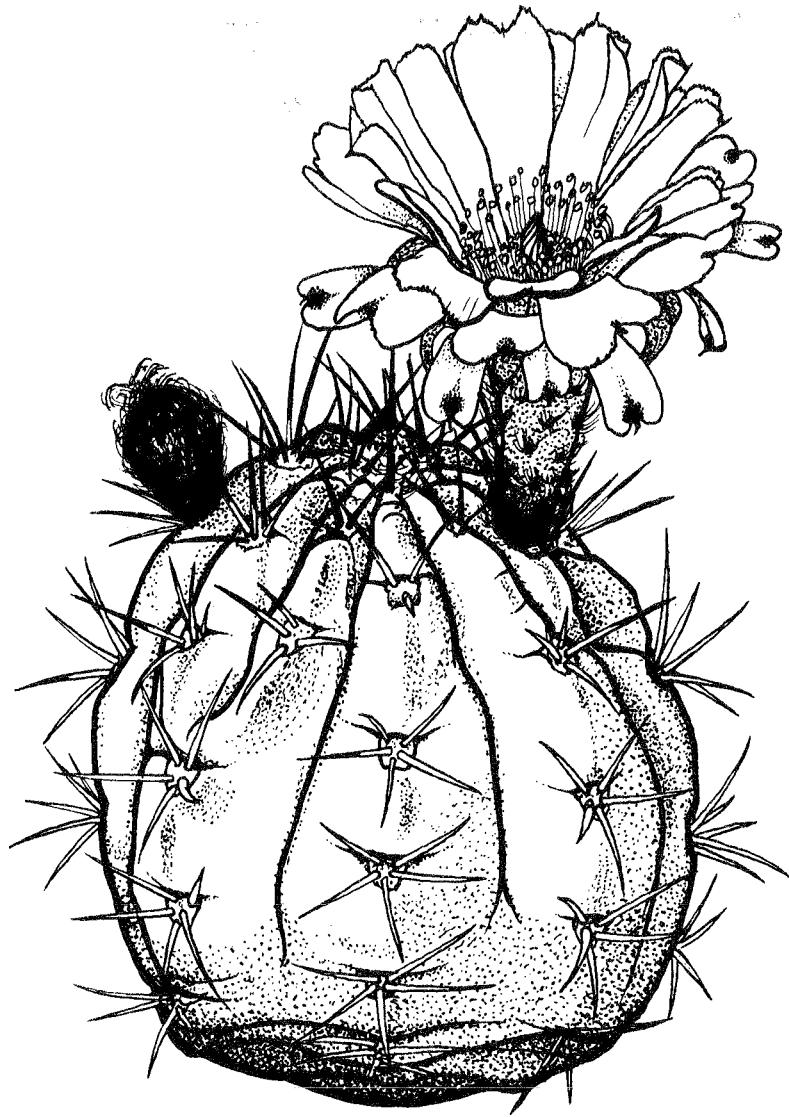


THE CHILEANS '69

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ACANTHOCALYCIUM

GLAUCUM

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COLLECTION C. LAZZARI

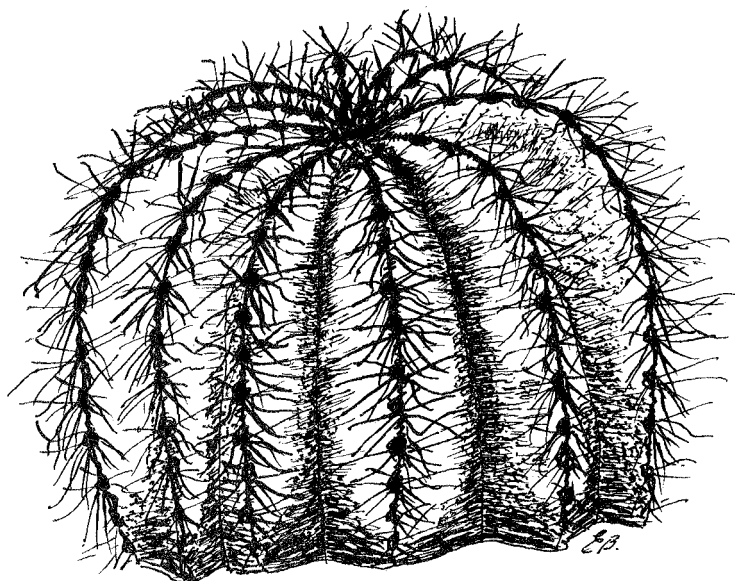
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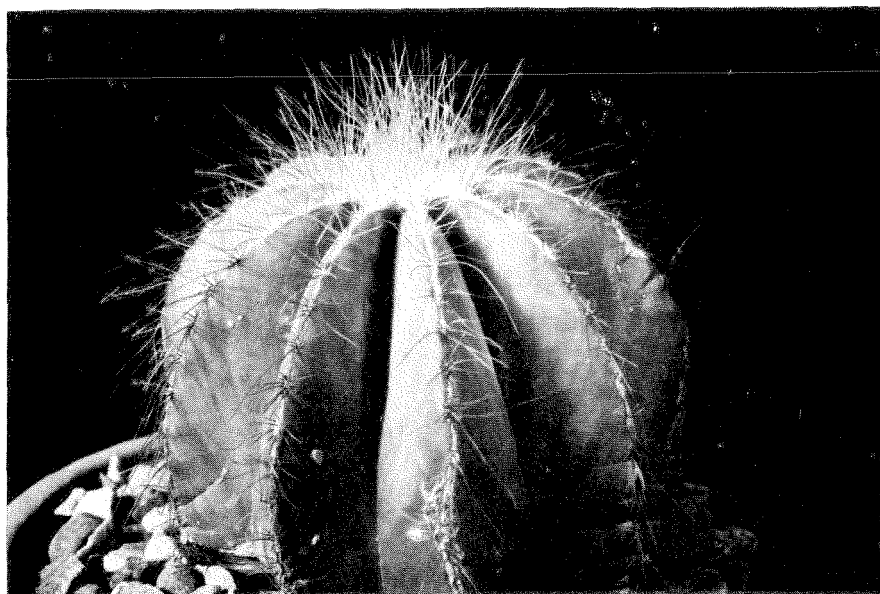
IN HABITAT
HERR LEOPOLD HORST
(ON RIGHT)
COLLECTING SEED

Foto: Buining

NOTOCACTUS
MAGNIFICUS



COLLECTION
E.W. BARNES



PHOTOGRAPH AND
COLLECTION
A.W. CRAIG.

OUT SEARCHING FOR NOTOCACTUS MAGNIFICUS RITTER

by A.F.H. Buining

(Translated from 'Succulenta' for October 1967 by H. Middleditch)

On Saturday January 28th 1967, Leopold Horst and I found ourselves in the State of Rio Grand do Sul, Brazil, in the vicinity of where *Notocactus (Eriocactus) magnificus* Ritter originates. The idea of 'vicinity' will be understood to mean that we had to make at least a half day's run from Julio Castilho before we could attempt the very difficult trek to the discovery spot.

We travelled through a splendid rolling plateau with hills here and there. The plateau was gashed now and then by swiftly flowing rivers. After a long journey over well-nigh impassable trails, we found ourselves in a tiny village that only consisted of a pair of houses. Our shelter for the night was the entire tiny room of a small, shabby, wooden dwelling. As usual the people here were most hospitable towards us. It was remarkable that a sort of game with large balls was being played, next to a little coffee house, that reminded me of the well-known French 'boule' game.

The following morning we set out early, as our very long journey by foot was better made before midday on account of the great heat. After a single kilometre by car over a rapidly descending rocky track, we came to the edge of the river that had worn out a deep gorge in the plateau in the course of many centuries. Only at spots such as this can one reach the river.

The sides of the gorge rose steeply at least 150 km. straight up from the river. The only means of getting close to our plants which were at least 2 km. upstream, was by careful wading on bare feet over the slippery rocky bed of the river.

This had to be done with the utmost care for the bottom was overgrown with algae in most places, so that wading was almost impossible. In my rucksack I had my cameras and some camping equipment.

It was an unforgettable sight, these steep and nearly bare cliffs, with here and there some plants rooted in crevices in the near-vertical face, now and then a single *Cereus peruvianus* and sometimes some shrubs. Above, at the rim of the gorge, began the virgin forest extending for many kilometers in which, according to the inhabitants of the village, many snakes, tiger-cats and also a so-called 'white lion' was to be found. These 'white lions' were apparently as large as a St. Bernard and entirely covered with long white hairs and an even longer mane.

Continually slipping, we went on upstream, driving away great schools of salmon, which playfully showed their handsome coloured bellies in the fast flowing water. Now and then the water was so deep that we carefully scrambled along the bank to make headway.

Eventually we reached a place on the right hand side before a somewhat more sloping rise, but yet still a steep cliff, while the river there was very deep. We had therefore to scramble up this bank, and at once we became surrounded by thick jungle. Scrambling over loose boulders, broken tree stumps, all thick with drooping lianas and mostly unknown wild growth reaching 10m. above us, I slipped once and dropped down at least 5m. and had to continue our journey with badly bleeding legs.

Suddenly we came into a somewhat more open part and there we struck great groups of the plants we sought. On the accompanying photo you can see how splendid are these bluish-tinted plants. We took a great many photographs. It was remarkable that hardly a single small plant was to be found. The downward directing stems with up-pointing heads are so bulky that it was not possible to carry them along this difficult route. Herr Horst collected seeds and the few small plants, whilst I accurately recorded the flowers.

Before long, however, we must start the return journey, for it began to get terribly hot. Carefully climbing, avoiding huge cobwebs here and there and keeping a keen lookout for snakes,

we came once more to the river. After about 100m. we pulled up - here was an opportunity for taking a bathe in one of the deeper parts of the river. We had no swimsuits with us, but here in this completely uninhabited spot we could allow ourselves a bathe dressed like Adam.

After further scrambling to reach single small plants, we continued on our way. At occasional deep places we had to go over some small dry flat rocks, which had become so heated by the sun that with our bare feet we rapidly sought the cooler water again. Either because of the sun which by now had become burning hot, making the deep gorge like an oven, or because of the long, greatly fatiguing journey, I do not know, but only a hundred meters before the last lap, my legs suddenly shot out from under me upon the slippery level bottom and I went in with my rucksack (in which were both cameras) right over my head twice. My friend Horst came as fast as possible to me, and I gathered up the equipment as quickly as possible to bring it on to dry ground.

After quickly obtaining some further forms of so-called *Notocactus linkii*, we came back to our starting point. We laid out the cameras, light meter, and the greater part of the clothes in the burning sun, and in an hour everything was dry.

So concluded this captivating and interesting journey, that for me will always remain linked with *Notocactus magnificus* Ritter.

Alas, when we looked later in Holland, all the colour slides proved to be worthless, together with all those shots taken during and after this adventure. It was a wonder that later I was still able to take photographs. Happily one black and white negative appeared to be pretty well undamaged and the photograph herewith is the only perfect specimen. In it you can see Leopold Horst collecting seed from this splendid blue-coated plant with its golden-yellow spines.

THE HABITAT OF NOTOCACTUS MAGNIFICUS

The location of the habitat of *Notocactus magnificus* is given by Mhr Buining as half a days' journey from Julio de Castilhos. This place is situated roughly in the middle of the state of Rio Grande do Sul, north of the valley of the Jacui, at about 2,000 ft. altitude at the southern edge of the Parana plateau.

The Parana plateau is a rather remarkable geological feature, very irregular in outline but extending to almost a thousand miles north and south and over two hundred miles east and west. It is formed of sedimentary strata, predominantly sandstone, in almost horizontal beds throughout. These beds have subsequently been invaded by immense flows of lava - lava which has come not by destructive volcanic eruptions but by a steadier upwelling. It is the more free-flowing type of lava and has formed beds tens of feet thick over this vast area, infusing between the bedding planes of the sandstone strata thus forming a multi-decker sandwich of sandstone and lava over the whole plateau.

Wind and weather and rivers have eroded the plateau so that the surface is now a patchwork of sandstone and lava. The two soils most commonly encountered on the Parana plateau, in consequence, are the 'terra roxa' and the 'terra arenosa'. The terra roxa is formed on the outcropping lava and is the best known. This is a deep, porous soil which can be easily recognised by its dark reddish purple colour - roxa means purple in Portugese. When it is wet it becomes slippery and sticky, and travel over it becomes quite difficult. In dry weather it turns to a powdery red dust. On the outcrops of sandstone a light coloured sandy soil is formed, called terra arenosa. There are many spots where the original sedimentary rocks have been metamorphosed by contact with the lava and these now appear as resistant rocky outcrops.

The greater part of the Parana plateau enjoys an abundant rainfall - in excess of 70" per year, this being fairly evenly distributed throughout the year. Summer temperatures approach 80°F and winter temperatures approach 60°F. This combination of elevated rainfall with a fairly high average temperature and good soil, produces a vegetation cover of rich semi-deciduous

forest. Amongst the variety of trees there will be found the Araucarian pine and also the maté producing tree *Ilex paraguayensis*. This is the 'virgin forest' described by Mhr. Buining.

One might well ask how it comes about that any cacti are to be found within such a wet forest region. Epiphytic cacti we might perhaps expect but one normally associates soil-rooted cacti with an arid climate, certainly not a storybook jungle crawling with snakes, and dripping with lianas.

Those of us fortunate enough to see the slides taken by Mhr. Buining on his first trip may well recollect how often the plants could be seen to be growing on rocky outcrops or amongst broken rocks. All the articles which Mhr. Buining has written for the Dutch Journal 'Succulenta' seem to indicate that either in the grassland or in the jungle, the cacti are to be found on 'bare patches' or on 'isolated rocky patches'. Because of the excellent drainage at such spots, together with the fairly high rate of transpiration at the ambient temperatures, there will be a highly localised 'arid' climate between rain showers. A surface with both soil and sub-tropical vegetation cover will retain a very great deal of moisture, so maintaining the growth of non-xerophytic plants even when rain showers are well over a week apart; under the same conditions an area of exposed rock only retains minimal moisture in cracks and gaps and so can only support xerophytic vegetation. It is in the latter situation that we find cacti growing.

There are very few cacti commonly found in collections which grow in a region with a rain-fall anything approaching that of the Parana plateau. This might suggest that *Notocacti* could benefit from fairly generous watering spread round most of the year.

H. Middleditch

COMMENTS ON NOTOCACTUS MAGNIFICUS

..... from K. Halstead:

"There are two distinct forms of this species now available, one, the original discovery by Ritter and two, the Uebelmann type. The spines of all these plants are not unlike although the Ritter type appears to have the felting between areoles extending well down the ribs.

"As for the crown, the spines in both my Uhlig and Uebelmann types are upstanding and brush-like but those on the latter do not seem so long or outstanding as the former, which is why I think the sketch by E.W. Barnes is of a plant of the latter form. My Uhlig plants have much more acute ribs whereas my Uebelmann type lacks the deep clefts between the ribs and appears to be flatter than the other but, as it is a young specimen, it may not be wise to draw conclusions too early both with regard to its mature form and its difference from the other, until further study has been made.

"I don't think the sketch varies too much from other specimens, where slight waviness of the spines does occur."

..... from J.D. Donald:

"There are indeed two distinct forms of this plant imported from Brazil. Those from the firm of Uebelmann closely resemble the original Ritter plants with very sharp ribs, on which are set the very small, numerous areoles in close proximity, and from which arise the yellow to golden brown, straggly displayed, spines; the epidermis is very glaucous. In most plants the spines are predominantly downward directed. It seems to flower quite easily, plants 2½ inches or over readily producing a succession of single flowers. As a plant it is much more globular than the other members of the *Eriocactus* section of *Notocactus*.

"The Uhlig form is a much more columnar plant, still with a glaucous epidermis, but with a slightly less acute and more rounded apex to each rib ridge, on which are set relatively large rounded areoles with white wool and spaced $\frac{1}{4}$ to $\frac{1}{2}$ inch apart, from which arise a fairly regular display of white, pale yellow or yellow spines, stiffer than for the Ritter/Uebelmann form. It flowers less readily than the Ritter/Uebelmann form and the flowers are slightly more stiff if anything, producing a more funnel form rather than a flattened flower.

"The sketch is not too easy to decipher - it does show the wide spaced areoles and a more or less regular display of spines typical of the Uhlig form rather than the Ritter/Uebelmann form. Nevertheless it seems to me that the number of areoles per rib is greater than it ought to be. Eddie Barnes' sketch seems to show a plant intermediate in character between the extremes of the two forms I have described above.

"I suspect that Ken Halstead's Uebelmann type with the lower rib ridges and flatter slope generally is only a seedling or an immature plant. Its description closely resembles the seedlings I have raised from Uebelmann seed. Imported mature specimens from Uebelmann show the typical Ritter form with deeply cleft ribs.

"It would be interesting to see how this distribution of characters is confirmed by other member's plants "

..... from E.W. Barnes:

"The Uhlig form of *Notocactus magnificus* seems to have very little felt on the ribs and bridging over from one areole to the next hardly ever occurs. I had the opportunity of observing seven specimens from Uhlig and not one of them had a continuous bridging over of felt. My own plant illustrated displays - very intermittently - the clefts or scars from which the felt must have sprung. These clefts extend to and merge with the areoles but never constitute a continuous chain as in the Ritter/Uebelmann form, where all the areoles are linked. I see this feature can be clearly seen in Alan Craig's plant: it seems to me that this is untypical of the Uhlig form. I have never observed the long apical spines nor the felty bridges to such a marked degree in a Uhlig specimen before.

"All the spines on my own plant (4" dia by 3" high), are between 1.5 and 3.0 cm long, more or less flexible, horny yellow, variously twisted and pointing in many directions - predominantly downwards. There is no bridging felt between areoles and most ribs show no signs of it having been carried. The crown is slanting in typical *Eriocactus* manner and the only ribs exhibiting bridging-felt scars are those towards the 'front' or lower side of the plant (facing the sun in habitat?). The epidermis is glaucous, pale greyish green with a faint bluish tinge in places. Ribs 11, broad at the base, deeply divided. I am puzzled that John Donald suggests that 'the number of areoles is greater than it ought to be.' I have counted those on Alan Craig's plant and they are as numerous as those on mine. I would have thought that this number was typical of the Uhlig form. On comparing Alan Craig's photograph with my plant I would say that they are similar in many ways except that my plant has no long spines at the apex - they may be thin, straight and upright, but no longer than any of the other spines on that plant. Alan's plant seems to keep its apical spines erect over a wider area of crown than mine, which also has a more depressed crown and little apical felt or wool, each areole being easily discerned right up to the growing point itself. Ken thinks my plant may be the Uebelmann form; I think it may be closer to the Uhlig form.

"I agree with John Donald that the Uhlig form produces a stiffer, slightly funnel form flower. After making comparisons with a sketch and notes of my *magnificus*, I can quite see that the Uebelmann form produces a very widely expanded flower compared with that of the Uhlig form. My plant begins to bud in December/January. Already (Feb) there is a well advanced bud - 2 cm dia., covered with brownish felt and 2 cm. long dark brownish bristles. Usually the first flower opens in May."

..... from J. Forrest:

"My own plant of *N. magnificus* has whitish spines in the crown, differing in this respect from the yellow to golden-brown spines observed on the plant in the collection of H. Middleditch and referred to by J.D. Donald."

..... from A.W. Craig:

"The plant illustrated in my photograph was obtained from Sukaflor in early June 1968 and was completely without fibrous roots but with a very long curved tap root - so that the complete plant was curved like a horn in a similar manner to those shown in Mhr. Buining's photograph.

"This made it very difficult to pot and I had to cut off the lower third of the root, dry the cut for a couple of weeks and then pot it in a very coarse compost. Within six weeks it had produced a mass of roots, and it is now (March '69) extremely turgid. It appears to have recovered completely from the importing journey and from my surgery."

..... from H. Middleditch:

"My own plant of *N. magnificus* is about 10 cm. in diameter and came from Uhlig: it is on its own roots. In October 1968 it started to produce two buds from near the centre of the crown - these grew until they were just over 1 cm. high and remained in that form through the winter. They showed no sign of movement in spring or early summer and were given up for lost. However, on return from our Cactus Tour in late June, it was clear that one had flowered and shortly afterwards the second bud also came in to flower - nine months from first seeing the bud.

"The buds are covered with a very pale brown wool; in the upper part appears some bristles, about 8 to 10 mm long, of a golden brown colour - a very similar colour to the body spines. This same covering clothes the flower receptacle, the bristles projecting above the wool around the outside of the petals. The flower petals are a uniform pale yellow with a slight sheen and are about 5 mm broad with a blunt tip.

"Probably the most striking feature of the flower is the stigma which had seven lobes each almost 1 cm. in length. These are also pale yellow and carry two rows of stumpy projections which seem to be about $\frac{1}{2}$ mm high."

A HAAGEOCEREUS IN FLOWER

From Mrs L.E. McIntosh, New Zealand.

I have a plant of *Haageocereus multangularis* v. *dichromus* which I acquired as a seedling about eight years ago. It was grown in New Zealand from imported seed and now has three upright branches, the tallest being about 26" high. It is kept in a pot in the glasshouse - we find that they require all the sunshine that we can give them, summer and winter. Although they have a very small root system they need copious water in summer and are kept bone dry in winter.

The particular plant which has flowered lives close to the glass and receives sun from dawn to sunset. All the plants go back facing the same way whenever they have to be moved, mainly because of the possibility that they may otherwise get burned on the south side. The flowers occurred on the sunny side of the plant near the glass, on that season's growth. A second flush of flowers started after the first and alongside them but these were well into our resting period and died back before fully opening. At present (June) there are six more buds on the same season's growth but from the south side of the plant, spaced around the stem. I think that these may hold until spring.

It was in late spring, on December 15th 1968 that I discovered four fluffy white dots at the tip of four adjacent areoles, about $1\frac{1}{2}$ inches from the top of the branch. By December 15th these were pea sized, green with a coat of white wool. By January 5th 1969 the buds had become $\frac{3}{4}$ " long and were pointed with green sepals edged with brown, visible. On January 8th the tube had grown to $1\frac{3}{4}$ " in length and carried many green scales with tufts of white wool at their tips.

By January 10th the tube had become $2\frac{1}{2}$ " long and the flowers opened fully by 4.00 p.m. and remained fully open for about 24 hours. The petals were $\frac{3}{4}$ " long, the outer ones green edged with brown, the inner ones white; blunt. The stamens almost filled the tube - they were yellow and heavy with pollen. The stigma had twelve lobes of a pale greeny yellow colour and just protruded above the stamens. The stamens were attached to the tube about $\frac{3}{4}$ " up from the bottom and seemed to be in two rings, one just a little above the other but all were like veins of the tube. The flower had a strong odour, not offensive, but certainly not a perfume - rather clean like a cucumber. The flowers were not self-fertile.

The hottest period of our day is from 11 a.m. to 1 p.m. and all night blooming cacti seem to open round about 4 p.m. as the heat drops down, and they are usually open in time to take a picture before dark. We have very cool nights even after the hottest day so it cools quite quickly when the sun is low down.

Another *Haageocereus* which flowers very young here is *H. subtilispina* var. *procumbens* - it has a quite different flower altogether. I shall be looking out for one in flower.

The writer of this article has donated five slides to our slide library which show the development of the bud and flower. These slides are especially welcome in the slide library as very few members in Britain are likely to have an opportunity of seeing this plant in flower.

COPIAPOA - FROM THE ROBIN

Early contributions to our Copiapoa robin were reported in the Chileans No. 12 pp. 103-106. In later contributions to the first round, the problems surrounding identification of plants of unknown name or of doubtful name have been discussed. On this question D. J. Lewis feels that "forming a key to help identification may be difficult. Many plants in collections are still young plants at ten years of age. Can we consider any characteristic we use in a key as constant? I suspect not - thus in *C. cinerea* most characteristics change except for the spine colour.

"*C. humilis* and *streptocaulon* tend to flower quite young in which case they may well be classed as being adult after less than ten years of life. May I suggest that a key is based upon a certain size range of plant so that juvenile spination and colouring may be considered, as it is these plants which are in most peoples' collections. A further key could be prepared for adult plants if required".

In considering some of the characteristics we usually use for identification, W. F. Maddams comments "Of my two large Copiapoas, *C. haseltoniana* is now nine years old and about $3\frac{1}{2}$ " across the body. It cannot be said to be of particularly rapid growth. I have seen other examples of this species and the spination is quite variable: some have spines twice as stout and rather longer than mine and the colour varies between orange brown and medium brown.

"I have had *C. taltalensis* in flower this year; *C. montana* flowered last year on the floor of a glass-to-ground greenhouse - it was in a south facing position getting a fair amount of sunshine but certainly not as much as it would have done on the staging. My three year old specimen of *C. hypogaea* is becoming woolly at the apex and I am hoping that buds will appear shortly. I suspect that we shall find that quite a number of these Copiapoa species flower when they are three

to six years old; in general this seems to be true of a good many Echinocactanae from the western side of South America.

"I do not know how much the flowers on Copiapoa differ or what is representative of the genus, but certainly there are marked differences between the flowers on my taltalensis and montana. In the latter the stamens are very spreading and do not form a close packed cylinder round the stigma lobes, as do many other cacti.

"I hope to obtain some black and white photographs of Copiapoa - I feel that we should try to build up adequate reference material as quickly as possible. To do this we have to ensure that we are dealing with correctly named species and also that the photographs are of a good standard. Ideally, one would hope to be able to identify a species from a b & w print, but for this the original photograph must be sharp and the reproduction must be of good quality."

Further comments on the question of identification come from K.H. Halstead, who observes that "many Copiapoa are unusual in that they lack central spines - nearly half my plants have either no centrals or only occasional ones.

"There is a need of a key with which to identify Copiapoa. In Die Cactaceae Backeberg set out the following:-

- (a) plants normally becoming cylindrical with age:
cinerea, dealbata, brunnescens, gigantea, haseltoniana, malletiana and marginata.
- (b) plants globular and grey-green:
coquimbana, cinarens, echinoides, bridgesii, krainziana, taltalensis.
- (c) globular and light green:
applanata.
- (d) plants with turnip like root and more or less caespitose:
cupreata, humilis, pepiniana & v. fiedleriana and megarhiza.

This may be one way of starting a key, but I agree with several contributors that there is a need to define juvenile habit and - if possible - the difference brought about by grafting. Backeberg's key included plants that become cylindric with age, but how long do we wait for this characteristic to appear - for example, with a cinerea and haseltoniana? I have seen quite large specimens of these - including a 12" plant of cinerea - showing no signs of becoming columnar.

"An important aspect is that all species should first be described from a plant imported from habitat and any differences noted in home grown plants. Such a system will be ponderous but what other method will cover all circumstances?"

We hear from E.W. Barnes that "I have seen quite a number of collected Copiaopos and at a glance many of them look very much alike. On closer examination, however, they seem to be quite variable within the species. C. haseltoniana is an example of this, which comes in two forms. One has more ribs and deeper coloured spines and the woolly crown is lightly tinged with orange. On the other hand the other form has fewer ribs which are not so deeply divided and the spines are translucent and in many instances thinner and longer too. The wool is very pale - almost white in fact. As the plants age these differing characteristics become less pronounced, but as seedlings they are quite distinct. A packet of seed will sometimes yield one or the other and on occasions both forms will be evident. R. Ginns noticed this some time ago and commented on it.

"I obtained C. vallenarensis and desertorum from Uhlig last year and was delighted to flower them this last winter. Both flowers were similar and were pale yellow in colour. They lasted a week, but no seed pods were evident as a result. Later, whilst probing around in the woolly crowns of these plants with a pair of forceps I discovered a dried up pod in each. Both contained approx. 100 seeds and I now have a nice batch of seedlings coming along.

"*C. humilis* seems to be very variable indeed - the varieties *remontana* and *spiralis* differ markedly. I think I must have about seven different plants of this species, one of which is very interesting as it has a dull rose coloured body and black spines. The body colours of the others range from deep green to deep purple.

"I must agree with other contributors that grafting can and sometimes does alter the characteristics of a plant, but on the other hand, as Rene Zahra remarks, grafting can intensify spination and body colour. If one grafts everything on *Tricho. spachianus* or allies this is to be expected. Many plants show no ill effects at all, but others look quite shocking after being grafted on such stocks for some months. This type of stock is ideal for pushing seedlings over the critical first year or so of their lives, after which they can be degrafted or regrafted on to a slow stock. I find *Eriocereus jusbertii* is ideal for this final graft.

"There is just one more point on grafting - if a scion is left on the same stock for a number of years, growth will slow down and spination will become stronger; earlier, whilst the scion is smaller than the stock in comparison with its absorptive needs, there is bound to be some bloating. To sum up: it is not grafting which alters the characteristics of a scion, it is bad choice of stock. As most of the grafts available are on quick growing stocks for commercial reasons, this has led to the belief that all grafts grow out of character. *Copiapoa* do very well as grafts and in any case they don't put out very strong spines for the first year or so."

Mrs. Z. Andrews comments: "my *Copiapoa* are all pretty young and I have had no flowers yet. I have an idea that the lack of flowers may not be entirely due to size and age in this country but perhaps wrong treatment too. We may have to study soil conditions and other factors more closely before we can expect better results. One tip from Dr. Schutz of Czechoslovakia is that they like extreme changes of day and night temperature. Our N.Z. friends who don't have to heat their greenhouses which are often more open anyway, are probably helped in this respect. No one has mentioned if they give any additional minerals or other foods. I have started giving Dr. Buxbaum's salts this year with very good results to my South American species, many of which produced flowers for the first time at last. Another thing I have noticed is that seeds and plants from Czech growers have done much better than plants grown here and I know that their methods are much different from ours and they do feed."

If you can spare just two or three seeds of any known *Copiapoa* species, our *Copiapoa* group leader D. J. Lewis (address on last page) would be very pleased to receive them for study. A matchbox forms a very good protection for seed in the post. (Samples of *Copiapoa* seed received by the Seed exchange will automatically go for study).

COPIAPOA

- comments from E. W. Putnam:

"I was delighted to see Miroslav Voldan's extremely useful article on the genus *Copiapoa* in *The Chileans* No. 11. It enables me to look at my own plants in a more scientific and systematic way. I find I have plants under about two dozen of the names listed by Mr. Voldan, though I should not like to swear to the correctness of my labels! To date I have never flowered a *Copiapoa*. This may be partly explained by the fact that the majority of my plants are fairly young seedlings, few more than four years old. I do not have *C. mollicula*, which flowers readily when young according to John Donald. Among the outstandingly attractive plants in my own collection are *C. cinerea* v. *albispina*, *C. cinerea* v. *columna-alba*, *C. krainziana* and *C. haseltoniana*, all with beautiful spination and body colours. *C. barquitenis*, raised from seed in 1968, looks interesting and attractive though the plants (two only, unfortunately) are as yet very small. They have a fine bronze colouring and look very sturdy.

"I have some doubts about Mr. Voldan's cultural hints. These may well be correct for adult plants, but from some years of seed-raising I have come to the conclusion that *Copiapoas*, in their early life at least, require a good deal of water and do not like a dry winter rest. After early

difficulties in raising them I found that I got excellent results by growing them in a very peaty compost and being generous with water. Some early seedlings, grown in the more traditional way, had remained as rather unhappy and stunted objects, but on transfer to pans of peaty soil and generous watering they perked up quickly and have grown on at a good rate without any distortion or lushness.

Labelling of Copiapoa offered commercially is highly unreliable, perhaps even more so than with most S.American cacti. I might mention purchasing "Copiapoa" streptocaulon, which turned out to be a Gymnocalycium, and "Copiapoa" wagenknechtii, which turned out to be Neoporteria wagenknechtii, not to mention seed packets which have yielded very odd mixtures of seedlings!

- and some more comment from P.H. Sherville:

"I have flowered only two Copiapoa, C. bridgesii and C. hypogaea. C. bridgesii conforms to the published floral characteristics, but my C. hypogaea has neither a hairless bud nor do the petals overlap. The bud is enveloped in light grey/white wool initially and sparsely covered up until opening. When open the flower is extremely simple, containing only a few petals completely separate with two rows of stamens within. There is always the possibility that my specimen is not C. hypogaea but the body seems to tally with most descriptions."

- and from A. Johnston:

"My collected Copiapoa seem to have quite a bit of growing in the autumn of 1968 - C. cinerea, haseltoniana, cupreata and desertorum have a lot of new spine growth and I am sure that if I was to water them more freely then, they would grow a lot more. I think the suggestions that Copiapoa might prefer some water in the winter and grow at that time might be right (e.g. Chileans No.10 p.18 - H.M.), especially for collected plants.

"My C. haseltoniana has two offsets trying to get through the skin, but it is so thick and tough that it is a slow old process. The first thing you notice is a bump on the body, then the skin eventually splits and out pops a cluster of spines."

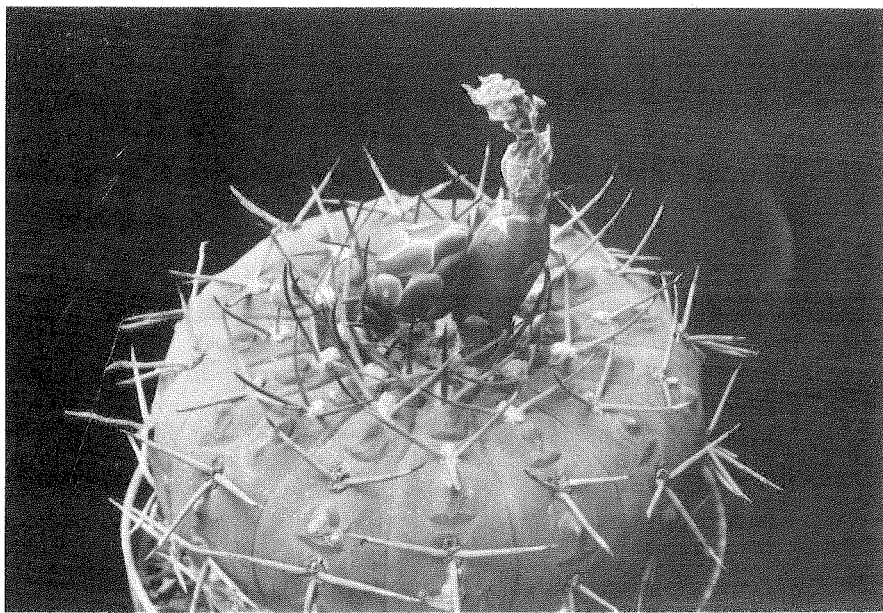
GYMNOCALYCIUM KOZELSKYANUM Schutz. sp. nov.

(Translated by S.Kulig from Kaktusy 66.)

Diagnosis: Body hemispherical, crown depressed, flattened, colour reddish-brown (coppery), 10 cm. wide or more and 6 cm. high. There are 14 ribs and these are 3 cm. wide, very low and smooth, slightly notched above the areole - continuous straight, almost without chins, grooves between the ribs straight and shallow; areoles 2 cm apart at first slightly felted, later becoming bald.

Radial spines 3, straight or slightly curved upwards, stiff, subulate (awl-shaped), 2 cm long, dark brown when young, later ash grey.

Flowers from the areoles round about the crown, about 6 cm. long, flower tube 1 cm. thick, dark grey-green with semicircular scales, shortly pointed, dark green becoming brownish red with margins in white. Outer petals spatulate about 1 cm wide, apex slightly pointed, pink, dark grey-green on the back. Inner petals lanceolate, 1 cm wide also rose-pink, purple in the lower parts. Filaments white, anthers yellow, style white, 8 white stigma lobes. Fruit 4 cm long and 1 cm thick, dark grey-green, scaly. Seeds of the group Trichomosemineae, 1.2 mm long dark brown, shiny, with pale yellowish aril. Habitat. Cordoba, Argentina. According to Backeberg some plants were imported in 1963 and distributed by the firm of K.Uhlig under the description G. vatterii. It was soon clear that these plants did not match the description of that species. After two years of observations, after the plant had grown more and flowered, it became apparent that it was a new



Gymnocalycium kozelskianum in the collection of Dr B. Schutz.
(Photograph by H. Middleditch)

species. A paper on the subject was going to be published to celebrate the 90th year of the Czech Cactus Society; Mr. Koselsky died before the celebrations so this article is to his memory.

G. kozelskianum varies in a number of ways from other plants in the seed group Trichosemineae previously described. The three spines make an angle of 90° with each other in typical plants, are quite strong, straight and firm. The ribs are unusually wide, almost flat, the grooves between them being shallow, round the circumference of the plant the ribs are divided into very low tubercles. Flowers are a full and lively pink with darker purple edges. Seeds are rather large, dark brown and shining, with a huge arillus of yellowish hue. The testa is red-brown like copper or bronze.

Some more plants have been imported into Czechoslovakia and these are represented in a few collections. We have also managed to acquire seeds, so that the continuation of this species is assured. Similar plants were reared many years ago from imported seeds by Mr. Jan Suba - these plants of *Gymnocalycium* may be found in some specialist Czech collections; formerly we used to describe them as *G. triacanthum*, but these specimens are very rare. Their eventual synonymy with *G. kozelskianum* will be determined correctly only after further studies.

B. Schutz.

One of these plants was observed in the collection of Dr. Schutz during our recent Cactus Tour, a fine plant over 4" in diameter, and about $1\frac{1}{2}$ " high. The body of this plant was completely brown without any trace of green at all - a most unusual colour approached by very few other cacti, for example *Gymnocalycium ragonessii* and *G. riojense*. There is an illustration of this species in the new Cactus book recently published by Dr. Schutz and Herr Fleischer, of which an English version is not yet available. The same illustration also appears in the Dutch "Succulenta" for March, 1967. - H.M.

A REPORT IN PICTURES ABOUT BOLIVIA

By Walter Rausch

(Translated by W. Kaugler from the G.O.K. Newsletter for March 1969)

The introductory slides gave a fine review of Bolivian flora. A few examples may be quoted: a mighty rock-wall through which there runs diagonally a small sheep track, is covered with *Tillandsias*. Only in the immediate vicinity of the path is any of the plant growth missing - it has been eaten. *Yucca*, *Puya*, *Bromelias* and *Hechtias* are present. Of small, dainty growth, forming rosettes with fresh green saw-tooth edged leaves (another species has shining red leaves) they are a picture to behold, but trousers, shirt, and skin are torn to shreds if you approach too near. We also recognised good old 'friends' in their wild state: *Fuchsias* (their flowers are smaller than in cultivated plants), *Begonias* and, on seeing a picture of a *Solanum* species, we thought we had a potato plant in front of us.

The pink flower of *Passiflora molissima* measures 10-12 cms in diameter. On the same plant was hanging a big egg-like fruit of 10 cms long. A winding plant, 2 meters high, opened its gigantic pink funnel-shaped flowers; in the high grass you can see dainty white flowers; the yellow-brown flower of a ground orchid rests on the green leaves; out of rock-fissures a bush with lovely red flowers, or one with yellow basket-like flowers, shines towards us, their intense colours being comparable with our alpine plants. *Echeverias* of different species with red, pink, orange or yellowish flowers are found only in altitudes of about 3,000 m. (9,500 ft.) and grow in shady, rocky countryside.

The range of Bolivian cacti commenced with *Cylindropuntia*, *Tephrocactus* and *Platyopuntia* (yellow and red-spined plants stand next to each other). *Echinopsis* were represented by *E. huottii*, *E. ayopayana* and *E. potosina* (with strong thick spines up to 5 mm thick). An as yet unknown *Echinopsis* - a dense spined sphere - forms spines up to 10 cm in length.

A red-flowering *Pseudolobivia* was probably given different names, amongst other *Pseudolobivia carmineoflora*, but Schumann had previously noted that *Pseudolobivia obrepanda* flowered white and red. *Pseudolobivia callichroma* is really outstanding with its wonderful flower colour!

Lobivia oligotricha is incorrectly described as *L. chereauniana*. Several pictures of *Lobivia pentlandii* with its differing forms in flowers and spines demonstrates the variability of this species. *L. caespitosa* in its natural habitat grows in clumps of up to 100 heads, with long yellow spines. *L. lateritia* differs from all other *Lobivias*: it grows cylindrically and the flowers appear near the crown. Synonyms of this plant are *L. cintiensis* Card. and *L. imporana* Ritter.

We relived with Herr Rausch one of his neck-breaking journeys by car through the Bolivian highlands with the aid of his impressive pictures. He was, for instance, looking for the type-location of *Lobivia laeae*, which Cardenas described and named after the Bolivian botanist Lara, who is the successor of Cardenas. Herr Rausch, Senor Lara and Senor Vasquez (also an ardent cactus explorer) set off with the University jeep. They drove over rough roads and trackless ground until even the jeep was unable to proceed any further - after all that there was a foot-slog for another 20 km. (12 miles)! On another occasion Herr Rausch was lucky enough to get a lift on a lorry. The pictorial record of that journey shows the lorry on a narrow roadway which snaked along a steep precipice. In front of him were towering blocks of stones from a rock avalanche and part of the road had slipped away down the precipice.

Or near Sucre: there is a splendid bridge over the river whose piers look like castles from a bygone age - but you may pass over only on foot. The traffic must ford the river!

But now back to our cacti; this time to *Parodias* - *Parodia camargensis*, *P. roseo-alba*, *P. culpinensis* and *P. subterranea* colonise a region in which the aridity is too much even for these species, one finds often only the dried up skins of the plants. *Parodia schwebsiana* grows in

ancient rock formations in the immediate neighbourhood of the town of Cochabamba. From Sucre originate *P.tarabucensis*, *P.yamparaezii* and *P.tuberculata*.

Sucre is a beautiful city; the neighbourhood also has its charms and attractions - round about there are magnificent cacti and we repeatedly find new *Sulcorebutia*. Especially on market days, Wednesday and Saturday, there is always something going on! Herr Rausch has caught this colourful life on film in breath-taking pictures. From a wide radius, often after days of walking, the Indians come to the market with sack and pack and kith and kin and offer their scanty harvestings. Their women are dressed in colourful costumes and on their black, plaited hair, perch white cylinder-shaped hats or black melon-shaped hats. (Each region has its own typical headgear). Always there are children with them, the smallest being carried on their backs. Herr Rausch also gave us a good look at the Indian villages. In one village, where houses were built of clay bricks and thatched with grass, the fleas surely left a lasting effect on him!

On a high plateau at 3,800 m. altitude (12,500 ft.) were several small lakes and among them we found one of the Indian villages; we asked ourselves involuntarily how these people found or grew enough to exist on there. Well, it is sufficient. A few pebble-strewn acres of corn, sheep, and Llamas together with mules on which they transport the products of their fields to the market (after a couple of days marching) offers them their livelihood. The snow-covered mountains of the high Andes form the backcloth to their landscape.

While we are mentioning snow - in the town of Potosi at 4,000 m. altitude (13,000 ft.) Herr Rausch was surprised to see a thick blanket of snow one morning. And round about that place, cacti are growing which survive all weathers, cold and wet. Why do not they do so with us?

Weingartia pulquinensis grows at Pulquina and Mizque. Further south, near Aiquile, their spines are redder and it is then called *W.multispina*. Herr Rausch took some pictures of *Weingartia platygona* at the type-locality (Potosi) and told us a good characteristic story; a cactophile from Potosi had searched all his life for *W.hediniana*, near and far round the neighbourhood of the city, where that plant was supposed to be a native. He did not find a single one, always only *W. platygona*. He came to the conclusion that both species must be identical. Following observations by Herr Rausch, the plants found around Potosi are very felty at the apex, towards the south and further on the felt on the areoles becomes much less.

The *Sulcorebutia* enthusiast had a special treat. The 'clean-up' of many mistakes in the literature, the clearing of many open questions and a lot of new finds are the fruits of the 1968 expedition. *Sulcorebutia steinbachii* is pretty variable in its widespread growing area; forms with different flower colours grow together, among them the 'varieties' *rosiflora*, *gracilior*, *violaciflora*, etc. Only at one habitat location have we found plants exclusively with uniform flower colours - outside red, inside yellow.

A new find is a *Sulcorebutia* whose distribution is restricted to one hill only. It is exclusively yellow-spined, the petals are of a light or darker carmine and exhibit a white mid-stripe. A quite overpowering picture showed us the type locality of *Sulcorebutia totorensis-polymorpha*; the sterile, stony soil was littered with plants so much so that when trying to photograph them one did not know where to put one's foot.

Sulcorebutia verticillacantha is hard to find; their small bodies have a diameter of 2 cms; it is very hard work indeed to hack out their long spreading carrot-like roots from the soil. Herr Rausch found a variety of this species with much finer, curved, spines (he will give it the name of *v. crispata*). The conclusions from the 1968 expedition have demonstrated that the plant described as *Sulco. taratensis v. minima* Rausch in the K.u.a.S. for June 1968, should be classed as a variety of *S.verticillacantha*.

Sulcorebutia kruegeri grows hidden among rubble and boulders in habitat and is almost impossible to find. *S.candiae* was photographed at the type locality. *Sulco. FR 774*, described by

Backeberg as *S. xanthoantha*, shows sufficient differences from *S. candiae*, so Backeberg's name will no doubt remain. There are various Cardenas-names for *S. breviflora*.

A new *Sulcorebutia*, up to 2 cm. in diameter with golden yellow intermingling spines, is a good variety of *S. verticillacantha*; Herr Rausch will name it after Senor Vasquez. Another new *Sulcorebutia* with brown-red spines curved towards the body, will be named after Ing. Frank - the flowers having a bluish tinge.

A summary of this review pointed to the valuable ones which are at home in the area round Sucre; *S. frankiana*, *S. canigeralii*, *S. verticillacantha* v. *crispata*, *S. tarabucoensis* (*tarabucina* with fewer ribs and larger tubercles, *S. verticillacantha* v. *vasqueziana*).

But not enough of the exciting new finds! Herr Rausch presented us also with his new found *Rebutias*. An *aylosteria*, which is a new one according to Cardenas and has yet to be described and will first have to be more carefully compared with *A. pseudodeminuta*. A *Mediolobiva* with white flowers - a picture that belongs to Ing Markus by whom these plants were flowered last summer, every one was white. A new variety of *Aylosteria muscula* Ritter, which instead of fine snow white spines is clad with golden yellow ones - var. *aurea*. An orange-brown spines variety of *Aylosteria fiebrigii*.

The most exciting new find is *Rebutia heliosa*. Herr Rausch said that this is his most beautiful find from all his journeys. With its one mm long white spines, laying flat to the body, this plant has a striking resemblance to *Solisia pectinata*. It flowers with an unusual colour for a *Rebutia*, shining orange-red. The flower is interesting in other respects: around the flower a short and a long flower petal occur alternately.

Herr Rausch tells the story of the discovery of *Rebutia heliosa* - I would not like to withhold it from anyone: One day, being a weekend, Senor S. from Tarija, with whom Herr Rausch stayed for some time, made up his mind to go for a ride into the countryside for a picnic with his family. So the whole dear family packed food, half the household and the kitchen pot were loaded on to a lorry and the guest (Herr Rausch) was also warmly welcome. We drove cheerfully through the scenery until somewhere the Senora decided "It is nice here, we stop here." Very much to the disappointment of Herr Rausch because he did not find it 'nice' at all - it did not look a bit like cacti there. "Here is nothing" he moaned. But, if one is a proper cactus addict, one has no peace until one is convinced that there is really "nothing". While the soup was bubbling in the pot, he climbed over a hillock, and over another one and another one - "Perhaps there is something?" (Mushroom seekers will know all about it!) Yes, here amongst broken stones he discovered small plants, hardly visible. "This is impossible" he said to himself after the first pleasing shock, "*Solisia pectinata* in the middle of Bolivia?" But, after a second look at the discovery, it seemed it would have to be treated as a *Rebutia*. On the far side of the hillock, in search of further specimens, there was to be found a large number of the most magnificent *Cleistocactus straussii* one can imagine. As this is "nothing"! The bubbling soup-pot, however, was forgotten.

From the smallest cacti of Bolivia, Herr Rausch went over to the bigger ones. He introduced us to *Trichocereus werdermannianus* (a few yards high) and *Corryocactus*. The *Trichocereus camargensis* which exhibits numerous offshoots, grows shorter - under two feet high. A *Trichocereus* growing in mid-Bolivia is comparable to our *T. macrogonus*. Further south this species develops increasing hair and up to 10 cm long flexible spines. *Trichocereus* of the type of *T. spachianus* are found there in different forms: dainty, thick, and mighty ones. Limited to higher situations and extremely photogenic against the sky, is *Oreocereus*. Pictures of *O. celsianus* showed a variability of this species which is hardly imaginable. Lovely reddish spined plants intergrade with plants whose central spines are whitish or yellowish in colour. A few bear brown wool, some are clad in dense white hair with short central spines, others have hardly any hair at all and spines only. When *O. celsianus* becomes thicker, it is then called *O. maximus*. Lovely to look at is *O. trollii* with shining orange-coloured spines. This species also varies in its habit

from densely white-haired, with only short central spines, to others with less hair and long spines.

Interesting was the picture display of the Bolivian *Cleistocacti* which Herr Rausch let pass in front of us. *Cleistocactus candelilla* from Comarapa showed a decumbent growth and is very dark spined; *Cleistocactus sucrensii* has long yellow or brown spines and flowers 8 cm long. *Cleistocactus mendoza* Card. has dense short golden-yellow spines. Then came *C. tarijensis* with reddish-yellow spines and next to it on the picture grew *Parodia splendens* with 10 cm. long central spines. *C. tupizensis* has reddish longer spines.

Now followed a series of lovely photographs of *Cleistocactus straussii* in different locations among shrubs or rocks. To me one picture remains unforgettable, a grand rock face with *C. straussii* richly represented and shining in the reflected light; in this same location Herr Rausch discovered the 'yellow muscula' which grows in clefts in the stone and in rock fissures. The spread of *C. straussii* is much larger than anyone had accepted until now. It reaches from Tarija northward to central Bolivia (El Palmas) and southward to Santa Victoria, Argentina.

One shot made clear to us why a true cactophile is drawn back to Bolivia again: the wealth of so many different species - *Oreocereus*, *Cleistocactus*, *Parodias*, *Lobivias*, *Pseudolobivias* and *Trichocereus* are all framed within one single picture!

Herr Rausch closed his exciting colour-slide report with the words "When one wanders up-hill and down-dale through the countryside, harvest a few fruits here, hack out a few plants there, one is happy!"

But we, too, are happy that our South American traveller Walter Rausch let us take part in his expedition through his magnificently illustrated report.

With that the attractions of the evening were still not at an end. Herr Ing. Maly had for sale plants which came from the Rausch expedition and, in addition, slides of *Parodia malyana*, which showed these fascinating plants in all their fullness of variety of flower colour - yellow to dark orange, rarely lemon yellow, some flowers being quite flame coloured. (Many of the places referred to above may be found on the map on the front cover of *Chileans* No. 13 - H.M.)

Comments from H. Middleditch:

"During our 1969 Continental Cactus Tour we were able to pay a visit to Herr Rausch at Aspern, just outside Vienna. Herr Rausch was well bronzed as a result of his exploring trips - for anyone dissatisfied with a tan they obtain on the Riviera we can now confidently recommend a cactus-hunting trip in South America to improve it.

"Herr Rausch kept his collection in a cold frame which was about 8 m by 1½ m - although a new greenhouse was just in the course of erection. Apart from a very small number of plants, his collection comprised solely *Lobivia* and *Sulcorebutia*. Up to two dozen or more plants of each species were being cultivated together in pans and Herr Rausch was at pains to point out to us the diversity of flower colour in many species of *Lobivia*.

"In one pan there were over a dozen of the new *Rebutia heliosa*, the body being practically invisible under the covering of short, white, adpressed spines. Another batch of small green-bodied plants with almost flat diamond shaped tubercles, in the centre of each having a few very short, adpressed, black spines, proved to be *Sulcorebutia rauschii* - one might be excused for having thought on first sight that they were *Neoporteria napina*.

"We look forward to publication of the new species referred to in the foregoing article."

WHAT'S NEW IN THE WORLD OF CACTI

A talk given to the Upper Austria Branch of the G.O.K. in January 1965

By Stefan Schatzl. (Reported by Alfred Bayr, President, G.O.K. and translated by W. Keugler.)

Herr Schatzl reported from his four journeys to Herr Uhlig in Rommelshausen, which he undertook in 1964, when he purchased about 350 imported plants for the type-collection in the Linz Botanical Gardens. Among known species - which had previously seldom been imported - were also rarities and some which we supposed were different forms of known species (for instance, *Gymnocalycium monvillei*, *spagazzinii*, and *saglionis* with central spines) and plants until now unknown, of which we cannot say for certain whether they are new species, or only varieties or forms of existing species. The extensive imports of the firm Uhlig give us for the first time a picture of the wealth of forms of species of the genus *Gymnocalycium*.

The range of this imported material poses a great many problems in regard to the systematic placing of the plants. The numerous transitions already show us today, without much study, that the 'species' of the genus *Gymnocalycium* are substantially fewer than those which can be found quoted in literature; many 'species' are nothing other than forms of one and the same species, and the number of validly published forms rises continuously with the more thorough exploration of the cacti habitat.

Amongst the slides then shown by Herr Schatzl may be mentioned *Gymnocalycium pugionifer* with mighty dagger-like spines, *G. bodenbenderianum* (offered as *ragonesi*), *Gymno* sp. L. Col., *G. spagazzinii* (two forms, one with greenish body and blackish spination and one with a brownish body and lighter, paler spination), *Gymno* sp. La Rioja, *G. marquezii*, v. *argentinensis* Bkbg. (remarkable because the fruit does not split open laterally as on all other *Gymnos*, but opens circumferentially at the base of the fruit, from which the seeds discharge out of the blood-red fruit pulp), *G. mihanovichii* v. *pirarettaense* and v. *filadelfiense* which - according to Ing. Pazout are the primitive form of *mihanovichii*, *G. schickendantzii* (as opposed to the other related species its fruit is not red, but green with a bluish coating and also larger), *G. weissianum* (a doubtful species), *G. hybopleurum* with 0-4 central spines, *G. sp. Cerro medina*, *G. baldianum* (flowers with different shades of red; there is also a report of a white flowering plant!), and many others offered only with field collection numbers as identification.

There was also a plentiful offer of *Parodias*, among them *Parodia splendens* (supposed to be identical with *Parodia ritteri*) and the precious *P. pennicillata*.

The plant purchased as *Soehrensia* sp. C.E. turned out to be *Helianthocereus crassicaulis* and an *Islaya roseiflora* turned out to be *Islaya divaricatiflora* Ritter.

From his recent visit to the Botanical gardens of the University of Heidelberg, Herr Schatzl brought back some fine slides of *Melocacti*, taken by Herr Hoffmann on his collecting trip to South America in 1964. At this point Dr. Simo informed us that Prof. Rauh in his work on "The formation of cephalium on cacti" mentioned that when cephaliums are kept moist continuously, they can flourish without roots.

Dr. Simo then followed on by talking about *Copiapoa haseltoniana*, which comes from the Antofagasta district of Chile and strikes one with its unusual spination of a lovely orange yellow at the crown, the farinaceous (mealy) covering of the dirty green body and the round, sunken areoles, and evidently develops different forms. One plant in Dr. Simo's collection, purchased in 1958 from Herr Pilcher in Wels, was difficult to identify and could possibly be a very divergent form of the true species.

In 1964 Uhlig imported plants of *Matucana yanganucensis* which, because of their shape and their occurrence, made us rack our brains considerably. They come from the district of Oyon in Peru

in the Sierra Negra, from steep cliffs alongside the Marañon river. One plant occurs at 3,700 m. altitude (app. 12,000 ft.) with white flowers. One plant from 3,500 m. changes its shape from the original initial shape. (in cultivation? - H.M.) The spines remained the same. A few hundred meters further down, yellow flowering plants were found. Until now only one yellow-flowering *Matucana* has been described - by Vaupel, as *Matucana weberbaueri*. Dr. Simo's plant, however, is not that described by Vaupel; it is obviously an as-yet undescribed form of *Matucana yungayensis*. Plants in cultivation lose their central spines but, on the other hand, the radial spines get bigger and whitish. This behaviour is typical of the species.

A slide was shown of *Submatucana myriacantha* Vaupel which originates from northern Peru, Department Amazonas, at 2,600 m. altitude. In our cultivation it grows different central spines. The hair-like bristles springing from the base of the scales on the flower tube were quite visible. Thus this plant is a *Submatucana*.

As a special delicacy, Dr. Simo was able to show us a picture of a fruit of *Oroya borchersii*; the fruit of this species was unknown until now. It is rock hard, long, with the dried-up flower remains on top. Situated at the base of the fruit is a round hole from which the seeds fall out. Moreover, in the past few years an idea has got around that *Oroya borchersii* may be identical with *Submatucana myriacantha*. This view is surely erroneous.

From Heidelberg Dr. Simo brought with him a slide from Herr Hoffmann of a collected plant of the true *Oroya peruviana*, which was thought to have been lost to knowledge for a long time. Cultivated plants lose the characteristic habit of the species, which explains why there are doubts about the authenticity of plants in cultivation which have been grown from seed.

A stimulating discussion then followed about the great scientific value of the imported plants, of which the Linz gardens already have over 700 species, and the need for collective study of these plants to clarify all the problems which their current availability has brought to light. This abundant material proves clearly that some species have a variability hardly believed to be possible. The previous lack of knowledge of the great range of variation has evidently led to many mistakes on the part of authors resulting in a multitude of names which must be brought back into line, each in its proper place.

Here lies a broad field for the hobbyist also; the cultivation of a wide range of seedlings from imported seeds and their further cultivation to maturity could yield valuable information. And most important: observe the plants and observe again! Anyone who is able to do so should record his observations by photos; such pictures could be valuable documents to form a clarification for the system.

Together with one further following article and those reports of the Linz Gardens previously published in the *Chileans*, this will complete the reviews appearing to date in the *G.O.K.* (Austrian Cactus Society) Newsletter - H.M.

THE BEHAVIOUR OF SOME CACTI DURING FERTILISATION - CLEISTOGAMY

By W. Simon

(Translated from *Succulenta* for May 1967 by H. Vriend)

In 1938/39 Porsch made a survey of pollination of cactus flowers. Only very little new information on this subject has been published since that time.

We know that most cacti are allogamous - that is, they can only form seeds after pollination with pollen from a flower of another plant, - commonly called cross pollination. Only a few cacti - as, for instance, some *Rebutias* - are autogamous, or self-fertile to their own pollen. In

addition, there are other species in which self-fertilisation occurs in the closed flower; such plants form viable seeds without the flower having opened. This phenomena is called cleistogamy; we know this characteristic from *Fraileas*.

Hardly any attention has been paid in literature, until now, to this different behaviour; Porsch (1) gives a summary of the publications known up to that time; concerning cleistogamy he cites Schumann (1898) Spegazzini (1905), Britton and Rose (1921), Vaupel (1925), Berger (1929), and Backeberg-Knuth (1935), but he emphasises that all assertions concerning cleistogamy must be handled with care and examined more closely. In Backeberg's 'Die Cactaceae' (2) too, there is nothing new.

The accepted opinion is that *Frailea* flowers only open in full sunshine, otherwise fruits will form cleistogamously. In reality relations are quite different, as I have seen from my own experience, and I now offer a brief report:

Both *Frailea grahliana* and *F. schilinskyana* produce buds in the form of a miniature plant of barely 10 mm in section, which do not open but which may still become seed-bearing fruits. Only when the young plants grow larger and are amply surrounded with offsets, do buds develop which pass into open flowers. Plants having open flowers for the first time, also produce again in the following year (pre-supposing that growth continues in the same manner) a few cleistogamous flowers first and after that open flowers. Only when the plants are so large that they flower with open flowers right at the start of the season, does this ability apply to even the smallest offset. *Frailea aurea*, *carminifilamentosa*, *pseudograhliana*, and *pumilis*, behave in this same way. Larger growing *Fraileas* such as *F. bruchii*, *dadakii*, *pygmaea*, which seldom make offsets, bear fewer flowers. Here again, open flowers only appear on older plants. For every standstill in growth, the plant answers with cleistogamous flowers - in the summer weather too. In the event of the standstill in growth occurring in spring - for instance owing to repotting - then open flowers only come in summer. This will have led to the wrong opinion, that *Frailea* flowers only open in full sunshine.

That this is not the case, one may easily establish by observing the buds accurately from the commencement of their growth. Of the species mentioned, buds are initially conical, then shortly a change occurs in the bud development - that part of the bud at the base starts growing thicker. These are the buds that form fruits cleistogamously. The other buds grow a slender egg shape and open quite some time later. With a little experience one can soon see whether a bud will open or not.

In the pointed conical buds petals are never formed; in the slender buds, on the other hand, petals will be formed. These buds open even when the sun is not shining fully. The decision whether a bud will form seed cleistogamously, or will unfold its flowers, has consequently already been made at an early stage in its development. Only rarely was I able to observe that suitable buds did not open - owing to a cold wave setting in suddenly, they dried up without reaching the seed-forming stage.

Under normal circumstances the flowers opened in the greenhouse at a temperature above 20°C. They stay open only a few hours, mostly from 1300 to 1500 hours and they do not open again the next day. It is of interest that most of the open flowers do not form seeds if one does not assist by pollinating by hand.

I am not quite sure that all *Fraileas* can pollinate themselves. They behave quite differently. From the species listed above, I have not yet been able to gather seeds from *F. asterioides* by self-pollination. Seeds of *F. cataphracta*, obtained by self-pollination were not found to be viable. With *F. chiquitana* (or, more accurately, with the *Frailea* on the market as *F. chiquitana*) I have not yet been able to observe formation of seeds cleistogamously. However, one should not draw rash conclusions from this.

- Bibliography: (1) Porsch, Cactaceae 1938/1, 1939/1: Das Bestäubungsleben der Kakteenblüte
1 & 2
(2) Backeberg, Die Cactaceae, 1959.

CONTRIBUTIONS ON FLOWERING FRAILEA

..... from Mrs A. Lavender:

"We have had flowers wide open in bright sunshine on our plants of *Frailea columbiana*, *grahliana* and *schilinzkyana*, but on August 4th I found flowers open on both *columbiana* and *schilinzkyana* when the sun was obscured in an overcast sky. There had been some sunshine that day but little, if any, blue sky and the day had been mainly overcast with high haze and indeterminate cloud - but the day was very warm indeed and close.

"I found the flowers open at about 4.30 p.m. - they were quite wide open but not flattened to the plant as they had been when in flower in full sun on a previous occasion; they closed up at about 6.00 p.m. *F. schilinzkyana* carried two open flowers - one on the main body and one on an offset."

..... from A.W. Craig:

"I have always associated *Frailea* flowers with being open only in full sunshine, so I was very surprised to find a flower open on my *F. asterioides* in the first few days of October. It was not a particularly bright sunny day, but it was distinctly warm. The flower was found open in the afternoon and it closed up as the sun was going down."

These contributions make interesting reading in comparison with those recorded on p. 67 of No. 11 of the *Chileans* - H.M.

MY JOURNEY TO CHILE. PART 1 - RIO HUASCA

By Karel Knize, Czechoslovakia

(Translated by H. Middleditch from *Dodonaeus* VI, 1, 1968)

The name of Huasco is familiar to all those who are interested in 'Chileans'. That is why, in planning and arranging for this journey, I had already proposed to devote a portion of my time to it. Leaving La Serena, main town of the province I set out resolutely on my first expedition to the north.

Having decided to go by train to Vallenar, I started by trying to obtain a train timetable ... but this does not exist. In the absence of a timetable I go to the station where one expects an information service ... but nothing there either. The 'employee' is content to assure me that there will be a train in that direction but he does not know when.

The Chilean railways have nothing in common with those we rely upon because they are a century behind the times; they are a narrow gauge track and have no idea of timetables.

The travellers who make use of the train are in general the poor people who travel around with all their offspring and who take the carriages by storm. Misfortune to the lonely stranger who had the absurd idea of wishing to travel alone and in the same train, craftily pushing steadily in the hope of reaching a seat with clothing intact

If you are not put off by shabby thoughts of this sort the journey is the more interesting because the railroad crosses an impressive countryside of escarpments and of rocky and confused valleys where one only discovers majestic white columns. This is truly South America.

Vallenar is a small town lying 180 Km. to the north of La Serena: in addition it is the first and only settlement worthy of the name. At first one crosses the more populated territories of

the province of Coquimbo then one climbs more and more gradually to reach the altitude of 1,800 to 2000m. above sea level. Slowly travelling onward, the train stops repeatedly - one does not know exactly why, unless it is to enable other travellers to cram together on the last spaces still vacant. The temperature is troublesome and reaches 32°C in an atmosphere becoming more and more rarified.

At last, in and amongst discomfort, we approach the desert which still separates us from the small town - then everyone dashes to the windows to look at Vallenar, first town since our departure - throughout the journey we have only seen some rare groups of poor habitations in the hilly country. The north of Chile is a country where one may travel for 1,000 Km. without meeting with a single human being.

On numerous occasions I am asked "Are you travelling alone?" But certainly - and without a car! From time to time I hire a horse or a donkey and I trust myself to the mountain guides who are familiar with the region because it is here where one cannot live if one does not know the water-holes, that water acquires the true value of gold.

I have travelled the country a little in all directions and know well when I should expect to reach a village, but I may only find empty and abandoned houses. Having the misfortune to abandon their lands and their goods because the water had failed abruptly the little community had left to re-establish itself at the source of another spring - but for how long? Added to that the active volcanic character of the region and you can imagine something of the precarious existence and the all too familiar misfortunes of the poor of Chile.

Water is not much of a problem at Vallenar because there is ample quite close in the full length of the River Huasco. A European would have little difficulty in envisaging the attraction of these lands for cacti. The Rio Huasco glides towards the sea by a very easy passage in the deep valley which crosses a region of contrasts; far above, towards the mountain peaks, all is bare, confused and desolate but all around the floor of the valley one finds some trees, some bushes - somewhat sickly - and at the same time a few grasses.

At the edge of the sea, it reaches a little port of Huasco where, in spite of the proximity of the ocean, the humidity of the atmosphere remains rather low. The vegetation of the surroundings is divisible into two zones:-

First zone - arid desert of sandy and chalky subsoil (pH 7.3 to 7.4). The ground is relatively flat or slightly undulating and pierced here and there by the rocky outcrops from 5 to 7 m. high. The ground has a yellowish colouring and the rocks which project out of the ground are brownish.

One finds on the right bank of the Huasco, *Neopoteria villosa* and *N. atrispinosa*, while on the left bank is *N. thiebautiana*. Further off, were seen *Copiapoa cupreata* Ritter and *Horridocactus* sp. Kz23. There is only either very little or no other vegetation.

Second zone - this includes all that region to the north of Huasco as far as Nicolasa and Vallenar. It is comprised of very sweet soil (pH 7.0 to 7.2), very rich in mineral salts and of a yellowish colour to brown. One finds there, more or less scattered, both between the rocks of the escarpments diverse species on the flat ground. Under the bushes and between the tufts of grass, one finds occasional examples of some rare species.

The thousands of huge clumps of *C. alticostata* give the landscape a very characteristic appearance. *C. desertorum* Ritter occurs as little groups to the west of Huasco, often in the vicinity of *N. napina*, of which there are many forms. *Horridocactus heinrichianus*, rare, only met with under bushes. *N. glabrescens*: this is no species but a form of *N. napina* which one finds abundantly at one known site, at the summit of a hillock.

Neochilenia huascensis, *Neochilenia* sp. Kz25 and *Horridocactus giganteus* which one finds solitary or in little groups of two or three plants, always close besides stones. *Neochilenia crispa*, very rare, is found most often at the foot of *Eulychnia floresiana* which here attains a height of 80 cm.

On the whole, the daytime summer temperature (Nov. to March) is within 24° and 40°C while the night temperature varies between 14° and 22°C. The winter temperature (June to August is the rainy season) oscillates between 8° and 20°C by day and between 4° and 14°C by night.

It rains generally three to five times a year: most often twice in June, once or twice in July and once in August, with some exceptions. There are sometimes dews and mists by night but it is very exceptional. According to the statistics, there are in this region from 310 to 340 sunny days in the year.

I have also taken the opportunity to establish that, during the month of May, there will be a heavy mist every other day which persists until 10 or 11 o'clock in the morning and which provides addition to the humidity of the air. This allows the plants to capture at least traces of water during the most favourable period of the year.

Species collected by K. Knize between Vallenar & Huasco

- Kz 9 *Opuntia michellei* (miquelii? - H.M.)
- Kz 16 *Copiapoa alticostata* Ritter in the vicinity of Freirina and of Nicolasa.
- Kz 16a *Copiapoa alticostata* var. *minima* n.n. in the vicinity of Nicolasa. Well developed natural form.
- Kz 16b *Copiapoa alticostata* var. in the vicinity of Freirina: no central spine and somewhat similar to our *Copiapoa malletiana*.
- Kz 17 *Neochilenia crispa* var. : about 10 cm. dia, flower about 7 cm.
- Kz 17a *Neochilenia* sp. from the same place : about 4 cm. diameter, 1 or 2 spines - rare - hollows in the ground between Huasco and Freirina.
- Kz 18 *Neochilenia napina*. Huasco.
- Kz 18a *Neochilenia napina*. Another form.
- Kz 19 *Opuntia* sp.: widespread in the mountain.
- Kz 20 *Neochilenia mitis*, 4 Km. to the east of Huasco. It seems likely that this could be the original plant.
- Kz 21 *Copiapoa cupreata*, Huasco-Bajo.
- Kz 23 *Horridocactus giganteus*: 12 to 14 cm. diam. - 30 to 50 cm tall, black body, 3 to 5 curved spines: in the desert at 12 Km. to the north.
- Kz 23a *Neochilenia* sp. green body, no seeds.
- Kz 24 *Neochilenia* sp.: same place as *N. huascensis* to the east of Huasco.
- Kz 24a *Neochilenia* sp.: plant slightly different, found in crevices in the rocks, flower reaching 5 cm in diam.
- Kz 24b *Neochilenia* sp.: similar to the foregoing but seeds black.
- Kz 25 *Neochilenia* sp.: rare, yellow flowers, spines as fine as hairs.
- Kz 27 *Eulychnia floresiana*: On the mountain side forming strong clumps reaching 60-80 cm. in height.
- Kz 30 *Copiapoa carrizalensis* On the mountainside to the north of Huasco.
- Kz 31 *Neoporteria villosa*, to the north of Huasco.
- Kz 32 *Horridocactus heinrichianus*, Huasco.
- Kz 33 *Neochilenia glabrescens*, to the east of Huasco.
- Kz 34 *Copiapoa desertorum*.
- Kz 35 *Copiapoa cupreata*: identical to Kz 21.
- Kz 36 *Neochilenia aerocarpa*: in the vicinity of Freirina.
- Kz 40 *Neochilenia huascensis*: in the vicinity of Huasco-Bajo.
- Kz 42 *Neoporteria atrispinosa*: to the south of Huasco - could be only a form of *N. villosa*.
- Kz 44 *Copiapoa vallenarensis* n.n.
- Kz 45 *Neochilenia* sp. between Huasco and Freirina.
- Kz 91 = Kz 44.
- Kz 113 *Neochilenia lembckeii* which I had at first thought to be *N. pseudoreichei* - Maitencillo.

- Kz 113a *Neochilenia neoreichei* Ritter; from the surroundings of Nicolasa.
 Kz 119 *Neochilenia* sp. from the vicinity of Freirina, flexible spines of 3.5 cm. in length.
 Kz 119a *Neochilenia* sp.: between Freirina and Huasco, of which I found only three specimens.
 Kz 119b *Neochilenia* sp.: rare - from the vicinity of Freirina.

It will be evident that I have also found other plants which have in the main been listed under (a) and (b) but there have been so few examples or so few seeds that it seemed to me inappropriate to publish or to make mention of them.

The map on the front cover of Chileans No. 11 includes several place names referred to in the above article.

The following is the foreword to the current seed catalogue of Peter Thiele (translated by E.W. Bentley):-

What are KZ numbers?

Since October 1968 a young man, Herr K. Knize, has been journeying in S. America in order to observe and photograph cacti in their habitat and to collect them. Herr Knize knows the cacti in the European collections and botanic gardens and knows his way about the South American locations, since he had already travelled in various countries in the year 1967. The plants that Herr Knize finds, whether they are now well-known or cannot be identified yet on the basis of the literature, all get a KZ field number. Under this number are recorded all important data on the plant in its respective habitat.

Seeds of these plants, collected under KZ numbers are offered to you in this catalogue with data on habit and origin as far as Herr Knize sends me them. This list represents a collecting time of scarcely 5 months.

THE "COUNTERFEIT" *LOBIVIA FAMATIMENSIS*

By Harry Blossfeld

(Translated from "Le Sosie du *Lobivia famatimensis* (Speg.) Br. & R." in *DODONAEUS*, IV, 5. (1966) pp. 99-102 by E.W. Putnam).

Mr. Buining has published a very interesting article devoted to *Lobivia famatimensis* (Speg.) and its "counterfeit", actually considered to be a *Hymenorebutia*.

Because I personally collected these pretended *Lobivia famatimensis* in considerable numbers and sent them to Europe and the United States I have been freely held responsible for the controversies and confusions which have lasted nearly twenty years on the subject of these two very different plants. Perhaps I may be allowed to give a frank explanation of this involuntary mistake.

It was in 1934 that I began my prospecting trips in Argentina in company with Oreste Marsoner, who knew the country well. One of our objectives was the mountainous Sierra de Famatina, with the firm intention of seeking the famous *Echinocactus famatimensis* Speg., and to collect as many as possible to send to our numerous clients.

One of the axles of our vehicle having broken, we were immobilised for ten days in Chilechito. We spent the time travelling in the nearby mountains, with the disappointing result that we found only three miserable specimens. As I had orders to supply several hundred plants, I could not hope to meet the expenses of this costly expedition, and it is this that explains the contradiction cited by Mr Buining in reference to the notice I published in "Kakteenkunde" in 1936.

I ought also to add that, because of lack of film, the rare plants of Echinocactus famatimensis Speg. were not photographed. Moreover, the camera I had then was of little use for close-up photography.

In accordance with my contracts (I was then studying botany at Dahlem) these three plants were sent off to the botanical museum of Berlin-Dahlem, but I do not know whether they arrived. I do not believe they did.

Some months later I returned, alone this time, to the Sierra Famatina through which I ploughed for five days on foot and horseback, covering ninety miles, going from Chilechito to the Rio Amarillo, then following the course of the Rio Cajon as far as the district around the village of Famatina and after that across the gold-bearing country until I found myself again at Chilechito. During the whole of this journey I did not find a single E. famatimensis. But, on the other hand, I did collect considerable quantities of seed of other kinds. This was the origin of the announcement about my difficulties with the undiscoverable E. famatimensis Speg.

At the end of June 1934 we crossed the provinces of Rioja, Tucuman and Salta and arrived in the province of Jujuy. There we left the provincial capital of the same name by the old Inca road to the north towards the Bolivian frontier. In the Quebrada de Humahuaca where we collected Lobivia densispina (Werd.) Buin., known since 1931, we found some other plants sufficiently similar as to puzzle us and to which we gave the reference number BM 49; these plants are very similar to Lobivia drijveriana Backbg., if not identical to it. While exploring the innumerable small valleys in the district we discovered, during the following days, a great number of plants which we took to be E. famatimensis Speg.

I soon began to have some doubts; could they be this species, for we were some 370 miles from the reported natural habitat, and usually Lobivias have a very limited area of dispersion. However, I reassured myself with the thought that the elderly Spegazzini might have made a mistake or had confused the sierra of Famatina with that of Jujuy, where we were prospecting. It would not have been the only mistake of this kind. One can think of Cereus peruvianus, which comes from Brazil, not from Peru.

I took a photo of this presumed Lobivia famatimensis Speg. which appeared in 1936 in "Kakteenkunde". I hope, in fairness to myself, that it will be admitted that this photograph showed a real "double" or "twin" of Lob. famatimensis Speg. and that confusion was made easier because we had collected during the full drought and all the specimens were extremely shrivelled and devoid of flowers, and there was no possibility of comparing our find with living type specimens. Our on-the-spot identification was a thoughtless blunder for which I was very soon to be punished.

First of all it was A.V. Fric who asked whether the plants I had sent were Lob. famatimensis as described by Spegazzini. He sharply accused me of mystification and claimed to have noticed in my photograph some groups of Bromeliads, typical plants of the province of Salta, a fact which he did not fail to proclaim and use to prove that my photograph was taken in that province.

However, this time it was he who was careless, as these Bromeliads occur freely in the cloud zone at 1500 metres altitude and are just as common in Rioja as in Salta and Tucuman; moreover my photo really was taken in Jujuy. Alas, appearances were against me; the cactus shown was not Lob. famatimensis Speg. but a Hymenorebutia.

After him, it was Kreuzinger who expressed doubts on the subject of the plants I had sent over. Then it was the turn of Professor Werdermann. In view of the samples I had sent him and of specimens he had probably examined at the firm of Hahn in Berlin-Lichterfelde, and having seen their flowers, he wrote plainly and dryly that the Lob. famatimensis (Speg.) Br. & R. in our collections showed notable differences and ought to be differently named. He carefully refrained from proposing a name and had good reason to be so prudent.

The mystery continued until 1939, when Buining and Fric erected the genus Hymenorebutia. Alas, the erroneous name had been published in seed-catalogues and in plant-lists and was on labels



LOBIVIA DENSISPINA

(SO-CALLED 'FAMATIMENSIS')

COLLECTION - R. ZAHRA.

in many collections. All this is now even more embarrassing because the true Lob. famatimensis, conforming to the original description, has been rediscovered since then.

It still remains to answer the question: what are we to call those impostors of Jujuy which deceived me so embarrassingly? It is necessary to choose among the various species of Hymenorebutia of which I know the following species (without daring to pretend that this list is complete):- chlorogona, citrifolia Kreuzgr., drijveriana, kavinae Fric, kreuzingeri, densispina, minima grandiflora, rebutioides, sanguiniflora, sublimiflora, scoparia, leucomalla. According to Haage, this list would be far from complete.

I have now re-examined the notes of my trip, my diary, my old photographs, and revived old memories in order to arrive at the formal conclusion that most, if not all, of the plants came from the same part of the Quebrada Humahuaca in the province of Jujuy, Argentina, and were all part of a single consignment which Marsoner and I sent from Argentina in 1935. Before us many others had prospected that area: Marsoner, Stumer, Hermann, Wessel and Backeberg, and after us, Laibe, Vatter, Fechner and Ritter. Marsoner even lived for several years right in the district. We can therefore reasonably assume that this region has been very thoroughly scoured and that all the species are known.

All cactus prospectors know that spines can vary in the habitats. I can also add that, on a later journey, I found growing over several square metres plants with flowers which were ivory-white, golden-yellow, rose-pink, iron-red and blood-red. When a commercial supplier, who may not be very knowledgeable, receives a case of plants showing such variations, it is very easy and tempting to pick out the extreme forms from the consignment which show such big differences that a conscientious botanist asked to examine the specimens may conclude that they belong to different species. Only those who have had the opportunity of forming their opinions by comparing the incredible range of variations in the habitat could pass a sound judgement.

Werdermann, who had the chance of examining a large group of these plants in flower at Hahn's, was shrewd enough not to describe them as a new species. We might well ask the reason for this. There is not a botanist anywhere who would not be tempted to jump at a similar chance to describe an attractive new species after having examined a quantity of imported plants that he could study at leisure. The reason for Werdermann's almost inexplicable caution is that, until 1936, he was convinced that all these plants of differing appearance were only varieties of (Echinopsis densispina, which he himself had described).

Is this assumption well-founded or not, and does it apply to all the Hymenorebutias? Could not one study in detail the structure of the flowers, fruits and seeds? The colour of flowers and spines in such variable species are not significant characters.

Study material is abundant enough, but it would be necessary to set aside all commercial considerations, the professional honour of "cactus hunters" and the well-known sensitivity of authors.

COMMENTS FROM H. MIDDLEDITCH

This article by Harry Blossfeld is very valuable as it takes us back to the origins of the confusion and controversy which continues to exist even today over the name Lobivia famatimensis.

It is quite evident that the original confusion arose due to Harry Blossfeld having collected plants in the very north-west of Argentina, a great distance from the Sierra Famatima, sending them back to Europe under the name 'Lobivia famatimensis' apparently without revealing for many years the different origin of the plants. It is left to the reader to decide how far this was due to a genuine belief that the plants were indeed identical to Lobivia famatimensis and how much it was due to the ten excellent prospects for selling plants so-named, rather than selling them under their correct name viz: Lobivia densispina.

There is no doubt that the showy flowers, their variety of colour, and the relative ease and abundance of flowering, made these *Lobivia densispina* an asset in many a collection – but to the vast majority of collectors, these are '*Lobivia famatimensis*' variety this, that, or the other as the flower colour or some other slight variation might suggest. Any nurseryman wishing to fare badly in business need only try to sell these plants under their correct name of *Lobivia densispina*: in consequence, the original Blossfeld error of 1934 continues to be perpetuated in almost every nurseryman's catalogue available today and in almost all amateur collections (including my own.)

All these '*Lobivia famatimensis*' whatever their flower hue, are correctly named *Lobivia densispina*.

During our recent Cactus Tour, we visited the Botanic Gardens of Linz once again and there we found a plant of *Lobivia famatimensis* collected by Herr Rausch in the Sierra Famatima: two heads had been cut off and were growing well as grafted plants. The collected plant had only radial spines, the spines on the grafted plant being similar but much shorter. Any of our readers who have had acquaintance with collected *Rebutia* or *Lobivia* (which are mainly from a comparable altitude) will be familiar with the change from the fierce armament of the plant coping with the inhospitable climate of their habitat to the comparatively weak spination of the European greenhouse-grown version. Here we had just the same effect repeated once more, at Linz between the imported plant and the grafted offcuts.

In Backeberg's *Lexikon* you may find an excellent colour photograph on p.691 of precisely the same comparison which we saw for ourselves at Linz from one plant – only in the *Lexikon*, Backeberg names the short-spined version '*Reicheocactus pseudoreicheanus*'. Anyone unfamiliar with the source of the grafted plants in the cold frame at Linz would undoubtedly have given them this Backeberg name – just as Backeberg himself must have done.

Any collector who has a plant labelled '*Reicheocactus pseudoreicheanus*' which tallies with the description and illustrations of this plant can congratulate themselves on having an example of the original *Lobivia famatimensis* Speg.

By repute, this particular plant seems to be rather shy to flower.

OBSERVATIONS ON THE MUSCOSEMINEAE OF THE GENUS GYMNOCALYCIUM

By F. Pazout

(Translated by K.Wood-Allun from the G.O.K. Newsletter. January/February 1964)

Fric-Kreuzinger's division of the genus *Gymnocalycium* into five seed groups (1935 Revision), i.e. *Macrosemineae*, *Microsemineae*, *Ovatisemineae*, *Trichosemineae* and *Muscosemineae* also meets all the requirements of a useful division of this popular genus in respect of the characteristics of the plant bodies, their spines, flowers and partly also the habitats of individual species.

In the Journal '*Kaktusy*' (1960) I therefore attempted to go one step further and group the species into individual sections according to their kindred relationships. Dr B. Schutz's work (*Friciana*, Volume 1, No.1) contributed further progress in this direction by further dividing the group *Muscosemineae* into four subgroups:– *Terminalea*, *Periferialia*, *Nigroantheralia* and *Chacensia*.

Let us therefore keep to this newest division, even if in my opinion only two of Fric's descriptions are successfully chosen: *Macrosemineae* and *Microsemineae*. The remaining three, *Ovatisemineae*, *Trichosemineae* and *Muscosemineae* were selected according to microscopically visible characteristics of the cells of the testa which could be mistakenly extended to the size, shape or other peculiarity of the whole seed, although these seeds are not oviform, hirsute nor moss shaped. A better terminology of these three groups should be left to professional botanists.

But now back to the cacti of the Muscosemineae group, with which I have been concerning myself for decades, although my greatest interest lies in the circle of plants around *G. mihanovichii*. Today I intend to say only a few words about the less wellknown plants of this group, which are however no less interesting than the generally popular old established species of our group, such as *G. mihanovichii*, *G. anisitsii* etc.

The habitats of all these plants are scattered over a wide area, from the mountains south of Cordoba for 2500 km. northwards to Eastern Bolivia and from the eastern slopes of the Andes for 1500 km. eastwards as far as the eastern border of Paraguay. Although the first species of our group had already been described in 1890 (*G. anisitsii*) and the number of known species today is between 15 and 20, we often know very little about these plants.

Many species have been exterminated in their habitat but the vast and little explored plains in the northern Chaco certainly hide many new species, as the discoveries of Hammerschmid and Rausch prove. It is therefore difficult to make a precise survey of all the plants of the Muscosemineae.

The only common characteristic of importance which links all the species is the seed: relatively small, spherical, brown with a rough surface to the testa and with a relatively small hilum. (Illustrated in Chileans No.12 p.95 - H.M.) No other groups within the genus *Gymnocalycium* have such seeds. Most species also produce their flowers from the lateral areoles. The peduncle is slender, long and often curved. Many species have ribs which are almost divided into individual tubercles, but the ribs of other species have straight and sharp edges which are not otherwise known in the genus *Gymnocalycium*.

There are many differences in the size and shape, in the spine formation and in the construction and size of the flowers. The cultivation of these plants presents few difficulties. They do not like full sun (in habitat they grow under trees, bushes or in the grass) but they must have plenty of warmth and water during the growing period. Their fine roots are accustomed to acid humus and easily die in our cultural conditions. If you wish to grow large, old plants for years, you should graft. My thirty year old specimens of *G. mihanovichii* are all grafted on *E. jusbertii*, *T. gladiatus* or *E. eyresii*. Almost all species flower for long periods and young seedlings on their own roots sometimes flower themselves literally to death. I shall not repeat the history of those species which have been well known for years, nor of the new species which have been well described. This applies to *G. anisitsii*, *G. damsii*, *G. schickendantzii*, *G. de laetii* and *G. mihanovichii* with its varieties (*stenogonum*, *pirarettaense*, *fleischerianum*, *melocactiforme*, *angustostriatum* and *albiflorum*). I refer my readers to my article in the journals *Kaktusarske listy* 1951 and *Friciana* Nos. 1 and 3. In connection with the problematic species *G. stuckertii* Speg. this is discussed with reference to *G. pungens* Fleischer below. Our attention is therefore drawn to the plants about which there is most uncertainty. We must go back to Fric's last trips from 1926 to 28 and discuss his *G. michoga*, *G. knebelii*, *G. marsonerii* and the so-called *G. stuckertii* Fric. Two of these species, namely, *michoga* and *marsonerii*, were later described by Y. Ito (Explanatory diagram of *Austroechinocactinae*, March 1957, 292 - 293, 175).

G. michoga is a smaller, light grey-brown to dark grey plant, whose body is divided into 10 - 11 warty ribs. The areoles bear seven strong, dark, approx. 2 cm. long spines and have dark green spots. The flowers, 3 - 5 cm. long and almost as wide, have a dark green tube, and white petals with greenish stripes. According to a habitat map which I got 25 years ago from the Gymnospecialist V. Fort, Fric collected these plants in Santiago del Estero Province, Argentina, near Et. Union, south of the river Salado. It was Backeberg's opinion that this species should bear Fric's name as the author. In my opinion this should also be the case with the two other plants for Fric published his plants shortly before a Latin diagnosis was necessary.

G. knebelii is a large, flat grey-green plant with five short but strong spines to the areole. The flowers are fleshy and whitish and, according to Fort-Fric's map, it originates from the north of Tucuman Province, Argentina where it was collected by Fric near Trancaso. Uniform plants

grown from the seed imported by Fric were a testimony to the fineness of this species.

G.marsonerii varies from *G.knebelii* only in the number of spines. It has seven dark peripheral spines to the areole and originates from the same locality as *G.knebelii*.

The story of these plants should close with observations on another good species which Fric thought at the time to be *G.stuckertii* and he imported seed thus named. He collected his seed south of the river Bermejo. I well remember the uniform seedlings from which very large specimens up to 30 cm. high occasionally exist in our collections. These strong and lone spined plants produce relatively small whitish flowers from the lateral areoles too. The spherical red fruits contain typical seeds of the Muscosemineae group and have hardly anything in common with the small, sharp-ribbed and poorly spined *G.stuckertii*. They are all rather much nearer to the recently described *G.pungens*. According to Hosseus, *G.stuckertii* Speg. is a problematical plant which is now extinct in habitat. It is questionable whether it belongs in our group of Muscosemineae and indeed whether it was ever imported into Europe.

Let us follow the story of our plants further however. After Fric, no cactus collector came near the sparsely populated, remote regions of the Gran Chaco for almost ten years. Not until roads were constructed through virgin territory during the war between Paraguay and Bolivia did collectors pass that way again. Chief amongst these was Adolpho Maria Friedrich, a Viennese who, as a war reporter and officer of the Paraguayan army, had a golden opportunity to scour the region which at that time (1932 - 35) had been opened up.

Accounts by this collector, who lives today in Asuncion, will best convey the work he did. In 1935 he handed over to Harry Blossfeld's cactus expedition 17 kg. of cactus fruits in linen sacks which he had collected. Only a small portion of this enormous harvest reached Europe at that time and it was sold by Robert Blossfeld in Potsdam. The larger part went to Japan and the U.S.A.

Already in 1935 reports were reaching Europe of the rediscovery of *G.mihanovichii* and its pink-flowered varieties. Dr. Werdermann contributed in 1936 in 'Flowering Cacti and other Succulent Plants, Vol. 29 No. 113,' of 31. 10. 36 not only the description of *G.mihanovichii* var. *friedrichii* Werd. with a colour reproduction of this plant next to a green flowered *G.mihanovichii* (after the first importation of these plants) but also a text reproduction of the five forms characterised by Friedrich from his discoveries in the Gran Chaco.

According to these well known characterisations which were later repeated in my report on the *Gymnocalycia* of Gran Chaco (*Kaktusarske listy* No. 10 - 1951) and most recently in Backeberg's monograph (*The Cactaceae* Vol. III) we can conclude that only Friedrich's Form 2, i.e. the dwarf *G.Mihanovichii* var. *friedrichii* is widely distributed. All further forms which originated from seed collected by Friedrich were even at that time extremely rare and are only represented in individual specimens in our collections. That also applies to the only green-flowered Form 1 which does not correspond to Fric's original Type *G.mihanovichii* but rather to his var. *stenogonum*.

It is hard to say how far the varieties of *G.mihanovichii* mentioned by me agree with Forms 3 - 5. The two varieties *fleischerianum* and *melocactiforme* are at least very close to them. The variety *angustostriatum* belongs to the circle of the small var. *friedrichii* and the var. *albiflorum* is close to one of the three forms recently discovered by Prof. Hammerschmid near San Jose de Chiquitos. The *G.mihanovichii* var. *pirarettaense* comes from seed from other sources imported by H. Blossfeld, as do the plants which were distributed after 1935 as *G. tortuga* or grown in Brunn under the descriptions *G.rysanekii*, *G.pilicarpum* and *G.depressum*.

I had hoped that the habitat photographs of his plants taken by A.M. Friedrich thirty years ago, which, together with his entries of the places of discovery of individual forms which were made in a map obtained from G. Moser of Vienna, would produce further understanding of our group of *Gymnos*. Perhaps this so valuable documentation will help to throw more light on further groups of plants.

One year before his death our unforgettable grower J. Suba received from F.A. Buining, under the description F 17 a parcel of seed which contained five new varieties: *G. karwinskyanum*, *G. seminudum*, *G. rotundicarpum*, *G. paraguayense* and 17a. I do not know whether and where these *Gymnos* were described. Plants which were grown from this seed and are already seven years old are to be found in a number of collections in Prague; Brunn, Liberec and Olmutz. The first four plants are very close to each other and belong to one group. They form large, flat bodies (10 - 20 cm.) with coarsely grained, light to blue green epidermis, have sharply crenate ribs, yellowish to dark spines and produce whitish flowers from lateral areoles.

The fifth plant (17a) was very different, even as a young plant and is very close to *G. mihanovichii* var. *pirarettaense*.

I would not exclude the possibility of the four first named plants partly agreeing with the species *G. megatae*, *G. tudae* and *G. onychacanthum* described in 1957 by Y. Ito among his genus *Discocephalum* or belonging to the same group of plants. I cannot support Backeberg's opinion that the plants are hybrids or that these species do not originate from Paraguay, which was given as the place of discovery of *G. megatae* and *G. tudae*. To quote Uruguay as the home of the *Muscosemineae* group would be incorrect, if we ignore the discoveries of recent years. I have already mentioned the plants collected in San Jose de Chiquitos in eastern Bolivia by Prof. Hammerschmid. We are dealing with three forms which were found between 50 km. and 150 km. apart. They are close to *G. Damsii* and *G. mihanovichii* (var. *albiflorum* Paz.) which have been known for many years. Backeberg's *G. damsii* var. *rotundalum* is not far removed also. In addition, with the plants collected by Rausch in 1963 at the habitat of *B. tilcarensis* which were large, with black, appressed short spines and bottle-shaped fruits and which perhaps also belong to our group, this group of *Muscosemineae* is certainly not complete. South America can still surprise us.

In conclusion I should like to say a few words about the division of the genus *Gymnocalycium* within our *Muscosemineae* group. According to Backeberg's earlier interpretation, all these plants with long, slender, slightly bent flower tubes covered with numerous scales and having almost campanulate flowers belong to his *Schickendantziana* which was subdivided into two groups: - *Euschickendantziana* (species with green or slightly dark epidermis and warty ribs) and *Mihanovichiana* (species with a darker body and sharply pronounced ribs which are however diagonally sulcate and lightly striped). I consider this division more useful than the new key (The *Cactaceae*) which constitutes a retrograde step as far as the whole genus *Gymnocalycium* is concerned.

Dr. Schutz proposed a division which was certainly better for the *Muscosemineae* group (Friciana I No. 1, 1962): - Terminalia: (*schickendantzii*, *michoga* and *pungens*), Periferialia: (*de laetii*, *tortuga*, *marsonerii*, *knebelii*, *megatae*, *tudae* and *onychacanthum*), Nigroanthralia: (*anisitsii*, *damsii* and *joossensianum*) and Chacensia: (*mihanovichii*).

In my view one cannot even here have the last word without intimate knowledge of the habitat, for those plants which we know surely constitute only fragments of long chains of relationship which merge into each other. At any rate I believe it is more useful for the present to establish a smaller number of species groups with well-defined varieties, rather than to create numerous separate new species based on insufficient differences which often represent chance variations of known varieties. All the experiences of cactophiles, who have done extensive research on these plants in habitat, demand this interpretation, i.e. for simplification. I have therefore only erected varieties related to *G. mihanovichii* on the basis of long years of study of the plants, even if many show more differences than for example *G. schickendantzii* compared with *G. de laetii*; *G. knebelii* compared with *G. marsonerii*. Individual species groups may therefore be divided into branches, e.g. in the case of *G. mihanovichii* into branches with smooth and grained epidermis. I could not support today a division according to the colour of the stamens, e.g. within the forms of *G. mihanovichii* var. *friedrichii* light to dark anthers occur.

Until our group is finally fully explained I consider it satisfactory for the time being to maintain a simple separation according to the place of discovery of these plants, which also corresponds to the most important characteristics of the body and the flowers. May I express the wish that these

beautiful children of nature remain pure in habitat and in our collections.

Comments from G.J. Swales:-

"Growers in Britain, particularly in the North, should be careful regarding the shading of *Gymnocalycium*s. Although it is indeed true to say that they are shaded in habitat, I would suggest that in our climate that this is quite unnecessary. On the other hand, water is often too sparingly given by growers during the summer months. Over the last two seasons I have stepped up the water supply to my own plants with very noticeable benefits by way of more rapid growth and a longer and more prolific flowering season. If kept too dry all the year round, many species, having shrunk down almost to ground level during the winter, never really regain their normal water content - without which they cannot grow or flower actively - before water is again withheld in the autumn.

"Regarding the grafting of *Gymnocalycium*, in my opinion it is quite unnecessary, although I readily admit I cannot claim 30 years' experience with the plants yet! If your sole aim is bulk then graft by all means but if you wish to study the plants in as natural a state as possible, then leave them where nature intended i.e. on their own roots. Our greenhouses are most unnatural habitats at the best of times - don't make things even worse. If a plant loses its roots, blame yourself and your treatment of it, not the plant itself.

"I found much of interest in the accounts of various lesser known species and the explanation of the two plants under the name "*G. stuckertii*" - the latter being a good very reason for getting into the habit of quoting the author for a species when discussing a particular plant.

"I think it should be pointed out that some of the 'species' mentioned are in fact varieties e.g. "*G. rysanekii*" is almost certainly *G. mihanovichii* var. *rysanekium* Paz. while *G. pilicarpum* and *G. depressum* are to the best of my knowledge as yet undescribed botanically and may also well be varieties of existing species. However, valid names or not, it is useful to come across them in the context of their group.

"The problem of subdividing the *Muscosemineae* is a much less important issue at present. Something may be said in favour of all the schemes. I should, however, like to point out that the division between *Terminalia* and *Periferalia* seems to be a very difficult one to make. When does a terminal flower become periferal as it moves out from the centre? Dr. Schutz in his most recent classification (reproduced hereunder - H.M.) uses only these two groups having dropped *Chacensia* and *Nigroantheralia*. On the other hand, Dr. Buxbaum uses, amongst other criteria, seed characteristics to separate his two groups. I have yet to go through my seed samples to see if I can apply his key successfully, but this does seem a much better approach than just the position of the flower on the plant body.

"The reference to the unsuitable names of the *Ovatisemineae*, *Trichomosemineae* and the *Muscosemineae* I feel is just a quibble and should be disregarded. In fact, the author himself later - in *Friciana* V. 29 p.21 1965 suggested alternative names which in my opinion were no better than the existing ones and were most unconvincingly illustrated. The point is now in any case largely academic as, if one adopts the new classification by Dr. Buxbaum, the names are abandoned.

"After going carefully through this article, the reader will be left in no doubt as to the complexity of the problems surrounding the section *Muscosemineae* of the genus *Gymnocalycium* and in particular, that closely related group of plants based on *G. mihanovichii*. It is an excellent example of the value of thinking in terms of groups rather than species, varieties, etc. Only when you have allocated your plants to their groups, it is possible to even begin to think of trying to delimit species and varieties and, as the author points out elsewhere, even then our limited knowledge of the habitat of some of these plants is still a great source of difficulty.

"It is hoped to discuss the relationship between Dr. Buxbaum's recent classification for *Gymnocalycium* and the new classification put forward by Dr. Schutz, in later issues of the *Chileans*."

GYMNOCALYCIUM, GROUP MUSCOSEMINEAE - II

By Dr. Bohumil Schutz

(English summary reproduced from *Friciana*, Czechoslovakia, No.30 1965)

This group has been divided into four sub-groups:

- Terminalia - large plants, in later stages pillar shaped. The flowers are on the top which is always spiny.
- Periferialia - are wide and low. The crown is spineless and depressed. Areoles are rather wide apart and carry spines from their upper part. The flowers are on the sides (peripheral). I consider this to be a very important feature. The migration of the flower from the crown to the periphery is an expression of an advanced development. An objection that plants flowering from the top often have flowers on the sides, is inconclusive. It only shows a tendency which is suppressed in large populations. There is a development jump at the species where this tendency prevails.
- Nigroantheralia smaller plants belonging to the form group of *anisitsii*, *damsii* and *joossensianum*. In most forms dark anthers can be observed.
- Chacensia - is a separate form group of *G. mihanovichii* with its innumerable forms.

The individual form groups have very wide areas overlapping each other. *Terminalia* and *Periferialia* grow in the Cordillera mountains and in the Chaco. *Nigroantheralia* and *Chacensis* have their home in the west, in the east, and in between. I therefore consider all attempts to divide *Muscosemineae* according to geographical considerations as inconvenient.

G. delaetii and *G. schickendantzii* are very different species. *Schickendantzii* flowers from a spiny areole and belongs to *Terminalia* whilst *deletaetii* flowers from side areoles. It is a representative of *Periferialia*. The fact that natural hybrids exist is not an argument.

Gymnocalycium knebelii grows, according to Fric, in Tucuman and not in Paraguay.

Gymnocalycium mihanovichii was enriched by a new form recently imported from Philadelphia.

G. friedrichii is supposed to originate, contrary to Dr. Werdermann's statements, not from Paraguay but from a region then situated well in Bolivia. As the discovery site is very small, it is an unstable species, which is proved by the many forms in our collections.

G. damsii was found by Prof. Anisits in N.W. Paraguay. New varieties have now been discovered in Bolivia. Another argument against a geographical division.

G. damsii vars. *centrispinum*, *rotundulum*, *torulosum* and *tucovacense* were described by Backeberg in December 1963.

G. anisitsii is very rare in the typical examples which have very long spines.

G. joossensianum is a fine plant which can easily be distinguished from *damsii* and *anisitsii*.

GYMNOCALYCIUM, GROUP MUSCOSEMINEAE - III

By Dr. Bohumil Schutz

(Translated by E.W. Bentley from Friciana No. 46, 1968)

Plants of diverse size and shape: some species are small, others reach up to 30 cm. in diam. many are flat, others in old age become cylindrical, mostly not offsetting. Fruits are club-shaped, splitting vertically. Seeds up to 1 mm in diameter, spherical. Testa light-brown, dull, as if dusted with cocoa. Hilum small, arillus but little prominent.

Type species: *Gymn. mihanovichii* (Fric & Gurke) Br. & R.

On the basis of recent information especially about Paraguayan plants it is divided into two sections viz:-

Terminalia	sect. nova
Periferialia	" "

Section Terminalia - the terminal flowers emerging straight from the crown, also from young areoles are characteristic. Several flowers appear like a nose-gay on the crown.

Type species: *Gymn. mihanovichii* (Fric & Gurke) Br. & R.

Section Periferialia have flat wide bodies with spineless deep crown. Flowers spring from lateral, old areoles and form a circle round the crown.

Type species: *Gymn. megatae* Y. Ito.

Terminalia

- G. mihanovichii* (Fric & Gurke) Br. & R.
- friedrichii* Paz.
- anisitsii* (K Sch.) Br. & R.
- damsii* (K Sch.) Br. & R.
- joossensianum* (Bod.) Br. & R.
- schickendantzii* (Web.) Br. & R.
- michoga* (Fric) Y. Ito.
- pungens* Fleischer.
- griseopallidum* Bckbg.
- pseudomalacocarpus* Bckbg.
- U 207 sp. San Jose.
- sp. de Salinas.

Periferialia

- G. megatae* Y. Ito.
- tudae* Y. Ito.
- fricianum* Plesnik.
- delatetii* (K. Sch.) Bckbg.
- marsonerii* (Fric) Y. Ito.
- knebelii* Fric.
- hamatum* Fric nom. prov.
- sp. Majares.
- onychacanthum*?

Comments from H. Middleditch:

"From the plants in my own collection which are in the Muscosemineae group, the flowers appear to be quite distinctive amongst the Gymnocalycium, with their slender flower tubes and relatively small flowers. The flower petals generally do not lie uniformly one over the other but have irregular gaps between individual petals of the inner and outer series, some petals are also curled to different degrees - the whole effect being to present a somewhat untidy looking flower.

"The flower tubes are up to about 3 cm. long and are seldom 5 mm. in diameter, being almost parallel over their full height. The flower bud grows as an enlarged head upon the tube with a quite distinct change in diameter at the junction of the tube and outermost petals. One plant labelled *G. mihanovichii* (possibly Var. *friedrichii*) exhibits a well-developed flower bud looking rather like a miniature belisha beacon just prior to the flower opening.

"All the plants which I possess in this group exhibit quite pinky coloured buds when these are in the very young state - only slightly larger than pin head size; shortly afterwards one can discern the numerous scales on the bud, which appear to be far more numerous than on buds on plants in other seed groups. However, plants of Muscosemineae seen in other collections - for example, *G. delaetii* seen in the collection of A.W. Craig - have new buds coloured green.

"Many species in this group exhibit body markings faintly reminiscent of those on *Frailea cataphracta*, having greenish bodies with deep purple markings below each areole. In some plants round *G. damsii* these markings are rather deeper under the areole than at the conjunction of the ribs or tubercles, whilst in some plants of *G. mihanovichii* and varieties, these markings become more in the form of almost parallel stripes round the plant body.

"The comment in Ing. Pazout's article that it is incorrect to quote Uruguay as the home of the Muscosemineae group, appears to have little relation to its context and the cause of this specific comment is far from clear. One may only surmise that the author is questioning the validity of the habitat quoted for *G. onychacanthum*, which appears in Backeberg's *Kakteenlexikon* as "Uruguay?". Perhaps the question mark was inserted after Ing. Pazout made his comment in this article?.

"On our 1969 Continental Cactus Tour we had the pleasure of visiting Dr. Schutz and of viewing his collection, which included some fine mature plants from this group, exhibiting quite distinctively the characteristic of flowering either from the centre of the crown or from the shoulder of the body. It will be seen that this character now forms the basis of Dr. Schutz's division of this group.

"There are two aspects of the later article by Dr. Schutz which puzzle me somewhat. My own plant of *G. joossensianum*, albeit fairly small, is flowering from areoles set away from the very centre of the crown - indeed, one might almost describe some of the flowers as appearing from the shoulders of the body.

"Secondly, *G. delaetii* first appeared in print as *G. schickendantzii* var. *delaetii* - it will be found thus in Backeberg's *Kakteenlexikon*, so it is rather surprising to now find *G. schickendantzii* in the *Terminalia* section and *G. delaetii* in the *Periferalia* section."

SULCOREBUTIA

From the Chileans Robin

E.W. Barnes sets away our *Sulcorebutia* Robin by commenting that most *Sulcorebutia* available from nurseries seem to be grafted and that most grafted species seem to offset readily; as the offsets flower as well as the main head this gives a veritable bouquet of flowers. "However, they seem to present few problems when grown on their own roots. I use a sand/leafmould mix for my rooted plants, giving them a bright position and cool winter quarters. This seems to encourage them to flower well enough, as I believe they are resistant to some cold, coming as they do from quite high altitudes. With me they seem to spring into growth without any prior warning and begin to make flower buds by the end of February. After flowering they become almost dormant, but begin to grow a little more rapidly in the autumn.

"I was rather surprised to learn that some cactophiles had experienced difficulty in getting offsets to root. I find rooting them quite easy - if rather slow. The larger the cut surface of the cutting taken, the longer the roots are in forming. Offsets from grafted plants which are taken with a narrow neck (thus exposing a very small area of cellular tissue) root quickest. If these are inserted in a peat/sand mix, rootlets are soon produced from the lowermost areoles. These take 18 months or so to develop into the thickened roots, more commonly associated with this genus. But many are then untypical, having a number of roots rather than the single carrot-like tap root of collected specimens - single as far as I can judge. Cuttings seem to root quite well in the open air, laid on their sides, but are subject to a great amount of dehydration by this method."

On cultivation, M. Gilbert remarks that his experience "is very similar to that noted by Eddie Barnes. They are indeed perfectly simple to grow on their own roots and it is a pity that such a small proportion are sold in this way, though of course the greater number of flowers and offsets produced by grafted plants are a considerable point in their favour. I am a convert to soil-less composts and have been using my present mix for about three years now. It consists of equal parts by volume of peat, coarse vermiculite (though not as coarse as I would like) and small granite chippings, watering with Biopan to provide the necessary nutrients. This mixture wets far more easily than those using peat and sand only, which seems to be the major objection to such composts.

"I agree with the comments about keeping cool in winter as some of them seem only too willing to become etiolated if kept too warm during the dark months. Some of my plants also seem to have a quite well marked summer rest and have a second period of growth in the autumn. I root all my cuttings in vermiculite, preferably with a bit of bottom heat, and have had no trouble at all with *Sulcorebutias*. They can however be rather slow, but the failure rate to date has been nil. Similarly, imported plants seem impressively easy to establish, possibly because most of them are undamaged. I simply pot up normally and water sparsely until there are signs of growth and then treat normally. Going back to rooted cuttings, the rate at which the tuberous roots can form is most impressive, a cutting of *S. tunariensis* in the space of a year had more under the soil than above!

Also discussing cultivation, Mrs J. Mullah comments that after advice acquired at the N.C. & S.S. weekend at Grantley Hall in 1968 "I returned home and beheaded two *Sulcorebutia* from their grafts - *mentosa* and *sucensis*. This was done not at the joint with the grafting stock, but higher up, in the hope that the bit of scion left on the graft would send out pups - and with *sucensis* this is just beginning to happen. Because of this idea the cut exposed quite a wide surface and have taken longer to root, but *mentosa* is now (May '68) sending out hair roots. The ring of buds even held on without withering.

"The white variety of *kruegeri* rooted here without any trouble at all - but again the cut surfaces were not as large as the two we are doing this year. I am now going to degraft these plants gradually as the scions become large enough to make a decent sized plant.

"I have *S. tunariensis* and *tiraquensis*, both collected plants, with very long tap roots - in fact a long tom pot is required. I am wondering if the degrafted plants will form this type of root in time - as a *Mammillaria zephranthoides* is doing slowly."

Opening his contribution R.E. Hollingsbee says "How pleased I am to see a separate robin for *Sulcorebutia*. However, I must confess to being one of those who find rooting of offsets difficult in some cases. *S. kruegeri* is different - this is an easy rooter. Those I have difficulty with include *glomerispina* and *steinbachii*. In the first case the offsets were very small, in the second of reasonable size. Possibly I am afraid to keep them damp enough. At the moment *glomeriseta* seems slow to root also."

On identification, E.W. Barnes comments "How polymorphic this genus is! Both in form and flower, but detracting nothing for being so. *S. tiraquensis* seems to come in a multitude of forms; some have strong red spines and others pale brown to yellow. From a packet of 25 seeds I raised 14 seedlings, each one with slightly different coloured spines. I am waiting to see if all these variations stay distinct as the plants age.

"I have noticed collected plants have a very corky base, reminiscent of collected *Eriocereus* - is this caused by detritus being banked round the plants by wind action? Also some collected plants are almost denuded of spines in their upper parts, but produce them once more after a few months - is wind action the cause here too?

"Observations from my own plants lead me to think that the 'cut or fold above the areole' seems rather an indistinct way of identifying the genus. *S. steinbachii* exhibits it, but in others it is very indistinct."

Taking up this last comment, M. Gilbert observes "the 'cut or fold above the areole' certainly does not seem to be a good diagnostic character for the genus, probably because the genus was erected for just *S. steinbachii* at a time when virtually all other species were not discovered, quite a common event in taxonomy and quite unavoidable. The best diagnostic characters for the genus would seem to be the shape of the areoles - quite distinctly elongate in all the species I know, and its position on the tubercle, somewhat skew on the upper side, and of course the flowers lacking hair or bristles in the axils of the receptacle scales with distinctly shorter tubes than any *Rebutia* with naked flowers. It is certainly one of the easier genera to recognise within the Cactaceae.

"One of the nice things about these plants is that there seems to be few arguments about delimitation of the genus. I feel, however, that before very long there is going to be a drastic change in the number of species recognised. The polymorphism of some of the species is quite incredible and when this is added to the narrowness of the differences between some of the species so far published it can only add up to the disappearance of quite a few names. This would certainly seem to apply to the steinbachii, tiraquensis, glomerispina, polymorpha, totorensis and lepidota complex and probably also to some other species-complexes. The answer to problems of this nature, however, can only be based on the study of a large number of wild plants, preferably still in habitat and certainly with detailed collecting data that is never available with plants obtained commercially - thus I feel that such disputes are best left alone.

"What I would like to do is to ask what peoples' views are on the identity of some of the plants in cultivation. I think first of Uhlig's sp. Nov. 1, which seems to correspond closely with tiraquensis v. electracantha having bright yellow spines and otherwise like *tiraquensis*. My plant labelled tiraquensis v. electracantha is nothing like that variety, having very long subulate spines up to 1.5 inches long, at first brown, turning grey, and dark magenta flowers. The spines are few in number compared with *tiraquensis*. (In Backeberg's *Kakteenlexikon*, *S. tiraquensis* is given with 12-13 radial spines and 1-2 middle spines in young plants, more in older ones, up to 3 cm. long; *S. tiraquensis* v. *electracantha* is quoted as having about 25 radial spines, about 7 middle spines about 1.3 cm. long, with orange-red flower - H.M.) To the best of my knowledge *S. weingartiana*

has never been described - which is quite surprising as the plant I have seen is quite different from any other species I know."

Mrs J. Mullard regards "*S. weingartiana* as a favourite, having lovely bright yellow flowers and the plant itself looks golden in colour as well. This has spines half an inch long but thin compared with *tiraquensis electracantha*.

"My *tiraquensis v. electracantha* also has long spines like Mike Gilbert's and is quite different from *tiraquensis*. It now has three flower buds which are of considerable interest to me as it has not flowered for me before. When it came from habitat via Uhlig's, the spines were a good inch long; those on the new growth are thinner but still very long."

Following the question of imported plants having almost spineless tops, R.E. Hollingsbee wonders "if this could be due to growth between the time the plants are uprooted from habitat and the time they arrive in England - I am not thinking of during transit; possibly before being sent to Europe plants are replanted out in the open or under glass and growth takes place but without the typical strong spines.

Regarding *S. weingartiana*, the specimen I have with dark brown spines seems to me to resemble *S. glomeriseta* quite closely in form and flower and I wonder, if mine is correctly named, whether it is just a form or variety of the latter."

J.D. Donald comments upon the different appearance of top growth in imported plants that "this is not really understood - it occurs with some specimens and not others, but with me it seems to be only a temporary set back; the plants once thoroughly established start growing normally again and producing spines in the second new growth, leaving an annoying bare midriff."

"What are people's experiences with fruiting this genus?" asks M. Gilbert - "my plants have not formed any fruit and would seem to be completely self sterile, rather annoying as I have one specimen only of most species. I suppose the answer is to collaborate with someone else with a specimen in flower and put one of them to stud so to speak. Has anyone ever had any experience of sending pollen through the post? I imagine it could be done by sending flowers at a suitable stage of development. If the pollen is viable for an adequate period of time a better way would be to collect pollen on a suitable object and send that. One possibility would be a camel hair brush - or a short length of pipe cleaner ?

"On cross fertilisation, has anyone ever tried crossing *Sulcos* with other genera? I know of crosses between *Sulco tiraquensis* and species of *Gymnocalycium* and *Weingartia* which are easy to obtain and vigorous. I believe attempts to obtain hybrids with *Rebutia* have failed, which all rather suggests that the relationships of this genus are with *Gymnocalycium* and not, as is most usually suggested, with *Rebutia*."

"I also think it is correct to say that these plants are self-sterile" says Mrs J. Mullard - "I have several different plants of *S. steinbachii* flowering at the same time last year and no seed set, so I am going to get busy with our little brush this year and see if anything comes of that. I also have several duplicate plants of other species, but again no seed as yet."

"I too would agree that most plants seem to be self-sterile" says R.E.H. Hollingsbee "but I regard it as a challenge to try and set fruit on all plants which flower and go to some lengths to ensure that they do. However, I do not remove stamens from any flowers. So far this year I have set the following pods:-

- S. glomerispina*, pollen from *Mediolobivia* sp. 6 flowers set out of 6.
- S. kruegeri* (orange yellow flowered import) pollen from *Mediolobivia*, 1 out of 5 set.
- S. taratensis*, pollen from *Mediolobivia*, 4 out of 4 set.
- S. kruegeri* (yellow flower), *Mediolobivia* pollen, 12 out of 12 set.
- S. weingartiana*, *Rebutia* pollen, no fruit set.
- S. steinbachii*, *Mediolobivia* and *Echinocereus* pollen, none set.

S. steinbachii x *steinbachii* (different spines) 1 of 2 set.
S. steinbachii x *steinbachii* v. *gracilior* - 4 large pods.
S. lepida FR 369 red spines, *Mediolobivia* pollen, none set out of 6.
S. lepida FR 369 brown spines ex Uhlig, *Lobivia* pollen, 8 out of 10 set.
S. steinbachii with *Lobivia* pollen, 5 out of 5 set.
S. glomeriseta with *Lobivia* pollen, 20 out of 30 set.
S. tiraquensis v. *electracantha* (import) with *Rebutia* and two types of *Mediolobivia* pollen - 5 of 6 set.

"One or two others also appeared to have set but these proved to be false pods. The above are all healthy, firm, fruits. The variation in fruit size is considerable - suggesting only partial pollination? I have heard that some plants need an acid spray to encourage setting of pods. (Mrs L.Teare also raises this last point - H.M.)

"I do have a *Chamaecereus* x *Sulcorebutia* hybrid, produced by a nurseryman who is rather handy with a pollen brush."

J.D.Donald comments "For me fruiting seems to be all too easy - all my plants have fruited this year with plenty of seed but I do not guarantee the purity of it. There were plenty of leaf-cutting bees about so my guess is that the progeny will be all hybrids. I know of two *Chamaecereus* x *Sulcorebutia* hybrids, one from *S. kruegeri* and one from *tiraquensis*, one yellow flowered, the other purple red flowers, with characters near *Chamaecereus*. Attempted crosses with *Lobivia cinnabarina* - the nearest relative morphologically and conspecifically - failed until this year.

"Regarding the use of acid spray, this is said to encourage the stigma to be receptive to pollen i.e. not to inhibit the penetration of the pollen tube."

The article on *Sulcorebutia* in the N.C. & S.S. Journal No.17 of 1962, p.13 is referred to; the number 453 appearing with the photograph of *S. verticillicantha* is merely a filing reference number and has nothing to do with F.Ritter's field collection numbers.

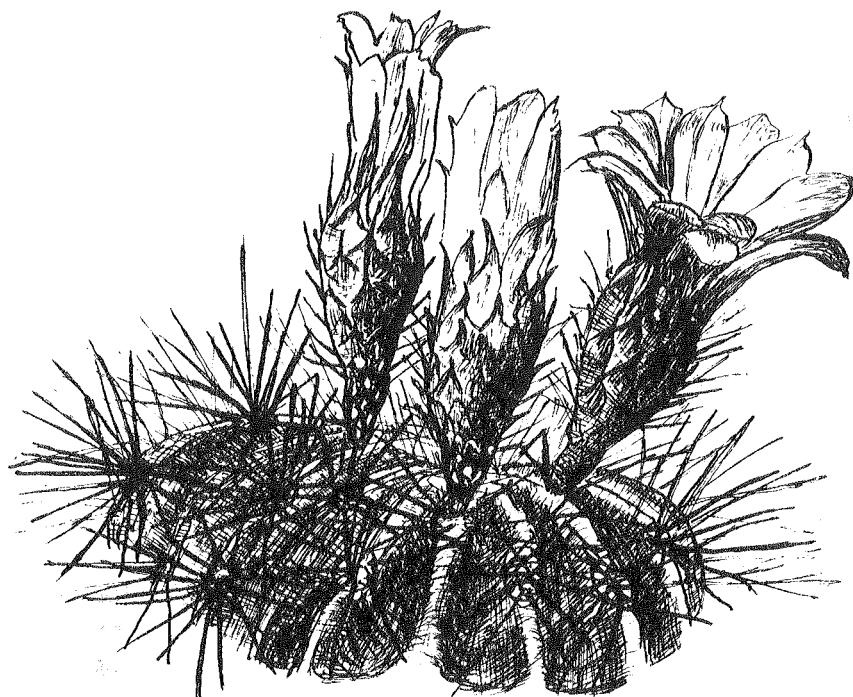
THE GENUS ACANTHOCALYCIUM - AN INTRODUCTION

Like other genera of more recent establishment, species now classed under *Acanthocalycium* can be traced back to their first discovery when they were included in one of the then current all-embracing genera. Thus we find Schumann publishing *Echinocactus spiniflorus* in 1903, the plant coming from Cerro Morro or Cerro Bianco in Argentina. Britton and Rose record that they had seen similar flowers collected from Jujuy by Dr.Spegazzini and from Cerro de Mancha near Cordoba collected by Dr.A.Dominguez.

These flowers all had two characteristics in common - a mass of woolly hairs round the base of the style, and the scales of the ovary and flower tube are stiff and terminate in a sharp point. Britton and Rose also referred to two *Lobivias* - *L. chionanthus* and *L. thionanthus* - which also exhibited both these features.

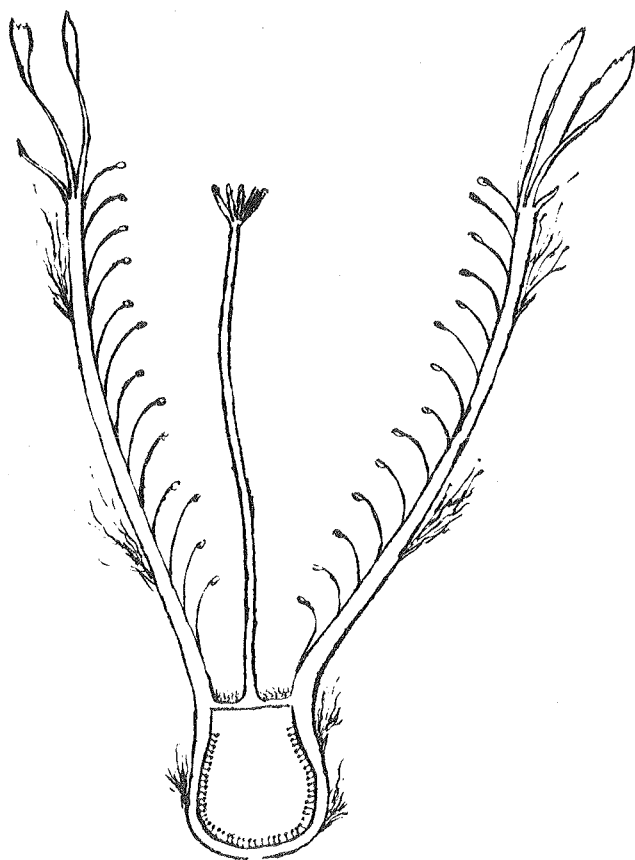
These two characteristics were later used by Backeberg to separate the genus *Acanthocalycium*, which he established. In his Lexicon, he describes the following species of *Acanthocalycium* :-

<i>brevispinum</i> (t)	<i>griseum</i> (t)	<i>thionanthum</i> (t)
<i>catamarcense</i> (t)	<i>Klimpelianum</i> (v)	<i>variiflorum</i> (t)
<i>chionanthum</i> (v)	<i>peitscherianum</i> (v)	<i>violaceum</i> (v)
<i>glaucum</i> (t)	<i>spiniflorum</i> (v)	<i>sp.n.</i> (U 2175)



ACANTHOCALYCIUM
VIOLACEUM

Collection E.W. Barnes.



ACANTHOCALYCIUM
GLAUCUM

Flower Cross Section
Collection - H. Middleditch.

These plants may be divided into two distinct groups, firstly those around *A. violacea* which have mauve, pink or white flowers with yellow styles and a scaly but not very woolly tube (marked 'v' above). When these plants are in bud, the horny-tipped scales surrounding the bud are very distinctive. Secondly there are the plants around *A. thionanthium* (marked 't' above) which have yellow flowers, some with a blood red style, and a fairly woolly tube.

SOME COMMENTS ON ACANTHOCALYCIUM

.... from H. Middleditch:

"In 1967 my plant named *A. glaucum* produced a black flower bud, with a rounded crown; around the bud, but not dense enough to obscure it, were many curly black hairs. If there were any scales on the bud, these were obscured by these black hairs. This bud was quite unlike the pointed top of the bud on *A. violaceum* with its yellowy-brown scales, which flowered the same year.

"The bud on *A. glaucum* grew steadily, up to 3 cm. long with a head some 1 cm. diameter, the head still being black. Immediately prior to the flower opening, the tube lengthened rapidly to about 5 cm. in length - again quite unlike *A. violaceum* where the flower tube remains short. Indeed, grave misgivings were entertained on the accuracy of the plant label until enquiries suggested that the plant was correctly named.

"This plant has obliged with a flower again this year, a cross section being shown in the accompanying sketch. The style and stigma are pale yellow, as are the stamens. The petals are a somewhat deeper yellow colour; the outermost petals have a brownish tip. The shorter outer petals which occur between the top of the tube and the full length outer petals, contain more brown pigment near the tip and have a green midstripe, together with a stiff black bristle about 2 mm long at their tips which is identical to the bristle on each scale on the exterior of the tube.

"With making a closer scrutiny of this flower, it became clear that each scale carried the short bristle at its tip just like the more or less hairless tubes of other species of this genus.

"There was a faint suggestion of some yellow wool at the base of the style in the interior of the receptacle, but if I had not been looking for it on account of it being described as a feature of this genus, it would have been overlooked."

.... from J. L. Arnold:

"The only *Acanthocalycium* I have flowered is *A. oreopogon* which has yellow flowers and a white wide-spreading stigma very much like an *Echinopsis*. The outside of the flower tube is very hairy."

(Efforts to establish the origin or authenticity of this particular name have so far failed; any suggestions? - H.M.)

.... from Mrs. J. Hobart:

"My *Acanthocalycium violaceum* flowered this year so I kept a good look out for the spiky scales that are supposed to characterise this genus. Almost from the very beginning the flower bud was surrounded by a coat of upstanding dark bristles and after some time I realised that these were the spiky tips of the scales that appeared on the tube of the fully grown flower."

.... from D. W. Whiteley:

"In the Chileans No.3 p.2 there was listed under *Pyrrhocactus*, *P. griseus*. This has now been transferred to *Acanthocalycium*. (An entry in Backeberg's *Lexikon* confirms this - H.M.) Another

plant once listed under *Pyrrhocactus* by Uhlig, U 170 spec. Talombam from seed collected by Lembcke, has been renamed in later lists *A. tolonbanense*. There is a difference in the spelling of the locality here, one of which may be an error.

"I obtained a number of plants from Tookey, in the past, named *Pyrrhocactus*; one of these flowered with a typical *Acanthocalycium* bud. It is quite likely that other plants distributed by Tookey as *Pyrrhocactus* may prove to be *Acanthocalycium*. I have tried to find out from Tookey where these plants come from and who collected them, but I have never had an answer to these questions. I would imagine that the collector who dug up these *Acanthocalyciums* may have thought he had collected the species of *Pyrrhocactus* known to come from the same locality."

.... from J. D. Donald:

"The splitting of *Acanthocalycium* into two distinct sections is more than justified - the violaceum group is distinct from the thionanthum group in seed as well, so that it appears that the two groups may have had different origins. It is tempting to look towards *Notocactus* as a link on the basis of the blood red style and yellow flowers of the thionanthum group, but apart from these two characters coupled with the woolly flower tubes and occasional bristly scales in *Notocactus*, there is little to tie them together.

"The yellow flowered group have also been compared with *Pyrrhocactus* which in fact lack the blood red style characteristic of the yellow flowered *Acanthocalycium* - although it is important to note that some forms of the latter do occasionally produce only yellow stigmas (like my *A. glaucum* - H.M.)

"I have never seen *A. chionanthum*, which in description appears to have some characters of both sections. There is I feel certain a considerable amount of over specific description. There is very little difference between *A. klimpelianum* and *A. peitscherianum* both of which are in all probability only forms of *A. spinaflorum*.

"The yellow flowered forms all seem to have glaucous green bodies which steadily become greyer as the plants age. *A. brevispinum*, *A. catamarcense*, *A. thionanthum* and *A. sp. S. Am. U 2175*, appear to be very near to each other and not really separate species. The highly variable *A. variiflorum* also belongs to the thionanthum species population; on the other hand, *A. glaucum* and *A. griseum* are clearly distinct species from each other and from the thionanthum group.

"In cultivation many plants sold as *Gymnocalycium glaucum* are in fact really *Acanthocalycium* - the true *Gymnocalycium glaucum* is a very rare plant with a typical *Gymnocalycium* flower. Any woolly budded *G. glaucum* are almost certainly *Acanthocalycium glaucum*."

.... from Mrs Zella Andrews:

"I grew *Acanthocalycium violaceum* from seed in 1964 after seeing a lovely plant in flower at a Cactus party. The one seedling I kept grew into a very nice plant and in 1967 I noticed buds for the first time - these however did not develop. Mentioning this to a visiting friend he told me that the same thing had happened to his plant and that he had been told that this plant is inclined to abort its first buds, with the advice to give it plenty of water as soon as the buds appear the following year.

"Taking this advice I was surprised just how much water this plant does need, on hot, sunny days sometimes twice daily but the result was very rewarding indeed with eleven flowers open all at the same time and several odd ones after that. From the beginning of October until middle March it is kept completely dry. I don't think I have seen such strange buds before either, they look just like tiny paintbrushes and take a long time to develop.

"I also have a three year old seedling of *A. oreopogon* which flowered in May this year. I should be glad if anyone could advise me on treatment of this species."

.... from J. Forrest:

"I removed some soil from an imported *Acanthocalycium* which had obviously been on the plant when it was collected and when tested it had a pH of 5.5."

.... from A. Johnston:

"I obtained four collected plants of *Acanthocalycium* from Uhlig in August 1964, all of which are now well established. My *A. violaceum* flowers regularly each year, a very pale lilac which I am told is much paler in colour than other plants under this name, but I would think that the actual flower colour can vary through several shades of lilac without indicating that the plant is different from the name it was bought under. The body of this plant is 12 cm. in diameter, with sixteen ribs; it now has two offsets, one 4 cm. dia. and the other 2 cm. dia.

"*A. thionanthum* is 9 cm. in dia., globular, having 15 ribs with a chin under each areole. Radial spines up to 14, centrals up to 4, all up to $1\frac{1}{2}$ cm. long, whitish at first with brown tip later passing to grey. This plant flowered in 1965 and again in 1966 but has not flowered since. Seed set in 1966 was sown in 1967, with good germination. One seedling was grafted and is making nice growth with strong spines.

"*Acanthocalycium* sp.n.AM. This plant is 9 cm. dia. and 15 cm. tall, with 22 ribs which flatten out with age. Radial spines 10, centrals one, slightly larger than the radials which are $1\frac{1}{2}$ cm. long. Spines pale brown at first with dark tip, later passing to grey, areoles yellowish. Flowered in 1966 only, flower similar to *A. thionanthum*. John Donald tells me that the plant under this number is now *A. thionanthum*, but it does vary in body habit quite a lot from my own plant of this latter species. Young seedlings of both look very similar. I would welcome any further information on this plant."

.... from A. McMillan:

"My plant of *Acanthocalycium klimpelianum* is about $7\frac{1}{2}$ cm. dia. and 5 cm. high. It has 17 ribs, acute and dull green. The areoles are 10 - 12 mm apart, oval, about 5 mm dia. and woolly. All the spines are pale brown with a darker tip, 9 radials and one central, all 8 - 12 mm long. The flower is about 5 cm high, ovary and tube with many spines and hairs, higher up the tube turning to scales terminated in a spine. Numerous white petals 17 mm. long, opening wide, many stamens inserted all the way up the tube (as shown in the cross section sketch), filaments 5 - 10 mm long, greenish, anthers yellow with much pollen. Greenish stigma with 12 - 14 lobes, widely separated, about 1 mm long, style pale green 13 mm long. White wool inside tube, 1 - 2 mm up from base of style. No fruits.

"I have two dried and pressed flowers which I shall be glad to send to anyone who would like to compare them with other species."

ERRATA - NO. 13

The article "Where Do We Go From Here?" should have been ascribed to J. Jelinek as author and to D.W. Haigh as translator, not vice versa.

Cover should read Vol. 2, No. 13. Vol. 3 starts with this issue.

ACANTHOCALYCIUM AURANTIACUM RAUSCH SPEC. NOV.

By Walter Rausch

(Translated by E.W. Bentley from "Kakteen u.a. Sukkulenten" 19 : 5, 68)

Solitary, 5 cm high and up to 9 cm in diameter, grey-green, epidermis very hoary; ribs 10-16, straight lightly humped; areoles about 2 cm apart, white, woolly, later becoming bare; centre spines mostly 5, sometimes 7, more or less spread out, straight, sharp, 3-4 cm long, rarely longer however; central spine seldom 1 of the same length, all spines whitish or yellowish, pink in the middle and black at the tip.

Flower appearing at the side, 5 cm long and broad, ovary and tube olive green or olive brown with brown scales and hairs; outer floral leaves orange-red with brown or dark green middle stripe, lanceolate; inner florals lanceolate or spatulate, orange-yellow with orange, red or pink margins; hymen, throat and stamens light yellow; style green, with a brown ring of wool at the base; stigmas 10, green or yellow; fruit round, 1 cm in diameter with white wool; seeds 1.5 mm with black shiny verrucose testa. Home: Argentina, Catamarca, Mina Capillites at 3000 metres. This species bears my Collection No. 148.

This species belongs with A. chionanthum, thionanthum, glaucum, etc.; in my opinion all these form-groups which occur from Salta to Catamarca are varieties of one species; they all have the more or less hoary epidermis and more loidioid fruit to differentiate them from A. violaceum with spiny perianth tube and fruit, that comes from Cordoba.

SOUTH AMERICAN EXPLORERS - 2

In 1745 La Condamine brought back to Paris from South America a record of his personal experiences and observations, some plant seeds and some indigenous material, but all the botanical specimens so painstakingly collected prior to their descent of the Amazon, were lost. (See Chilean No. 8 p. 19).

At this time only a few *Opuntia*, *Cereus* and *Melocactus* from the north coastal regions of South America were known in Europe.

In 1769 Captain Cook sailed through the straits of Magellan on a voyage of discovery to the South Pacific. A passenger aboard was one Mr. (later Sir) Joseph Banks, who was interested in observing natural history. While on shore at Tierra del Fuego, Banks shot an Albatross; Banks was later President of the Royal Society for 40 years but Captain Cook was killed on a Pacific Isle.

Many other ships called at the southern tip of South America, either en route to trade in the Pacific, or English pirates out to plunder the Spaniards. This small region of the continent rapidly became well charted and well known.

The Spaniards continued to exhibit very little interest in the natural history of their colonies. They supported desultory scientific expeditions to their American possessions but they continued to neglect the products of these expeditions. There were others in Europe not so uninterested in the natural sciences of a still largely unknown continent. One such was Baron Alexander Humboldt, a German, who while in Paris, met Aimé Bonpland, a French Doctor by profession and botanist by interest. These two decided to make a trip to India, but finding it difficult to obtain a passage, went to Spain. They obtained a Royal Warrant from King Charles IV permitting them to visit any part of his American domain and instructing all commanders and officers to assist the two scientists.

In 1799 Humboldt and Bonpland sailed from Corunna and ran the British blockade out into

the Atlantic. After a call at Tenerife they stopped at Cumana on the coast of what is now Venezuela. Many tall cacti grew there on the mountain slopes which came right down to the sea's edge. The two explorers spent six months botanising around Cumana. They then went to Caracas and made a trip across the Llanos to the headwaters of the Orinoco, collecting en route. Asail once more to Cuba, they stopped at Havana and there divided their collected specimens into three similar collections, each of about 20,000 plants (which included some cacti). One collection was shipped back via West Africa but was lost at sea. The other two collections were despatched much later, by separate ships; both cleared the British blockade and arrived safely in Europe.

In 1801 Humboldt and Bonpland went back to the mainland, to make their way up the River Magdalena to Bogota. There they met Dr. Jose Celestino Mutis, an outstanding botanist with a very fine herbarium - an almost unique figure in the continent at that time. Mutis had sent specimens home to Madrid where they had previously been inspected by Humboldt.

In July 1802 the two explorers reached Quito, having augmented their collection all the way en route. Here they passed through more cactus country when they visited Mount Chimborazo, which they ascended, at great hazard to their persons, to a height of 19,286 ft. - then a world altitude record.

From the high, cold, windswept plateau on which Quito stood, they took a trip down the eastern flanks of the Andes to Jaen and on through the jungle to the banks of one of the Amazon tributaries. Then up into the Andes once more and down again to Cajamarca. Up once again and down to Trujillo, on the Pacific coast, then along the coast to Lima.

On this last leg of their trip they traversed a veritable desert, with only an occasional shallow lake supporting reeds and flamingoes. They found Lima, in November, at the tail of its winter cover of drizzling mist, which blanketed out the sun. Humboldt was very intrigued by the desert conditions prevailing at the edge of a sea coast, especially since the air was so humid. He discovered that the land was apparently warmer than the offshore water and suggested that (as we now know) this would account for the peculiar climate of the coast.

He also examined the great depths of the guano beds - the accumulated excrement of millions of sea birds - on the cliffs of the offshore islands, which could only persist owing to the continued absence of rain over a great many decades. The cool sea current - subsequently named the Humboldt current - would also account for the presence of the vast numbers of fish upon which the guano-producing birds fed.

Humboldt and Bonpland sailed from Callao in 1803; after making a brief botanising trip in the Gulf of Guayaquil, they went to Mexico, where they spent a year before returning to Cuba. There they despatched to Europe their accumulated collection of some 60,000 different plants, a great many (including many of the cacti) entirely new to science. They then sailed back to Europe - calling at the U.S.A. on the way to see President Jefferson - along with vast quantities of notes on botany, geology, astronomy, volcanology and archeology.

Bonpland eventually returned to South America for good, residing just on the Argentine side of the Paraguay border. Humboldt, in Europe, devoted great energy to converting his field notes into a set of very fine illustrated folios. He also wrote books and articles and gave talks describing his journeys and discoveries.

If one examines a map of the South American continent, the area actually explored by Humboldt and Bonpland appears insignificant. Nevertheless, as a knowledgeable scholar and energetic observer, having all the advantages of visiting a demi-continent under the patronage of a single very powerful and well-organised authority, he added tremendously to the current knowledge on the natural history of South America.

Never again would an explorer visit South America with a piece of paper signed over two thousand miles away, which gained unquestioning compliance to every request from every single person in authority in the demi-continent. Never again would the total sum of scientific knowledge of South America be multiplied so greatly by one man's works.

Thus did Alexander Humboldt, Baron, gain a place in history, his name framed wherever scientific knowledge was respected. The plants we now know as *Euphorbia lanata*, *Borzicactus sepium*, *Armatocereus laetus*, *Opuntia bonplandii*, *Seticereus chlorocarpus*, *S. humboldtii* and *S. icosogonus*, were amongst those first introduced to Europe and named as co-author by this great naturalist.

SOME THOUGHTS ON CLASSIFICATION - 1

From Dr. G.S. Myers, California.

As a boy I raised some cacti from seed, but I turned to zoology rather than botany and I did not have the opportunity to renew my interest until about ten years ago.

Meanwhile, I devoted a good deal of my time to the taxonomy of South American freshwater fishes. In the course of that work, I have visited South America six times, once for a 2½ year sojourn in Brazil. I have observed many cacti, but only my recent trip to Venezuela this past summer has come within my renewed cactus interest. In Venezuela, I ran across some facts of *Cereus* distribution which, strangely enough, may contribute something to my studies of fish distribution down there. In any event, I am interested in anything regarding the taxonomy of South American cacti.

You say that you find it difficult to obtain named species of cereiform plants. I marvel that one can obtain what one does, in view of the parlous state of cactus taxonomy. I have had 45 years of experience as a professional taxonomist, albeit of animals, but the principles are precisely the same as with plants. I have available a large part of the recent taxonomic literature on cacti and I am personally familiar with much of it. I agree with my botanical colleagues that the cacti are perhaps the worst classified of all plant families. The work of Backeberg, part at least of that of Werdermann, and even much of that done by Britton and Rose horrifies me by its carelessness. By all odds, that of Backeberg is the worst. The recent drastic generic reduction in the new classification by Hunt is a fully expected reaction to the extraordinary generic splitting of Backeberg.

I think that Hunt's lumping goes a bit too far, but it is better than the other extreme. I believe that not only Backeberg, but also Ritter and Cardenas have run wild in describing new species without any clear idea of the geographical variation seen in all species of animals and plants. Considering the state of knowledge at the time he was working, I have conceived a greater respect for Schumann in species discrimination than his successors. In any event, it is obvious that much of what ails cactus classification is due to the fact that much or most of it has been done by amateurs intent on amassing collections of greenhouse plants without interest in or knowledge of the ways in which living organisms live, vary, disperse, and evolve, in nature. Most collectors of living things, be they cacti or tropical aquarium fishes, are completely uninterested in biological classification and don't wish to learn anything about it. All they wish is a nice, pat, unchanging name for each specimen in their collection, and they feel vaguely put upon when they discover that the names, like the taxonomic science to which the names are tied, change not only with advances in knowledge but also with changing opinions and fashions in generic limits.

There is, of course, one thing for which Backeberg deserves credit energy! Energy to put all of his classification together in one great monograph where people can easily look up and study his results, and judge whether the latter are good or bad.

That the classification of Chilean cacti is not now in a very good state is due largely to the fact that most of them have been made known by a succession of workers, starting with Philippi (who worked on everything from mammals, birds, reptiles and fishes to cacti and other plants), who do not have a reputation for precise taxonomy. It is unfortunate that Backeberg's generic arrangement of these Chilean species is rapidly coming into vogue, largely because it is the only recent complete treatment. By its use, cactus fanciers are bringing down upon themselves precisely what they do not like - eventual name changes. If anything in cactus taxonomy is certain, it is that Backeberg's genera will eventually mostly be lumped into more comprehensive generic units. Perhaps the lumping will not be as drastic as Hunt's, but it will wipe out most of Backeberg's generic names.

SOME THOUGHTS ON CLASSIFICATION - 2

Or, What is constant?

Most of us will have had an opportunity at one time or another to see an imported specimen of a fairly well-known plant. Usually the first impression is of a plant much more fiercely spined - both in spine length and density - than we are used to seeing in cultivated plants in collections in Europe. Fortunate indeed is the collector who can produce on the new growth on an imported plant a spine formation remotely comparable to that produced in habitat. Examples of new growth with 'European' spines may even be found illustrated in Backeberg's *Die Cactaceae*. I suppose that most of us would accept this as being a result of bringing the plant to higher latitudes where it receives far less sunshine - the sort of thing that would never happen in genuine cactus country, even to a lesser degree we may think.

An interesting example of the reverse phenomena is given by R.H. Kirkpatrick, who writes from California: "I have been experimenting with quite a few of the South American species here in the Mojave Desert at Barstow, California, and on the whole most species seem to adapt to our extreme environment very well. Most are very sensitive to our exuberant sunshine and have to be lightly shaded and heavily watered during the summer months but seem to really enjoy the mild dry winters. The excess heat combined with lots of water seems to really make them grow by 'leaps and bounds'. Our temperatures are from 115°F to app. 15°F, with a night/day range of 30° - 40°.

"The *Sulcorebutias*, lightly shaded, take all the extremes of temperature very well. An interesting thing about them is that the spination changes tremendously. By that I mean they grow thicker, longer and closer together as if to try and protect themselves from the fierce sun. In fact most of the non-native cacti I grow here do the same. Another interesting feature is that a lot of the Mexican and South American species grow a large amount of wool around the areoles. This, I suppose, is an attempt to protect themselves against the extra amount of sun. Anyhow, the conclusion I have arrived at is that spine color, length and number is variable according to the environment they grow in. The extra amount of wool grown also appears to be a result of environmental condition, that is, extra dry and extra hot. After some of the non-native plants are grown here for two or more years they are almost unrecognisable in respect to the published pictures! I suppose our weather conditions are almost as severe as Chilean deserts as 2-5" of rain is about average here for the year and yet we do have snow occasionally.

Last year we had 6" of snow for about a week! The altitude here is approx. 2,000 ft. about midway between the lower and upper deserts."

Thus we now have examples of spine formation diverging in both directions from which occurs in habitat, due to a change in the duration and intensity of sunlight in both cases. But we must now suppose that the sunlight, heat and dryness of the habitat of any cactus species is uniform.

A plant growing on rocky ground sloping towards the sun will receive much more heat and light reflected (even after sundown) from the surrounding rock, than one with surrounding sand or gravel; a slope facing away from the sun or with a sparse cover of grass or thorn bush will lose water less rapidly than one more exposed to the sun or carrying very little other vegetation. The plant will respond to these differences - but not to the same degree - just as it does to the more extreme differences in climate when transplanted far from habitat, by changing its spine characteristic to a greater or lesser extent. As a result, a given species may appear in various forms throughout its habitat. Where many forms of a species are known, it is referred to as a polymorphic species i.e. many formed, and the variable characters are termed 'plastic' characters.

When a restricted number of forms have been observed by a collector in habitat, he may feel justified in giving each specific status i.e. each form may be named as a separate species. Other collectors or authors may prefer to describe them as varieties of one species. Readers of the *Chileans* will have observed that in many of the articles culled from Continental journals (as in this issue) problems have been posed as a result of subsequent discoveries which produced further intermediate forms - so that a distinct dividing line may no longer occur between published varieties or even between supposed species.

Faced with this polymorphism of plastic characters, one may well ask, is there not a more constant characteristic which may be of more value in identifying a plant? More of this anon.

H. Middleditch

SOME THOUGHTS ON CLASSIFICATION - 3

By J.D. Donald (from the *Neoporteriae* Robin)

I think I am getting a built-in resistance to the commercial gimmicks that try and create new species and new names without any botanical justification. In the *Notocacti* and the new 'with-it' *Brazilians* we have another area with fascinating taxonomic problems just ripe for wholesale redundancy of species and genera! - after Donald & Rowley have done their worst with the *Neoporteriae*.

No, it is not my prime purpose to create havoc amongst the names of our beloved cactus plants but to bring a spot of botanical logic and ordered life into a family of plants that has stepped out of line in modern concepts of genus, species and variety.

The field data that is at last pouring in from Chile, Peru, Bolivia, Argentina and Brazil, points again and again and again at the inadequacy of our tight little box descriptions and narrow specific boundaries to cope with the enormous breadth of natural variation that exists within each real species population. The *Cactaceae* are naturally polymorphic among the very characters by which we try to recognise our plants. Creation of new species or new varieties does not really solve the problem, it only creates the need for more new species and new varieties to cope with the never ending flood of different looking plants that are constantly being imported from South America and Mexico. Broader, more flexible diagnoses are what are needed - fewer names and not more names - fewer boxes, but larger, to accommodate the individual variations of less botanic import.

Do we collect plants or names? If it is the latter, then obviously you will not like this line of thought but if it is the former, as I am indeed sure it is - what do you do with your surplus names and with your different looking plants with the same name? In time you will get used to fewer names but you will still keep - and go on acquiring - different looking plants all with the same name and the collecting urge or the genuine love of plants will be satisfied by the build up of representative collections showing the extent of natural variation within each species or subspecific population. Each individual plant within the representative collection can be

identified by whatever name or number you think most suitable. If you are among those who feel uneasy with an anonymous plant - the only thing you must not do is to create a new Latin bi- or tri-nominal for it.

How to choose the most suitable means of identification so that you can communicate its existence and compare it with others? Normally the first person to draw attention to a particular variant has the right to name or number it and this is then accepted by all other adherents to the circle acknowledging its existence, and recognising its separate nature. Numbers are easier in my own opinion as they can be incorporated from the collection accession number if you keep such records - but I know some people would prefer cultivar or trivial names instead.

All of which brings us back to the problem - how does a mere amateur cactophile navigate between the Scylla of the arch-lumping of orthodox botanists on the one hand and the Charybdis of the commercial world and amateur tyros' super-splitting on the other. As we have said above, more of this anon.

ANNUAL REPORT AND ACCOUNTS: for 1.4.68 to 31.3.69

Our Treasurer reports as follows:-

<u>Income</u>		<u>Expenditure</u>	
Subscriptions. (including for '67 - '68 - £7.17.8 for '69 - '70 - £20. 0.6	£223.10. 8	Printing	£302.17. 5
Sales of Year Books	98.17.11	Postage and Stationery	85. 2.11
Sales of Back Numbers	107.19. 6	Plant purchases	91.11. '0
Plant sales	133. 0. 8		
Donations, etc.	6.12.10		
Bank Interest	7.12. 6		
Carried forward from previous year	36.11.11	Balance c/f	134.14. 8
	<u>£614. 6. 0</u>		<u>£614. 6. 0</u>

For the coming year, our subscription income is expected to cover the cost of preparing, printing and posting two issues, although we do expect to issue more. With the increased U.K. postal charge of 2d. per copy plus the effect of increased S.E.T. on printing costs we cannot expect to maintain present content and standard at current subscription rates after this year.

It is a pleasure to acknowledge the publicity provided for the Chileans by: The Cactus & Succulent Society of Great Britain; The African Succulent Plant Society, The New Zealand Southern Spine, and Messrs D.W. Sargent, C. de Herdt and D.W. Whiteley.

I must also record our indebtedness to all our hard-working translators, the results of whose efforts form the backbone of our Journal.

H. Middleditch.

FORTHCOMING ARTICLES

We should be pleased to receive comments upon any of the material appearing in the Chileans and also to hear from any members who have flowered any *Cereus*, *Borzacactus*, *Seticereus* or *Loxanthocereus*.

Future articles will appear on *Noewerdermannia*, *Delaetii* and *Oroya* and any observations made on these plants would be welcome.

STUDY GROUPS / ROUND ROBINS

English	Cleistocacti	A.A.Sadd, 26 Carlisle St., Island Bay, Wellington S.2, New Zealand.
	Copiapoa	D.J.Lewis, 16 Brundall Crescent, Cynntwell, Cardiff CF5 4RU.
	Epiphytes	A.J.S.McMillan, 5 Oakfield Road, Bristol BS8 2AJ.
	Frailea	J.Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
	Gymnocalycium	G.H.Swales, 5 Hillcrest, Middle Herrington, Sunderland, Co. Durnham.
	Hydroponic Culture	P.R.Hallett, Llaregyb, 20 The Garth, Bull Bay, Amlwch, Anglesey.
	Lobivia	R.E.Hollingsbee, 46 Markland Road, Dover, Kent.
	Matucana/	
	Borziactinae	Contact the Chileans
	Mediolobivia	Mrs C.S.Winsland, 6 Acacia Grove, St.Neots, Hunts.
	Miniature Opuntia	D.E.Watling, 52 Frances Road, Windsor, Berks.
	Neoporteriae	H.Middleditch, 5 Lyons Avenue, Hetton le Hole, Co.Durham.
	Notocactinae	K.H.Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
	Parodia	A.Johnston, 11 Malvern Road, Scunthorpe, Lincs.
	Photographing	
	Cacti	A.W.Craig, 16 Skeeby Close, Hartburn, Stockton on Tees, Teesside.
	Sulcorebutia	W.G.Sykes, 10 Ashley Close, Thornton Cleveleys, Lancs.
	Trichocereus	N.T.Hann, 30 Copse Avenue, West Wickham, Kent.
German	Chileans, Echinopsis, Epiphytes, Gymnocalycium, Islaya, Parodia, Rebutia and Lobivia	- W.Kinzel, 53 Duisdorf/Bonn, Bonhoefferstrasse 16, West Germany.

THE CHILEANS

Organiser	H.Middleditch, 5 Lyons Avenue, Hetton le Hole, Co. Durham, England.
Editor	A.J.S.McMillan, 5 Oakfield Road, Bristol BS8 2AJ.
Treasurer	R.L.Purves, 19 Brocks Drive, Fairlands, Guildford, Surrey.
Membership Secretary and Back Numbers:-	Mrs.A.Lavender, 62 Finchale Avenue, Billingham, Teesside.
Seed and Seedling Exchange:-	E.W.Barnes, 22 Coniston Grove, Ashton under Lyne, Lancs.
Slide Librarian:-	A.W.Craig, 16 Skeeby Close, Hartburn, Stockton on Tees, Teesside.

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