as on the opposite slope. But the summit gave rise only to grasses and thistles which gave way, in many places, to fields of corn, potatoes, and maize. In the bottom of the valley, at one o'clock, the centigrade thermometer stood at forty degrees; at Cavori, at six in the evening, at six degrees. This difference made me experience a very brisk sensation of cold, which a particularly strong wind made even more intense.

From Cavori I followed the contour line along the mountain slope - called *ladera* - for some two leagues, crossing cultivated terrain all the time. Facing me, summits covered with snow; at my feet, the Rio Ayopaya. The faint track, high above the river, for a long while passed through arid terrain, burnt, covered with a sparse, dwarf, vegetation, characterised by a great number of spiny plants. At the bottom of the valley I passed through a narrow belt of mimosa and came to the broad belt of rounded pebbles, in the midst of which I found the river running with some force for a breadth of 25 to 30 metres. After having crossed the second belt of mimosa, I entered a veritable forest of cacti. I have already observed that where the mountains are warm and dry, they are covered only with trees having pinnate leaves and the cacti (often aborescent) constitute three quarters of all the plants. After an ascent of four hours, I arrived at the town of Machacamarca.

It is four leagues from Machacamarca to Palca Grande [=Independencia - H.M.]. From Machacamarca the track led me uphill until I passed into a deep gorge where I again met with thickets of the tree which I had first seen near the summit of the western cordillera on my route from Arica to La Paz. It is remarkable for the bark which consists of numerous thin layers like glazed paper. I left these thickets behind me and by a twisting path came to the grassy area which covers all the mountain tops. Arriving at the highest spot a view of immense extent opened out before my eyes. To the left, a gorge covered with gloomy forest; lower still, a broad cultivated valley which in the far distance joined another valley whose course was obscured by the intervening hills, the whole bordered on the horizon by a huge mountain chain, of which all the peaks, high and low, were covered with snow.

Whilst I was taking in the view, my pack mules and their muleteer had gone on ahead. I found myself with a choice of two tracks, with nothing to guide me. I was much inclined to take the better track, but shortly I saw below me the town of Palca Grande and realised that I had misled myself, so I retraced my steps. Two hours later I was down at Palca. This town is located in the bottom of a valley, surrounded by fields of maize and corn.

I left Palca to stop overnight at Santa Rosa, four leagues distant. On the way there I passed slopes now and then cultivated, with dwellings here and there, inhabited by the indians. That night was extremely cold. Next day, I found myself face to face with an arm of the Andes covered with snow, only being separated from it by the Rio de Ponacache. On the following day I went a distance of eight leagues to Morachata. Looking down to the bed of the river, en route, I was able to see the successive zones of vegetation; that of the cactus at the bottom, followed by the bushes, themselves replaced higher still by a pasturage extending up as far as the snow line. I descended rapidly as far as the R.Ponacache, by a poor track, down steep slopes, amidst spiny bushes and candelabra cacti, over ground covered with stones. After crossing the pebbles in the river bed I started up the flank of the snow-capped mountains, climbing towards the eastern Andes, passing scattered fields of maize and corn, as far as the hamlet of Chinchiri. I found myself looking at high mountains formed of red and violet sandstone, laid in horizontal beds. The more one ascended the less abundant became the cacti. Some trees grew even at the hamlet of Parangani, from where they were succeeded by fields of corn. The valley became appreciably narrower. Again I saw fields, and then, finally, the town of Morachata, the objective of the day's journey. Considerable poverty reigned in this village, where only potatoes and barley could be cultivated, on account of the altitude and the proximity of the snow line.

There were now only four leagues from Morachata to the pass over the eastern Andes. The valley I ascended was now an enclosed ravine. Cultivation ceased a short distance from the village and once again I found myself in the zone of pasturage where all the plants were reduced to a turf. The track became more and more difficult. On account of the rarified air there was a short pause every ten paces. At the first of these pauses I got off my horse to better observe and to gather several interesting plants. I was conscious of an intense cold and such was the effect of the rarified air that I could only make a few steps before being brought to a halt by a palpitating heart.

A short distance after the third pass, I started down into the rich valleys of Cochabamba and Cliza. Here were two immense cultivated plains surrounded by arid hills. It looked like the promised land in the middle of a desert.

..... from H.Middleditch

This travelogue covers only a small part of the very extensive travels undertaken by D'Orbigny in South America. Many of the place names mentioned by D'Orbigny may be located on the map of Ayopaya. On this route he starts by crossing the main chain of the eastern Andes near La Paz and continues along the same eastern flank until it recrosses the main chain above Cochabamba. The first half of this route passes through terrain more or less exposed to the rain bearing winds from the north-east and so carries a pretty dense cover of vegetation. The second half of his route passes through high ground deeply dissected by river valleys; this high ground extends well to the windward side of the main chain of the

Andes and D'Orbigny even notes that those peaks marked as Cordillera Cocapata on the accompanying map, are snow-covered. On this account the rain bearing winds from the north-east lose a great deal of their moisture before crossing the area drained by the rivers Santa Rosa and Ayopaya. As D'Orbigny notes, the consequence is that cacti are quite common in that part of his journey. He would observe the tall cereiform cacti, but this area also supports *Lobivia*, *Parodia*, *Echinopsis* and *Sulcorebutia*.

THE FACTS AND THE FABLES - RAISING PARODIAS FROM SEED By. W. Verheulpen

Translated by J. Brickwood from *Succulenta* 70, 7/8, 1991

The raising of *Parodias* from seed is perhaps a bit trickier than many other cacti and hence I will here attempt to consider this question in some detail. As with anything which can be a bit difficult to grasp, one should have a basic method to follow when sowing such seeds.

Since modern seed-sowing techniques, such as the Fleischer method for example, have already been fully described in various other cactus journals, I will not comment on these any further, other than to say that upon experimentation with this method I found it rather cumbersome and awkward to use. This rather tiresome method hardly produced a better crop of seedlings than more traditional methods, such as pots in plastic bags, for example. Nevertheless, my experimentation with Fleischer's method over a period of two years provided me with a good foundation of experience for the development of the technique which I currently use. It enabled me to establish some ground rules on which to take bearings and gain a more comprehensive insight into the techniques involved in raising these plants from seed.

The black-seeded *Parodias* have larger seeds that are approximately 1 to 2 mm in size and which are invariably black in colour. The white, corky appendix (strophiole) which *Parodia* seeds possess is not very big on these sorts. The seedcoat (Testa) is usually rough in appearance due to the presence of tiny tubercles. The small seeded *Parodias* usually have small fox-brown seeds of 0.5 mm diameter, or even much less. However, their colour does vary somewhat to darker shades, in some cases almost being blackish. These tiny seeds have a large or very large strophiole, generally whitish-yellow in colour and consisting of a corky material, which if nothing else, enables you to spot their position in the pot you have sown them in. The seedcoat is usually smooth and glossy.

The tiny seeds are best sown in large quantities, e.g. in portions of at least 100 seeds and preferably rather more. Why seed merchants should even bother time and again to supply the ridiculous packets of 20-25 seeds of the tiny-seeded sorts (*P. microsperma* type) is a mystery to me. It is a complete waste of time and money to purchase such small packets of seed. The tiny seeded species are more easily raised from seed if they are allowed to stand crowded together in the seed container until the young plants are around 2 cm or so tall. In this way they form a cushion or turf-like mat of seedlings, pushing away from one another as they increase in size.

The black-seeded *Parodia* need not be sown either in such large quantities (the smaller packets of seed may suffice) or so close together, since they generally grow better as individual young plants and they need more elbow room. Both seed types are best germinated and grown on in a completely closed system, for example by sowing in plastic flower pots which are then enclosed in plastic bags. Any sturdy seed tray can also be adapted as a container for germination providing a sufficiently watertight cover can be provided to maintain a closed atmosphere and which still provides some headroom above the level of the compost.

Seed Compost One should aim for a gritty and mineral-rich porous compost. This may, for example, be comprised of crushed lava fragments, or broken pieces of argex, broken and weathered fragments of old clay pots, plus a small amount of Rhine sand, etc. It should contain no more than 20-30% of a humus-rich potting compost to which, say, sphagnum peat should be added, not the least to provide a check on any potential souring of the compost. Up to 10-20% of crushed charcoal (active carbon) can also be incorporated. A household sieve with a mesh of about 1 mm is very useful in order to separate the coarser material.

It is a good idea to prepare and thoroughly mix together the compost ingredients some time prior to sowing, say three months beforehand, and then store it in a rather dark and slightly damp environment, so that at the time of sowing the ingredients will be completely integrated. One must not be afraid of the development of any moulds in this compost - a truly good seed compost will not form any moulds under such storage conditions. If the compost does develop any mould, then one should regard it as fortunate, since at least you know that the compost is unfit for use for sowing and you will be spared a tray full of dead seedlings or rotted seeds.

In previous years I used to sterilize my seed compost through steam or heat treatment but no longer bother. It entails a lot more work and is a very smelly process into the bargain. Furthermore it does not give any better results, either in terms of increased germination percentages or growth rates. At the same time it should be noted that by sterilizing the compost in such a way, any natural inhibitors of mould or bacteria, originally present, will be eradicated and thus leave the compost vulnerable to attack in this respect. If such problems do occur, large doses of fungicide can go some way to prevent harm to the seedlings, but it is rather like playing a game of draughts. My own experience suggests that when disaster does strike, everything is usually irretrievably lost anyway.

As protection against potential losses, the seeds should be treated with a fungicide: TMTD (which may also bear the different tradenames of Pomarsol or Thiram) is an excellent means of control for this purpose. It actively protects the germinating embryos against moulds, etc. With regard to 'wet' or 'dry' treatment methods, everyone has their own views on this matter. Personally, after years of disinfecting using a wet treatment, I now use a dry method. This is achieved by covering the seeds with a fine powder. It is easier to use, clearly more effective, and offers longer protection during the germination period.

Temperature The two *Parodia* seed types can be sown and germinated at a similar temperature without any problems but, of course, preferably not in the same pot or seed tray. This is because the black-seeded types grow at a faster rate than the small-seeded types and thus are ready to be pricked out at an earlier stage - an undesirable operation if smaller seedlings are growing in the same container, since it would check the growth of the latter if they were to be disturbed.

Extensive observations of seed raising over a period of about ten years seems to indicate that a daytime temperature that fluctuates between 24 to 28°C is ideal. However, the temperature must actually fluctuate, not remain constant! Occasional peaks of 40°C around midday in the summer will not result in any harm as long as the containers are protected by shading, for example by an old curtain or sheet, and as long as sufficient moisture is provided. The night time temperature must not fall below about 18°C and may fluctuate between 18 and 20°C. Experience suggests that temperatures below 15°C have very unfavourable influence on percentage germination.

A propagator of some sort that can maintain such a regime throughout the whole year should, in the case of Parodias, not be viewed as a superfluous luxury. However, the inventive amateur can, without much problem and for relatively little money, put together a home made propagator. This can be done, for example, by using the polystyrene wrapping or packaging material which one often finds encasing domestic appliances or glass products. The propagator should be constructed sufficiently large. Such structures can also be utilised for temporarily accommodating pricked out seedlings in need of a slightly warmer home. Such propagators will reward you by promoting faster resumption of growth at very little extra expense.

Watering Parodia seedlings need constant moisture to grow well following germination and once pricked out also need some ventilation as well. However, it is not advisable to ventilate at an early stage, especially not the tiny-seeded sorts. If they are, one warm sunny day can result in irreparable damage or losses.

Sowing the seeds in a closed system - that is to say sealed in a plastic bag or other container - is now accepted as standard practice, not to say an absolute necessity. In such a closed system one must be careful even at an early stage to check for excessive moisture levels. On the other hand, some types of plastic bag imperceptibly allow a fair amount of water vapour to escape, resulting in the compost drying out. Freezer bags are probably the best sort to use. Undetected drying out of the seed compost is a much encountered problem using this method for germination. Nevertheless, one must not forget that "good humidity" is better than "sopping wet".

When to sow seed Perhaps the ideal time of the year which is most favourable for sowing Parodia seed is the autumn (from about mid-September to mid-October). Unfortunately the trouble is that no seeds are offered by the trade at that time of year, although fellow Parodia enthusiasts may be able to help in this respect if all else fails. A second favourable sowing period occurs in early spring, from February to March. Sometimes it happens that seeds sown in October do not germinate then as expected, but pop up the following spring instead.

Most Parodia species grow very well from seed in the spring and by the autumn have attained the size of a good pea. Occasionally one is lucky enough to find one or two have reached the size of a marble. However, if they still remain the size of pinheads by that stage, there is usually something amiss. Such small sized seedlings usually indicate that a cessation of growth has occurred. Even seeds sown in October often produce seedlings the size of a match-stick head come December.

Pricking out "Prick out seedlings when necessary". This is the usual advice given on the subject, but in practice it is not especially useful. The following example might serve as a better guide. If one sows the black-seeded Parodias in early March (at which time artificial heat is needed), then by about mid-July they will be around 0.5 to 0.7 mm in diameter, the exact size being dependant upon the species. These sorts can be pricked out at this stage, since before winter sets in there is still plenty of time for them to become re-established and to make plenty of growth.

The tiny-seeded species, if sown at the same time, will be around 0.3 to 0.5 mm in diameter by mid-July. At this size they are best left alone to continue growing in the same container, since these types often slow down or have a rest period during the winter. On the other hand, if by this stage they have made better progress or are already crowded tightly against one another and you feel that they could make better growth if transplanted, then so be it. Perhaps the most practical time for sowing seed of these sorts is at the end of January into early February, since by mid-July the seedlings will then be of a more satisfactory size to warrant pricking out.

Any left-over seed compost, or a general plant compost, can be used to grow on transplanted seedlings. The black-seeded types can be pricked out individually or transplanted in groups of three or four seedlings. The seedlings should be set fairly close to one another in the new container. If they then quickly press up against one another, then all the better, because this at least proves that they have continued to make growth, and if this happens by around mid-September, it presents no real problems with winter approaching when less growth is likely. At this time, the tiny-seeded sorts may be so closely spaced as to form cushions or mats of seedlings, the compost no longer being visible between them. These cushions of seedlings are best split up into groups of 5 to 10 plants which should then be transplanted fairly close to one another - about 5 mm apart may be sufficient. However, packed too tightly together can be a potential problem, since any affected by disease or with bruised bodies can die and may spread ailments to those surrounding them. Pricking out at this stage helps to prevent such problems.

Transplanted seedlings are best treated at once with a fungicide. A suspension of, for example, Captan in water is excellent for this purpose. A water-based 'wet' treatment is obviously more suitable and easy to use when treating seedlings. The purpose of this treatment at this stage is to immediately remove the threat of danger to the seedlings which are at that stage in a temporarily weakened condition following their disturbance. Having got them that far, one does not want to incur losses and have to start all over again. One must therefore take every precaution to ensure that the transplanted seedlings are in a healthy position to make further growth straight away.

Personally, I always try to prick out my seedlings before the winter. On some occasions, however, I have been unable to do so, and then I did not have much success. Throughout the winter the plants continued to grow to the extent that they started to heave themselves out of the pots and were crushed together so tightly that some were virtually flattened. Such a potential source of damage to young seedlings can be the start of a wholesale attack by bacteria and moulds, and in the winter these are rather difficult to combat. However, a dry treatment with Benomyl (Benlate) mixed with fine sand, together with charcoal powder as a makeweight, can frequently work wonders in this respect.

Overwintering seedlings Any seedlings left in their original seed containers for their first winter will make further growth. The shortage of light during mid-winter is quickly compensated for in the spring. Those who believe that the spaces between their pricked-out seedlings will remain constant and not become smaller during the winter are mistaken. In fact, the pricked out seedlings can grow quite quickly, until around May in the second year of growth they may reach 1 to 2 cm in size and can then be potted up. However, even at this stage the grower is recommended to plant them together, for example in larger polystyrene trays.

The trend towards seed-sowing methods and timing related to the plant's natural habitat behaviour (i.e. sowing in the early spring) does not mean that one can abandon caution. The colder spring days will still require the aid of an artificial heating like, for example, an electrically heated mat, in order to avoid mishaps. Seedlings germinated in October that are pricked out the following May (at about 7 months old) can attain a size ready for potting up by early September. Sometimes the results are so good that surprisingly few or even no seedlings may have been lost at that stage.

Cookery book recipes do not apply in the hobby of growing cacti. The success of recipes is too dependent on local conditions to be anything other than of only general use. For that reason, one must view the methods outlined here only as a substantial backbone around which one can experiment.

..... from H.Middleditch

It was, I believe, in 1964 that our Cactus coach tour went to Austria and Czechoslovakia. If I recollect, we were able to visit the Fleischer collection during our stop at Brun, but unfortunately I do not remember any details of the Fleischer seed sowing method.

..... from W.Verheulpen

To refresh your mind about the so-called Fleischer method of sowing, it involves the use of large glass jars. These are usually the types used for home bottling of fruit or vegetables. The soil has a large mineral content. Sterilisation in boiling water of the jar and its contents results in a completely sterile environment for sowing. Plants are often kept for one year or longer in this jar. If not opened, bacterial or fungus attack is almost completely excluded. In order to test it out, I used it for a few years before developing my own method. In exchanging ideas with the people in our botanical department it was even suggested that soil sterilisation is to be avoided since it destroys all biological micro-life in the soil. My own experience in this field showed that a sterilised soil is not able to defend itself against any attack of bacteria or fungi. Even treatment with fungicide proves almost impossible or ineffective on thoroughly sterilised soils. That was another reason for me to drop the use of the "Fleischer" method, in addition to the large amount of work entailed.

..... from J.Brickwood

My own method of sowing *Parodia* seeds is to use 2" pots, sowing up to 100 seeds per pot, which are then covered with cling film. The compost is a mixture of J.I. No.3 plus a small amount of coarse sand. I find the proportions of these two composts quite critical, for the following reasons.

Since the germinating seedlings, like pinheads, are far too small to prick out for a considerable time, a long stay in a richer No.3 compost increases their growth rate compared with the use of standard composts. The first two months or so are the trickiest. Germination can take 2 to 4 weeks and higher germination rates seem to be obtained when the compost is barely moist - when it is beginning to dry out. Soaking wet compost usually results in very low germination. Spells of diffused sunshine, such as through a net curtain, seem to promote germination, but the seedlings need semi-shade to grow well following germination. They do not like to be dry for too long during the first three or four months. If a crust develops on the compost, both germination and growth of young seedlings is inhibited. Since they only have a tiny hair root (often just one) a few mm in length, such surface caking can be disastrous, hence I do not add much sand to the compost, less than 10% in fact. Likewise I never cover the seeds with sand or anything else after they have been sown. To me, the biggest hazard is the growth of algae. Very little sand sprinkled finely amongst the seeds, over the surface of the compost, can help in this respect. But I generally find that if algae comes then there is virtually nothing I can do to stop it! Sometimes the seedlings grow on regardless, but if algal growth occurs before germination then you cannot expect anything from such tiny seeds. This problem only seems to affect some pots, not all of them.

Every time I water the seedlings I use a weak solution of feed, and this can be every other day during sunny weather. This does not result in overblown or leggy seedlings because the growth rate is so slow anyway. I allow the pots just to dry out between waterings. In summer the *Parodia* seedlings come out of the propagator, since they do not benefit from the bottom heat at this time. They grow very happily under the staging in my greenhouse from about early May to the end of August.

Another crucial factor, I feel, is to keep the small-seeded sort of *Parodias* going throughout the first year and a half. Consequently, in mid-September I put the pots back into the propagator and keep them ticking over during the winter - unlike some other types they do not etiolate with this treatment. The benefits are enormous - at one year old from seed you can have seedlings a cm or more in diameter, compared to 3 to 4 mm for others not kept moving during the winter. From about one year old, I prick them out into seed-trays in closed spaced rows. They tend to form a far superior root system here than if grown on in pots. The large-seeded sorts do not require to be returned to the propagator for winter and can be allowed to rest until the following spring.

During the winter the small-seeded sorts of *Parodia* seedlings usually turn a purplish, reddish, or brownish hue and at the same time they withdraw somewhat into the compost. This was something which rather alarmed me the first time I grew them from seed, but evidently this is quite natural and does not signal their imminent demise!

I cannot accept the suggestion by Verheulpen that a mineral-rich compost should be used for *Parodia* seeds, since it would be prone to drying out very quickly - probably in hours if a heated propagator was used, even in an enclosed environment. I also think that there are pitfalls to growing seedlings in a closed system for too long a period following germination. Foremost being the tendency for the resulting seedlings to be 'soft' with sparser or weakly developed spination. But otherwise I find myself in general agreement with what he says.

..... from R.Moreton

The problem with algae I would put down to poor drainage and this should not happen with a seed compost of peat + grit or coir + grit. Nowadays I use a seed compost made of roughly equal parts of grit and coir (coconut fibre), not just for the fine-seeded *Parodias*. Indeed my recent late autumn sowing of these sorts has resulted in considerable success, far better than I have had for a long time in fact. The seeds were sown in 2 inch square pots and twenty four of these just fit into a standard seed tray, the whole then being covered with cling film. This obviously retains a very high humidity. They are then put in the propagator at 70°-75°F. Within ten days I had a very high germination rate - only one pot with nothing showing.

..... from R.Allcock

After germination, and when they are of suitable size, the small seeded sorts of *Parodia* are not pricked out individually. I wait until they are trying to squeeze themselves out of the pot, then they are broken up into smaller clumps.

..... from M.Muse

The situation in respect of the germination and raising of *Parodia* from seed is, I think, more complex than the account by Verheulpen would have us believe; some of the further considerations are addressed by the contribution from J.Brickwood, though by no means all. Having said that, one might look in vain to find a better account (or perhaps any sort of account) that is *Parodia* specific.

My own *Parodia* seed has come from four different sources. All species came in the standard form of 25 seeds per packet and by the look of the results barely a month after they were sown, this quantity has by no means been a waste of time. Whilst some germinations represent only two or three seedlings, others are like mats of cress and the two cannot be separated on the basis of small or large seeded types; if a pattern exists one must look to other factors.

My seed is usually sown during February and relies upon a growing medium made up of 50% 2-3 mm top dressing grit and 50% peat based universal potting medium such as Levingtons or Arthur Bowers. These latter contain lumps of peat and rush fibres which I either remove or break up when preparing the mix; with the broken fibres they go into the bottom of the pots both to prevent loss of medium through the drainage holes and also to hold moisture. The 2" square

pots are filled to the top with the mixture, tapped to settle them, labels added, then the seed is sown. A total of twenty four pots are accommodated in an 8" x 14" seed tray which are then soaked in rainwater containing 1 gm per litre of Chinosol (Hydroxyquinoline sulphate). As soon as the surface of the media in the pots is thoroughly wetted, the seed tray and contents are left to drain for a few minutes before being completely sealed in industrial stretch-wrap cling film.

Three of these trays can be accommodated on my 24" heat mat which has a separate temperature control unit, whilst a further tray and a few individual pots are accommodated in my Ward propagator, whose heat cannot be controlled and whose heat distribution is uneven. As a precaution against reddening of seedlings, the heat mat and the Ward propagator are covered with a sheet of white plastic of the sort used for bin liners; this allows through a decent level of light and I am indebted to Chris Pugh for this idea. The propagation enclosure itself has a roof made of rigid clear plastic sheet which is angled north at a pitch of about 20° and this lets in enough light during the early months.

The biggest single problem in the past has been growth of algae at the surface of the media. This is not merely a question of drainage since in 1991 I sowed a similar quantity of seed in a 70/30 grit vermiculite mixture and if anything algal crusting was even worse than usual, although all genera other than *Parodia* survived it very well. If I recall correctly, Chris Pugh told me that he was not bothered with algae, so perhaps the white plastic may demonstrate that it has some bearing on this problem?

One interesting and possibly relevant observation made this year is that whilst the small seeded sorts are almost dust-like at the time of sowing, examination with a hand lens reveals them to be quite swollen and globular after about two weeks. If this occurs then in my experience there is a very good chance that the seed will germinate a week or so later. If there is no sign of swelling after two weeks, then it seems most unlikely that germination will occur.

Experience this year suggests that if a lesson is to be learned about raising *Parodia* from seed, it seems to be that a combination of damp compost, neglect, and shade plus low temperatures, is more likely than any amount of care to result in success. Seed from Piltz, Lambert, and Neuhuber sown this year germinated and was taken out of the propagator when the seedlings were no more than 2 mm in diameter. They were then moved into the greenhouse and put under the bench; those sown in February are now almost 1 cm in diameter, having endured drenching, drought, and freezing. Plants left in the propagator seem not to grow much above 2 mm in diameter, even after six months, and eventually start to succumb to mats of algae or moss. In November I paid a visit to G.Hole on a bitterly cold day with strong winds and icy showers, yet most of his *Parodias* were still outside in the open air!

The accepted position seems to be that microspermae type seed has a low span of viability compared to other sorts of cactus seeds, but is this really a practical problem? What are the fruits of *Parodia* like; how long do they persist; at what stage does the seed mature; how large are the fruits and what is the typical seed count? Is there any uniformity in the environments where the small-seeded *Parodias* grow; can these sorts be understood in terms of such environments; what would be the utility of seed having a short span of viability? Do seeds of the microspermae sort need special conditions in order to germinate and is it this rather than a low span of viability which is the problem? I would like to make it clear that I have no knowledge of *Parodias* as such and at the moment my interest extends only to that data which might be useful in growing these plants from seed.

A JOURNEY TO THE NORTH OF THE ARGENTINE REPUBLIC. By F.O'Driscoll.
The Geographical Journal, 1904

For the purpose of description, our travel began at the town of Jujuy, the capital of the Argentine province of Jujuy - also the terminus of the railway from Buenos Aires and other parts to the south. For travel northwards from the town of Jujuy, arrangements were made for mule or horse troops. The Argentine government were continuing the railway past the town of Jujuy, with a view to eventually connecting with the railways in southern Bolivia. The route of the road and railway north of Jujuy follows a natural valley - a river bed, sometimes almost a canyon, that extends far towards Bolivia, with an almost unvarying northerly direction, and the valley rises the whole way with a fairly regular slope. In July 1903 the railway works had not extended more than 4 or 5 miles north of Jujuy.

Along the route, known as the Quebrada de Humahuaca, there are no special difficulties for railway engineers; they have simply to keep their line out of the river bed and push it northwards. There is however about 20 miles north of Jujuy a place that may cause some difficulty. There the valley is about 1.5 miles wide; to the west there was a chain of hills rising perhaps at their highest point some 2000ft above the river bed. One of the highest of these peaks on the eastern side was mainly composed of fine, pasty, argillaceous matter that in wet weather held water like a sponge. The side of the mountain nearest the valley had broken away and poured its flow of mud into the valley. Always in wet weather vast masses of this stuff slide down the sides of the mountain into the valley. The place naturally retains moisture long after the surrounding country is quite dry and damp mist sometimes fills the valley from moisture drying out of the mud-slide. When I passed over the place it was in the winter, when everything was dry; indeed, had I not experience of places similar to this in other parts of the world, I should have had much difficulty in believing the soft, jelly-like condition which the greater bulk of this vast mud-slide attains during the wet season of the year.

The valley from Jujuy northwards is the main road to Bolivia, over which almost all the loading from the northern Argentine railway passes daily. Mule-trains, with as many as fifty or sixty animals, were continually met. We rode for five days up the valley; sometimes it was two or three miles wide, sometimes but a hundred yards or so, rising slowly all the time, with a small stream, 15 to 20ft wide and 12 to 18 inches deep, rushing down somewhere over the interminable stones and boulders that covered the entire river bed. The hills on either side varied in contour every mile of the way; sometimes only a couple of hundred feet or so above the river bed, in other places rising to 2000 to 3000 ft high. At Jujuy the height was 4200ft and each day I travelled from 20 to 25 miles northward and rose about 2000ft. The second day out I passed Tumbaya. All along the valley, wherever there was a collection of houses, I was greatly struck with the character of the architecture; like Arab or Moorish villages, one great wall without windows surrounding them. Truly the occupation of Spain by the Moors has left deep markings, they even extended across to the new world.

..... from Colonel Church, Geographical Journal 1904

Mr. O'Driscoll has this evening shown us views over some of the tramping grounds of my youth. He has gone a little further to the north-west than I travelled, but where he left the country to the north, I went immediately northwards up the Rio Grande and reached Peru by way of Bolivia. Well do I remember that river; I never want to see another like it. For 250 miles up its boulder-covered bed it was nothing but jagged rocks. You may judge of the character of the riding when I tell you that I forded it on one day fifty one times. Such is the character of the country that the river is hemmed in by lofty mountains. One finally emerges from the headwaters of the stream and reaches the tableland of Bolivia.

..... from H.Middleditch

We have had occasion in previous issues to refer to the prevailing easterly winds which bring the summer rain to much of Brazil and its bordering lands, as well as to the flanks of the Andes in north-west Argentina which are exposed to these winds. Being obliged to rise in order to clear the Andean chain, these winds drop most of their moisture, the condensation forming a cloud which banks up against the eastern flank of the cordillera. At the Chileans' Weekend we were shown by R.Kiesling one slide of this cloud bank in Jujuy, and by N.Wilbraham another slide of the same sort of cloud bank at a comparable altitude in Tucuman. The same effect, somewhat attenuated, appears in certain major valleys; we have been shown a slide by J.Lambert of this same cloud bank at the head of the Quebrada Escoipe. In the Quebrada Humahuaca it occurs between Leon and Volcan and is in no way due to the "moisture drying out of the mud-slide". It is not only cactus writers who can misconstrue what they see and mislead their readers.

..... from L.E.Miller, In the Wilds of South America

Leaving La Quiaca the railroad winds upward through a narrow rocky gorge to the station of Tres Cruces, at an altitude of 12,400ft. From there it descends at a steep grade.... The rocky knobs flanking the gorge are old and weathered and very picturesque. A small stream winds back and forth across a boulder-strewn course; the water is clear and cold. About mid afternoon we encountered an abrupt change in the type of country. The bare crags and narrow, rocky floor of the gorge gave way to a wide expanse of brush covered land and green pasture. The change was first noticeable at a small station called Leon, elevation 5000ft. The vegetation grew thicker and the landscape more inviting as we continued the journey. At dusk we reached Jujuy,

..... from F.Vandenbroeck

The narrow winding roads from Salta north to Jujuy via Abra Santa Laura runs among densely wooded mountains. The magnificently luxurious vegetation gives evidence of periodical heavy rainfall. It was also raining heavily around Jujuy. The next day, getting over the clouds, reaching Volcan we left the rains behind us.

WHERE THE LOBIVIAS FLOWER By Ernesto Vatter

Translated and adapted by H.M.Roan from the National Cactus & Succulent Society Jnl 4.2.1949

In this article the reader will not find a scientific dissertation but a description of how I found my first Lobivias in their native home, high up in the mountains, growing amongst rocks and sand. For a long time I had wanted to visit the most north-easterly corner of the Argentine, the provinces of Tucuman, Salta, and Jujuy. I had heard so much about the wealth and variety of the cactus flora in that area that you will appreciate my eagerness to accept the first possible opportunity of making the trip which I had been dreaming about for so long. This dream became a reality in the 1930's.

Towards the end of November we were on our way at last. For a day and a night and another day I listened to the monotonous rhythm of the train wheels. Tedious to the others, the sound made music to my ears. On leaving the fertile maize and grain belt behind us we caught sight of the mountains of Cordoba. The countryside became increasingly drier and thorny bushes and trees ever more frequent. Then the first cacti, so long awaited, put in an appearance until they formed a ring of cactus forests around the Salinas Grande. Agaves in full bloom grew alongside the rails, pushing their flower stems up from 12 to 18 ft, each one topped by a crown of neat white bell-like flowers.

At Tucuman my feelings of anticipation were roused to fever heat as we reached the Cordillera where they rise from the wide expanse of flat country. Soon the train enters the steep gorges and valleys of the Andes and the thickly wooded mountain landscape meets the eye. The scenery changes rapidly whilst one is searching for the sight of the long-awaited cacti growing hidden amongst the undergrowth and bushes which cover the hillside and come right up to the railway track. By watching closely, quite a few different species can be noted. Where the wide valleys open out one can see the giants of the *Cereus terscheckii* without difficulty. The 10-hour journey through the mountains to Jujuy passed like lightning with all the beauties of nature to admire.

Early in the morning we left the town of Jujuy for the more northerly parts of the province where, at last, I was to search for and find the long-anticipated cacti. After a short journey by car through the sub-tropical forest we reached the Quebrada de Humahuaca. The character of the landscape alters rapidly. As we go higher and higher the luxuriant vegetation gives way to drier and more scanty plant life. The first cacti appear on the hillside growing amongst the broken rock. Veritable giants of their race stand defiantly in the mountain wilderness. Old plants of *Parodia steumeri*, *Gymnocalycium saglionis*, and *Echinopsis longispina*, not forgetting the massive pillars of *Cereus pasacana*, predominate here at a height of some 6500ft, growing high up over the bare mountain sides. During the afternoon we reached Tilcara, and the wonderful tour through this grandiose ravine came to an end. We discussed our plans and completed our preparations for the next stage of our trip and retired for the night.

At 5 o'clock in the morning we are ready at the foot of the mountains. I am wondering what surprises are in store for me and what secrets we shall uncover. Ancient giants of *Cereus pasacana*, overgrown with parasites, reach high into the clear mountain air. Bare rocks; only some low, thorny undergrowth struggles for its very existence in the clefts of these rocks. We climb higher and higher: not a sign of cacti anywhere. Surely there must be signs of plants soon ... We search carefully as we go along. At last! Unexpectedly we find it. In the cleft of a rock, almost invisible and hardly to be distinguished from the rock, we found the smallest Echinocactus, *E.liliputanus*. Resembling the stones in colour, pressed flat into the cleft, just like a dried-out little mushroom. Our first "find".

Greatly encouraged we continue forward and upward. After much arduous climbing we round a rocky promontory and we suddenly come upon a whole colony of magnificent yellow gold *Parodia chrysacanthion*. The plants had established themselves here in large numbers amongst the overhanging rock; crowded together, some plants up to 10 inches in diameter. An unforgettable sight. Still, where are the Lobivias? We are already almost 10,000ft up and the houses in the valley look like miniature toys. The air is pure and clear and the sound of a cock crowing down in the settlement seems to come from only just behind us. At each step we scrutinise the ground for cacti, but still no success.

Another 1000ft higher. At last! There, in sandy patches between the stones, we find the Lobivias to which we have looked forward and for which we have searched for so long. Some are almost completely covered by the sand, others are sheltering amongst the stones to which they closely approximate in colour. My joy knew no bounds. For the first time in all my travels I was seeing Lobivias growing in their natural home, singly and in clusters with up to 10 heads, some with short and others with long spines of many different colours, all of them covered with grey, brown, and black woolly flower buds. With each pace the quantity and variety of these wonderful plants increased. Here at a height of some 11,500ft we found a wealth of these rare and lovely plants each one more attractive than the next. The problem was which to leave and which to take. Not only had my haversack long since been filled to its utmost capacity but also a small sack

for fastening to the top of the pack.

After a good rest we had to think about the descent. At the last moment I could not, however, resist selecting another two magnificent clusters, one to be carried in each hand. All the plants were prolifically covered with buds and I was full of anticipation for the superb show I was going to have when the flowers opened in my greenhouse.

Now, laden with valuable plants to the utmost of our capacity, we start the descent. Hour upon hour, lower and lower, each step calls for greater effort. Our priceless burden bears down upon us and a rest is indicated. After a short break we carry on. How tired one gets. Pauses for rest become ever more frequent. Time presses as the sinking of the sun indicates the approaching evening. I make a vital decision and resolve to follow the watercourse as it is the shortest way down. With renewed zest I enter a ravine. How quickly one gets down the mountainside. I round a corner - what a disappointment! In front of me is an almost perpendicular drop of some 1000ft. Tired and discouraged I retrace my steps - back over the last hillock and down the other side to follow the watercourse again.

Everything appears to be fine until - I almost despair - another steep drop bars my progress. This time the action of the water has polished the rock surface until it is almost like a mirror. I close my eyes. In my weariness I consider the possibility of spending the night up here and going to sleep in the open. I am determined not to leave my plunder behind. After a more extended rest I take courage again and make a closer examination of the situation. A brainwave! I let my waterbottle slide down the steep cliff. In a twinkling of an eye it arrives at the bottom safe and sound. Incredible! What next? With a heavy heart I part with the two clusters of *Lobivias* I have been carrying in my hands and let them whizz down the slide. Amazing! These also arrive safely at the bottom.

I make up my mind. I am going to follow the same way! I suppose the rear portion of my anatomy will stand it, but will my trousers? I shall have to take the chance because it is already getting dusk. A brief moment for reflection - I'm off! I am shooting downwards! Before I can come to my senses I receive a hearty bang on the head and back and I somersault forward. I have arrived. Both I and my cacti are safe and sound. Everything is fine, only my trousers feel as they were on fire but even this passes off.

After repeating another risky performance like the one I have just described, I come to a bend where the ravine suddenly opens out and I find myself at the foot of the giant mountains, complete with my collected plants. The lights of the village are flickering just in front of me. In a little while I can quench the thirst which is tormenting me when I arrive at the hospitable village complete with *Lobivias*. Later when I settle down at Buenos Aires, the magnificence of the floral display of these lovely plants was such as to defy description. This is something each one has to experience and enjoy himself.

A MONTH IN SOUTH AMERICA By J-M Chalet

Translated by H.Middleditch from *Cactus* (Belgium) 7:2:1975

(At Tucuman).....The departure in the direction of Salta is arranged for 10.00 hours, but is put back from hour to hour as the result of a landslide which obstructed the track above Tucuman. The droplets of sweat dripped off my face - it was 36° in the shade. Departure was finally at 1300 hours. The track rose rapidly straight after leaving the town. A luxuriant vegetation took the place of xerophytic plants. The sky loaded with clouds threatened to open flood-gates just at the time that the cereoides made their re-appearance. On account of their height, they majestically dominate this vegetation formed of spiny bushes. Beyond El Molino cultivation re-appears in the shape of maize and roses. At 1700 hours the carriage reached Cabeza de Buey, whose environs are covered with *Opuntias* and *Cereoids*. Night falls and the cathedral bells of Salta ring out at 1800 hours, when the carriage reaches the mainline station. This town, situated at 1187m altitude, possesses a magnificent square - the Plaza of July 9th - which everyone has to visit.

On the following day the coach leaves at 0730 hours for Jujuy, a town which will be reached three hours later. All the length of the route and after each halt, I noted with admiration tinged with envy, the mode of driving of our coach-driver. With his left hand he holds the steering wheel and changes gear whilst with the right hand he enters the price of each journey on a cash register, alters or completes it in pencil, collects the money, refunds the change, and distributes the tickets. As Jujuy draws near, the fields of sugar cane give way to tobacco which is dried in the sheds with double walls in which a fire is made. A stop of 30 minutes at Jujuy, then departure in the direction of the Quebrada de Humahuaca. The road rises rapidly. Here and there, as at Maimara and at Purmamarca, this resembles the Grand Canyon of Colorado with the superimposed beds of strata passing from yellow to chestnut brown. And when it comes to volcanoes, the dream becomes reality.

After thirteen days of plane, bus, and train, at last I had come to the country of wonders. The first *Helianthocereus pasacanas* loom up at the turn of the road. Sometimes they cling to jagged slopes of the hills but most frequently they are grouped together among the fallen rocks. At a distance one gains the impression of seeing a telegraph company depot. Arrive at Tilcara (2461m) at 1245 hours. With an Argentine friend whom I met in Jujuy, we make a choice of a place to stay. The hotel Eden will be our depot, with board and lodging for a modest price - 10 Swiss francs per day. At the beginning of the afternoon, I set off in search of cacti. After having crossed the Rio Grande and the railroad, I reached the first patch of rocks which had fallen from the edge of the mountain; these rocks were composed of a conglomerate of large pebbles. Erosion is of great significance and confers on the countryside a most unusual appearance. At the foot of these escarpments are to be found the fallen rocks in which the cacti grow.

The ground is sprinkled with *Pseudolobivia longispina*, covered with superb spines; with *Brachycalycium tilcarensis* of which certain ones reach 40cm in height; with majestic *Helianthocereus pasacana*; with *Parodia tilcarensis* whose flowers vary from orange yellow to blood-red; and with diverse *Tephrocacti*. Towards the end of the afternoon, I crossed over through the village, in order to explore the other side of the valley whose vegetation is very similar but less rich. As dusk approaches the village comes to life and for a reason. This evening it is the Tilcara Fiesta. The indians from all the neighbouring villages flock hither. The atmosphere reaches a culmination when the "Frontier Indians" interpreted with an incomparable virtuosity the best known tunes of the indian folklore. To round off the evening, these musicians executed Mozart's symphony no.40 with their flutes and guitars. How amazing!

THE QUEBRADA HUMAHUACA By Barker Gonjian

Translated by Mr. & Mrs. P.Collins from *C.C.C.C. Argentina* Vol.14 No.2 1969.

In order to cover the 1600km separating Buenos Aires from Jujuy at a moderate pace, we took three days over it. The Route Nacional No.9 passes through the provinces of Buenos Aires, Santa Fe, Cordoba, Santiago del Estero,

Tucuman and Salta. It is surfaced all the way, except for some 80km in Santiago del Estero province, currently under construction. It is obvious that the traveller who is in a hurry can easily cover this distance in two days, but it is even more obvious that he will pass by without seeing much wonderful scenery and many historic places on this long journey.

The tourist, as he approaches the city of Jujuy, knows intuitively that he is going to encounter something different from what he has seen before, and he is not mistaken. The scene is unlike anything he has been acquainted with. The approach to Jujuy can be made by two different roads; one, fully surfaced, via Guemes, Pampa Blanca, etc., the other via the city of Salta along the wonderful road called La Cornisa. At the end of this road you can make a stop on the La Cienega dam to eat some of the delicious fried pejeney - freshly caught - that are the speciality of the sailing club restaurant. Then, as we get nearer to the city of Jujuy, there appear the typical tobacco plantations with their drying sheds and ovens, and in the suburbs, spanning its winding roads and slopes, great trees with quantities of epiphytic plants attached to their branches; though in smaller numbers than those found on La Cornisa, where there are places so shady that the sun's rays hardly seem to penetrate.

On arriving in the city we are agreeably surprised by the contrast between its modern shops, streets, cinemas, etc., and a part of the architecture that retains a definite colonial style. The 'coyas' - especially the women with their voluminous multi-coloured dresses and their children carried on their backs in the typical indian manner - provide a string of surprises for those who, like myself, come from a city like Buenos Aires. The city of San Salvador de Jujuy is situated at 1259m above sea level. It is hot and humid, reaching temperatures in excess of 40°C, particularly in the summer months, the time when my normal occupation allows me to take my holidays. It is the time of the heavy rains in north-west Argentina, and these sometimes cause veritable disasters, especially in the mountain gorges where the rivers, which normally carry a mere trickle of water, are changed into veritable torrents; the large amount of rainfall washes away the tree-trunks, rocks, vehicles and on occasions houses and bridges, having thus brought about more than one tragedy, with loss of life and much damage to property. I myself have on two occasions, along with my family, been obliged to spend the whole night between two sheepskins, waiting for the waters to subside so that I could continue my journey. On another occasion I was stuck in the middle of the river with my car for more than 40 minutes before a lorry was able to pull me out of this awkward situation. By good luck the river remained calm on this occasion, otherwise it would have washed us away with who knows what consequences for us.

Leaving the city of Jujuy we come upon the famous Quebrada de Humahuaca, the course of which is well defined from north to south. It has an approximate width of 2000 to 3000m. In its narrowest parts it is reduced to less than 100m, as in the case of Perchel and Volcan. When a cactophile first enters the Quebrada de Humahuaca, after covering his first few kms he begins to feel disappointment since the scenery is the same as that on La Cornisa and the approach to Jujuy, that is to say, large Thipas with trunks and branches covered by Tillandsias, Rhipsalis, Bromeliads, ferns, orchids, climbing plants, etc.

So he travels on with his gaze fixed on the hills trying to find a cactus, first going through the locality of Reyes, crossing the quebrada and river of the same name; great therapeutic value is attributed to its thermal waters and you can also hunt and fish for sport. After travelling 13km we reach Yala, famous for its lake, situated at an altitude of 2100m, where you can fish for pejeney and trout. So they say, but I spent the whole of one afternoon trying to catch something and was unable to pull out even a tiddler, notwithstanding that I have practised the sport of fishing for many years. To get to the lake you climb some 1000m in less than 7km along a road which begins at the highway we are travelling on and which is reasonably easy to negotiate despite its steep gradient and sharp bends.

Still continuing northwards, after travelling another 10km we reach the river and locality of Leon at an altitude of 1620m; in the 23km since Jujuy we have climbed 360m smoothly and almost without noticing. Past Leon the scene begins to change little by little. The vegetation is now less luxuriant and some cacti begin to appear, standing out between the rocks, especially *Cleistocactus strausii* v. *jujuyensis*, known to the locals as "cola de zorro" (fox's tail - P.C.) which at a distance resemble erect, white candles in candlesticks. If we go a little deeper into this region it is possible to find in the shadier parts and mingled with the ferns, beautiful *Parodia chrysacanthion*. I had to import it from France to have it in my collection - what will a collector not do when he wants a particular specimen!

After Leon there begins a fairly marked gradient, and once past this we reach Volcan, 40km from Jujuy and at 2070m altitude. In the 16km that separate Leon from Volcan we have climbed 450m. *Trichocereus pasacana* and *Gymnocalycium saglionis* have now begun to appear. The *Trichocereus pasacana* are still showing their white flowers; however the *G. saglionis* have flowered previously and are already covered with their purple-red fruits. At Volcan we have also found *Austrocylindropuntia vestita* which many authors ascribe to Bolivia. As we continue to ascend the Quebrada de Humahuaca, a deep and narrow valley with its sides bordered along the whole of its length by mountain ranges, its climate also is changing along with its physical features, becoming cooler and dryer. The height of the hills that bound the quebrada is in general some 1000m above the level of the road on which we are travelling and the highest point occurs on the outskirts of Tilcara, where at times it exceeds 2000m.

Still heading northwards along the Quebrada, Route Nacional No.9, or the Pan-American highway, joins several countries of our continent. A few Kms from Volcan is Tumbaya, a picturesque little village of the quebrada, and another 13km further on we come to Purmamarca. A road forks left to the village, where there is a church supposed to have been built in the mid-17th century. Going through Purmamarca this year we followed the quebrada which bears its name for about 25km, reaching an altitude of some 4500m; on this road we saw large numbers of *Trichocereus pasacana* as well as species of *Lobivia*, *Oreocereus trollii*, *Echeveria peruviana*, and right at the top, *Soehrensia* too.

Returning to the Humahuaca route we establish that we are 60km from Jujuy and at an altitude of 2193m. *Parodia maassii* has begun to appear, with big, strong, hooked spines and flowers of an intense orange colour, almost red. We have also found a couple of times in this area *Lobivia densispina*, which is scarcer every time, to the point that this year we have found very few specimens. It is in this part of the Quebrada, too, that the cactophile who is patient and searches very carefully, without losing heart, examining every crevice in the mountain, can with a little luck find the famous *Blossfeldia liliputana* which is the smallest cactus yet known, its diameter hardly exceeding 1.5cm, which grows in the crevices of rocks and has the same leaden-grey colour. Its roots are tuberous, seeming by their great size to be out of proportion to the stem, and its flowers are yellowish-white in colour. After the description of the size, colour, and habitat of this little cactus, my fellow-collectors will understand that I do not exaggerate in saying that it is very difficult to find, despite having it under our noses at times.

Going on for another 17km we reach Maimara and 18km further on we find ourselves in Tilcara, one of the most important villages of the Quebrada. We are at an altitude of 2460m, and turning right across a bridge which is the pride of the Tilcarensians, we reach the village, which like all the villages of the Quebrada is very picturesque with its adobe houses and narrow side-streets contrasting with an hotel of modern appearance and standards of comfort. You cannot

leave Tilcara without acquainting yourself with its important archeological museum and the no less famous Pucara, an ancient indian settlement situated on top of a hill. My attention was attracted by the curious fact that all villages of the Quebrada are on the left bank of the river, looking north, with the single exception of Tilcara, which is situated on the right.

Leaving Tilcara and continuing for a further 17km we arrive at Huacalera where I have spent my holidays every time I have visited the Quebrada. The climate of this region is cool and dry, being characterised by the wind that begins to whip up around 4 p.m., becoming gentler at nightfall, when the temperature drops considerably, at times to 0°C at the height of summer. Consequently it is advisable to wear an overcoat. The wearing of winter clothes has always caused great amazement in the majority of people, who are not acquainted with these regions of our country, and more than one has asked me if it was not a joke. It is generally believed that north-west Argentina is very hot, but again I emphasise that the unwary tourist will have much cause to be sorry if he visits these places without wearing enough protection against the cold, even at the height of the summer and despite the fact that Huacalera is located exactly on the tropic of Capricorn.

Several of the hills that surround Huacalera, Purmamarca and other places in the Quebrada have such an intense coloration that if we saw it reproduced on a painter's canvas we should think it an artistic exaggeration. In Huacalera and its environs many of the species of cacti that we have mentioned above are found in abundance, with the addition of *Austrocylindropuntia weingartii*, almost always squeezed between Jorillas and other spiny shrubs, as if seeking protection against the sun and wind. Here also are found *Tephrocactus longispinus* and *T. nigripinus*, *Lobivia longispina* and *L. ferox*, *Opuntia sulphurea* which is a veritable pest, and many other kinds of small *Opuntias*. This part of the Quebrada is without doubt a real treasure-chest for the enthusiast and it would be very interesting to explore it thoroughly. In January of this year we made an excursion on muleback which lasted all day, setting out at 5 in the morning with our friend Robert Sarkissian and a guide, and we saw several *Lobivias* and *Mediobolivias* unknown to us, in particular one that up till now has not been recognised by any of the people I have consulted, whether professionals or amateurs. We shall wait for it to flower to see if we can have it identified. Obviously it is very difficult to explore this area in summer, with limited time, and with the risk of a storm that might get us into difficulties. The ideal would be to have at least a month at one's disposal, between August and December, the best months for a cactophile being October or November, because many small species are easier to see, thanks to their being in flower at that time.

Huacalera is situated 2641m above sea level; continuing in a northward direction, at a distance of 29km, having passed Yacoraite (a subterranean river) and another little village called Uquia, we reach Humahuaca at an altitude of 2940m. This is a very old and picturesque village, typically colonial with such narrow streets that at times cars have to struggle to turn some of the corners. All along the Quebrada de Humahuaca the wood of the Cardon (*Trichocereus pasacana*) is used to make furniture, ornaments, and roof-stays - many old chapels have their roof frames, pulpits and large doors made of Cardon wood, which has completely resisted the effect of the weather.

Some 25km further north at about 3000m altitude the cactophile used to meet with a pleasant surprise, and I do mean, used to. In a clearing there used to be found *Oreocereus trollii*, without having to climb, and on perfectly level ground, with wool as white as white can be, shiny and silky. Unfortunately I was unable to see them in flower, since in January they already had ripe fruits and I had to make do with seeds and a few specimens, which gave me quite a lot of trouble to get out because of their thick, strong roots deeply embedded in the earth. The indians call *O. trollii* 'Vicunita' and 'Viejito' (little vicuna and Little old man - P.C.). Anyway, this area has been cleared and there are now very few specimens to be seen; presumably it has not been cleared by any collector. At approximately 3500m altitude appears *Helianthocereus poco*, known here as the Cardon real (Royal Cardon - P.C.).

Continuing for a further 15km we reach Azul Pampa with a prominent hill called Cuesta de Azul Pampa. Here in this part of the Quebrada can be found *Neowerdermannia* and *Lobivia muhriae*. We carry on for another 25km and arrive at Tres Cruces, which is the end of the Quebrada and also the highest point on the route, since we are now 3750m above sea level. In this place we are agreeably surprised by the discovery of *Oreocereus celsianus*, which differs from *O. trollii* in that its hair is not so thick and silky, it grows to a greater height (I have seen them over 2m tall) and it branches, something that never occurs with *O. trollii* which instead proliferates from the base, forming attractive groups less than a metre in height. Another interesting sight for the tourist is provided at these altitudes by the herds of graceful and haughty llamas that are to be seen in the fields on both sides of the route.

The road goes on across a plain, and after passing through the hamlets of Abra Pampa and Puesto del Marques, and then travelling 100km from Tres Cruces, it reaches La Quiaca, border of the Argentine Republic with Bolivia, at an altitude of 3442m. Thus ends a journey of almost 2000km, wonderful and unforgettable, of which I have tried to give only a superficial and general idea, for its beauty at times soft and gentle, at others wild and rough. Despite everything, this description is only a pale reflection of the feeling experienced by the traveller who has the good fortune to visit the Quebrada de Humahuaca.

REBUTIA GONJIANII sp. nov. By R. Kiesling

Translated by H. Middleditch from Boletín de la Sociedad Argentina de Botánica XV.1:1973

The cactus enthusiast Senor Barkev Gonjian has been President of the Cactus and Succulent Collectors' Club of Argentina (C.C.C.C.) for a long time. Some years ago he came across a species of Cactaceae whose identity he could not determine, to the west of Huacalera in the province of Jujuy. In January of this year he returned to the same spot and on this occasion he was able to collect specimens with fruits and seeds, together with some flowers, already dry but well preserved, which he was able to study. The excellent preservation of the dried flowers, which were over very unripe fruits, allowed them to be reconstructed and analysed. A few days earlier, the author, together with others, came across the same species, but only unfruitful examples, to the west of Tilcara, in the same province. I am grateful to Senor Gonjian for having returned to a place which is very difficult of access in order to search for this plant as well as having passed this new species over to me, which I now very properly name after him.

Roots fairly swollen, much branched, and sometimes almost as long as the aerial part of the plant, slightly or not at all corky, with fibrous branches from which extend the absorbent hairs. The geotropism is not always negative, since some branches are horizontal or even ascending, which produce new stems as they emerge (gemmiferous roots). Stems growing solitary or in clumps, sometimes fairly crowded owing to its gemmiferous roots, its seemingly easy germination and the abundant branching of the older stems. Stems more or less cylindrical, of some 15-20mm in diameter and up to 7cm in length, although generally smaller. Areoles elliptical, with some 12-14 adpressed spines, pectinate, 10 to 12 disposed in pairs, and the others at the ends, with swollen bases, colour dark chestnut and the remainder hyaline; with

short, sparse, woolly felt disposed compactly between the spines. The areoles are situated at the apex of the tubercles, which are aligned spirally, although in one narrow band in one specimen the tubercles were arranged more or less joined together into vertical ribs. The height of the tubercles is 2mm and their diameter 3mm.

Flowers located at the lower areoles on the stems, solitary, actinomorphic, of some 2cm in length. Pericarpel fleshy, with few scales; these carry a white felt and little hyaline spines, bent or curled at the tip, hair-like. In a narrow band between the dry perianth and the immature fruit is to be observed a definite abscission zone, which coincides with a complete ring of scales with abundant wool and several hyaline bristles in their axils. A few rows of tepals display the transition from scales, more or less fleshy, up to the petals, thin, spatulate, terminating in a long tapering point, of transparent colour, up to 1cm long. Stamens arranged in a single spiralling series which runs from the base of the internal tepals to the upper edge of the nectar chamber. This chamber is of some 2-3mm in length. Style cylindrical, which starts some 2mm above the cavity of the ovary, without any connection to the floral tube; it is some 10mm in length, does not project beyond the stamens, and terminates in a stigma with 6 blunt, papillate lobes of 1.5mm in length.

Ovary globular, with numerous ovules, of 3mm in diameter, somewhat depressed in the upper part, with slender whitish funicles, which join up in twos or threes forming a thicker placenta, arranged on the outer wall. Fruit spherical, dry at maturity, of 6 to 10mm in diameter, dehiscing transversely, pyxidious; surface without a hairy covering, with a few scales terminating in a short sharp point, somewhat fleshy, which carry prolific white hairy wool in their axils. Seeds of 1mm in length and somewhat less in breadth, dark chestnut colour, with a central longitudinal crest and a few others, sometimes not well defined, formed by warts and joining together at the apex which is consequently completely verrucose. Large strophiole, occupying the whole of one end of the seed, bordered by the outer integument which is darker than the remainder of the surface. The inner integument is thin, glossy. The embryo white, displays the terminal radicle barely discernible as an extremely blunt apex and does not display any cotyledons.

Material studied: Argentina, Jujuy, Department Tilcara, a four hour mule ride to the west of Huacalera, gathered by B. Gonjian 2 January 1973 - Holotype, La Plata herbarium; also summits to the west of Tilcara, more or less 3,500m above sea level, gathered by R. Kiesling no.334 with O.Ferrari, W.Rausch, and E.Zeher - sterile material, La Plata herbarium.

Geographical distribution. Province Jujuy, in hills of more than 3000m altitude, near to the summits, to the west of the Quebrada Humahuaca, from Huacalera in the north as far as Purmamarca in the south - this last location according to verbal communication from W.Rausch. Grows in fissures in the rocks, between herbaceous vegetation, in fairly humid atmosphere in summer on account of the clouds which come from the east.

Observations. In accordance with the Backeberg system, I would include this species in the genus *Mediobolivia* Backeberg, being related to the species of the series *Conoideae* Backeberg i.e. *Med. conoidea* (Wessn) Krainz and *Med. schmiedcheniana* (Kohl) Krainz and varieties.

..... from P.A.Smart

The original description of *Rebutia gonjianii* contains some rather surprising points - and omissions! I have certainly never observed offsets arising from the roots in the *Rebutinae* - in fact I can only call to mind such a phenomenon in *Notocactus* and *Echinocereus* within the cactaceae. But what is meant exactly by the term gemmiferous? The term means "having buds" by all accounts. Is this an identical process to the stoloniferous offsets I have referred to? Most of the *Rebutias* seem to branch from the stem, but in sheer definition, where does the stem finish and the root start? My own observations indicate that the buried stems in this group eventually seem to be absorbed into the root system and, in time, seem to become indistinguishable from them!

It is not quite clear whether the "long tapering transparent point" applies to the scales, sepals, or petals, or all three transitional stages. Nevertheless 1cm is an awfully long point and I have never observed such "points" on any *Rebutia* tepal. At this stage it becomes pertinent to ask why, in such an excellent detailed description, R.Kiesling does not bother to give details of the number, disposition, shape and colour of the perianth segments?

The fruit described is reminiscent of that of some *Lobivia*. I only recollect noticing fruit of this description on one close *Rebutia* population - that of Lau 476 and 477. These two Lau numbers apply to what seems to be a broad sampling of one population of Fric's *Cylindrorebutia einsteinii*, the spination of which seems to be very variable. The flowers, however, seem fairly constant in characteristics right across the population, and fit Kiesling's description perfectly (with reservations on the missing data referred to above and the long pointed tips to the tepals).

In *Ashingtonia* 1.7.1983, J.Donald refers to Lau 476 and 477 as *Rebutia einsteinii* var. *gonjianii* (Kies) Don comb. nov. In the brief comments made there he describes the roots as fusiform, which exactly fits my own plants as they arrived from habitat. His description of the spines of the two taxa also indicates the wide plasticity which I have observed! It would seem therefore that Kiesling's *Med. gonjianii* is a form of Fric's *Cylindrorebutia einsteinii* from the northern edge of the distribution and exhibits one limit of spine variation to be found within the species population.

..... from F. Clark

It would probably be 1982 when I was out in Buenos Aires and Roberto Kiesling took me along to see Gonjian's collection. Whilst I was there Gonjian told me that he had crossed some hills and come to a plateau where he found these plants now named after him; apparently he proceeded to dig up all he could find at the spot and put them in his car boot, bringing back some three hundred odd plants. They were being grown, if that is the right term, in a compost which was so fine that I can only describe it as dust. The stems were as thin as *Pterocactus* stems, all wizened and looking just like fossils. I had the quite clear impression that Kiesling was not too happy either with the way a site had been virtually cleared of plants or with the way they were being looked after in cultivation. I came away with a couple of plants; the four-fingered piece never showed signs of life but the single head eventually got away, in my 3 to 1 peat and sand compost. The bottom of the plant was so grotty that I cut off the new top growth and rerooted it, disposing of the base portion. Now it is in a tray, and at some half inch in diameter it is decidedly stouter than Gonjian's own plants. It has also flowered, but I missed them.

..... from W.Rausch K.u.a.S. 25.5.1974

In view of the current fashion for *Sulcorebutias*, the *Rebutias* have been somewhat unjustly consigned to oblivion. A contributing factor to this demise may also be the perpetual uncertainty of many correct or incorrect names, and likewise field numbers, which exist with the cactus dealers and in collections. From the over one hundred more or less different *Rebutias* which I have collected in the Bolivian and Argentinian mountains, I have been able to establish some jewels, which already today secure the potential of the *Rebutias* in many collections. I would like to enumerate here only a few, like for example *R. fulviseta*, *eos*, and *heliosa*. It pleases me to be able to introduce to you a further gem, which Roberto Kiesling has described.

In 1965 I found in Argentina to the west of the Quebrada Humahuaca at around 3000m a quite small *Rebutia*, which dried out on the journey to Europe. In 1969 the Argentinian cactus collector Barkev Gonjian found the self-same plant again somewhat further to the north, yet the flower was nevertheless still unknown. Not until 1973 could Gonjian collect this mini-cactus again. We were also able in that year, independently of Gonjian's trip, to discover another locality with adequate plant stocks.

This plant is, by virtue of its smallness, very difficult to find in the terrain. It grows up into separate small groups. The individual heads measure 5-7cm long, with a diameter of 1-2 cm, with a relatively large, wide-branching, soft fleshy root system. The 15-19 tiny ribs are divided into 2-3mm long tubercles, which carry a 1mm long, oval, white felted areole. The radial spines stand, comb-like to the body, in 5-6 pairs, their length amounts to 1-2mm, they are white to brown with black bases. Central spines are non-existent. The flower is about 2cm long, the ovary and the tube is covered with white wool, as well as having some white bristles; the petals are more or less flesh-coloured; the style is, as the drawing and description shows, not united with the tube. The seed is about 1mm long and somewhat less wide, and has a basal, wide, flat, hilum.

..... from A. Johnston

Two or three years ago I received an offset taken from a grafted plant of *Rebutia gonjianii*. This never really prospered, for no obvious reason, and gradually shrank so badly that I eventually disposed of it. The short offsets on this plant rather intrigue me as they have an appearance which is something like that of *Lobivia famatimensis*.

..... from A.W. Craig

A few years ago I had a small piece of *Rebutia gonjianii* from Roberto Kiesling. This had the usual treatment that I give to imported plants that is normally successful, but this particular one never looked happy and it failed to get established. Now that I have obtained another piece of this species I have put it on to a graft where of course it is growing very well - possibly too well.

..... from G.J. Charles

A piece of *Rebutia gonjianii* came into my possession about a couple of years ago, but despite being given the usual treatment which succeeds with most offsets and cuttings, this particular specimen failed to get itself established. Finally it was put on a graft before it went past the point of no return. I am not very happy with the atypical way it is growing on a graft but it is now producing some offsets so this will give me another opportunity to try and get it away on its own roots. I have the same sort of difficulty in establishing any of the *Rebutia* in the *einsteinii* group.

..... from R. Stephenson

In 1982 I obtained from I.S.I a rooted cutting of *Rebutia gonjianii* as "Isotype material collected by Gonjian at Tilcara". It was about three inches long and barely three-quarters of an inch in diameter, the lower part a thickened rootstock. It was rather late in the year when it arrived so I just left it to one side for the winter and potted it up in a very open compost in the spring. It came away quite rapidly and shortly afterwards a flower appeared about three quarters of the way up the stem; this was soon followed by the first offsets also high on the plant. So far it has made eight offsets from the part of the stem as received and a further two offsets appeared this year from the new growth of the main stem. The longest offset will now be over one inch long.

On receipt the growth was fairly open but it is now much tighter - the areoles on each rib are so close together that they almost look like one long line, very slightly spiralled. It appears that the areoles are now far closer together because the plant seems to have shrunk at the base as it has grown at the apex, so that the original stem as received is now only about two inches long. The original stem still does not grow upright but took on to itself a leaning attitude. New offsets are very high on the stem once more but I feel sure that these too will settle down to a lower level and eventually the plant may appear to be clumping from near the base, rather like the *heliosa* group.

The flower is virtually identical to that on my plant of *Rebutia einsteinii* v. *schmiedcheniana* in regard to size and shape and general appearance, possibly very slightly whiter (not paler). For the first time it has flowered this year on the new growth in my cultivation i.e. over half way up the stem of the plant. The withered flowers are left on the plant as otherwise it marks the plant if they are pulled off. The fruit disintegrates as one would expect of any of the *Mediolobivia*. I know of no *Rebutias* which produce offsets from the roots but as they so often self-seed I can understand why someone should think this might be so.

..... from W. Clarke

About three or four years ago I obtained a grafted specimen of *Rebutia gonjianii* from Fearn; as soon as an offset was big enough it was removed and soon rooted down. It is now three inches tall and over half an inch thick, growing like a pillar, with areoles very close together indeed. For some time it has been on the top shelf on the south side of the greenhouse, very close to the glass. Last year it both put out new offsets from half way up the stem and flowered for the first time, from the same level. It has not yet been out of its pot so I do not know what the root is like.

At the same time as I obtained *R. gonjianii* I also bought a plant of *Rebutia einsteinii* Lau 477. The offsets from this plant take quite some time to root down. The areoles are more widely spaced so that the brownish body can be seen easily. The areoles are elongated and up to 2.5mm long. There do not seem to be any central spines; the radiating spines are occasionally up to one inch long, the longest not pointing straight downwards. New spines are a dark brown colour. Although the flowers are similar to those on *R. gonjianii*, there is not the least similarity in the appearance of body and spination of the two sorts. I am not at all happy to see it regarded as just a variety of *gonjianii*.

..... from J. Arnold

I have four plants of *R. gonjianii*, two of which came from Tom Jenkins as seedlings, one came from Fearn as a graft, and the fourth originated from the I.S.I. offering. The I.S.I. literature described the flower as "dark brownish-purple". Nowhere else have I seen them described as purple and I have never seen plants with this colour flower. Someone's imagination has obviously been running away with them! The flower petals are a brownish orangy-yellow colour. The photograph in Rausch's latest *Lobivia* book depicts the flower colour as I recollect seeing it in cultivation, although the plant illustrated has areoles and spines much more open than any of mine. These flowers are very similar to those on my *R. einsteinii* Lau 477 of which I have a habitat propagation and also a seed grown plant. The fruit which has set on my *R. gonjianii* is large in comparison with the fruits that one gets on *Rebutias* which are small dry berries. It is also pulpy and opens with a split like *Lobivia* fruits.

My grafted plant of *R. gonjianii* was cut into two halves, the lower part remaining as a graft then produced offsets which rooted down without any trouble. On the other hand the top half of the plant proved to be very difficult to root down. Perhaps these plants are like *Sulcorebutias*, where I find that offsets which come to a point at the base do root down fairly easily. At one time I did have a plant of *Rebutia einsteinii* which had a massive root, almost the size of a small turnip but without any thin neck between root and aerial body. As far as I can recollect it came from Jumanery.

Although I struggled with it for a considerable time, it just did not seem to want to get itself established and eventually it passed away.

..... from R.Ferryman

My *Rebutia gonjianii* is on a graft and the main stem does grow finger like; it is about three inches long. Not far above the base there are about a dozen offsets and these seem to retain a far more stocky shape. Some of the offsets have been removed and rooted down in pure grit; they have been given feed with the water just like all my other plants. The offsets are not as easy as most other *Rebutias* to get away on their own roots but no slower than most *Sulcorebutias*.

The offsets which form on *R.einsteinii* are more basal.

..... from J.R.Gooch

I have a plant of *R.gonjianii* R.578 on its own roots which has about three dozen heads, all of them growing between one and two inches above soil level, with no obvious main head. In addition I have a plant of I.S.I.1306 which is 3.5 inches long and carries a couple of small offsets. The flowers on this ex-I.S.I. *R.gonjianii* always come later, and are larger, than the flowers on my R.578. The flowers on both plants are a mid yellow colour.

..... from G.E.Sharp

My own plant of *R.gonjianii* came from Jumanery about three years ago. It had been grafted on to a robust stock which looks like *Trichocereus bridgesii*. It had a good rate of growth, possibly too good as it was soon making a more elongated form of growth than I would have expected for a *Rebutia*. So I cut off the top half and regrafted it on to another piece of *Trichocereus* stock, where it has now reached some four inches in height and over one inch in diameter. It has also produced a two inch long offset from near the base. The bottom half of the original plant put out offsets from near the cut; when these had reached about the size of an acorn I removed eleven of them and put them into two pots on gritty compost. These have all rooted down and are now growing nicely. Another crop of offsets should be ready for removal and rooting down later this year. Only recently has one of these plants flowered, with a fairly stout tube carrying pretty substantial dark brown scales.

..... from W.W.Christie

The plant of *R.gonjianii* in my own collection came as a graft from Abbey Brook. I had had in mind taking it off its graft and getting it on its own roots, but when the time came it almost fell off the graft by itself so that very little cutting was involved. This was treated in the same way as all my cuttings and so forth that are to be rooted down, by putting it on a pot of my standard compost and then surrounding it with grit to keep it upright. The compost is one part of John Innes no.2, one part of Perlite, and one part of Arthur Bowers ericaceous compost. Perhaps I should explain that all my plants are watered from the bottom, by standing a number of pots in large shallow trays and pouring the water into the trays, never into the top of the pots. Once I am satisfied that an adequate amount of water has been taken up by all the pots in the tray, the excess water in the tray is syphoned off by means of a strip of thick porous padding - the sort on which indoor plants can be stood.

In order to encourage *R.gonjianii* to send out roots I also used a method which I adopted for the first time with a dessicated segment from a dwarf *platyopuntia* which had resisted all attempts to assure its survival; in fact it was not only dessicated but there were one or two rather nasty orange coloured spots on it which I took to be fungus. I put this joint to soak in warm water with the addition of a fungicide and left it there for 24 hours. When I next looked at it the segment had not just become turgid, it had taken up so much water that it was bloated. I had had several pieces of *Sulcorebutia* which had stood for two years without making any attempt to send out roots, so they were next to be given the soaking treatment, this time for a few hours, and afterwards they rooted down quite promptly. This same method was used on my degrafted *R.gonjianii* which also rooted down well.

..... from H.Middleditch

My limited experience of growing *Rebutia* has led me to believe that many of these plants set fruit fairly readily and that these fruits gradually dry up until the walls become paper thin. Any attempt to remove the fruit usually results in the fragile walls of the fruit disintegrating and the seed spills out over the areoles and on to the surface of the soil in the pot. However, Kiesling's description of the fruit on *R.gonjianii* and especially the illustration of a dehiscing fruit, shows us that this fruit splits open. The split looks like a break in a still slightly turgid fruit, not like a crack in a bone-dry wall of a fruit. Now Backeberg appears to describe the fruit of *Mediolobivia* as thinwalled - does the fruit on *Mediolobivia* usually dehisce in substantially the same manner as *Rebutia*? Or is *Mediolobivia* fruit less brittle when it dehisces? Does the fruit on any *Mediolobivia* normally dehisce by splitting rather than by disintegrating? By what feature or features has R.Kiesling concluded that this plant could fall within the compass of *Mediolobivia*?

The seed on this plant is described as having a "large strophiole occupying the whole of one end of the seed" whilst there is no reference at all to a hilum. If it was not for the publication date you could have imagined that the author had taken note of "A strophiole by any other name" from Chileans No.43.

The root formation described for *R.gonjianii* - thickened roots growing underground, rising to the surface and there producing new vegetative shoots - is a form of growth which is familiar to me in *Senecio stapeliaformis*, but certainly I have never seen this form of root growth before on any sort of *Rebutia*. Does it occur on any other *Rebutia*? or just on *Mediolobivia*?

..... from R.Mottram

My present plant of *R.gonjianii* is ISI 1306, propagated as an offset from Pip Smart's plants. Offsetting has taken place mainly at ground level, from the lowermost stem areoles. It has also branched at the apex where the meristem has been damaged. The root consists of 3-4 fusiform taproots, arising from different points from the base of the original cutting. If it had been a seedling I would expect the initial root development to be a single taproot arising directly from the hypocotyl of the seedling. All plants of the *pygmaea* and *einsteinii* complexes tend to behave like this. I have never known any horizontal or proliferating roots on this or on any related species. However, if Kiesling actually observed this, then perhaps it is possible. Normally however I would expect the fusiform root to have been severed from the main plant before stem formation can occur. This has been documented for *Haworthia truncata* and I have personal experience of *Copiapoa humilis* doing this.

Rebutia gonjianii is definitely not stoloniferous. A few cacti are stoloniferous, the best example being *Notocactus caespitosus*, where a complete plant, spines and all, will form beneath the ground, connected to the parent plant by a thin umbilical cord. To a lesser degree this can be observed in *Notocactus ottonis* and in *Gymnocalycium uruguayense*.

In botany, the term *gemma* has a very specific meaning and refers to the asexual reproduction of mosses and liverworts. It may also be applied to thickened segments of hyphae in fungi. Other meanings for the term appear to be gaining ground, however - Little & Jones: A Dictionary of Botany (1980) also refers to a process of pollen grains. Len Newton once sent me a plant that he called *Ceropegia gemmifera*, which does not appear to be a published name. I quote

from his letter as follows:- "The *Ceropegia* is propagated from 'gemmae' - short thickened portions of stems that fall from the plant and root up in the next wet season and then grow into new plants - remains of these will be seen on the material sent. As far as I know this is the only species to produce these curious structures". The problem is that *gemma* is a latin term meaning bud or bud-like and one might therefore be excused for applying it in a broader sense than the strict definition, wherever it seems appropriate.

Turning to fruits, it would be wrong in my opinion to refer to any *Rebutia* fruit as "dry" at maturity. Maturity is the point at which the fruit is ready for seed dispersal and the seeds are fully developed. In *Rebutia* the fruit is always fleshy at maturity, filled with funicular pulp. At maturity they are not normally indehiscent. Compared with the naked fruit described and illustrated by Kiesling for *R.gonjianii*, I can however recall a fruit on *R. Ritteri* which bears small areoles carrying fine hairs but it split just as Kiesling illustrates for *R.gonjianii*. Most, if not all, of the *Sulcorebutia* split their fruit in a similar fashion. In nature it must be the intention for ants or other dispersal agents to carry away the elaiospores (seeds plus funicular appendage) while still moist, but overlooked fruits will remain to disintegrate and disperse seed over a much more restricted range. *Rebutia* fruits have a relatively thin wall so they dry quickly after maturity.

..... from R.Kiesling

Yesterday I saw in the collection of my friend Ferrari a plant of *Gymnocalycium mesopotamicum* with an offset from the roots - i.e. gemmiferous roots.

..... from P.Allcock

I would certainly agree with the view that many fruits do contain ripe seed well before they become brittle and fracture. Just as an example, I have taken one or two fruits off *Neochilenia* (*Horridocactus*) when they have expanded but not yet elongated and the seed gave every appearance of being well formed and ripe. Because I aim to collect the seed from fruits which I have set by hand pollination, I have to keep a close eye on any fruit where the seed must be collected immediately it is ripe and before it spills out to become lost amongst the spines in the crown; fruits that do not spill their seed can be left for attention whenever convenient. Into this latter category come the fruits on *Cylindrorebutia einsteinii*, Lau 477, and *gonjianii*, where the fruit wall does dry out but does not become brittle like the fruit on *Rebutia*. These plants are like *Mediolobivia nidulans* and *M.aureiflora* insofar as both the fruit and the seed are larger than the fruit and seeds on *Rebutia* and *Digitorebutia*.

Bear in mind that not only *einsteinii* but most of the *Cylindrorebutias* do grow extremely slowly. Is it possible that this slowness of growth has given the impression that the plants are not really doing well, whereas they are simply moving at their usual very slow pace?

..... from D.Schweich

About *R.einsteinii*, I am surprised to hear that some collectors find these plants difficult to grow. Do they possibly confuse slow growth with difficult growth? For me, without a greenhouse, they grow easily although very slowly. Thus in the Rausch book: "I have for 20 years had some *einsteinii* forms which are still globular". I have seen those plants and they are no more than a few cm in diameter! Another growing problem with *einsteinii* is grafting. Some four years ago I received a cutting of Lau 477 from Lau himself. It had very small spines with visible swollen bases. Rooting was not successful and so I grafted the plant. The spines which have grown later are thinner, longer, and have no swollen bases! One may see the same thing on P.Smart's grafts. I have a cutting from an original clone from Kiesling and the base of the spines is slightly swollen; on my second clone, WR 578, they are not. In fact *gonjianii* is just as variable as the classic *einsteinii*!

..... from G.Hole

Most *Rebutias* can be propagated from cuttings with very little trouble. All that is required is for the cut surface to be allowed to dry off for about six weeks and then place the offset on moist compost, where it will root down in a few weeks without any bother. On the other hand, any cuttings of plants in the *einsteinii* group need to be treated in a quite different manner, (after drying off) by placing them on dry gravel if it is winter and on moist gravel if it is summer. If examined two months later, they would not be expected to be showing any roots; even after a further two months it would be surprising to find any roots starting to develop; but after yet a further two months there might just be signs of roots. The white spined *gonjianii* are probably more difficult to persuade to root than the usual clone.

The group of plants round *einsteinii* must come from an area with a particularly harsh climate, because among the *Rebutia* they probably have a larger root in proportion to the size of the body. In this respect they are similar to several *Lobivias* such as *L.keuhnrichii*, *rebutioides*, and *sublimiflora*, which are also fairly small bodied, have long thick tap roots and also come from the same area as the *Rebutias* of the *einsteinii* group.

..... from J.R.Kirtley

My own plant of *R.gonjianii* came from the I.S.I. offering; the spines are whitish, perhaps a greyish white in colour. The stem is neither as long nor as thick as my little finger but it carries over a dozen offsets. The older ring of offsets are about one inch long and I removed one of these in early summer in order to root it down in my usual all-grit compost. It was watered just the same as all my other plants, with the addition of *Vitex* to the water. For practical purposes it put on no growth at all, but when I came to unpot it in September in order to pass it on to a fellow collector, I was surprised to find that it had produced four substantial thickened roots growing obliquely downwards. These roots grew from the sides of the plant which had been buried in the grit. They were roughly 30 mm long the shape of a short pencil sharpened at both ends, so that where they joined the stem they were really quite thin for a length of about 2 or 3 mm.

..... from G.Sharpe

Yes indeed the roots are thickened in just this same peculiar manner on my own rooted cuttings of this plant. The first batch of offsets were rooted down in a mixture of loam and perlite, the second batch on gritty sand.

..... from H.Middleditch

As far as I can tell from the information about habitat locations which I have consulted, the distribution of *Rebutia* Schumann falls into two bands; an easterly one following the eastern ridge of the Andes, roughly Pulquina - Padilla - Entre Rios - Santa Victoria - Cumbres Calchaqui; and a westerly one, roughly Oruro - Potosi - Tupiza - Villazon - Tres Cruces - Sierra Chani. Because the rain bearing winds come from the east, naturally the more westerly zone will be somewhat drier than the eastern zone. In addition, there is an overall reduction in average annual rainfall from north to south, so that the southern end of the western zone will, for comparable topography and orientation, be likely to have a quite harsh and dry climate. Here average winter temperatures will also be the lowest, due to the combination of high altitude and lower latitude. It is in this coldest and driest part of the *Rebutia* distribution area that we meet with *Rebutia einsteinii*, *schmiedcheniana*, and *pygmaea*. They will probably have a harder existence here in the wild than most of, if not all of, the other *Rebutia*.

..... from R.Purslow

I never cease to be surprised by the similarities between the *einsteinii* group and the varieties of *Lobivia famatimensis*, which is a very funny *Lobivia*. The flower section on *L.famatimensis* v. *sanjuanensis* has stamens inserted all the way up the tube; the areole is slightly elongated, which is odd for *Lobivia*, and the stigma is well extended.

..... from H.Middleditch

There appears to be ample opportunity for observations to be made on plants of *R.gonjianii* and allies in cultivation, especially in regard to flower form and stamen insertion. These features may be consistent to a "species" or even across the whole group. In addition, some observations on plants found in habitat have been received from M.Nilsson and it is expected that these will appear in the forthcoming issue of *The Chileans*.

ECHINOPSIS SILVESTRII From F.Vandenbroeck

When travelling south from Salta in the direction of Cafayate we found a number of *Echinopsis* growing at Alemania which appear to me to be *E.silvestrii*. We only found one population and the plants were not very numerous. They were growing under fairly lush and wooded conditions where the plants were in half shadow. Most were offsetting, some clusters reaching up to 20 heads, not greatly different in size. They were accompanied by *Gymnocalycium antherosacos*, *Parodia ?rubristaminea*, and an *Eriocereus* sp., possibly *E.platygonus* because it had very rounded, shallow, ribs. Also *Cleistocactus baumanii*, *Cereus aethiops*, and *Pfeiffera* were present here. The *Echinopsis* grew taller than broad, somewhat barrel shape, with about 11 obtuse ribs. The new spines in the crown were brown or buff but these became white at the shoulder of the plant. The spination was rather variable; the radial spines were all more or less the same length but on some plants the central spines were not uniform in length. Some central spines were roughly the same length as the radial spines whilst on the same plant other central spines other were twice as long as the radials. Away from the shoulder of the plant the radial spines nearly touched those from the adjacent rib on only one or two areoles, mostly there was a gap of about one cm. between the tips of the radial spines from adjacent ribs.

..... from M.Nilsson

At Alemania I found *Echinopsis* MN 13a growing in what might be called woodland, among bushes, in a red soil. Mostly the plants were solitary, but some plants had two or more heads, which might have been caused by grazing animals. Together with these *Echinopsis* grew *Parodia microsperma* v. *cafayatensis*, *Eriocereus bonplandii*, *Gymnocalycium schickendantzii* and *Cleistocactus smaragdflorus*. I found the same sort of plant more to the north at Cabra Corral, MN 94, growing under the same conditions.

..... from H.Middleditch

There is a photograph of *E.silvestrii* in Ritter's *Kakteen in Sudamerika* Fig.320. To judge by the amount of leaf and other litter lying on the surrounding ground it may be supposed that the plant is growing in the company of bushes, possibly even in woodland. The rib count might be 13; the ribs seem to be fairly sharp and deep. The radial spines do not meet those from adjacent areoles on the same rib or from areoles on the adjacent rib. If the flower in the photograph is a typical *Echinopsis* length, then the radial spines might reach 10mm in length. There appears to be only one central spine, barely 10 mm long. The areoles would be about 18 mm apart on the rib. The plant looks as though it is slightly columnar and may well have a leaning attitude. In general appearance this plant looks surprisingly similar to *Echinopsis* which come from Uruguay or Brazil, usually described as *E.oxygonus* or *E.multiplex*.

My own plants of *E.silvestrii* and *E.multiplex* both possess a somewhat similar form of spination, having shortish, straight spines, circular in cross section, which taper steadily from a fairly stout base to the pointed tip. Both plants have a single central spine which is longer, but not a great deal longer, than the radial spines. The radial spines do not radiate in one plane, but form a rather shallow cone. In addition, the areoles do not bulge a great deal above the outline of the ribs, but appear as if the rib must have been depressed or notched to accommodate them. However there are two characters which to my eye do differ between the Uruguayan plant and that from Salta Province. Firstly in *silvestrii* the outline of the ribs in side view follows a very steady curve, whereas in *multiplex* there is a slight tuberculate effect with a shallow saddle between each pair of areoles. Secondly on *multiplex* the ribs are pretty deep and acute, whereas on *silvestrii* the ribs are less acute, possibly even obtuse, although the actual ridge of the ribs is about as sharp on both. Nevertheless I can see that if any plants of *silvestrii* were found in the wild with somewhat more acute ribs, they would bear a degree of resemblance to plants of the *eyriesii-multiplex-tubiflora* group. This may help to explain how the name *tubiflora* has become associated with plants from NW Argentina.

..... from J.Lambert

It could be difficult and misleading to draw valid data from a small picture like Ritter's Fig 320 *E.silvestrii*. The flower on my JL-156, collected at Alemania, is 210 mm long and if we took this length for the flower in Ritter's figure, it would give a body diameter of 86.6 mm, which matches fairly well with the observed diameter of 90 mm with JL-156. My plant does indeed have 13 ribs (a common number in *Echinopsis*) but the areoles are only 12 mm apart. Radial spines are up to 15 mm long but the central is much shorter, 7 to 8 mm. Number of radials is 5 to 7, rarely 9 (on Ritter's picture some areoles show at least 6 radials). There is one central in young plants, but this may go up to three with age. Although the plant which I have in cultivation is now offsetting profusely, the plants I saw at Alemania were all solitary and the ribs were high and acute.

..... from H.Middleditch

Describing ribs in terms such as "deep and acute" may satisfy an observer but may not necessarily convey the same impression to all readers. Also it hardly provides a firm base for comparison. Which is no doubt why many species descriptions give dimensions for rib depth and width. However it is not clear where this depth and width is measured, since ribs are usually smaller and thinner on the crown than down the sides, and often flatter towards the base. I suppose that half way down the body might be the best place to consider rib measurements. Also I do wonder how exactly one is supposed to measure the width of a rib without cutting the plant in half horizontally in order to put a ruler between the base of one intercostal groove and the next. Perhaps a pair of bisectors could be used instead? Or is it to be calculated from the circumference over the ribs and the circumference at the base of the intercostal grooves? And what exactly is the depth of a rib? The measurement down the side of the rib from the crown of the rib to the intercostal groove? Or the height from the intercostal groove to a ruler placed across two ribs? Or the height to the top of the rib from a line joining the two intercostal grooves - which again seems to require the plant to be cut in half. Or does one measure the diameter over the ribs and over the base of the grooves and divide the difference by two?

..... from J.Lambert

Perhaps I should mention that normally I do not concern myself with measuring the exact height of ribs in

Echinopsis, as I think it is more a matter of general shape than of millimeters. I distinguish between "flattened rounded ribs", which would be separated by shallow grooves, "rounded ribs" separated by medium to somewhat deeper grooves, and "high acute ribs", always separated by deep grooves.

..... from R.Mottram

We had a batch of Echinopsis B.35 from Frau Muhr of which some plants were solitary and some were freely offsetting. The new spines at the growing point of the offsets were usually a distinctly red colour. When these reached about 8 mm in length the upper half of the spines had become a darker red. At about 20 mm in length the upper half of the spine had become dark brown, the lower half being buff-grey. The spination was indeed rather variable with central spines occasionally up to 40 mm long.

..... from J.R.Kirtley

Last year I obtained from Whitestones a very corky plant of B35, the last of a batch of imported plants, which had lost its growing point and is putting out a number of offsets. The body is dull green, but the brown, wrinkled epidermis on the lower half of the body and the "tide mark" leads me to the conclusion that half the body has been growing below ground level. Many of the below-ground areoles have no spine cushions. Roots were non-existent, although from the base of the plant I would judge it to have fibrous rather than tap roots. Height 45 mm, diameter 65 mm, ribs 10, straight, more acute than rounded, 7 areoles per rib. Lateral and upper areoles 15 mm apart, round, with some whitish wool. Spines mostly damaged so that their length cannot be accurately determined, but number between 7 and 9 radials distributed laterally and downwards, 1 central spine. bulbous at the base, all are straight and round.

Two offsets were measured, one 30 mm in height, 30 mm in diameter, with 11 ribs, the other 35 mm high, 35 mm diameter, with 10 ribs. In both cases the ribs are straight, 8 areoles per rib, upper and lateral areoles 5 to 8 mm apart, with whitish felt, radial spines 7-9 straight, up to 9 mm long, distributed laterally and down, 1 central spine up to 15 mm long, straight, but turned down at 45° from the areole, bulbous at the base, all spines round, coloured purplish grey/brown in zones along the length, always darker tipped. In some areoles there is a 3 mm sub-central spine, directed upwards in line with the ribs.

..... from H.Middleditch

Could it be that this particular plant of B.35 had been growing not half buried in the ground, but with the lower half covered up by the litter from surrounding bushes, as described by J.Lambert and by F.Vandenbroeck, in the sort of surroundings photographed by Ritter?

..... from A.C.J.Hall

My own Echinopsis B35 offsets naturally but sparingly at ground level and these offsets are usually already rooted when they are removed. The apex of the main body is not damaged but the base is very corky. It has a very interesting long-tubed flower.

..... from M.Muse

To judge by the seed it seems to be quite possible that B.35 is not *E.silvestrii*; if one felt pressed to burden it with a name, it could be appropriate to use Schumann's *E.albispinosa*.

..... from H.Middleditch

It is interesting to note that J.Kirtley counted more areoles per rib on the offsets than on the main head of his B.35. The offsets on my own plant of *E.eyriesii* are near soil level and the areoles can be counted only on a few ribs, because some ribs are pressed against the body of the parent plant, some are close to the soil, and some are obscured by offsets being hard up against one another. But here again there are more areoles per rib on the offsets than on the main head (14 and 9). Is this similarity in the large number of areoles on the offsets another reason why Spegazzini considered certain Echinopsis from Catamarca, Tucuman and Salta to be the species *tubiflora* which most probably originates from Uruguay or southern Brazil?

..... from M.Muse

There is a fairly small offset on my mature *E.oxygona*; the main head has 7 areoles per rib and I must admit to some astonishment upon finding that the young offset possessed nine areoles per rib!

..... from C.Webb

My own cactus collection started off in 1958 when I acquired a plant which I believe to be *Echinopsis tubiflora*. A great many offsets have gone to good homes over the years and the plant I have now is a vegetative propagation off the original. Because it is now completely surrounded by offsets it is in fact very difficult to be sure of the number of the number of areoles on the main stem. In addition there are a number of concertina-ed old areoles to be found at the base, just like any old plant of Echinopsis or *Lobivia*. There are 4 or 5 areoles on the expanded ribs on the main head and on all the offsets. The main stem has 11 ribs and the offsets have mostly 13 or 14 ribs, just a few have twelve.

..... from J.Lambert

The colour print of the *E.tubiflora* grown by C.Webb bears 9 radial spines and 1 central. This matches the figures given by Spegazzini, but not at all those mentioned by Backeberg, who speaks of 20 radials and 3 to 5 centrals (*Lexikon*). I suppose that this must be a mistake. What were the figures given by Pfeiffer and/or Zuccarini?

..... from H.Middleditch

Echinopsis tubiflora is a bit of a problem. In his *Enum. Cact.* 1837, under the heading of *Cereus tubiflorus*, Pfeiffer quotes "*Echin. tubiflorus* H.Angl", 1-3 centrals pale yellow with black tip and base, 7-9 shorter slender radials (no colour). Presumably the "H.Angl" is hort Angl, i.e. a plant in cultivation at that time in this country under the unpublished name of *E.tubiflora*. I also have a copy of *Echinocactus tubiflorus* from Curtis' *Botanical Magazine* 1839 No.65 which contains a drawing of the plant in a collection in the city of Norwich, the drawing having been sent to the magazine under "the name now adopted" i.e. it was being cultivated as *E.tubiflorus* prior to the publication of the name by Pfeiffer. It may then be assumed that this is the plant to which the Pfeiffer reference "H.Angl" applied.

On the Curtis drawing I can count no more than six radials at any one areole and there are no central spines. But the description quotes "six to eight strong black spines, half to three quarters of an inch long". Now it is difficult to believe that the artist could have omitted every central spine, but, as the flower is drawn as if it originated from below an areole, not from immediately above the areole, it appears that we might be entitled to question the accuracy of the artist.

Zuccarini established the genus *Echinopsis* in 1837. This was evidently regarded as far too much of a new-fangled idea to be acceptable at that time hence we find *Cereus tubiflorus* Pfeif. in *Enum. Cact.* and then *Echinocactus tubiflorus* in the 1839 Curtis *Botanical Magazine*. By current practice it should be *Echinopsis tubiflorus* (Pfeif) Zucc. but Schumann published it as *E.tubiflora* Zucc, the same way as he did *Echinopsis oxygona* Zucc. instead of *E.oxygona* (Link & Otto) Zucc. So there is apparently no Zuccarini description for *tubiflora*; Schumann 1903 gives 3-4 centrals, very many (up to 20) radials, which is presumably what Backeberg took for his *Lexikon* description.

We therefore have the alternatives of accepting all these descriptions which yields a tubiflora with 0-4 centrals, 6-20 radials, slender pale or stout black, or selecting one of the two pre-Schumann descriptions. The plant grown by C.Webb as *E.tubiflora* appears to be reasonably close to the earliest descriptions of this species.

Certain specimens in cultivation as *Echinopsis silvestrii* also come more or less within the Pfeiffer description of tubiflora and it seems quite probable, and plainly understandable, that it was these plants that Spegazzini had in mind when attributing a location of "Tucuman and Salta" to tubiflora. If we recognise that no cacti had reached Europe from Tucuman or Salta by 1837, then we have the alternative of accepting a split location for *E.tubiflora* i.e. Uruguay and Salta, or accepting it only from Uruguay. If we wish to consider *E.tubiflora* as coming only from Uruguay, then we have quite a wide range of habit for *E.silvestrii*; if we wish to consider that both species occur in Salta, then we have to decide exactly how we are going to distinguish between *E.silvestrii* and *E.tubiflora*.

..... from J.Lambert

As you indicate, the available descriptions for *E.tubiflora* are somewhat confusing as to spination. If I had to make a choice, I think I would stick to the pre-Schumann descriptions, because a variability of between 0 to 4 for centrals and 6 to 20 for radials seems rather too much for *Echinopsis*.

..... from H.Middleditch

A comparison of Pfeiffer's description for *E.tubiflora* (with Spegazzini's *E.silvestrii* in brackets) yields: "Body 3.5 inches high, 4 inches in diameter (5-10 cm high by 4-8 cm in diameter) Ribs 10 (12-14), Central spines 1-3 (1), less than one inch long, radials 7-9 (5-9), all spines short." However, both my own *silvestrii* and B36 are at present fatter than they are high, although rib counts are 10 and 11 respectively.

..... from A.W.Craig

My own plants of B.36 were obtained from Whitestones and they are similar, but not identical. One of them was almost squat cylindrical rather than depressed globular, a grubby blue green colour which I take to be either a fungus or to have been caused by lichen, as the new growth is a fresh green and the plant now looks almost columnar. The second plant is growing barrel shaped and is a good deep green colour. On both plants central spines are about 10mm long, slim, brown to dark brown, radials a little shorter and paler. The radial spines do not radiate but point upwards and outwards, sideways and outwards, or downwards and outwards. The habitat growth on one plant had very broad and very obtuse ribs but in cultivation growth is more like the second plant, with quite deep ribs. The second plant of B36 has ribs with a fairly sharp crown. The vertical groove between adjacent ribs is fairly sharp. By comparison my plant of *E.multiplex* has an even sharper, acute ridge on the ribs, even deeper slab-sided ribs, and an even sharper vertical groove between adjacent ribs.

Two plants of Lau 536 which were obtained from Windyridge are very similar to each other; like my B.36 they also have 12 ribs but the ribs have a more rounded ridge and the vertical groove between adjacent ribs is radiused. The spines are about 12 to 15 mm in length, centrals brown, darker at the tip, or dark brown to almost black, pale right at the base, many with a swollen base. The radial spines do radiate or are slightly deflexed, following the general curvature of the body, pinkish brown to straw coloured, often the two uppermost short radials projecting outwards, dark brown. Because the spines are over 1 mm thick at the base, steadily tapering to the point, the spination is far more robust than on B.36.

The plant of B.35 was labelled on receipt "Salta 1300 m"; it has two heads of a washed out green colour, with 10 ribs, sharp, slightly obtuse, with a generous radius between the base of adjacent ribs. Spines slender, up to 15mm long.

..... from P.Allcock

A plant of B.35 in my own collection, also labelled "Salta 1300 m", has a rather open spination; radial spines are all similar in length, 15 - 20(-25) mm long, the single central spines 30 (-45) mm long, some with a bulbous base. The spines are of chocolate brown colour when new, becoming pale brown later. New areoles look fairly large, about 5 mm in diameter, with buff wool, but later are much more compact.

The plants of Lau 536 are interesting in that the flowers appeared from well down the side of the plant - as low as two areoles above the soil level. The flower on these plants are about 120 mm in diameter which seems to be somewhat larger than the flowers on my plants of B.36. The fruit is a sort of tapering barrel shape about 30 mm long and 20 mm in diameter at its broadest. The spination is very robust for an *Echinopsis*, all the spines being broader than they are deep and somewhat curved to follow the body contour. The spines retain their pinkish brown colour right down the side of the plant body.

My B.36 came from "Salta 1500 m" and this also flowers from well down the side of the plant. The flower is about 80 mm in diameter and so is not very broad. The hairs on the flower tube are much darker than those on the flowers of Lau 536. The spines do not retain their original colour after a year or two.

..... from H.Middleditch

From the Lau field number list I see that L 536 *Echinopsis silvestrii* is from Salta, near L 535; this L535 is *Parodia mutabilis*, from Salta. Could this be Salta city, which is a great deal more specific than Salta province? Where is *Parodia mutabilis* found in Salta?

..... from J.Lambert

The finding place for *Parodia mutabilis* lies just north from Salta city, along the road from Mojotoro to Betania; this is along the secondary road to General Guemes. Nacional Route 9 is the main road direct from Salta to General Guemes.

..... from H.Middleditch

So it appears that we may have five locations for *E.silvestrii*; one at Alemania, another along the Mojotoro road, a third according to Kiesling up the Quebrada del Toro, the MN 94 from Cabra Corral and the possible inclusion of P.166 into this group from Vipos. It still appears to be a very limited number of populations.

..... from M.Muse

But in addition to the five locations just mentioned, there is the location for MLV 6 at Sumalao. I have found this place on a map; it is where the river running due south from Salta city meets the river running out of the Quebrada del Toro. But from a more recent map this spot is near the northern edge of a huge reservoir which I suppose must have been formed by damming the River Pasaje where it cuts through the enclosing mountains to the east.

..... from J.Lambert

On my 1988 trip I collected JL-236 at Sumalao; this is very probably Verab's MLV.6. My own plants of JL-236 are still young, some 45 mm in diameter, with 11 to 12 ribs. The relative length of the centrals is greater on some plants than on others, but generally speaking the spines are robust and straight.

I also have a plant of B.36 in my greenhouse which has flowered, although of course I do not have an identity or location for this number. It is always very hard to get such information in the case of Dorothea Muhr's field numbers! Anyway, the spination on this plant is short and straight but is still different from my JL-156 from Alemania. Piltz writes

that his P.57, which is also from Alemania, has "a green body, with fine and short spines", so that this could be the same as my JL-156.

Rausch mentions *E.silvestrii* WR.160 from the Quebrada del Toro, whilst Piltz mentions *E.silvestrii* under his field number P-258, from Campo Quijano which is at the entrance to the Quebrada del Toro.

..... from J.Piltz

During my visits to Argentina I was able to collect some plants of *E.silvestrii* from near Campo Quijano. These plants have a very short spination with a body which is rather like that of B36. The flower tube bears long black hairs and the stigma lobes are quite long.

We found our collection number P.166 near Vipos in Tucuman, but very similar sorts of plants were to be found at places between Vipos and the Rio Juramento. These were growing in places which carried a vegetation of open forest. Similar sorts of *Echinopsis* are to be found near Cabro Corral, but these particular plants flower with a green tube.

..... from J.Lambert

We also met with an *Echinopsis* JL-255 at Vipos; together with the *Echinopsis* JL-300 from Cabra Corral I opted for the name *E.spegazziniana*, because of the rib form and rib number and also because of the yellow wool on the crown. At the present moment the plants which I have in cultivation are only young, slightly higher than broad at this stage, and the spines are still short. Here the central spines are markedly longer than the radials, another feature which differentiates this species from *E.silvestrii*.

Of course Rausch identifies his WR.99 from Alemania as *E.tubiflora* and although this species was originally described in the early nineteenth century, pointing to a Brazilian or Uruguayan origin, that does not prevent it appearing in northern Argentina, too.

..... from A.Ridley

My own plant of *E.silvestrii* was grown from seed obtained from Piltz, but identified as OF 60/80 from the borders of Tucuman and Salta. It is a fairly squat plant, being 8 cm in diameter and only 4 cm high.

..... from H.Middleditch

This location is probably not far from Trancas which lies on the border between Salta and Tucuman. It is on the route from Vipos to the Rio Juramento.

..... from C.C.Hosseus, Notas sobre Cactaceas Argentinas 1939

Now as to *E.tubiflora*. I am of the opinion that the plants mentioned with this name, from the three argentinian provinces, are *Echinopsis silvestrii* Speg. 1905, a species which is to be found in Salta, but not in Tucuman. Grows on stony ground together with *Parodia microsperma* and its varieties at several places.

..... from R.Mottram

We have had a number of plants sent from Schlosser as *Echinopsis tubiflora* from Dept. Colonia, Uruguay. These plants had very sharp ribs and the areoles were pretty well sunk into the crown of the rib so that the top of the areole appeared to be level with the top of the rib. Spination was rather variable in colour, either dark brown, brown, or grey-brown, and also in length, but most spines displayed a swollen base of dark red colour, even on the lowermost woody part of the plants. At the base of the flower the scales were minute; half way up the flower the scales had become about 1 mm broad and 3 mm long, the uppermost scales being some 8 mm long by 3 mm wide, all buff in colour with a dark brown spiniferous tip which attained some 5 mm in length on the uppermost scales. Hair in the axils of the scales was white to buff below and black above.

..... from H.Middleditch

How does this compare with the flower detail on *E.silvestrii*?

..... from M.Muse

All my plants which I would take to be *E.silvestrii* possess straight spines; these are B.35, B.36, MLV.6, P.166 and R.160. The spination on B.35 and P.166 is 4 cm long on immature plants whilst similar young plants of R.160 show the short rigid spination of B.36 and possess a more obtuse rib structure. To judge by the batch of plants of B.36 which I saw at Whitestones, they are somewhat variable in habit. The various plants identified with the foregoing numbers which were brought to the Chileans' Weekend could, in my view, all be accommodated under the name *silvestrii* despite the range of variation they displayed.

YET ANOTHER HAIR-RAISING TALE From D.W.Whiteley

Recently I have been looking up some information about *Opuntia clavarioides* - this is the same plant as *O.ruiz-lealii* of Castellanos. The Argentine Cactus Club published a memorial book of Castellanos' works concerning cacti; this includes a sketch not only of the plant, but also shows a rather unusual seed. The text describes the seed as "scabrosa et griseo-terrosa". The surface looks as though it is covered with a great many deep wrinkles. Turning to Britton & Rose, I was struck by the comments that *O.clavarioides* is supposed to have "lanate" or "woolly" seeds. This is not obvious from Castellanos' description of *O.ruiz-lealii*, so where was this observed?

What also stuck in my mind was that in the same Castellanos memorial book there is described a new *Opuntia*, called *O.colubrina*, that seems to have sunk without trace in the literature, not even being in Backeberg's Lexikon. To judge by the drawing in the book, it also has pronounced woolly or lanate seeds. The description of the seed attributes to it "abundante lana tecta, ± 2 mm longa". Has anybody set seed on *O.clavarioides* and is it hairy? Does a dry and abraded seed soon lose this superficial covering? Does anybody know how common "hairy" seed is in *Opuntia*?

..... from H.Middleditch

The origin of the hairy seed on *O.clavarioides*, as quoted by Britton & Rose, may be found in Schumann's Gesamtbeschreibung der Kakteen. Here he quotes the seed of *O.clavarioides* as "seminibus lanatis" in the Latin and "Same wollig behaart" in the German. In addition, when Kiesling established the genus "Puna" in *Hickenia* 1.55:1982., he provided a sketch of the seed of the two species *O.clavarioides* and *O.subterranea*. Both these seed sketches display the deeply wrinkled surface that is shown on the Castellanos sketch of the seed of *O.Ruiz-lealii*. Kiesling states "Seed surrounded by an aril having an irregular surface, more or less soft, formed by greatly lengthened cells, disposed parallel to one another, which are similar to locks of hair (but united laterally, forming a lax weave)." For practical purposes he gives the same description of the surface of the seed of his genus "Puna" in his review of the *Tephrocactus* of Argentina. But at a quick read, this might be taken as "the surface with the appearance of wisps of hair". Did Schumann fall into the same trap?

..... from R.K.Hughes

Last year Southwest seeds had their best selection yet of *Tephrocactus* seeds on offer. I selected those I thought of interest, just a few species as I only consider packs of 100 seeds worth while sowing. For one sort that was sold out I received a substitute in the form of *Austrocylindropuntia vestita*. These seeds looked very unlike what I expected them to be; they had a very wrinkled surface that is soft and scrapes off fairly easily, to leave a tiny hard centre that should contain the kernel. I wonder what it is supposed to be, or if it has not actually developed.

..... from H.Middleditch

Or is it a "hairy" seed?

YET ANOTHER IMPOSTER? From C.Holland

Among a number of plants which I have obtained from Knize there is a solitary piece of KK 2024, called *Tephrocactus asplundii*. It is in a somewhat shrunken condition, but nevertheless the areoles seem to be fairly closely spaced, with stiff whitish spines over one inch in length, inclined upwards. What is known about this name?

..... from H.Middleditch

This name was published by Backeberg in 1956, based upon a specimen collected by Asplund in 1920 in Bolivia, at Ulloma. This place is on the banks of the R.Desaguadero, very approximately half way between Lake Titicaca and Oruro. In Backeberg's *Die Cactaceae Vol.1* there is a photograph of the herbarium material deposited by Asplund. This gives the impression that it is a segment from a fairly typical hummock-forming *Tephrocactus*, with the usual concentration of spines at the topmost areoles. This is quite different to the spination on KK 2024 which is similar at all areoles. However, the latter appears to have a very distinctive sulcate groove above each areole, a feature which I do not recollect having seen previously on any *Tephrocactus* Lem.

..... from K.Gilmer

The plant on the photograph is undoubtedly *T.weberi* (Speg) Bckbg. The form of the "sulcate grooved" areoles is quite typical, as well as the spination

..... from C.Holland (later)

I now have two small pieces of *T.weberi* which came as DJF collected from Santa Maria. These do have the slit-type areoles, though only about half way down the tubercles. The spination is a rich reddish-brown colour.

..... from J.Lambert

When travelling north from Cafayate in 1986, along the Calchaquies valley, it was south of Molinos, near San Martin, where we found some plants of *T.weberi*. The plants here bore long and more or less reddish spines. The segments were also rather long and thin, reminding me of an *Austrocylindropuntia*.

..... from H.Middleditch

When the new growth, or offsets, first appear on *T.weberi*, they do not bear all the areoles that will be carried by that new segment; in other words the new segment - or branch, or offset - has a growing point, which produces a succession of areoles. This is how the vast majority of cacti grow, and in this respect, too, *T.weberi* is similar to *Austrocylindropuntia*. Also, *T.weberi* has a body somewhat similar in habit to the *A.verschaffeltii* photographed by M.Nilsson between Cortaderos and Santa Ana, which is illustrated in this issue - add to that plant the slit areoles, and stiff, straight spines and it becomes a close approximation to *T.weberi*. On these grounds it might be possible to suggest that *T.weberi* could be classified as an *Austrocylindropuntia*, but what is the fruit like?

AND YET ANOTHER? From H.Middleditch

In Chileans No.47 F.Fuschillo remarked upon a plant which he had received supposedly as FR 1179 *G.damsii*, which had the appearance of *G.paediophyllum*, so it may have really been FR 1177. It seems that I have also acquired an imposter. For some time I have had a seedling labelled *Gymnocalycium Borth* 421, which has continued to look more and more like *G.uruguayense*, putting out a ring of offsets last summer. My impression is that Borth travelled in western Argentina, but not in Uruguay, so I am very suspicious that this, too, is an incorrect label.

..... from H.Till

There is no such thing as Borth 421. Borth is an alpinist and lives in Vienna. His collecting activities in Argentina are well known to me, but he has never visited Uruguay

..... from M.Capenhurst

Could this plant have really been Borth 42? I have three plants with this number, which are labelled *G.genseri*. However, one of them has white flowers, with a pink throat, and the stigma stands level with the topmost anthers; the second plant has petals of a distinctly pinkish colour, an obvious red throat, and the stigma is buried in the anthers - it also has a stronger scent; the third plant has yellowish flower petals.

..... from H.Middleditch

It is looking as though these plants, as well as my imposter, are the results of dabbling round with a pollinating brush.

NOT AN IMPOSTER? From C.Holland.

Not long ago I received a piece of *Tephrocactus dimorphus* I.S.I. 1052 from a fellow-collector. I would be particularly interested to know if other members have this clone and how they think it compares with plants cultivated under that name. The uppermost segments of Backeberg *Die Cactaceae Vol.1* Fig.286 are most reminiscent of the I.S.I. plant. My other plants of this name resemble Fig.68 in *Tephrocactus*, Leighton-Boyce & Iliff, with much smaller almost globose segments which seem to remain small even on larger plants. Was there any information ever published about I.S.I. 1052?

..... from R.Moreton

I find that I have got ISI 1052 listed. It is given as *Opuntia dimorpha*, from Dept. Tacna, Peru, at 2550m.

..... from H.Middleditch

Opuntia dimorpha was first described by Forster in *Hamburg Gartenzeitung* for 1861. However, I am not able to find any reference to this name in Forster-Rumpler's *Handbuch der Kakteenkunde* for 1886. Britton & Rose tentatively

attribute this plant to *Tephrocactus sphaerica*.

TUNNEL TROUBLES From J.Arnold

The polythene tunnel greenhouse which I have been using for the last three years has served me fairly well with but one notable exception. Where the polythene touched the tubular framing it eventually split, the splits lengthening until the cover was being torn away by the wind. It seems to me to be unlikely that the polythene cover was gradually abraded where it came into contact with the framing; more probably it was the effect of the metal tube warming up on hot sunny days and adversely affecting the cover where it was in contact. Initially I had wrapped the tubular frame with plastic tape to avoid this very problem, but the tape gradually slipped and unwound itself and thus allowed the polythene cover to come into direct contact with the frame.

Before fitting a replacement cover I considered using the tubular pipe lagging that is used for insulating domestic water pipes, but opted for the traditional type of felt strip of about four inches in width. This was laid lengthways on to the tubular frame, wrapped round the frame, and secured by self adhesive tape. It remains to be seen whether this is really the answer to the problem.

NOT A SWOLLEN HEAD? From A.Johnston

Not long after the 1991 Chileans' Weekend took place I was in touch with D.Whiteley, who mentioned that he had earlier had some success with growing *Tephrocacti* from seed. He told me that he had grafted one segment of *Tephrocactus* on to a tuber of *Pterocactus kuntzei* and found the growth and spination was rather better than produced by the plant on its own roots. He had quite a lot of *Pterocactus* tubers in odd trays under the bench and offered to let me have several of them if I wished to try this method. As you may well guess, I accepted the offer.

The tubers were planted with the top of the tuber well above soil level so that the top could be cut off without any problem when they were to be used for grafting stock. They started into growth early in the following season and I thought that I would experiment a bit with them to start with, so I tried four grafts: *Pterocactus hickenii*, *Austrocactus spiniflora*, a *Blossfeldia*, and *Copiapoa lauii*. These were held in place by rubber bands round the graft and the pot. I was pleased to see after a short time that all four had taken, so I then tried *Tephrocactus malyanus*, *Pterocactus auracanus*, and another *P.hickenii*; by midsummer, all were growing well. If these continue to grow without any problems, then perhaps we will have a stock which has a lot of potential, especially for dwarf cacti which look a bit odd when grafted on to a column of cereoid stock.

I would imagine that once these grafts are potted up properly with the tuber buried, nobody would know that these plants were on a graft. Also the tuber should grow as well as the scion. As you may imagine I am now saving all my cuttings of *Pterocactus kuntzei* and put them down to root so I can produce a crop of tubers ready for the future.

..... from H.Middleditch

Some time ago I inherited a plant of *Pterocactus* which was then decidedly neglected, so that it was forever dropping shoots. Many of these had rooted down and started to produce tubers, so I am glad to have found a useful home to send them to.

..... from A.Johnston

It looks as though I am well on the way to acquiring the world's largest collection of *Pterocactus kuntzei*.

..... from D.W.Whiteley

As far as I am aware I did invent the idea of grafting on to *Pterocactus* tubers. I had heard of some succulents being grafted on to tubers - perhaps it was *Stapeliads* on to *Ceropegia woodii*, or something of that sort - so I thought that I would try the idea with a *Tephrocactus camachoi* on to a *Pterocactus* tuber. It took easily and although it was my original intention to see if it would induce flowering, as I do have flowers on *Pterocactus*, it has not done so as yet. But it has produced much longer habitat type spination.

?A SLIP ON A BA-NANA from M.Nilsson

In Chileans No.47 p.74 I wrote in error "... These plants tend to be more compact (minima, according to Knize.)" What I should have written as "v.nana according to Knize"!

CHILEANS 1993 WEEKEND

It is intended to hold this Event at our usual venue, at Cavendish Hall at Nottingham University, over the weekend of September 24-25-26th, 1993, commencing with the evening meal at 7.00 p.m. on the Friday and concluding with tea at 4.00 p.m. on the Sunday. It is anticipated that we will be joined by one speaker from Germany who has travelled in north-western Argentina, taking especial notice of *Tephrocacti*; together with a second speaker from Germany who has travelled in Rio Grande do Sul. We also hope to hear from B.Bates, R.Hughes and P.Downs about their 1992 trip to Bolivia, as well as from G.Charles, C.Pugh and R.Ferryman about their 1992 trip to Argentina.

CHILEANS 1992 YEAR BOOK - COMPENDIUM OF FIELD NUMBERS

This publication updates the Lau, HU, Rausch and Ritter field number lists which appeared in our 1972 Year Book, together with the addition of the RMF, RKH, P, JL, WO, G, MN, KPM, DH and AA field number lists, a total of more than 7000 entries. Because of both its bulk and availability, the KK field number list is not included. This compendium is intended to assist in identification of a plant for which a field number is known, and also to enable an impression to be obtained of the approximate locality in which each number occurs. Pin-point locations are not provided. This publication is available from the Chileans' Membership Secretary at a cost to UK members of £6.40, (inc. p & p) and £7.10. (or \$18) overseas.

REPORT AND ACCOUNTS Nos. 46-48 (inclusive)

INCOME

Subscriptions	2209.90
Back number sales	1196.12
Sales of other publications	483.44
	<u>3889.46</u>
Miscellaneous income	290.04
Bank interest	621.77
	<u>4801.27</u>
Four Chileans' Annual Weekends	7573.3
Balance brought forward from previous account	1107.82
	<u>13482.39</u>

EXPENDITURE

Printing of journals	1754.20
Postage of journals	232.63
Other postage, stationery, etc.	1573.92
Maintenance of photocopier	75.00
	<u>3635.75</u>
Nottingham University charges for four Chileans' Weekends	6941.30
Balance carried forward	2905.34
	<u>13482.39</u>

The disc on which the text of the Chileans' Journal is prepared has to be converted to a format and machine code to suit the printer's own equipment. As reported in the previous accounts (Chileans No.46 p.51), our printers continued to be unable to organise a satisfactory translation of the embedded formatting commands. However, as a result of the disc carrying the text for No.48 being converted by D.Aubrey-Jones and then formatted to machine-ready masters by G.Charles, this conversion problem with its serious attendant delays has now almost been overcome.

The use of the photocopier has enabled orders for all back numbers to be met without incurring several uneconomic short-run printing costs, whilst at the same time bringing some easement to the problem of storing back numbers. It has also enabled us to meet the relatively limited demand for the Field Number Compendium thereby avoiding both the heavy initial cost of an economic print run and an additional storage problem.

The notional profit on the four annual Weekends does not take into account any ancillary costs such as postage, stationery, etc., nor of display material obtained specifically for these Events. The ancillary cost is included under the heading of Postage, Stationery, etc., and would amount to approximately half the notional profit.

It is always a pleasure to be able to acknowledge the valuable assistance given towards various Chileans' activities by an appreciable number of members. Without this support in its many forms, it would be most difficult to continue with the publication of The Chileans as well as other activities.

DR.SCHUTZ REVISITED From H.Middleditch

In the post-war years there was an ever-broadening interest in this country in the cactus collecting hobby. By the late 1950's it was becoming recognised that, despite the ravages of the war and the problems of post-war recovery, there were many fine collections of cacti on the continent of Europe which outshone anything to be seen in this country. It may have been about 1960 when the National Cactus and Succulent Society looked into the possibility of making up a party of cactophiles in order to visit a number of these collections, but there was insufficient support forthcoming to go ahead with the proposal. The potential cost may have been a contributing factor.

After making soundings at various branch meetings and also submitting enquiries to several firms who offered continental tour arrangements, a fifty seater coach was booked for a two-week cactus holiday on the French Riviera at an all-in price of £48 per head. This was the very first time that an English party had visited the continent for a cactus trip, something that is regarded as commonplace today. There were the inevitable unforeseen problems, but many superb collections were visited. This trip was followed by another to Holland in 1963, then to Austria in 1964, and others subsequently.

In 1969 another visit was paid to Vienna, from where the party crossed into Czechoslovakia, heading for Brun, thence on to Prague and Dresden. Once Austria was left behind then within a day or two we became acquainted with the climate of restrictions imposed by the then communist authorities. However, we were not quite as familiar with the situation on our first morning in Brun when we went to visit the collection of Dr.Schutz. The whole coach load decamped at the Schutz residence where we were warmly welcomed, everyone being treated to a cup of coffee, which was readily refilled as required. The small greenhouse was crammed full of mature plants, including many superb Gymnocalycium. It was a day or two later, when we had found our way round Prague and how to get the best exchange rate for English money, that we realised goods like coffee were restricted to the communist heirarchy and were unavailable to the public - except from someone you knew, and at an exorbitant price. It was very much later that the realisation sank in that the coffee for the English coach party alone probably consumed considerably more than the Schutz' household budget for the week.

..... from R.Allcock

It was in 1992 that I took another holiday in Czechoslovakia and on this occasion went as far as Brno. Once in Brno I was able to find the telephone number of Dr.Schutz but a combination of difficulties plagued attempts at communication. Fortunately my brother-in-law was able to come to the rescue, for without his help the situation would have been very difficult - not only in communication (due to my limited grasp of conversational Czech) but also in finding the way to his house. With a street plan and advice on public transport, I was able to find my way to the Schutz' residence, a pleasant detached house in one of the best districts of Brno, all endowed with leafy gardens. Here I was most hospitably received, being invited in for coffee and then asked to join them for lunch.

Both Dr.Schutz and his wife are now at an advanced age so that he has had to part with almost all of his collection. Nevertheless they both well remember your visit in 1969. Dr.Schutz reminisced that it was very rainy at the time so the large company of fellow-enthusiasts had to stand rather wet in the living room whilst small parties of six could successively be shown round the tight confines of the greenhouse. He also recalls that your double-decker bus [actually a touring single-decker - H.M.] was the focus of considerable interest, so that all the locals came out to gape in wonder at this strange creation from England!

I was also shown a very fine visitor's book. There, on one page, were all the signatures from that visit. But, glancing down the subscribed signatures, I was surprised to find that the only name that I recognised from the present company of active Chileans was that of H.Middleditch. Then before leaving, on behalf of all those visitors, I presented Dr.Schutz and his wife with the pack of half a dozen large jars of Nescafe which we had brought with us from England. Mission accomplished!

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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
Frailea	J.Forrest, Spring Garden, 2 Darngaber Rd., Quarter, Hamilton ML3 7XQ
Gymnocalycium	F.Fuschillo, 55 Emberton Court, Torpion St., London EC1V 0EP
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 6AH
Opuntia	R.Crook, 35 Cardinal Close, Worcester Park, Surrey KT4 7EH
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