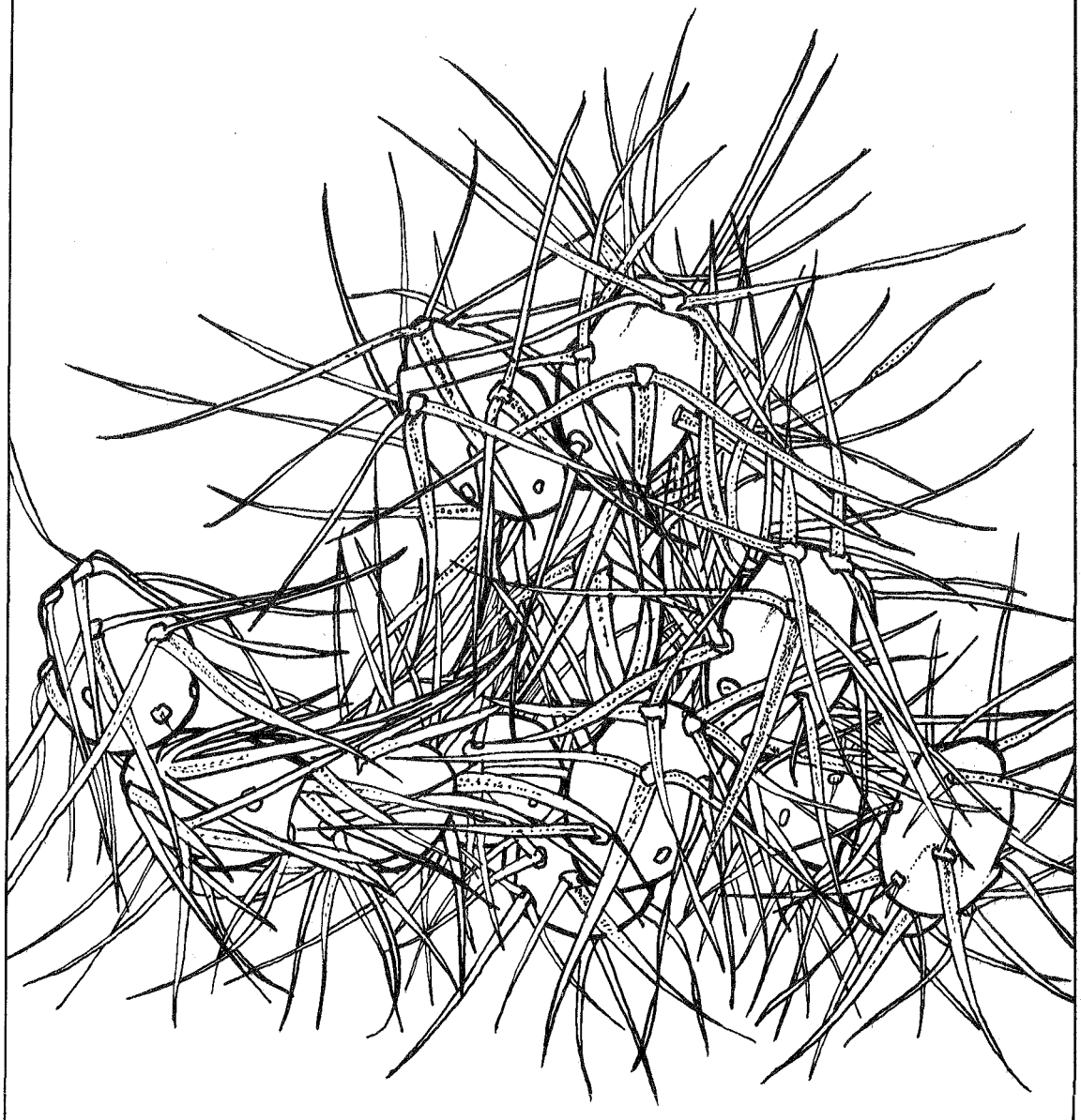
THE CHILEANS '71

VOLUME 5 NUMBER 19

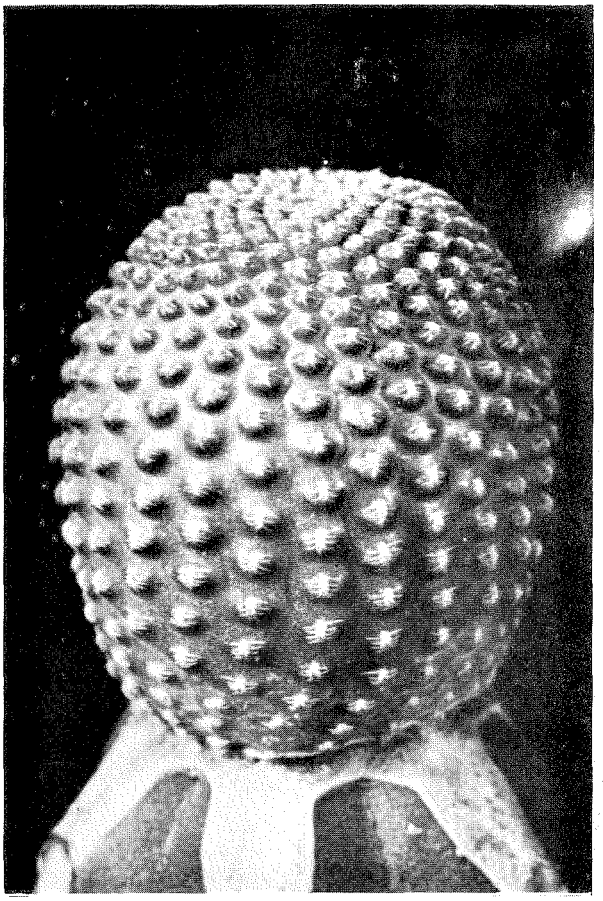


TEPHROCACTUS PAPYRACANTHUS

COLLECTION: T. LAVENDER

Carl J. Lazzari

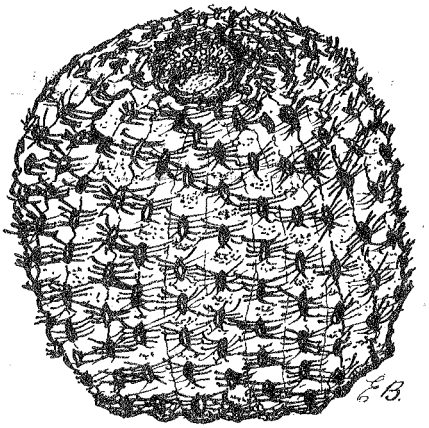
ACTUAL SIZE – PART OF LARGE SPECIMEN



LOBIVIA FAMATIMENSIS

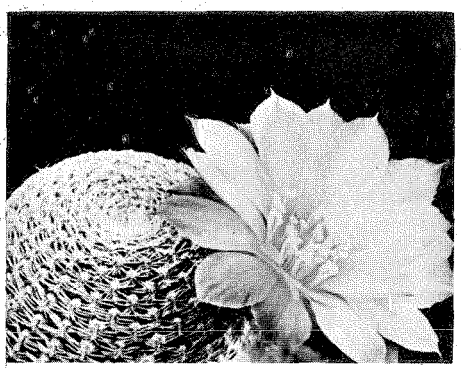
(SYN REICHEOCACTUS PSEUDOREICHEANUS)

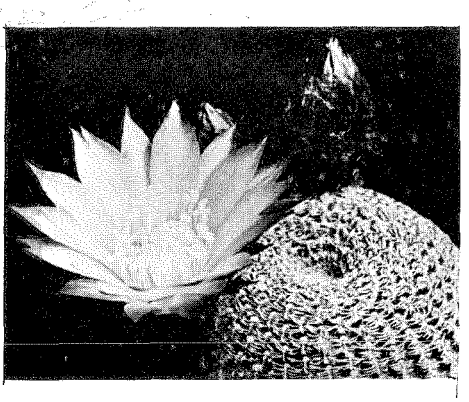
COLLECTION & PHOTO A.W.CRAIG



LOBIVIA FAMATIMENSIS FR 459

Collection E.W.Barnes





Echinocactus famatimensis Speg.

Above: Ritter collected plants grafted.

Note: natural variation in flowers.

Left: E. reichii hort Heese.

Collection & Photos – Buining

Dodonaeus 4. 4: 1966

ECHINOCACTUS FAMATIMENSIS Speg. by A.F.H.Buining

(Translated by Mrs C.Tunnard from Dodonaeus 1966 No.4)

At the I.O.S. Congress in Barcelona in 1961, I gave a lecture entitled "What is Echinocactus Famatimensis Speg.?" Since that date I have been able to collect together a full series of facts which justifies dealing with this same subject on yet another occasion.

Echinocactus famatimensis was described in great detail by Spegazzini in the "Anales.Soc. Gent. Argentina" No.92 in 1921; at the same time he published a very fine illustration.

In his turn, Werdermann in "Kakteen und andere Sukkulente Pflanzen" No.28 for 1936 published an illustration of Lobivia famatimensis (Speg) Britton and Rose as well as a German translation of Spegazzini's original description.

As these translations by Werdermann are very hard to come by nowadays, I include it herewith:-

"These little plants are found most often isolated amongst the rocks and have a cylindrical shape (30- 35 mm in height and 25 - 28 mm in diameter.) Their apex is well rounded and slightly flattened; their growing points are pretty well depressed. The lower part of the body remains below the surface of the ground and appears just as distinctly cylindrical - if not egg-shaped - with the same volume as the aerial part and which is extended by a skittle shaped rapiform root.

"The plant has twenty-four ribs, upright or slightly spiral towards the base; they are dullish grey or nearly ash-grey. They are rounded at the top over all their length and are separated by shallow furrows or sometimes by a very distinct groove. Each rib bears from twelve to eighteen blunt tubercles of 1 - 5 mm in height to the flattened tops and 3 - 4 mm in diameter, compressed one against another at the top and towards the base and separated by a small transverse furrow which sometimes alternates with the small tubercles of the neighbouring ribs.

"The sunken areoles are furnished with white down and more or less a dozen small spines. These spines are short - 1.5 to 2 mm long - slender white and nearly transparent, straight, erect, sharp at the tip and at the base swollen to very nearly globular, where they are brownish in colour. They are grouped in six or less on each side and are arranged like the teeth of a comb, pressed closely against the tubercles. Very often, the lower spine in each series is less erect, slender and shorter, and sometimes completely absent.

"The flowers, quite large, appear on the side of the plant on the upper third; each flower issues from the upper part of the tubercles. The flower buds are club shaped and are completely covered in long, fine, thick wool of slate grey colour. The flower, when fully open, is funnel or bell shaped, 30 - 32 mm diameter and rises above a pericarp 15 mm long which is nearly cylindrical in shape. It is also covered with a shock of fine slate coloured wool from 5 to 10 mm in length.

"The flower tube is all but totally covered with numerous small strap shaped ligulate scales; the sepals and the outer petals are crimson purple in colour and lancet shaped, 15 mm long, 2.5mm broad, each ending in a sharp white point. The inner petals are orange on the upper side, more dull or golden-yellow on the underside and lancet-shaped, 14 mm long and 3 mm wide.

"The stamens are divided into several irregular series. They are supported by slender, smooth yellow filaments up to 8 mm long. The anthers are small and of the same colour or slightly lighter. The pistil is whitish yellow, straight and cylindrical, 10 - 12 mm long and 0.75 mm in diameter and ends in 8 - 12 smooth, cream, thread-like stigma lobes, 4 mm long."

And that ends Werdermann's translation. Spegazzini also adds that the species is quite rare and is only found among the rocks of the Sierra Famatima between 2,000 and 3,000 metres altitude. He found it there in 1915 and thought it was very like the Echinocactus pygmaeus Speg.

As to Werdermann, he indicates that the plant represented by his illustration does not correspond exactly with that described by Spegazzini with which one agrees without any trouble

when this illustration is analysed. One is tempted to be less moderate and to decide that it differs considerably, notably in that which concerns the general morphology, the spines, and the floral details. There is room to think that Werdermann has allowed himself to be influenced by other authors who too often confuse Lobivia famatimensis Hort. with the Lobivia famatimensis (Speg.) Britton and Rose.

But let us return to Echinocactus famatimensis Speg. and let us reconsider what Werdermann says about it in "Beitrage sur Sukkulentenkunde und Pflege" 1938, 8:- "In the course of the years 1930 and 1931 I had plants imported from Argentina in my hands, under the name of Lobivia famatimensis which, with a little patience, have all grown and have flowered in an unbelievable range of colours, from red to yellow and sometimes nearly white. These plants have been dispersed amongst various collections. At about this same time, Fric protested energetically against this name and, at present, we must admit that he was not altogether wrong".

Further on, it reads:- "The results of my research may be summarised as follows:

"Echinocactus reichei hort Heese in our cultivation and known as Echinocactus reichei by Heese of Lichterfelde, comes from the Sierra Famatima, Province La Rioja in Argentina, and is identical with Echinocactus famatimensis Speg. It is a Lobivia in the sense of Britton and Rose. It was discovered initially by Hieronymus and Niederlein but was never described before 1921".

A little further on, we find:- "I found in the Dahlem herbarium, originating from Argentina, an envelope containing three dried cacti without flowers, with a ticket labelled thus: 'Le Incrucyada, Sierra Famatima, prov. de la Rioja, 29-1-11 1879, H.Hieronymus and G.Niederlein'. I have had them provisionally identified as Echinocactus reichei. It is without doubt that these examples are identical to Lobivia famatimensis and to the plants which we have just recently considered as Echinocactus reichei."

There ends the ideas of Werdermann and I am happy to be able to comment that he was perfectly right.

When, in 1949, I became friendly with Friedrich Ritter, I asked him in a letter on November 30th 1954 to search for Echinocactus famatimensis Speg. if he happened to be prospecting the Famatima Range. I have noticed on many occasions that Ritter has a very special flair in the cactus hunt. He replied on March 23rd 1955:-

"I have found Echinocactus famatimensis half way up the slopes of the Famatima Mountain. But this is not, in effect, a mountain but rather a tremendous mountain range which can only be crossed after an excursion of two days by horse. It is by no means impossible that certain explorers had looked in vain because it is very difficult to find and is only encountered in certain specific places. Unhappily I have seen neither the flowers nor the fruits. In my opinion this species is not connected with the genus Lobivia because of the enormous difference in the natural sites. I will send you a sample on my return to Valparaiso."

Then I received a small consignment which accompanied the letter that follows dated the end of March 1955:- "Famatimensis, 2 plants: two plants which illustrate very clearly the variability of the species which differs notably from the sorts in the Province of Jujuy and that have been distributed as 'famatimensis'. I completely disregard where one might have found the other so-called species. The examples herewith come from the Famatima Range and, more exactly, from the borders of the village of Famatima, half way up the slopes. The plants that I have sent to you very clearly illustrate the characteristics of the species, namely: the exceptional numbers of ribs on the sides (30 to 40) and the minute tubercles. Flowers, fruit and seeds unknown."

Having understood that Ritter had not been able to examine the flowers, fruits and seeds, I was very impatient to see the first flowers bloom. Meanwhile I had received some imported examples from Frau Winter and harvested by her brother under the label FR 459. In 1958, one of these plants flowered, harvested by Ritter and cultivated on its own roots; the flower was without any possible doubt the same as that Spegazzini had described. The long blade-like petals were

typical. In 1961, the other examples supplied and grafted by Frau Winter meanwhile flowered. The detail of the floral buds is identical to that of Echinocactus reichei hort Heese that I possess over and above the famatimensis already mentioned.

The description above of Echinocactus famatimensis Speg. corresponds item by item with Ritter's plants and their flowers. There is no doubt then that these are effectively the true famatimensis and moreover, they come from the same sites as those reproduced on the photographs of Spegazzini's. They are scarcely distinguishable from the Echinocactus reichei hort Heese unless it is by the spines which are somewhat longer on the imported plants. But everyone knows that Echinocactus reichei hort Heese has only been propagated vegetatively for a little more than 60 years, which affords an explanation of the diminution of spine length and the diameter of the spines.

If, according to Ritter, the habit differs, it seems that the flowers and petals differ equally in form and length, which seems a normal variation to me. The stamens are not joined at the base of the floral tube immediately above the connection to the ovary, but a little higher up the walls and make up a sort of open nectary chamber which is sometimes half-closed.

There are 24 ribs - exactly as in the description of Spegazzini - up to 40 ribs, as Ritter says.

To me, there is no doubt that my friend Friedrich Ritter will have had the credit for rediscovering Echinocactus famatimensis, which remained for so long beyond rediscovery; this now connects up the points of discussion and the controversies aroused by this species.

Lobivia famatimensis (Speg) Britton and Rose - Cactaceae 14,286:1923
= Echinocactus famatimensis Speg. - Anal. Soc. Cient. Argent. 92.44:1921
= Echinocactus reichei hort Heese non K. Sch.
= Reicheocactus pseudoreicheanus Backebg - Jahrb. D.K.G. 2.78:1942

Meanwhile, during the summer of 1961 I have been able to collect together seeds of

1. E.famatimensis Speg. x E. famatimensis Speg. both Ritter FR 459.
2. E.famatimensis Speg. import x E. reichei hort Heese.
3. E.reichei hort Heese x pollen unknown (seeds received from Dr.Hilberath of Wessling).

I have despatched some samples of all these seeds to Professor Buxbaum, requesting him to be good enough to examine them in detail. On August 31st 1961, Prof. Buxbaum wrote to me and advised me as follows: "The three samples are identical without a shadow of doubt. Each of the seeds is egg-shaped and irregular with a basal hilum; the hilum end does not terminate in a plane normal to the axis of the seed but the testa is extended in a triangular shape at each side of the hilum as if the hilum had been cut in such a way as to form two opposite angles. The whole seed is covered by a quite solid yellowish grey tissue all wrinkled up against the seed. The most substantial is that from No.2, whilst that of No.3 had practically disappeared. The No.1 seeds were quite different in this respect. Allowing for the aril becoming easily detached, it is quite possible that this difference is dependent upon their location in the fruit.

"The seeds are of the tubercled type. The mass of cells which project are of warty appearance and the cells themselves are granulated and as a result are dull black and arranged in longitudinal lines, separated by little furrows. The height of the cells and the humps diminishes very regularly from the base of the seed to the hilum, where their height is reduced by half without having changed form at all. The transition between the testa and the hilum is not clearly defined. The hilum is not level since the edge of the testa finishes at an angle and is closed by two patches inclined to each other, made up of two shallow depressions which are separated by a raised part crossing the hilum obliquely. Turning to the depression on the ventral side, there is only the scar of the funicle which nourished the seed; the depression on the dorsal side contains an extension of the inner membrane in the shape of a button emerging from the micropyle and made up of hard reddish violet cells - a characteristic especially typical."

Never lose sight of the fact that we have been comparing on one hand a sample of recently imported specimens with plants multiplied by vegetative means for 60 years, which originated from

one or at the most two examples (E.reichei hort Heese) and which might well have changed a little in habit and spines.

Undoubtedly the flower buds, the flowers, the fruits and the seeds have not undergone any modifications. With us, their flowering periods are found to coincide. There is only the flowers, the diameter of which vary in a quite natural fashion.

Here I will end in the hope that I have afforded some contribution towards the solution of this problem.

Comments upon 'Lobivia famatimensis'

..... from E.W. Putnam.

"Blossfeld and Marsoner can hardly have foreseen the decades of confusion, argument and even acrimony that were to result from their misnaming of the plants they collected in Jujuy in 1934. Thirty-five years later the name L.famatimensis is still given to thousands of plants of L.densispina in private collections and nurseries.

"The genuine L.famatimensis, in its two forms, one of which is virtually spineless to the naked eye, has suffered another indignity by having the totally absurd name of Neoporteria reichii attached to it, and it is under this name that it is to be found most commonly in collections in Britain. (It seems to be only the spineless form which is so-labelled).

"As "Neoporteria reichii" the plant has been sold almost invariably as a graft and there is a legend that it will not root if de-grafted. I have grafted and later de-grafted this plant, and have rooted cuttings without any great difficulty. What I cannot get is flowers. I have a sizeable self-rooted plant having a main stem and nine side-branches which grows well, but it has never produced a single flower-bud yet. This plant corresponds exactly with the one shown as Reicheocactus pseudoreichianus in Backeberg's Lexikon, by the way.

"I have seen a colour-slide of a plant in flower, and I have this year seen a grafted, single-headed plant with a large, dark brown, hairy flower-bud (this was at the cactus show of the North Surrey Branch of the C.S.S.G.B.). I find Backeberg's comments about the flower of this plant being quite unlike a Lobivia flower rather difficult to swallow. The variation in Lobivias is enormous, and I cannot see this flower as being unusual for the genus.

"It was good to read Harry Blossfeld's apologia (Chileans No.14 - H.M.) though it does seem a little late in the day for explanations!"

..... from H. Middleditch.

"The above article by Buining appeared in print prior to the response from Blossfeld which was published in Chileans No.14 p.23. Some parts of the original Buining article have been deleted since they were rendered superfluous by the disclosure made by Blossfeld.

"One should bear in mind that where Buining is quoting an extract from Werdermann's notes in Bei. sur Suk. u. Pf. 1938, the very last line must be a reference to E. reichei hort Heese and not to E. reichei K. Sch., or else that whole extract would cease to be coherent.

"One also finds a reference in that abstract to the plants collected by Blossfeld in Northern Argentina and sent to Europe as the supposed Lobivia famatimensis, which are now commonly considered as L. famatimensis hort and should more properly be regarded as L. densispina."

..... from T. Lavender.

"I have a plant of Lobivia famatimensis Speg. which was acquired under the name of Neoporteria reichei; it is grafted on to a stock of Harrisia sp. and is now about $2\frac{1}{2}$" high by $1\frac{1}{4}$" diameter. It has flowered each year for the last 5 or 6 years - usually with one or two flowers

each year. The buds - and subsequently the flower tube - are surrounded by copious twining greyish wool; this wool appears at first sight to be brown in colour but a close scrutiny will reveal that this is due to the dark brown scales which cover the bud and subsequently much of the flower tube.

"These scales are long and thin with a long tapering point, a similar pointed tip being very prominent on the outer petals of the flower, rather like those which can be seen on the flowers in the illustrations accompanying this article. The outer petals are a reddish brown colour on the exterior with the interior being yellow, but the uppermost part is an orange-brown colour; the inner petals are yellow.

"The flowers are not very large, being about $1\frac{1}{4}$" high and broad. The flowers appear from the shoulder or part way down the body of the plant - rather as one might expect from a Lobivia."

We have a slide depicting Lobivia famatimensis (Speg.) Br. & R. synonym Reicheocactus pseudoreicheanus, in the slide library - A.W.C.

EXCURSION CACTUS '69 by Nelida A. Serrano.

(Translated from C.C.C.C. (Argentina) LV.5: 1969 by H. Middleditch)

In order not to extend the account here unduly I decided to omit the attractions of the journey between the city of Buenos Aires and Cordoba. Just for the record, I will say that we left on the 14th of August at 21.00 hours, arriving at the city of Cordoba about midday on the 15th.

In the district near to Villa Carlos Paz, we made our first stopping place; only a few of us disembarked there, and made a brief inspection of the terrain in the more level parts and between the rocks, up to some 50 meters from the road. We were able to locate only some small clumps of Gymnocalycium leeanum and Trichocereus candicans; however, we did not feel that it was a suitable spot for all the members of the party to disembark.

We continued the journey and, at the suggestion of Snr. G. Petavs, we stopped at a spot again close to Villa Carlos Paz, except that it seemed more suitable; there the vegetation was greener and included great bunches of Opuntia sulphurea. The party spread out towards both sides of the roadway. The first specimens which came into our view were Trichocereus candicans and Gymnocalycium leeanum, all these plants extensively damaged, sometimes uprooted and overturned, I know not whether by the hand of man or by animals, since there were to be seen great numbers of hoof prints all over the place.

In that spot, once again, we came upon a curious form of Gymnocalycium hybopleurum, whose new offsets grew close to an areole but burst through the epidermis, in the middle of the tubercle. This form (or species) had already been observed two years previously in the vicinity of Rio Ceballos (Cordoba).

Proceeding a little further, about two hundred meters from the road, I came upon large clumps of Dyckia spp., with large rosettes, open, of pale green colours, almost silvery and with the edges reddened on account of the cold and the drought. The Trichocereus candicans could be seen intermingled with thornbush, some very badly damaged and with deep marks probably caused by bites of birds and other animals. A clump with nine heads caught my attention, the stems spread out in all directions and attaining a spread of approx. one meter, some stems being completely blackened and only the heads remained treen and upright - the diameter of the stems in some parts amounting to 19 cms.

Going on a little further, amongst the rocks, I came across a little group of Lobivias, which I took to be Lobivia aurea (Br. & R.) which was similar to others collected the previous year in the region of Los Cocos more to the north-west; they were rather weatherbeaten, the colour was

almost brown and one could see already the effect of the scarcity of water; I had passed besides them without seeing them and only by accident, on catching sight of a small clump of ferns, did I notice them.

Now we started to retrace our steps, resigned to not having seen the famous Cymnocalycium capillaense when, on passing close to some rocks I noticed a small clump of greyish brown colour, almost completely hidden amongst the moss and the gravel. Together with Srta.M.Sanda we collected some examples and then, perhaps through having got used to the scenery, we began to see other clumps, even larger, all of them nearly buried and not discernible at a quick glance; we proceeded to collect some more with the object of dividing them between the other members of the party.

Some plants were to be found singly with two or three heads joined at the same root, rapiform and rather lengthy; on the other hand, there were other plants with many heads joined together. But as we had now received the signal from the coach for our return, we rapidly took some photographs of this handsome little plant which was nearly underground and we then returned in order to continue the journey towards La Falda, where luncheon was waiting for us. At about 3 o'clock, we went northwestwards to our destination Cruz del Eje 70 Km away, where we would spend the night.

In the late afternoon we stopped again to observe and collect cacti in the area close to Capilla del Monte. The place was level, only a few rocks protruded above ground, covered partly with grass and partly with shrubs of modest height (thornbush, Tala, etc.). Some fallen palm trees of up to 5 m in height (Tritinax campestris) were very conspicuous, and Snr.L.Aiello has brought back a specimen which is now growing well in Buenos Aires. There, at the side of the road, where we had parked the coach, was G.hybopleurum, except that the spines were whiter and longer. Some meters further on, near to a wire fence, a handsome group of Trichocereus, which none of our members dared to touch because of their ferocious appearance.

Between the stones we found Notocactus submammulosus, with their central spines three-cornered, flattened, and of cream-yellow colour. Some 50 meters further on, we found more Trichocereus sp. in large groups of 7 or more stems, other species of Gymnocalycium with shorter spines, whiter and adpressed to the body of the plant; more Notocactus submammulosus, with diameters sometimes up to 17 cm - other plants much smaller, evidently seedlings which had germinated in the previous summer, all quite weather beaten and marked by the cold, which emphasized the colour of the central spines. Although they were very weather beaten, it was not the same sort of damage as the plants in the previous locality.

Gradually as we came nearer to the large rocks, we noticed between the cracks little clumps of Trichocereus with new stems and of a brilliant yellowish green colour, like that of the spines; I could see clearly that they were plants of two or three years' growth as seedlings.

In that place we also came across two varieties of Dyckia, one with more open rosettes, longer and more slender leaves, which was found at Villa Carlos Paz, the other with small rosettes with leaves laid out very close together and broader than the previous one.

Opuntias were to be seen in profusion, there being some most attractive specimens, for example, O.sulphurea, with their offsets which grow laterally and which extend like a string of beads up to nearly a meter in length, greyish green in colour and with their spines in this example rose-tinted, shining in the sun. After taking some photographs of them, I returned with the intention of looking at the vegetation on the other side of the highway.

On returning towards the road I saw a new type of cactus: globular, small and with broad spines spreading in all directions; I only saw one solitary example, but much later it happened to reappear in the area of La Rioja; not having any dried flower remains or fruits and from its appearance not being able to say if it was a matter of Gymnocalycium, Lobivia, or Echinopsis, one will have to hope for flowers.

At the other side of the road I met Snr.Kiesling: there the same species were to be found,

but much more badly damaged, it must have been a place more frequented by livestock. Near to a little copse we came across a large example of Opuntia salagria Cast. with "ears" all round and very distinctive areoles of intense yellow colour, almost orange coloured and very thick; the long needle-like spines were whitish-yellow in colour and were to be found singly in the upper part of the areole. The appearance of this Opuntia was that of a small shrub, the joints being set upon a central stem. The first plant which we came across was badly damaged by insects, pests, and bites from birds; further on we found other plants larger and in better condition so I photographed them and cut off two "ears" to identify them.

As the sun was already going down we decided to return, looking at everything that was growing around us, of course. All of a sudden, on a Gymnocalycium hybopleuerum, there was seen an outstanding little offset with a very special appearance, growing in the shape of a (screw? - H.M.); Kiesling felt that it was an offset with long-lost characteristics, the ribs being transformed into tubercles disposed in a helix and each one of them ending in a little bract, which would be a vestigial leaf. One may commonly discern these features with greater frequency in the genera Malacocarpus and Notocactus - and also we may see it in a photo of a Cleistocactus in the book 'Wunderwelt Kakteen' by Backeberg. Then - and as is natural after a discovery such as this - I looked closely at as many cacti as appeared before my view, an effort which did not prove fruitless because, projecting between the stones and almost hidden, was Gymnocalycium capillaense, which was much larger here. It also formed compact clumps, of reddish brown colour and - as I said previously - the search was not fruitless: amongst these there occurred one cristate specimen forming a little clump and I hurried to uproot it with care. I could not resign myself to leaving it there - one cristate specimen could not be left behind - truly ....!

Once more the passengers gathered together quickly while the last light of the day was going slowly with a splendid sunset between the mountain peaks.

We arrived at Cruz del Eje at half past six. There we lodged at the Hotel Espana, where, after allocation of the rooms carried out most efficiently by our fellow member R.Keisling, we refreshed ourselves with baths. After unpacking there still was time for us to pack up the collected plants in their boxes. (I make a habit, on these trips, of taking lengths of polythene film, which serves as separators between the plants and so prevents them damaging each other with their spines.)

Presently I came downstairs with my rooming and travelling companion, Hilda Alvarez, to the dining room where they were waiting for us for dinner. We had a lively discussion during the meal with comments on the specimens discovered, their condition, in what manner they should be cultivated and so many other things that we took hardly any notice of the contents of the menu, although if I remember it was not very suitable after a day of travelling. At the end I went off to my room as I was very tired and did not wish to join in an evening party: others, fellow travellers with more fortitude, stayed in the dining room and finally they went for a walk through the centre of the town. Oh what endurance ....!

MID-WESTERN ARGENTINA

The City of Cordoba is situated roughly in the middle of Argentina, at the foot of the Sierra Cordoba, about 500 miles north west of the capital city of Argentina, Buenos Aires. The capital city itself is situated almost at the centre of the highly productive agricultural region of the 'Pampas' and the City of Cordoba is situated just beyond the limits of reliable agriculture, where the climate is rather more arid.

The Sierra Cordoba, which lies away from the main body of the Andean mountain massif, extends for almost three hundred miles from north to south. Between this outlying range and the eastern foothills of the Andes proper, there is to be found a wide, flat and low-lying depression.

Between this depression and the single chain of peaks forming the summit of the Andes, there lies almost four hundred miles of hills and valleys. Running southward from the high, broad, Puna plateau, finger like spurs tail out into the broad hilly basin which merges imperceptably with the low, flat, depression west of the Sierra Cordoba.

In this broad area of hilly spurs, running southwards from the high Puna towards the lower basin, one may observe the major features of the Sierra Famatima, Sierra de Velasco, Sierra Ambato and the Sierra Ancasti. The three Sierras east of the Sierra Famatima are composed of very ancient rocks indeed (slates, granites and schists) belonging to the Precambrian and early Palaezoic periods, overlaid thinly in places by later sedimentary deposits. The valleys dividing the spurs are not erosion valleys, but are fault or 'rift' valleys brought about by earth movements in a region of mature rock formation. Valleys therefore tend to be rather steep sided but seldom so narrow as to hinder passage and transportation along the valley floor.

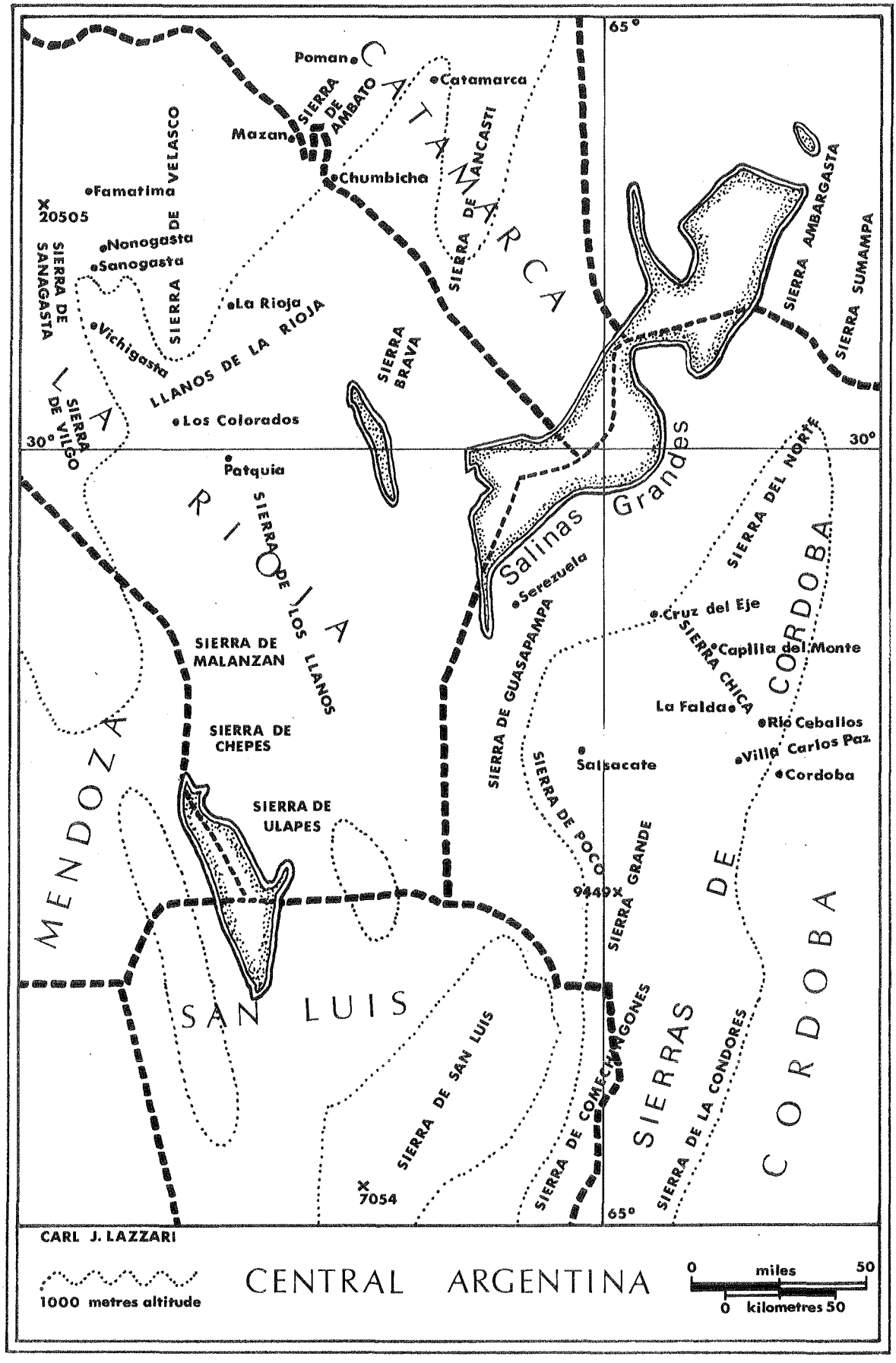
Between Tinogasta and the Sierra Ambato is a broad and elevated basin, with gentle piedmont slopes, covered by debris washed and blown from the surrounding hills. This basin is at a much higher altitude than the even larger, level, basin lying between La Rioja and the Sierra Cordoba. The Sierra Cordoba and the isolated hill ranges between La Rioja and San Luis are also composed of very ancient rocks, mainly of Pre-Cambrian formation.

The whole region is one of very scanty rainfall. Cordoba itself receives about 20" of rain per annum, being on the dry edge of the Pampas. The majority of the region receives less than 16" per annum and over a large area less than 10" of rain falls in a year; to the west and southwest of the hilly basin it is less than 5" per annum. Not only is the quantity small, but even that which does fall occurs in very irregular and torrential downpours. Valley bottoms which have been bone dry for months - or at best have a faint trickle of water hardly visible beneath the stones - suddenly become impassable foaming torrents carrying stones and gravel down the slopes or fanning out and spreading mud over flatter ground, making travel almost impossible. Until, perhaps a day or even a few hours later (see Chileans No.10 p.13) all returns to normal aridity once more.

On some maps one will find the river Salado drawn as if its headwaters drained the Famatima and Andalgala valleys, joining the Rio Bermejo and finally uniting with the Rio Colorado and flowing to the sea south of Bahia Blanca. These rivers are far more in evidence as hopeful lines drawn by geographers than as actual flowing water - with the rare exception of the occasional flash torrent, which usually disappears by infiltration and evaporation before it has traversed more than a portion of its indicated course.

These erratic downpours arise from localised thunderstorms which in turn occur due to the adjunction and mixing of different air masses. Beyond the typical afternoon up-valley winds and the typical downflow of cool mountain air on the flanks, there is no well defined pattern of major air movements over the region. In winter, the well-known 'doldrums' predominate at this latitude with light and indeterminate winds. In summer, however, the intense low-pressure system over the Chaco - immediately to the north of Cordoba - acts as a magnet drawing in huge air masses. Moist air is drawn in from the Atlantic and the occasional burst of cold air flows northwards up the eastern edge of the Andean foothills. Thus in summer there will be a conjunction of air masses of very different characters which will interact and give rise to thunderstorms and heavy rainfall; in winter, this situation very rarely occurs in this region. The rainiest month at Cordoba is February, when an average of 5.4" falls and June is the driest month with 0.1" of rain on average.

During the summer months when the overhead sun produces the intense low pressure, clouds, thunderstorms, and heavy downpours over the Chaco, the lowlying basin west of the Sierra Cordoba shares with the Chaco the distinction of recording a few days in high summer with a temperature of over 110°F. This peak temperature occurs nowhere else in South America. But, unlike the Chaco, there is precious little cloud cover over this low basin; exposed to the unrelenting sun, any rainfall or run-off is subject to rapid and intense evaporation. Minerals from the mountain rocks are dissolved out by the rain, washed down to the floor of the basin and then left behind when the water evaporates to form an enormous salt pan called the Salinas Grandes.


65°
Poman
Catamarca
SIERRA DE AMBATO
CATAMARCA
SIERRA DE ANCASTI
Mazan
Chumbiche
SIERRA DE VELASCO
Famatima
20505
Nonogasta
Sanogasta
SIERRA DE SANAGASTA
SIERRA DE VELASCO
La Rioja
Vichigasta
LLANOS DE LA RIOJA
SIERRA BRAVA
SIERRA AMBARGASTA
SIERRA SUMAMPA
SIERRA DE VILGO
Los Colorados
30°
Patquia
RIOJA
SIERRA DE LOS LLANOS
Salinas Grandes
Serezuela
SIERRA DEL NORTE
CORDOBA
Cruz del Eje
SIERRA CHICA
Capilla del Monte
SIERRA DE MALANZAN
La Falda
Rio Ceballos
SIERRA DE GUASAPAMPA
Salsacate
Villa Carlos Paz
Cordoba
SIERRA DE CHEPES
SIERRA DE POCHO
SIERRA DE ULAPES
9449
SIERRA GRANDE
MENDOZA
SAN LUIS
SIERRAS DE CORDOBA
SIERRA DE SAN LUIS
7054
SIERRA DE COMECHINGONES
SIERRA DE LA CONDORES
65°
CARL J. LAZZARI
1000 metres altitude
CENTRAL ARGENTINA
0 miles 50
0 kilometres 50

A high mountain range tends to make a climate of its own, differing from that of the surrounding lowlands. Two fine examples are the Black Hills of Dakota, which carry a cover of trees on their higher parts so distinctive from the surrounding treeless prairie as to appear 'black' by comparison: or the Hills of Lebanon, which bore the famous cedars while the lowlands round about support only scrub and occasional palm trees. The Sierra Cordoba is no exception, for it receives rain on over 72 days out of the year while the surrounding lowlands have rain only between fifty and sixty days out of the year. But this is only a better spread of rainfall - for practical purposes it receives the same total amount as the surrounding lowlands which means that there is less change in the vegetation than from the lowlands to the flanks of the Andes. On the Sierra Cordoba the trees and bushes are less stunted than on the lowlands, the species of Gymnocalycium met with here are far less common on the lowlands, and vice versa; the Tephrocactus - like that illustrated on our front cover - would appear to prefer the hot, dry lowlands rather than the highlands. The most westerly examples of Notocactus are to be found on these Sierras, separated by a broad expanse of plain virtually without Notocacti in the western half. The vegetation of the Sierra Cordoba is thus xerophytic in character, like that of the surrounding lowlands, but differing markedly in richness and make-up.

The sparse and generally erratic rainfall of this region supports vegetation which is mainly xerophytic in character; in some parts of the area, indeed, the scenery is one of sand or rocks, or both, often with practically no vegetation at all. Even in the parts less lacking in vegetation, the xerophytic growth seldom becomes so dense as to impede passage when walking. The toughest vegetation in the driest parts consists of grasses, low scrubby shrubs and cacti - mainly globular with some short columnar sorts - but with bare ground still very evident in irregular patches and between almost every piece of vegetation. The bare rocky or sandy desert and this scrubby steppe occupy the greater part of this region. On and about the Sierra Cordoba - mainly on the higher parts, the eastern flanks, and the adjacent eastern lowlands - one finds an open dry woodland, or monte as it is called by the natives. This consists of scrubby bushes and deciduous broadleaf trees growing as much as ten or twelve feet in height, together with grasses and cacti. The trees are predominantly leguminous species such as algarrobo or chanar (Gourliea decorticans and G.spinosa) together with some chuquiragua, various Prosopsis, some acacias and jarilla (Larrea sp.). This monte also appears on the higher parts of the Sierra de Ancasti and Sierra Ambato, where taller columnar cacti also appear. This form of monte vegetation continues in a band for hundreds of miles up the eastern flanks of the Andes, as far as Bolivia.

On the eastern flanks of the Sierra Ancasti and Sierra Ambato there is also found a narrow strip of mesophytic broad-leaf trees; this is the southernmost outlier of the famous 'Ceja de Montana' - the eyebrow of the mountains - the vegetation band which relies heavily on the moisture from the mist or clouds banked against the upper eastern flanks of the Andes. This forest is still open, quite unlike a dense rain forest of low altitudes, but it supports both ground and tree mosses and epiphytes, such as Rhipsalis. This form of vegetation, too, continues in a band for hundreds of miles northwards up the eastern flanks of the Andes.

We can now see that this arid inland basin between the Andes and the Sierra Cordoba, together with its surrounding hills, is bounded by a variety of climates. To the north is the Puna plateau, with its forest bands on the eastern Andean flanks; to the north-east is the lowland Chaco - the "Green Hell" - flooded and cooked in summer, arid in winter; to the east, beyond the Sierra Cordoba, is the highly productive Pampa; to the south is the cooler desert and steppe lands bordering on Patagonia; and to the west is the barrier of the mighty Andes. In this arid region one finds little else but xerophytic vegetation and some grazing animals - a fine hunting ground for cactophiles.

The account of their collecting expedition given by Markus and Rausch, appearing in the Chileans No.10 pp 11-14, covers many aspects of this region, as does the accompanying article from the Argentine Cactus Journal.

The map accompanying the Markus & Rausch article in No.10 depicts north-west Argentina to a small scale, the accompanying map depicting in more detail the territory described in the

Argentine Tour "Excursion Cactus '69". This map also covers the habitat of Gymnocalycium horridispinum and G. tillianum, which will be covered in a forthcoming issue. The Sierra Famatima, habitat of Lobivia famatimensis (syn. Reicheocactus pseudoreicheanus) is immediately west of the village of Famatima in the north-west corner of this map. H.M.

THE FORM-CIRCLE GYMNOCALYCIUM CAPILLAENSE - SIGELIANUM - SUTTERIANUM

by Gerhart Frank.

(Translated by K.Wood-Allum from K.u.a.S 21, 8:70)

By form-circle is meant a variable species which is mostly distributed over a wide area and which exhibits many different forms precisely because it is widespread geographically. Individual variability is exhibited by the following characteristics:- Offsetting (more, less, or not at all), colour of epidermis, number of ribs, number of spines per areole, the colour, length, thickness and position of the spines in relation to the plant body. Also to be added are external size, shape, and colour of the flower and the shape of the fruit.

On the other hand, the characteristics of the species such as the inner construction of the flower and the seed show great consistency. The variability, or range of forms, can, on occasion, be so great that the greatest extremes of form can lead to the erection of separate species or varieties. It follows that such action can be misleading since we are dealing with a closed population in which each individual is cross-pollinated by others and sets seed. Thus the above mentioned variabilities are passed on in an equally variable way. Every individual plant exhibiting differences to the type must therefore be a form. The habitual practice of calling them varieties is quite wrong.

It therefore follows that when one is studying and publishing species it is essential that one should be conversant with the habitat conditions. If one cannot gain this knowledge personally then one should at least have close contact with a responsible collector in the habitat. A correct species description is only possible based on the range of variability in habitat. It must take into account all recognised forms as well as photographs and exact description of the holotype and especially the inner construction of the flower and seed. Only in this way can one show the variability of the species. It goes without saying that for a species description to be made the exact location of the collected type material must be given, together with the geographical distribution if possible.

Over the years many species descriptions have been published, in good faith, some in ignorance but also frivolously and deliberately, of what were only forms of a variable species - indeed, there was often only a single type specimen. I should like now to give a practical explanation of my arguments with the form-circle Gymnocalycium capillaense - sigelianum - sutterianum.

The author of the three species, C.Schick, published them in 1923 in Moller's Deutsche Gartenzeitung. In his introduction he mentioned that he had received consignments of plants from two businessmen who lived in Capilla del Monte and that the plants had been collected near the town which is situated in the Sierra Chica of Cordoba. In a study of Schick's publication it became clear how much people were influenced in those days by the appearance of a plant. For instance, Schick writes that amongst these cacti from the Sierra Chica he had discovered not only E.quehlianum, E.mostii as well as six new species but also E.denudatus and E.centeterius. However, as is well known, the habitat of Gymno. denudatum is in Southern Brazil, far away from Cordoba, while the type E.centeterius was manifestly a Neoporteria from Chile. Among the Gymnocalycium of the Sierra Chica there may well have been, and there may still be, many forms of these two plants. In his description of the three new species in the 'Gartenzeitung' Schick, too, allowed himself to be influenced by a few insubstantial, superficial characteristics which by today's standards are in no way indicative of species status.

On the other hand no seed description was given for the three species. Apparently no significance was attached to this. So if a comparison of Schick's three species is to be made it immediately becomes apparent that the differences consist of quite insubstantial external characteristics only, as for example number of ribs, spine count and length of spine as well as minimal differences in size of flower.

Habitat observations and comprehensive studies of imported material have, however, long since shown that such differences of appearance lie fairly and squarely in the realm of species variability. The most recent imported consignments from Sierra Chica have demonstrated especially clearly that the form-circle to which Schick's three species belong are equally very variable in appearance. I should perhaps also mention at this point that the Argentinian botanist and collector Hosseus, who is without doubt very experienced, has already stated that these three species can scarcely be upheld. (Not.Cact.Arg.119, 1939).

Even if it should come about that there were plants in European collections which correspond exactly to the original descriptions and whose offspring exhibit inherited characteristics of the type, this would still not be justification for three separate species, for in these circumstances exactly the same would have happened as has happened with many other species in the course of many generations in Europe. In the belief that a good species has arrived in a consignment of imported plants in the shape of a particularly striking type, a great many plants have been bred from it. In this way single forms have been named from a variable habitat population and these have been bred from thereafter. Forms which deviated, of which there would have been initially certainly some, have either been described as species or varieties or rejected as alleged hybrid or a typical examples or passed un-named into collections. The majority of collectors therefore connect a quite precise, much too narrowly drawn type with a named species, mostly one which has been described from an illustration. In discussion among amateurs comments can be heard such as "The true G.vatteri may have only one spine per areole", or "The true Gymno. denudatum has five ribs" etc. That such a classification is wrong and utterly contradicts natural phenomena must be acknowledged by anyone who has ever seen cacti in habitat.

To effect the urgent and necessary clarification of these species, two of the three are eliminated. Since all three were published by Schick at the same time, the question of priority does not arise and as Herr Schick is dead I propose one species name for this widespread form-circle of G.capillaense. G.sigelianum and sutterianum are synonyms. I consider my choice to be significant and suitable since this name has a geographical connotation.

One would of course have no objection to naming descendants of the Schick imports which correspond precisely to his descriptions 'G. capillaense forma sigelianum' or 'forma sutterianum' as the case may be. Anyone who collects names can designate any extreme form 'forma' and breed from it. The expression 'variety' is however only appropriate with a species population with one or more striking and different characteristics, coming from an area separated from the type habitat and whose varietal characteristics have to be inherited by the offspring. It is unfortunately impossible to make rules about the form and quantity of such varietal characteristics. This will always remain a matter of opinion between researchers. In my opinion the recognition of, and knowledge about, species variability is essential. Arguments about the number of ribs, length and colour of spines and the number of spines per areole are merely idle games. It follows therefore that for the present partial confusion of species to be clarified, all doubtful and superfluous species, names caused by multi-naming must be eradicated. Amongst the superfluous species I include those where forms of a variable species have been named as a species. As in the above mentioned case, one name should be declared valid and all others set aside as synonyms or form names.

In the large form-circle of G.capillaense there is included amongst others G.deeszianum, described by Doelz in Kakteenkunde in 1943. As Doelz reported, Andreae found at that time in a consignment of import plants to De Laet, some plants which had been sent as G.sigelianum but which differed from the type known at that time by their long spines. It must be a cause for surprise today that it was Doelz, who at that time was arguing for a much broader conception of species in Kakteenkunde, who published the new species which differed only slightly from G.sigelianum.

Even Backeberg, who as you know did not oppose an intense separation of species, expressed hesitation with regard to G.deeszianum in Vol.3 of Die Cactaceae. Not only the original description and photographs but also material in modern collections place this species unequivocally in the form-circle G.capillaense. This applies most particularly to the fundamental specific characteristics of flower and seed construction. The significance of precisely these characteristics was quite obviously not correctly recognised earlier.

The form-circle of G.capillaense is closely related to G.calochlorum (identical with G. prolifer) which also comes from the Sierra Chica of Cordoba but grows at a greater altitude. Consignments of imported plants show time and again that there are transitional forms in the form-circle and that it is often difficult to draw the dividing line between the two groups. The essential characteristics, such as flower and seed construction are completely identical in G. capillaense, G.sigelianum and G. sutterianum and do not differ basically from the Gymno. calochlorum/prolifer group. The latter are markedly smaller and less heavily spined in the overall appearance, as is often the case with plants growing at higher altitudes.

So far as its seed construction is concerned, the above mentioned group shows its relationship to G.lafaldense, G.baldianum, G.andreae, G.platense, and G.leptanthum as well as to the group of the most southerly Gymnos, namely the relationship-circle around G.gibbosum, G.chubutense, and G.nigrum. This group, which Fric combined in his Ovatisemineae, is said (according to Buxbaum) to be the oldest or original group of Gymnocalycium. This is confirmed by, amongst other things, the fragments of skin on the arillus, the black pigmentation, and the elongated seedlings - whereas in the other Gymnocalycium groups they are stubby to spherical and, in addition, the wide geographical distribution of the group whose main centre of concentration is in the Province of Cordoba. This is also the centre of concentration of the whole genus.

I should also mention in this context that in this group and in G.lafaldense, flowers with short spines in the scale axil and even terminal flowers can be observed. Such atavistic throw-backs - an indication incidentally of developmental tendencies - could also support Buxbaum's argument that this group is, in its development, the earliest within the genus.

Comments on the Gymnocalycium capillaense group

..... from H. Middleditch.

"I find myself in the unenviable position of having no decent plants of the capillaense group which enable me to comment upon their characteristics. However, on our 1969 Cactus Tour we paid a visit to Herr Till at Attersee and amongst his collection he had a nice plant of G. sutterianum in bud and fruit. The fruit appears to me to differ from the general run of Gymno fruits, being of medium height and width, rather like a cylinder. Hans Till observes about this particular plant 'In my opinion it is the type-form; the flower is pale pink. In the C.S.R. (Czechoslovakia) it is also called G.eluhilton. This species is seldom found of pure descent." He also comments that "Schutz in his work on the genus Gymnocalycium in the 'Friciana' has not attempted to clear up a mistake made by Fric. Here it involves the leaving of the species calochlorum, sigelianum, sutterianum, capillaense, etc., in the Microsemineae. All these species belong from their seed structure to the Ovatisemineae".

"The illustrations accompanying the article in K.u.a.S. show an example of sutterianum with spines both finer and longer than those on sigelianum and capillaense, thus matching the plant seen in Till's collection.

"The article by Frank repeats an aspect of nomenclature which has been touched upon by many writers whose works we have reproduced in these pages, that is, the diversity of form which may be found in a given population group or species, in habitat. Between different writers the terminology varies as to whether such a population group is described as a form-circle, a species, a section of a genus or a sub-genus.

"Academically speaking, the basic logic of Frank's argument cannot be discounted. However, it does seem to me that Frank tends to belabour this aspect rather at length, so that it tends somewhat to obscure both certain valid criticisms and also those facets which are of interest to many amateur collectors. I have a nagging feeling that the heavy weight of such material in articles arguing over nomenclature, in the fare offered by amateur cactus Journals, tends to blunt the interest of those for whom they are supposedly written, like too much suet pudding on the menu.

"Frank refers critically to "people being influenced by the appearance of a plant" in coming to a decision on establishing a new name and also speaks rather disparagingly of anyone who "collects names". One would expect that an amateur collector purchases a plant to have something of interest to look at and - unless by intent - preferably one that is not a duplicate of an existing plant in the collection. If a purchaser was confined to an all-embracing species name, he would just have to take pot luck as to the form of the species which he received. On the other hand, with the use of a "Backebergian" species name, a collector at least has a sporting chance of purchasing a plant that will look different.

"Pure botanists will often respond to this by pointing out that one may use the collective-species type of designation coupled with forma (or variety) names, which necessitates the use of a triple name viz: genus, species, and form, to identify a plant. This replaces a simple and convenient tool for a name (genus plus species) by a clumsy one. Since the botanist is interested in botanical accuracy par excellence in naming plants, whereas the amateur collector merely requires the name to identify each sort of plant available, it may be most appropriate for each to use naming systems to suit their own purposes. Arguing the merits of each system from different standards of values would appear to be a worthless exercise.

"The suggestion made by Frank that both the external appearance of the flower and of the fruit have no significance in determining a species, might seem open to question. Even allowing for observed variations, there does seem to be certain external flower and fruit characteristics which differ significantly between species or between species groups and are more or less constant within a species or within a species group. If external appearance of body and flower cannot be used for identification, then the poor amateur grower is assuredly lost!

"In view of the observed variation within and amongst a group of related species, it is seldom practicable (as Frank and others have said) to tie most plants to a spine-by-spine description. The first step in identification, therefore, would seem to be to place any given plant in its appropriate group. For this very purpose we have had, and will continue to have, articles in this Journal dealing with classification of species into groups. Once a plant has been placed in a group, one may tackle the rather more difficult task of deciding how near to which species it stands."

..... from E.W.Putnam.

"Why G.sutterianum should have acquired the peculiar name 'eluhilton' I cannot imagine. According to my information, this name was a piece of nonsense born in a Japanese catalogue and was a corruption of euchlorum. But G.euchlorum is an entirely different plant which belongs to the multiflorum-hybopleurum group (and is in fact named as a variety of hybopleurum by Backeberg).

"I am seeing more and more variations in Gymnos and begin to suspect that Gordon Rowley's joke about there being only six different species contains a lot of truth!"

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

"I do not think that I can add any valid comment here as I have little or no knowledge of the plants in question. However, as a great devotee of suet pudding I would prefer to see the analogy "unleavened bread" used instead!"

..... from C. Walker.

"I found Frank's article most interesting, but I do feel that the translation of the German term 'Formenkreis' into 'form-circle' loses some of the original meaning. 'Species-complex' would seem more pertinent as a counterpart to 'Formenkreis' than 'form-circle'. I think that Frank wrongfully criticises Schick for being "influenced in those days by the appearance of a plant"; after all, at that time they had little else to work on. Electron microscopes weren't available for pollen studies at that time.

"The blame for the narrow species concepts of the amateurs is also wrongly placed. When students of cacti erect new species on the basis of minor differences and then ensure that their ideas get a firm footing by producing comprehensive monographs and distributing beautiful imports under their taxa, it isn't surprising that amateurs get the wrong ideas about natural variation.

"I too have little live material of this group. A plant of G.sigelianum is all my collection runs to at present and this has not flowered yet."

..... from C.Webb.

"Gerhart Frank does seem to rather labour the point of species variability - nevertheless it is a good and valid point. However, I think he is preaching to the converted a little as most collectors now appreciate just how variable many species can be. I have some sympathy, though, with the original descriptions; it is too easy, in these days of better roads and transport to criticise the early workers for their too narrow descriptions and we must accept that as time passed more and more material was bound to come to light to modify the original diagnoses.

"Frank's point about the effects of mass production in European nurseries is a good one and I am sure that many quite distinct horticultural forms of species are growing in our collections that bear little resemblance to the original habitat collected plants. It is only natural that we non-travelling collectors have quite definite pictures in our minds of many species. Until quite recently, when I received a plant collected in habitat, I had quite the wrong picture in my mind of G.multiflorum; indeed, further study has revealed that my six Gymno "multiflorums" are all hybrids.

"With reference to the form-circle G.capillaense - sigelianum - sutterianum, I would support Frank's suggestion wholeheartedly. I have several small plants under these three names, obtained from various sources, and they are remarkably similar in general appearance. If my labels are correct then I can see why the plants would originally have been described as separate species as there are superficial differences with spination, ribs, etc. but I am happy to see them combined. I like the choice of the name that indicates the habitat location. I have a tiny collected plant of G.deezianum and it is too early really to compare it with Gymno.capillaense but at present it seems very different; it is much more strongly tubercled and the spines are rather weak and twisting."

We have one slide of G.capillaense in flower - A.W.C.

GYMNOCALYCIUM OF THE GROUP MICROSEMINEAE FRIC. by Dr.B.Schutz.

(Translated by K.Wood-Allum from Friciana No.16, 1963)

(Explanatory note: this section was excluded from the review of this group published in The Chileans No.16 p.39 et seq. for the reasons quoted there)

Section Calochlora

Plant body smaller, not more than 80 mm in diameter, always low and flat with a tendency to offset and form clumps. Light coloured flowers, white to pink, medium size, circa 60 mm in diameter, with a fairly long tube. Seeds are spherical, larger than 0.5 mm. Testa matt, black; hilum circular, set in a relatively large hollow in the seed, black. The seed looks as if it has been chopped off at one end. Strophiole poorly developed, forming a sort of rim round the hilum and is also dark in colour.

Because the seeds of these species are somewhat larger than those of the remaining species in the related sections, many writers are of the opinion that this section should be excluded from the Microsemineae group and should be erected as the sixth valid group, added to Fric's original five. Bozsing's system is constructed on this principle, although he has not yet published it. Although this is a most interesting approach, I would still support Fric's classical division at the present time, even though I am well aware that the Microsemineae group is by no means as unified as the remaining four groups.

After further intensive study of the seed it will probably be necessary to subdivide the Microsemineae group so that many or all of the species-complexes within the group are erected as independent groups. Presumably only Saglionia would then remain in Microsemineae, since Fric took as his type plant for the group G.saglionis. All the Calochlora have their habitat in Cordoba.

G.sigelianum (Schick) Berger, G.sutterianum (Schick) Berger, G.capillaense (Schick) Backeberg.

Schick described all three species from import plants in 1923. The descriptions were published in a magazine which was not intended for cactophiles for the then editor of the official organ of the German Cactus Society was convinced that Dr.Spegazzini had explored the cactus vegetation of Argentina so thoroughly that it was not possible to accept the discovery of further species. In 1928 Schick's plants received complete recognition. A.Berger, one of the greatest living cactophiles of the time, included G.sigelianum and sutterianum in the genus Gymnocalycium in his book. G.capillaense was then introduced by Backeberg in his Cactus ABC.

The Argentinian botanist Prof. Hosseus expressed the view that all three plants were simply forms of a species. Apparently they all grow in the same place and all kinds of variations can be found amongst them. The question of how far each species may be justified is still not settled and it is a question of opinion between this and that writer whether the distinctions between the species should be very narrow or very wide.

It is my opinion that there is no justification for the combination of Schick's three species into only one. Each of the species described is characteristic and is relatively easily distinguishable from the others. The typical sigelianum has three spines although sometimes there are two additional though weaker and shorter, ones. Sutterianum and capillaense each have five virtually equal long spines. The colour of sigelianum is light grey-green, of sutterianum darker and in capillaense it is pike-green. The petals of capillaense are ivory coloured with a light pink central stripe, the throat is wine-red. The two other species have pink petals with a darker central stripe and only sutterianum has the wine red throat. Capillaense shows the greatest tendency to offset and clumping starts at an early age. In sigelianum and sutterianum offsets only appear on mature plants. We have typical plants as well as their varieties represented in our collections.

It appears that in foreign collections the old plants have died off and have not yet been replaced. We have very old examples, some being import plants. A beautiful form of sigelianum with white spines and splendid flowers deserves particular mention.

In Haage's 1928 list there was an illustration of a beautiful red flowering variety of sutterianum. It was introduced as 'Import Unikat' and was the pride of Haage's collection. Apparently it was stolen by an unknown thief and has never been recovered. We can only hope that another will arrive amongst the flood of new import plants which have been sent to Europe in recent years.

G.calochlorum (Bödl.) Y.Ito., G.proliferum Backeberg

These are two names around which there is much confusion. It is expressed in the incorrect naming of the plants in both private and public collections. In order to understand better the whole problem, we must acquaint ourselves fully with the history of these plants. Echinocactus calochlorus was described by Boedecker in November 1932. Two months later the same plant was described by Backeberg as G.prolifer. Both descriptions are in close agreement, although the first is carried out with typical Boedecker exactness and thoroughness. Both writers included with their descriptions photographs of plants in flower. Both apparently had at their disposal plants which were the same. Boedecker maintained that the imports came from Stummer, the collector. Backeberg apparently got his plant from the same source. The plants arrived in 1930.

There is no doubt that G.calochlorum is the valid name for it was published first. G.prolifer is only a synonym. For quite some time Backeberg would not recognise Boedecker's priority. He advertised prolifer in his list and sold seed under that name and even in 1936 he used the name prolifer in "Blatter fur Kakteenforschung". In Cactus ABC he uses the altered name G.proliferum. Here the description is fundamentally different to his original one. In the original there were 9 radial spines; in Cactus ABC 13. In the first descriptions by both authors the spines were yellowish to white, in Cactus ABC they have become pinkish. There are further fundamental differences. In short, a different plant was smuggled in (into literature? - H.M.) under the name proliferum. In conclusion, the original and valid calochlorum of Boedecker was deemed to be a variety so that the strange name G.proliferum var. calochlorum first saw the light of day.

Since Cactus ABC is written in Danish, a language we find difficult to understand, we were influenced by the description and illustration in "Blatter für Kakteenforschung" and had therefore plants named as G.prolifer in our collections which had nine whitish spines and small areoles which became completely bare with age, as well as larger plants with 13 longer, pink spines and large felty areoles which were often labelled G.calochlorum. This was incorrect for calochlorum was described first whereas the second had not then been validly named.

Backeberg finally acknowledged Boedecker's priority in 'Die Cactaceae' and lists the correct G.calochlorum Bod. But a new plant also appears here - G.calochlorum var.proliferum Backbg., which is supposed to be the pink spined plant which was named prolifer in Cactus ABC. Thus there arises much confusion in articles: G.calochlorum as a synonym for prolifer, G.prolifer as a synonym for calochlorum, and further the combinations G. proliferum v. calochlorum and G.calochlorum v. proliferum.

The conclusion is therefore as follows:-

G.calochlorum (Bödl.) Y. Ito - valid name.

G.prolifer Backbg and G.proliferum Backbg. - synonyms therefore invalid.

G.proliferum v. calochlorum - nomen confusum, invalid.

G.calochlorum v. proliferum - nomen confusum, invalid.

It is however necessary now to name the pink spined plant. I propose G.pseudocalochlorum n.n. It differs from the true G.calochlorum as follows:- Body dark green with a touch of blue as opposed to the fresh light green of the true calochlorum (which name refers of course to the colour of the plant body). Areoles large - retaining the felt persistently as opposed to calochlorum with its small areoles which soon lose their felt. Spines 9-13, much longer and noticeably pink, unlike the short, whitish to yellow spines of the true calochlorum, which offsets freely, unlike pseudocalochlorum. In my view the plants are so different that it is essential that we separate them as two independent species.

G.deeszianum Dölz.

This species was described in 1943 and very fine photographs were published in the same year in Kakteenkunde, the Journal of the D.K.G. The plant is ca. 65 mm in diameter, dark green apart from the growing point which is olive green. The spines are striking - seven to the areole, up to 25 mm long radial spines ordinarily present, sometimes also a single central spine. Flowers creamy white with pink throat. The plants were imported many years ago as G.sigelianum. Dölz found them at De Laet's in 1930. It is not known where they were discovered and that creates difficulties for it is highly doubtful whether G.deeszianum belongs to the microsemineae group at all. Dölz claims that the seed is 12 mm long and 0.8 across. That indicates that the plant belongs in the macrosemineae group, related to G.denudatum. Seeds harvested from my plant correspond to Dölz's claim and resemble the seed of G.denudatum var. paraguayense.

G.leptanthum Speg.

So far as this plant is concerned I would refer you to the comprehensive essay on G.platense in my article on the Trichomosemineae group (Chileans 15 p.70). Leptanthum, with a body diameter of some 60 mm, pure white flowers and remarkably long and slender tube is frequently represented in our collections under G.platense. May I once again draw your attention to the fact that all G.platense are leptanthum. In support of my view that the true platense is not represented in our collections, I can call upon an article which was published in "Möllers Deutscher Gartnerzeitung". For an extract of this see 'Bibliographie der Artkel von A.V.Fric' in Friciana Vol II no.9 p.12.

Fric was in the Sierra de la Ventana and looked for G.platense in vain. Not even he was able to bring back plants or seed and he distributed a plant under platense which Spegazzini himself separated from platense and for which he erected the new name leptanthum.

G.andreae (Bod.) Backbg.

This species is generally well known and very well represented in collections. It was described by Bödecker in 1930. It is really a miniature and never exceeds 45 mm in diameter. Body dark bluey green to blackish green with a dull shine. 7 radial spines up to 8 mm long, 1-3 central spines of the same length. Flowers sulphur yellow. The plants offset freely when young. The imports were sent to Europe from Cordoba by Prof. Hosseus and grow in the Sierra de Cordoba at 1500 - 2000 meters above sea level. A new variety was described in 1957:-

G.andreae v. grandiflorum Krainz et Andreae.

Somewhat larger than the type, spines longer and mostly curved. The original type plant of G.andreae is still represented in our collections by imported plants. I have two which were offsets of imports from Herr Andreae. Jan Suba of Olomouc grew and distributed the variety grantiflorum. The seed originated no doubt from Herr Andreae who had visited Suba on a number of occasions. There are, however, also crosses with G.baldiamum and lafaldense-bruchii. They can be recognised by the variations in body colour and the structure and colour of the flowers. They are worthless and their distribution is a constant danger for the maintenance of the pure species.

Comments on the Calochlora group of Gymnocalycium

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

"My own collection of Gymnocalycium is arranged with all the plants of one species-complex grouped together and it is remarkable how well the relationship between closely associated species may be seen in the characteristics of the body and spines. There are a number of plants which, for one reason or another, do not appear to match the rest of their group in body habit; one of these is G.deeszianum, which appears to be correctly named. In offering this particular plant up to the other groups, it seemed to match the plants in the Denudata group much more happily. It is most interesting to see that Schutz is also of this opinion and I shall look forward to the possibility of my deeszianum producing a flower and a fruit so that I may be able to make a comparison between the seed of this plant and both the Calochlora and Denudata groups."

..... from H. Middleditch.

"In the above article by Dr.Schutz it is stated that the origins of G.deeszianum are unknown and, further, that it appears to have affinities with G.denudatum. The comments from G.J. Swales would appear to bear out the apparent degree of similarity which this species has to G.denudatum.

"In the accompanying article by G.Frank it is stated that Schick discovered in a consignment of plants from Sierra Chica in Cordoba, a Gymno. denudatum. No doubt what he meant was that he had received from thence a plant which looked very similar to Gymno. denudatum. Were these plants then the original G.deeszianum?"

WHAT IS A CEPHALIUM? - 1 by F.Buxbaum

(Translated by K.Wood-Allum from K.u.a.S. 15.2.64. Adapted by H.Middleditch).

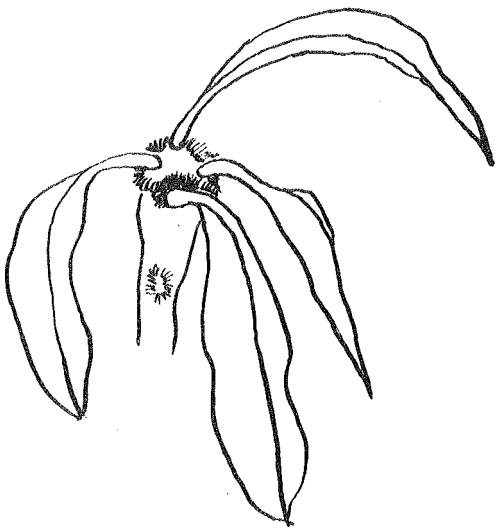
The cephalium, so reminiscent of the fur of an animal, which is the flowering area of many a columnar cactus and also the strange crown of the Melocacti and Discocati has, from time immemorial, aroused special interest on account of its striking appearance. It has been quoted botanically as a distinguishing feature so very often that even K.Schumann, who formed a most comprehensive collection of Cerei, divided them into two genera - Pilocereus sensu K.Schum and Cephalocereus sensu K.Schum. The botanical terms "true cephalium" and "pseudocephalium" were however interpreted in different ways by various authors without their ever really having examined the validity of the distinction between them. Before any discussion can take place we must certainly ask the question "What is a cephalium?" The question can and must be answered from the following three points of view.

1. Botanically descriptive i.e. what is a cephalium and what is a pseudocephalium?
2. Morphological i.e. How does the cephalium develop?

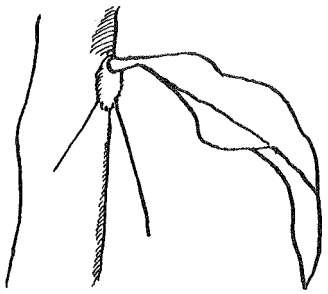
   From this question the third follows logically:-

3. Systematically phylogenetical (Classification) i.e. what systematic significance can we attach to the cephalium?

The first question scarcely requires a thorough answer, but a clear definition should be attempted. The cephalium is the flower-bearing or floriferous zone of a plant and is distinguished by a heavy incidence of hair and spines which, for the most part, are separated from the vegetative growing area. This general definition shows that there are many forms of cephaloid region, for example the felt-like spheres of Neoraimondia and the multiflowered areoles of Myrtillocactus fit the definition and if you take it a step further you could perhaps mention the floriferous or flower-bearing zone of Carnegia which is distinguished from the vegetative growing



First leaves
below areoles

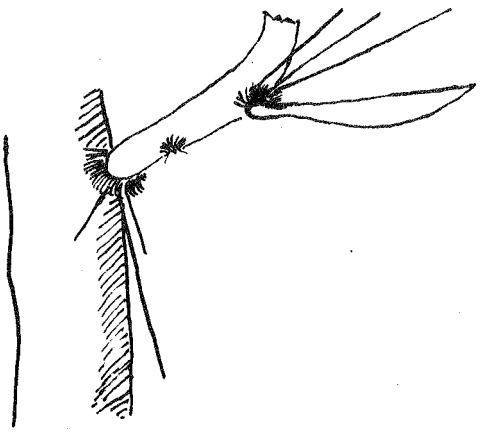


Second leaf
above areole

Peireskia moorei Br & R.

Peireskia sp.

First leaf
below areole



Quiabentia zehntneri Br & R

New leaves below areole
New shoots above areole

LEAF GROWTH ON CACTI - See "What is a Cephalium."

zone by its different spine growth.

At this point, however, we ought to pay particular attention to the "true cephalium" and the "pseudocephalium" found in columnar cacti since it is these which have given rise to gross errors in systematic classification. Werdermann has established the difference between the true cephalium and the pseudocephalium from examination of plants in their natural habitat. A true cephalium is one which is already formed as such in the stem apices of the plant, a pseudocephalium is one which develops only later from what was originally a normally developed areole. With this elucidation of the terminology the requisite foundation for the descriptive botany is created, but so far nothing has been said about the morphological nature of the cephalium to which the second question applies. To answer this question we must argue from two approaches - first we must investigate the podarium and the areole and then examine the flower and its development.

Podarium and areole

To make the argument clear we must begin with the relationship of the leaf and the axillary bud. If we pick a leaf from a wild or garden plant, bush, or tree, one may distinguish the broad flat part which would usually be described as the leaf and is botanically the lamina, together with the stalk which is referred to botanically as the petiole: sometimes the petiole is quite short and difficult to separate visually from the lamina. The foot of the stalk is broadened out close to where it joins the stem and this portion is the leaf base. Two basic sections of a leaf can therefore be distinguished - the lower leaf (or leaf base) and the upper leaf (leaf stalk plus lamina).

The crook or angle formed between the stem and the leaf base is called the axil and it is here that the axillary bud is formed. Initially the axillary bud is more like a dormant eye but if the occasion arises this axillary bud develops into a new shoot. This new shoot may be a stem with leaves or it may be a flower. When the leaf base and neighbouring region of the stem is increased in thickness it can be called a podarium which takes the form of a tubercle. In such a case the axillary bud may arise not from the junction between the stem and the leaf base but at a point displaced a little way along the leaf-base from the axil; this is described in botanical terms as recaulescent displacement. It may be observed with flower shoots on some non-succulent plants.

If the podarium is rather more extensive, the axillary bud may be displaced even further towards the tip of the podarium and then secondary axillary buds may be formed along the podarium between the axil and the original axillary bud. These secondary axillary buds may be formed in a line along the podarium between the axil and the original axillary bud, or on both sides of the original axillary bud. In order to understand the bearing that this has on a cactus plant, we shall take a transitional stage, which incidentally occurs in nature.

In this transitional stage, the leaf base has developed into a fairly large podarium, whilst the upper leaf (petiole and lamina) is considerably reduced. The axillary growth has become displaced quite a long way along the podarium which represents the original leaf base. If the axillary growth forms a new shoot it first develops lower leaves, then foliage leaves, and finally upper leaves with a flower at the end of the stalk. If this growth is only a flower shoot and not a new branch, it can be described as a stalk (Latin - caulis); the topmost part of the stalk which carries the flower may be described as the flower stalk (Latin - pedicellus). Take note of these Latin words for we shall soon be using them.

In a cactus plant the axillary growth is so advanced that it develops with the podarium; that is, we see the axillary growth in the form of an areole, appearing at the same time as the podarium or tubercle from the growing point. The podarium can either protrude singly as a tubercle or the podaria in the same vertical plane can flow together to form a rib. The upper leaf (lamina plus petiole) is only clearly visible on the Opuntioids and Pereskioids. The axillary growth on a cactus does not form a visible stalk but is a very stunted growth, covered by a cushion of woolly felt, which we call an areole. Instead of leaves, thorns appear on this axillary growth; thorn is the correct word although the word spine is most often used. Theoretically the thorns

should be symmetrically disposed around the stem apex of the areole just as the leaves are disposed symmetrically about the axillary growth stalk of a mesophytic plant. However, an early stage of development almost always occurs in a cactus in which the stem apex divides into an outer section which produces thorns and an inner section which produces a sideshoot or flower, so that the areole is no longer symmetrical about its apex.

The areole can therefore develop in three different ways:- 1. Thorn formation continues annually as the axillary growth continues to form the equivalent of further leaves on the axillary stalk. 2. Thorn formation ceases and no further growth takes place, or 3. The areole forms a sideshoot, either vegetative or a flower. If a flower is formed it constitutes the termination of development in the apex of the axillary stem. Therefore the flower can develop from what was previously a dormant stem apex of an old areole, or at the same time as thorns on a young areole (as in Coryphantha) or finally the development of the flower is in advance of the thorn formation or even the development of the podarium.

(to be continued)

Comments on "What is a cephalium".

..... from H. Middleditch.

"It may be as well to include here an explanation of the reason for the 'adaption' of the above article. It has been our rule (and, with rare exceptions such as this, still is) to reprint a literal translation of any article, often without correcting either author's or printer's errors. It is so easy to 'correct' an apparent error when in fact one is inadvertently altering the author's meaning. Whether the author may be subsequently either considered or proved to be incorrect in his postulations or views is not a matter which can enter into a translation. Our translator went to considerable trouble to ensure that the botanical phraseology was correctly rendered, but as the author is a professional academic botanist and would doubtless be readily comprehended by others familiar with this discipline, the same can hardly be said for myself and perhaps for many of our readers, too. It was only after reading Buxbaum's article, or parts of it, up to a couple of dozen times myself that I became satisfied that I had grasped the author's explanation. A large part of the article has therefore been adapted by paraphrasing the original.

"The accompanying article describing the Cactus Tour in Argentina refers to an illustration in Backeberg's 'Wunderwelt Kakteen' and on turning up that particular illustration I find it depicts the very feature that Buxbaum describes in his article above, that is, the lamina part of the leaf can be seen as a vestigal growth at the tip of the tubercle. This reminded me of a comment by E.W.Bentley in an early copy of the Chileans about a rose-coloured horn-like growth on a tubercle on a Neochilenia; on examining one or two of my own Neochilenia I was able to find quite distinctive pointed tips on several tubercles on a number of species, which will presumably be rudimentary leaves. These rudimentary lamina are very evident on plants of Matucana aurieflora observed in the collections of E.W.Barnes and A.W.Craig. Possibly the prominent humps which are such a distinctive feature of Notocactus herteri are the sort of thing which the author of the article on the Argentine Cactus Tour had in mind when commenting that the vestigial leaf was most apparent on Notocactus and Malacocarpus, but so far I have not seen any plants in that group which exhibit vestigial leaves remotely as distinct as those seen on Matucana aurieflora or in the illustration in Backeberg's 'Wunderwelt Kakteen'.

"As Buxbaum states in his article, the lamina or upper leaf is only clearly visible in the Opuntioids and Pereskioids, and some examples of these are depicted by Mrs Craig in the accompanying illustration. In examining a selection of these leaf-bearing cacti in the collection of P.G.Waterman, it was observed that the leaf was situated below the areole on plants of Peireskia aculeata, Rhodocactus moorei, Opuntia vestitia and Consolea falcata. This is precisely what would be expected from Buxhaum's description since the areole, or axillary growth, occurs in the axil between the leaf base and the stem, there being little sign of the formation of podaria on these

plants. However, an examination of *Quiabentia chacoensis* and *Quiabentis zehntneri* seemed to suggest that the leaf was appearing from the middle of the areole; an explanation for this arose some months later when re-examining plants in the collection of A.W.Craig - it was then observed that the initial leaves at any areole grew below the spines (i.e. the spines formed the axilliary growth to the leaf), but any second or subsequent leaf from the same areole grew from above the areole i.e. a secondary axillary growth. The new shoot growing on Quiabentia zehntneri depicted by Mrs Craig nicely represents the "axillary growth forming a new shoot" as described in Buxbaum's article; the shoot itself carries a leaf at each node, just like a new shoot on a mesophytic plant.

"The fact that the Pereskioids have the two features of a poorly developed podaria and a distinct leaf, explain why this family is given first place in works dealing with the whole of the Cactaceae (e.g. in Borg and also in Britton and Rose), because it has both the cactus-like areole but also the un-cactus like attributes of a distinct leaf. Next one finds the Opuntiae, which again seldom have a well-developed podarium but exhibit a rather more diminuitive and more succulent leaf. Finally, one comes to the globular and cereiform cacti with no leaf - or the rare vestigial leaf - and a well developed podarium. This, then, is the prime division in classifying the cactus family as a whole.

"Some of my cacti do produce brand new spines on old areoles and I always wondered how this came about, so the explanation given in the article above proved quite interesting. My Trichocereus fulvilanus seems to produce a few more new spines on several of the old areoles every year, always longer and stronger than those already on the areole.

"A number of observations and comments have been made concerning the ability of a number of cacti to produce more than one flower from a single areole, especially in Neoporteria and also in Weingartia. One might gather from the description provided above by Professor Buxbaum that some plants can and do exhibit not only axillary buds but also secondary axillary growth between the original axillary bud and the axil; each axillary growth can be a flower stem and this is how a plant may produce more than one flower at a single areole.

"Buxbaum refers to the two basic sections of a leaf, that is the upper leaf (lamina and petiole) and the leaf base. At first sight this may seem a somewhat uncommon, not say unique view of leaf structure, for a leaf is commonly regarded as having two parts viz. a petiole (or stalk) and a lamina, or flat portion. On referring to Buxbaum's 'Morphology of Cacti' one may find an illustration on page 8 depicting a leaf and indicating three divisions for purposes of description, viz:- the lamina, the petiole and the leaf base. In this particular illustration two stipules are shown forming part of the leaf base - a formation which may be observed on a typical rose leaf.

"Referring to D.G.Maclean's 'Introduction to Biology' one finds indicated at the junction between the leaf base and the stem the typical abscission layer which later forms the face at which the leaf parts company from the stem. One wonders how it comes about, in cacti, that this abscission layer has migrated on this plant? If one observes the truncated conical stumps left behind on the stem by the leaves dropping off Cotyledon wallichii, we do see here, too, evidence of a migrated abscission layer?"

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

"There is great difficulty in offering a comment upon this article by Prof. Buxbaum as he is almost alone in writing about the morphology of cacti; in consequence one is unable to check many of his statements by reference to other literature. However, I have been able to find two useful references in Lowson's Botany, 14th Edition of 1966. Firstly, on p.58 one may find mention of the 'leaf base', as follows:- "Most plants produce more than one kind of leaf (a) Foliage leaves which are photosynthetic and (b) cataphylls in which photosynthesis is at most a secondary function. The parts commonly seen in a foliage leaf are the lamina...the petiole... and the leaf-base. The leaf-base may be developed in several alternative ways. In a few plants

there is a pulvinus which is a kind of swollen joint (French or runner beans). In many plants the leaf-base is expanded into a sheath which is wrapped around the stem and which is sometimes of great size. Another common feature is the production of stipules which are projections from the side of a leaf base". This last feature may be observed on many garden roses.

"Further on, there is a reference on p.76 to cacti: "Each areole carries a cluster of spines, and usually various assorted bristles as well. Evidently the areole represents a node, but the nature of the spines is in doubt. They cannot be the leaves of the main stem for in those cacti which do possess obvious leaves (small cataphylls in Opuntia, large foliage leaves in Pereskia) these are clearly additional to the whole scheme of areoles and spines. More probably the areole represents a dwarf lateral shoot, but whether the spines are its leaves or its branches of the second order, or something quite outside the ordinary rules, we are not in a position to decide".

"I suspect that in the majority of cacti, it is not a matter of the migration of the abscission layer - there is not one - but of the non-development of lamina and petiole thus avoiding the need for one. In Opuntias, there may be an abscission layer but its position is indeed different. In Pereskia, the abscission layer would appear to be between the leaf-base and the stem. But remember also that flower stalks (later fruit stalks) sometimes have abscission layers e.g. apple, but others do not e.g. Poppy. In Sycamore, the individual fruits have abscission layers between pairs and later the remainder of the flower stalk is shed by the tree. In the Hollyhock, the ovary breaks up into sections along abscission lines when ripe, producing Hollyhock 'seeds' which are not truly seeds - they are still inside.

"My point therefore is this: there would appear to be no "normal" position for an abscission layer in plants. It is merely a convenient device for getting rid of pieces of the plant no longer required. Compare with perforations in paper and exploding bolts in spacecraft! I have never investigated any examples of abscission layers other than the ordinary deciduous leaf-base/twig example, but I would have thought that the same mechanism would have operated.

Thinking about the plant kingdom in general as opposed to cacti in particular, it would seem to me to be a rather unusual device, this "perennial flowering point". In fruit trees, the flowers appear year after year (sometimes in alternate years only, I believe) on special dwarf shoots, the growth of the tree being carried on by vegetative shoots which elongate and produce leaves normally. The only other example which comes to my mind are the small club-shaped branches (?) which produce flower clusters at least for some years in succession on Hoya carnosa, a favourite greenhouse climber. I wonder how many over-fastidious amateur gardeners, cutting off the dead flowers from their plants after first flowering have wondered why next year bloom was almost completely absent from an otherwise healthy looking plant?

"Perhaps others can add to this very short list of plants which exhibit localised flowering".

THE WINTERING OF CACTI by Dr.W.E.C.Merrett.

I was delighted to see in the last issue of the Journal (Vol.4; No.16; p.49) that Geoff. Swales has driven a well-directed nail into the coffin of that hoary old myth that cacti need to be "rested" during the winter months. It has long been a cherished belief that all cacti, with the exception of the epiphytes, should be deprived of all water from, say October to March, and then gradually brought into growth by judicious watering in the spring. This dry "resting" period was considered to be necessary to discourage any growth during these months and allow the plant to prepare itself for the business of new growth and flower production during the coming year. I find that more and more growers are beginning to question the wisdom of this procedure and I thought that a few more remarks on the subject might not be out of place.

This method of cultivation seems to be based on a faulty understanding of plant metabolism. As I see it, all plants have a natural, inborn rhythm of activity, a period of vigorous growth alternating with a period of restricted or even non-growth, and there is precious little that we can, or indeed, should do about it. A fair measure of a plant's activity is the extent of its

water utilisation which is regulated, not by the amount of water presented to it, b
needs at the moment. It will take up as much as it requires and reject the excess
favourable conditions, will drain away. The water requirements of a plant can be
under two heads, first the mechanical or physical, which accounts for the greater
second, the vital or chemical, which is much smaller in amount. The former serves the purposes
of transpiration and evaporation, the maintenance of rigidity, the control of temperature, the
absorption, distribution and storage of food materials and so forth. As such it must be variable
and reach its maximum proportions during those periods of the year when external conditions
of temperature, humidity and active growth demand an increased and more rapid water traffic
through the plant. The function of the second portion is the actual preservation of the cytoplasm
of the cells and tissues in a living condition and since this cytoplasm consists of some 90% water
it is obvious that, if this supply is not forthcoming the vital processes can no longer take place
and the tissues will die. This cell metabolism is a continuous process whatever the general
activity of the plant and, although greatly reduced during those periods when growth is not
occurring, must always be provided for since no living entity can ever be said to go into a state
of "suspended animation". Admittedly, in a succulent plant the phenomenon of water storage
ensures a reasonable supply for some time after external sources are cut off, but unless there is
an opportunity of renewing this supply from time to time, desiccation begins and the more
vulnerable parts such as fibrous roots die off and even the most succulent parts show evidence
of shrivelling. It should be remembered that even in those cases where there is a rapiform or
tap root, this serves only as an additional storage system and is dependent for its power of
absorption on the delicate rootlets which arise from it. Although cacti show remarkable powers
of recovery from desiccation, I think the above observations support the view that a dried-up plant
is a moribund plant.

The rigid "plant resters" therefore start off each new season with a plant that is almost completely dead below ground and in a noticeably poor and shrivelled condition above. If this is all the result that follows a so-called rest, it seems to me a curious way of preparing for the considerable demands of a growing and flowering season in the coming year. How often one used to find when re-potting in the early spring that many of one's plants had lost their roots and the new year had to be started off with what were virtually a collection of unrooted cuttings in poor fettle. Not only is much time lost in coaxing the plants back into growth, but the presence of dead tissue is always a potential source of infection, and rot, starting in the dead roots, may rapidly spread under moister conditions to the rest of the plant, which is an undoubted reason for many of the spring losses that take place.

I therefore regard it as essential that cacti should receive some water at all times, in winter just sufficient to keep the roots alive and enable the basic cell metabolism to continue. In this connection I think it well to stress again that plants are quite capable of regulating their own affairs, such as water absorption, without interference from us providing external circumstances are favourable. We all know that it is impossible, under natural conditions, to bring a deciduous tree or shrub into leaf or flower or even growth during the winter months no matter how much water we may offer it, it just takes what it requires to keep alive and rejects the surplus which drains away. Under the unnatural and restricted conditions of pot cultivation, unless drainage is perfect there is a danger that the soil may become sodden with the unabsorbed water and the risk of infection is increased but this is no reason why a plant should grow during its inactive phase. It is self-evident therefore that a certain amount of common sense must be exercised in varying the amount of winter watering in accordance with the prevailing temperature and humidity and the porosity of the soil mixture. Personally, I keep my greenhouse at a minimum of 48 to 50 degrees during the winter and spray fairly heavily about once a month, choosing a suitable day. Under these conditions I find that my plants do not grow but keep alive in all parts. If you are a Spartan and favour a generally lower temperature it may be unsafe to water so often but water you must unless you want the collection of sere and lifeless mummies that was fashionable until recent years.

I think there is little doubt that the idea of the winter rest arose from a misguided attempt

produce, as far as possible, conditions that occur in habitat. While it is obvious that general principles must be observed such as the difference in treatment of epiphytes from the rain forests and xerophytes from the drier regions, any attempt to carry the idea much further would seem to be based on three fallacies.

First, there can be little resemblance between conditions in habitat and the grossly unnatural methods of cultivation that we are forced to adopt. A plant having all the moisture and food resources of a large area of surrounding soil is in a vastly different environment from one imprisoned in a few ounces of leached soil, in the straight-jacket of a pot in a stuffy glass box. There is no desert so dry (and I have seen a few) as a three inch clay pot without water. The two cases are just not comparable and we might as well make up our minds that, in this country at least, we cannot begin to imitate natural conditions.

Secondly, I find that what I call the "habitat school" of growers concern themselves to a large extent with the general macro-climate of the geographical region from which their plants are derived. They tend to overlook, or at least pay too little attention to the micro-climate in the immediate neighbourhood of the plant which often bears little relation to the overall climatic pattern. A plant growing in the shadow of a rock, or in a crevice among stones, or at the foot of a large plant of another species, or even in a gully surrounded by steep slopes may not be exposed to desert conditions at all in the biological or physiological sense although it may be classified ecologically as a "desert species". Such micro-climatic conditions are difficult to estimate and almost impossible to reproduce.

But thirdly, the main fallacy is the assumption that habitat conditions are necessarily optimal conditions. It must often be the case that plants are found surviving in the most inhospitable surroundings, not because they choose to do so or that such an environment is best suited to their growth requirements. They may well have been overtaken by progressive, even dramatic changes in climate and their survival has depended on their ability to adapt themselves over the centuries to the deterioration in their surroundings. That such changes can happen even within a "historical" span of time is well seen in the coastal strip of North Africa where the architectural evidence of a flourishing and opulent Roman civilization in the middle of what is now a sterile desert argues a most remarkable change of climate during the past 2,000 years. Animals faced with such a challenge simply pack up and migrate to more favourable climes but plants, having unfortunately no means of locomotion except by seed dissemination, are forced to stay put and eke out a somewhat precarious existence at a point just above the level of starvation. Agreed that they can exist in such surroundings but the odds are that they might grow much better elsewhere. Children will survive and grow in the worst of our industrial slums but nothing is going to persuade me that they would not develop and be more healthy in the clean air and sunshine of the country or the seaside. I cannot see the point of deliberately trying to perpetuate in an amateurish way conditions against which our plants are continually struggling for their very existence.

To sum up then, I am strongly of the opinion that our endeavour should be to foster the natural rhythm of active growth without regimentation, and without subjecting them to extremes of plenty and dearth and certainly without subjecting them each year to the murderous threat implicit in the dictum "Bone dry during the winter".

NOTOCACTUS HORSTII Ritter Spec. nova by F.Ritter

(Translated by H.Middleditch from Succulenta 45.1:66)

Notocactus horstii Ritter, spec. nova; corpus viride, ad 14 cm. diam., dein elongatum, apice albo-lanato, spinoso; costae 12 - 16, rectae, tuberculis parvis instructae; areolae orbiculatae, albo-tomentosae, 6-9 mm inter se remontae; spinae aciculares, radiales 10-15 pallidae, 1-3 cm longae, centrales 1-4, subfortiores, brunneae; flores apicales, 3-3.5 cm longi; ovarium 5-8 mm diam., albo-lanatum, sestosum, squamis minimis instructum; tubus floralis infundibuliformis, albo- et brunneo-lanatus, squamatus; tepala 14-16 mm longa, 4-6 mm lata,

spathulata vel lanceolata, basi lutea, apice aurantiaca vel cinnabarina; stamina 7-12 mm longa, aurantiaca, antheris aureis ; stylus 18 - 23 mm longus, aurantiacus, stigmatibus 8-9, aurantiacis vel roseis; fructus globosus; semina 1 mm diam., hilo maximo, basalo.

Body; mostly single, now and then offsetting from the base, green, each growing up to 14 cm diam. and up to about 30 cm high; with further growth, occasionally as much as up to 1 metre, then partly lying or hanging from the rocks, apex slightly depressed, spiny and white woolly.

Ribs: 12-16, straight, with narrow separating grooves between, 1-2 cm high, blunt, with small blunt tubercles of about 2-3 mm height.

Areoles: white felted, round, 2-4 mm dia., in the furrows, 6-9 mm from each other.

Spines: needle like, radial spines 10-15, fine, straight or upon old heads curved, pointing sideways, pale brown to almost white, 1-3 cm long; central spines 1-4, a little more robust, strongly spreading, brown, little separate (?at the base? - H.M.), somewhat longer.

Flower: close to the apex: 30-35 mm long, opens about 30 mm wide, odourless.

Ovary: pale green, 5-8 mm long and thick, entirely covered with white wool, with very small pale scales, without bristles.

Nectary: yellowish, $1\frac{1}{2}$ - $2\frac{1}{2}$ mm long, with circular nectary glands thickening around the wall, half-closed above by the lowest filaments.

Flower tube: above the ovary, 12-13 mm long, funneliform, above about 10 mm diam., interior orange yellow, exterior greenish yellow, with small triangular, differently coloured scales with dense wool from the axils, white at the base, brownish further up, and with several fine reddish brown bristles.

Stamens: pale orange yellow, 7.5 to 10.5 mm long, inserted irregularly, distributed nearly as far as the margin of the tube, anthers and pllen golden yellow.

Style: pale orange yellow, 18-23 mm long, of which about 5 mm is included for the 8-9 outspreading, orange yellow to rose lobes, standing out above the anthers.

Flower petals: 14-16 mm long, 4-6 mm broad, spathulate to lanceolate, tip rounded off to almost pointed, orange yellow below, orange red to vermilion above, arising from blending of the two colours, orange yellow and purple.

Fruit: globular, clothed like the ovary, drying up, opening at the base with a fairly small opening.

Seed: 1 mm long, up to 1 mm wide, 0.75 mm thick, broadest at the hilum: hilum over the whole of the base, white, oval, sunken; testa black, dull, thickly set with fine, sharp humps.

Discovery place of the type: southern side of the Serra Geral, Rio Grande do Sul, Brazil.

Holotype in the herbarium of the University at Utrecht.

This species was discovered by Herr Leopold Horst of Arroya de Seca, Brazil several years ago and one single specimen sent to Herr Krainz in Zurich for identification. I was with Herr Horst at the discovery place early in 1964 and could prepare all the notes required for publication. At the request of Herr Horst I have completed this manuscript and name this species after its discoverer. It bears my field number FR 1269. It is related to Notocactus herteri Werd.

Comments on Notocactus horstii

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

"Notocactus horstii FR 1269, HU 17, is readily available as seedlings or grafted plants up to 14 cm diameter and higher. It grows rapidly and flowers easily from seed in three to four

years from sowing. It remains mostly single but occasionally seedlings break or become double headed. Grafted plants produce offsets very sparingly.

"Ritter's description is excellent and a model against which all descriptions of the cactaceae should measure. Cultivated plants raised from seed very closely resemble the imported plants especially when grown in the high humus, sharply drained acid composts that particularly suit the Notocactus group.

"Spine colours on individual plants vary from pure white through yellow orange brown to deep red brown, so quite a range of spine colour variants can be collected. Generally, the deeper the spine colour the deeper the tone of the flower colour, which varies from pale orange to deep orange red, lighter at the throat and darker at the margins of the tepals. One particularly red spined form with an almost red flower is sometimes sold as Notocactus erythrinus or Notocactus horstii v. erythrinus. This is a nomen nudum, only a catalogue name. This particular form is very similar to HU 82 from Candelaria, Rio Grande do Sul, also sometimes called N.muegelianus, another catalogue name. The type comes from Aquelo on the Serra Geral.

"Notocactus horstii certainly resembles N.herteri in body form but the flower is more funnel-form, less campanulate and the fruit and seed quite distinct from those of herteri. The fruit of horstii is remarkably small, sharing several characteristics of the ottonis group".

..... from H. Middleditch.

"Several of our members have referred to N.horstii as flowering much later in the season than any other species of the genus. August has been referred to on one or two occasions as the month in which N.horstii flowers. In mid-September I observed this species in bud in two collections. The buds were appearing right in the very centre of the plant. Around each bud was a loose coat of wool which was retained fairly close to each bud - although certainly nothing like as close and neat as on Notocactus scopa.

"The plant in the collection of R.Martin had two buds, one of which was 9 mm high, with white bud wool and a few bristly brown hairs which leaned no more than about 1 mm away from the bud. The orange coloured sepal tips were just visible in the crown of the bud. The second bud was about 15 mm high and on that it was just possible to see the slim pale yellowish green scales on the tube.

"Two plants in bud were seen in the collection of D.Rushworth, one having two buds, 6 mm and 10 mm high respectively, which were generally similar to the foregoing. The second plant was also bearing two buds, these being about 10 mm high, but round these was a coat of pale brown wool (not white) which also completely covered the crown of the buds so that no sepals were visible. The spines on this second plant were much more of a dark reddish brown colour in comparison with the rather more gingery brown colour of the spines on the plants with white bud wool.

"On making a close examination of several areoles it became clear that the central spines arose from almost the same point, thus explaining the phrase 'little separate' used by Ritter in his diagnosis when referring to the spines".

..... from R.Martin.

"The plant of Notocactus horstii which you saw in my collection did flower and very well indeed, in all four flowers; but for the colour, to me it resembled N.ottonis in general flower construction. David Rushworth who also flowered this plant at about the same time also agreed that it could be allied to N.ottonis. The colour of the horstii flower was very attractive, somewhere between orange and yellow and remained in good condition for a period of 9-10 days. After this period we noticed that the colour began to change, or rather fade I suppose, but in a very even fashion, to a very pale yellow and eventually the flower drooped and disappeared."

..... from K.Halstead.

"The following observations were made on my flower of N.horstii:

The lobes to the stigma open wide, as in N.rutilans.

The anthers are bunched closely together around the style - appearing similar to rutilans but slightly looser.

There are two groups of stamens, one group inserted near the bottom of the tube and the other group inserted close to the corolla; this formation is similar to the paucispina group of Notocacti.

The petals do not open very wide, at least not as wide as most other Notocacti."

..... further from H.Middleditch.

"On comparing the description by K.Halstead of the stamen insertion pattern observed on his flower with the flower cross sections which accompanied the article by Buxbaum and appeared on p.137 of The Chileans No.18, one finds that the flower structure of N.horstii appears to come close to that of Noto.ottonis. Perhaps a seed comparison of the two species might prove interesting."

..... from D.Angus.

"N.ottonis is about the only other Notocactus which I have seen flowering as late as this in the autumn, and that only occasionally.

..... from A.J.Worral.

"My own Noto. horstii was obtained $3\frac{1}{2}$ years ago and is grafted on what looks like Trichocereus spachianus. Judging by the rate of growth whilst it has been in my collection I would estimate that it is about eight years old. It is now 125 mm in diameter.

"It has flowered every year, the flowering being centred on mid August. In 1968 and 1969 all the flowers appeared in August and this year there were about twenty flowers spread from late July until the third week in September. The plant keeps up a very regular succession of flowers with usually only one and never more than two open at one time. It has never shown any signs of trying to flower at any other time. The striking things about the flower are the colour, a rich gold quite distinct from any other cactus flower and the mass of cottony wool around the tube. These features would seem to point to an ancestry some way from the main Notocactus line and it will be interesting to see if any other features indicating relationships can be turned up. Incidentally the stigma which used to be an identification feature for Notocacti is also gold and much the same colour as the petals."

"The stamens in the flower did stay fairly close to the style."

..... and further from H.Middleditch.

"The slide of Noto. horstii in flower from A.J.Worral will be copied for the slide library; it shows a fairly closely bunched mass of stamens arising from a narrow receptacle, not clinging close to the style as in the rutilans flower; an examination of some dried flowers from A.J. Worral would suggest that the stamens are inserted from the base of the tube nearly up to the base of the petals. The filaments on the uppermost stamens are quite short and the filaments on the lowermost stamens are quite long so that the anthers near the style are but 2 or 3 mm below the outermost anthers. This form of stamen insertion would appear to me on first sight to be somewhat similar to that on Noto. caespitosus and Noto. alacriportanus. The pericarp and tube of the dried flower remains were indeed covered with white felt just like cotton wool and looked whitest

of white, with but a few reddish brown bristles projecting from and above the upper wool; to me this degree of woolliness seemed to resemble Malacocarpus (Wigginsia) so it would be most interesting to hear if any readers have fruited this species and whether the fruits bore any resemblance to Malacocarpus."

..... from A.W.Mace.

"I have noticed the phenomena of stamens which are sensitive to touch with most Notocacti and it certainly occurs also with N.horstii. I have several N.horstii, the largest having flowered for the last three years and is now 100-120 mm in diameter. The time of year of flowering is interesting:

1968 May

1969 May and again in November/December.

1970 July.

"I have never set any seed on this plant, however, but I will try a cross-pollination if two plants flower simultaneously.

"The flower colour changes during the life of the flower more than any other cactus I know - opening a dark orange, almost red, and fading to a very pale beige colour after about four days.

"Both this species and N.herteri are in my experience fast growing, rapidly gaining large dimensions."

We are without a slide of N.horstii in the slide library - A.W.C.

WALTER RAUSCH - HIS 4th EXPEDITION to SOUTH AMERICA by G.Streiter.

(Translated by E.W.Bentley from the G.O.K. Newsletter Dec.1970).

The present journey of our friend Walter Rausch, on which he set out in October 1969, began in Peru - for him and for us, new territory that for the first time confronted us with the fascinating mountain world of the Peruvian high Andes in a breathtaking slide show.

First as a welcome to Peru, as it were, a picture of a 'Sol' - a Peruvian coin that bears the llama. The picture of a llama herd in the wild was taken right in the middle of the mountain giants on the snow line, which here in Peru occurs at a height of 4,600 to 4,800 m. Llamas are bred as domestic animals by the Indians, their flesh eaten and their wool clipped and worked into colourful blankets and ponchos. It is cruelly cold and friend Zecher, the leader of the present expedition has his woollen hat pulled well down over his ears. It is some degrees below zero - and this in the southern spring !

Up here in the icy desert of stones there are no cacti - so one would think if one believed the literature! But there are! At 4,600 m, for example, a giant clump of Tephrocactus sp.R.428. From a distance it looks like boulders. Some have assigned it to T.floccosus or T.lagopus, but Rausch however thinks it may be new. It is quite thickly covered with a long felted yellowish coat of wool, (T.lagopus, R.386, with orange to red flowers has shaggy hair) and its yellow flowers, also the fruits, are stuck deep down in the wool felt. T.floccosus (R.399, R400) has thick white wool; it makes large branches, its orange to yellow flowers stand out like shoots from the clumps.

Also from the snowline come shots of a peculiar, stone-hard, low cushion plant that resembles clumps of green moss - Azorella yarita (Umbelliferae, umbellate plant).

In a desolate waste at 2,500 to 3,500 m occurs Oroya in astonishing variety; clump building, solitary - up to head size, brown or reddish brown with white or silver-grey spination, the spine coat more open or thicker, the flowers red or red and yellow, the perianth leaves on the outside red, in the throat yellow, or even pure yellow flowers, this however comparatively rarely. As a result of this variety, naturally authors who do not know the habitat are thereby misled into giving names to single forms. Oroya gibbosa has a separate area and presents an altogether different appearance; the spination is more open, more of the green of the body can be seen.

Oreocereus hendriksenianus was found at a height of 4,000 m; this species builds great colonies; the fruits are large, hollow, yellow spheres (like paprika) from which at ripening the seeds roll out from a basal opening.

At lower levels of 1,500 to 2,000 m in desolate tracts and stony valleys occur Espostoa, Haageocereus and Weberbauerocereus. Espostoa melanostele attains a height of 1.5 to 2 m. Some specimens produce long spines, wool is only present sparsely; in some others on the other hand only wool is to be seen and the spines stay short. Rauh wrote that Espostoas only develop the cephalium in one direction. We were able to satisfy ourselves that this is not always so. In one picture the cephalia are clearly directed sometimes on this side, sometimes on the other.

The stiffly armoured Weberbauerocereus occurs as black or reddish brown or fine yellow spined specimens. A vivid picture of merciless aridity and the capacity to survive under the hardest conditions: Haageocereus for the greater part covered over with desert sand. Again the varying forms in one habitat jumbled up together - one has brown spines, next to it grows one with whiter, longer or shorter spines with all intermediates between one form and the other - at least twenty names from this one valley! But we have only one single, variable, species - Haageocereus decumbens.

Now what in particular has Herr Rausch found in Peru? What shall I mention from the rich photographic output that he has collected in his laborious journeyings up hill and down dale, on occasional drives and dangerous roads, now in the ice region of the high Andes, then in the burning heat of the coastal strand. Eulychnia ritteri should perhaps be named, on the branches of which, some meters high, are produced the almost undetectable lilac flowers; the giant branches of Armatocereus with thickly bespined fruits; or the rare Browningia, that with its bizarre branches casts sparse shade; and then Corryocactus (sensu Buxbaum - formerly Erdisia). A section of the flower reveals a bristled receptacle; Cleistocactus herzogianus with pink or even with green flowers; a fine cristate of Borzicactus tesselatus; a Melocactus which first produces its cephalium when fist-sized; Islaya with its amusing red fruits that the wind blows like air-balloons over the sand of the desert, or Mila, for which again many names could be collected from one spot - spines long, short, brown, white, robust, ... !

After this excursion in the hot coastal region, we turn again to the highlands - Herr Rausch will surely find Lobivias! First however a shot of Morawetzia doelziana (at 2,000 m) with pink to violet flowers; the fruit is a large yellow hollow sphere like Oreocereus - less hairy is the variety calva; a handsome tangle-spined specimen of Matucana haynei at 2,000 - 3,000 m. And here we have reached the Lobivias that over and over again drew Herr Rausch to South America and about which, after four expeditions with intensive field research, he has become more knowledgeable than almost anyone else. He himself thinks that, alas, so many questions still remain open and always new ones present themselves.

NEW SPECIES OF THE GENUS SULCOREBUTIA Backebg. by Walter Rausch.

(Translated from K.u.a.S. 21.6:70 by E.W.Bentley).

Sulcorebutia krahnii Rausch spec.nov.

Simplex, 30 mm alta et ad 80 mm diametiens; costis ad 32, prialiter in gibberes 6-8 mm longos dissolutis; areolis 4 mm longis et 3 mm latis, flavo-brunneis vel albo-tomentosis; aculeis marginalibus ca. 24, 10 mm longis, circa corpus contextis, setosetenuibus, albis ad brunneis; aculeis centralibus difficulter distinguendis 3-7, 12 mm longis, setosis, subpungentibus, brunneis ad nigris. Floribus 25-30 mm longis et 25 mm diametientibus; ovario et receptaculo viridi-flavo squamis rubro-acuminatis tecto; phyllis perigonii luteis, interioribus clarioribus; fauce alba; filamentis luteis; stylo et stigmatibus (5) albidis; (floribus secundum Krahn valde jasminiodoris).

Patria: Bolivia, a Comarapa (Cerro Tukiphalla) ad septemtriones versus, 1900-2300 m alt. Typus Rausch 269 in Herbario (Naturhistorisches Museum Wien).

Solitary, 30 mm high and up to 80 mm dia.: ribs up to 32 spirally set in 6-8 mm long humps; areoles 4 mm long and 3 mm wide, yellowish-brown or white felted; outer spines c.24, 10 mm long set against the body, bristle-fine, white to brown; central spines difficult to distinguish, 3-7, up to 12 mm long, bristle-like, somewhat sharp, brown-black; flower 25-30 mm long and 25 mm diameter; receptacle and tube greenish yellow with reddish tipped scales; perianth leaves (petals) yellow, lighter within; throat white; filaments yellow; style and stigma (5 lobes) whitish (according to Krahn, smelling strongly like jasmine).

Habitat: Bolivia, to the north of Comarapa (Cerro Tukiphalla) at a height of 1900-2300 m.

I name this form after Wolfgang Krahn, who brought the first specimens to Europe, where they were marketed under the name Sulcorebutia weingartioides n.n.

SULCOREBUTIA KRAHNII Rausch by Wolfgang Krahn.

(Translated by W.W.Atkinson from Succulenta 50.1:1971).

During my journey to the cactus lands of Peru and Bolivia in May 1964, I arrived in Cochabamba. I chose the town as headquarters and base camp for my collecting trips on account of its central position.

The road from Cochabamba to Santa Cruz takes us to the eastern and lower regions of Bolivia and is at present the only asphalt main road of the country; it was therefore obviously to be the axis of my proposed trips to cactus habitats. My interest was in the very popular Parodias and also the Sulcorebutias. I sought, inter alia, Parodia comarapana, which I hoped to find to the north of Comarapa. On a first attempt, in the spring of 1964, I had found many interesting plants but not the hoped for Parodia. Therefore I tried again in September.

From Comarapa I first followed a stream, crossing it at a fordable point, and struck northwards. Then my attention was drawn to a mountain whose red sandstone was dimly visible amongst the sparse vegetation. This gave me the vague feeling, which one develops from experience in collecting cacti and observing their growing places, that a closer look would prove profitable. Indeed, from half way up to almost the top splendid specimens of Parodia comarapana were growing, partly on relatively moist moss-covered spots. In more sheltered places I noticed specimens of Samaipaticereus corroanus and a terrestial orchid Epidendrum ibaguense.

In the hopes of finding a good view I climbed to the peak. The panorama of the valley and further distance was indeed splendid, but what interested me even more was a cactus species growing on the flat plateau of the summit and the continuing ridge at about 2,000 m height. At first sight, and because I had found only a few days earlier Weingartia pulquinensis, I thought that it was a Weingartia species. But on closer inspection it turned out to be an as yet unknown Sulcorebutia species.

Because of its initial resemblance to Weingartia, I sent the plants to Europe under the provisional name Sulcorebutia weingartioides, and field number 279. In 1970, Walter Rausch, who has a profound knowledge of Lobivia, Rebutia and Sulcorebutia, after his third journey on which he was also able to collect this plant, named it Sulcorebutia krahnii. Between times, the provisional name Sulcorebutia weingartioides was also used by Friedrich Ritter for another little known Sulcorebutia.

It should also be noted that the Bolivians of the district call this plant by the same name as the yellow flowered Parodia comarapana - "Anchapanco". Moreover, it is not uninteresting that Sulcorebutia krahnii Rausch was found on the eastern edge of the distribution area of the genus.

The appearance of the plant is described better than words by Heer Buining's colour slide of an imported specimen. The spination is variable in colour and density, yellow and brown tints being foremost. The flowers are very uniformly shiny yellow, and often appear in continuous rings.

The plants grow very well on their own roots in cultivation. To approximate to their natural conditions, a sandy well-drained mineral soil is desirable. The flowers appear in the early spring after an over-wintering which should provide as much sunlight as possible. Spination and growth are favourably influenced by bedding out in a flat tray.

The location of Comarapana may be seen on the map on p.153 of The Chileans No.18.

Comments on Sulcorebutia krahnii

..... from H.Middleditch.

"From the above article written by Walter Rausch I see that this species was sent to Europe as Sulcorebutia weingartioides, a statement which is corroborated by Wolfgang Krahn's own article. However, I find in Backeberg's Kakteen Lexikon a paragraph which appears to translate as follows:-

'Sulcorebutia weingartiana is an invalid name. The plants were collected by Krahn and belong to the form-complex of Sulcorebutia tiraquensis, to which type-description they correspond broadly in characteristics; they can grow single, then being also relatively large, or they offset a little; the spine coloration being ± ruby-red to brown; the fine areoles are short, linear.'

"On comparing this information with that given by John Donald in The Chileans No.5 p.6, one finds there:-

S.weingartioides n.n. Ritter FR 944

S.weingartiana hort ex. Krahn (via Uhlig & Uebelmann) which does not quite seem to tie in with the foregoing statements.

"In addition, my own plant of S.weingartiana does possess the somewhat linear areoles referred to by Backeberg; this appears to be quite a different shape to the '4 mm by 3 mm areoles' described by Rausch for S.krahnii.

"All in all, the picture is far from clear as to whether the various authors are referring to one species or to two."

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

"In regard to the apparent puzzle over Sulcorebutia weingartiana/weingartioides/krahnii, every one is correct in what they say from their own viewpoint. The situation is this:

"The plant described by the firms of K.Uhlig & W.Uebelmann as S.weingartiana are the

plants sent to Europe by Wolfgang Krahn as "Krahn 279 S.weigartioides Ritt.?" The change in suffix was brought into being to distinguish the Krahn plants from the Ritter plants FR 944 which appeared not to be identical upon examination. They are obviously closely related but are definitely not from the same populations.

"Ritter's habitat for FR 944 is not known and he has made no attempt to describe the plant. Rausch collected Krahn's 279 and decided to name it in his honour, hence "S.weingartiana hort ex Krahn" now becomes S.krahnii Rausch, type plant Sulcorebutia sp. Krahn 279. Ritter's FR 944 remains S.weingartioides Ritt.n.n. It differs largely in having a stiffer spination, much less bristly and typically longer areole - spine colours also are generally darker.

"The description of the areole by Rausch for S.krahnii as being 3 mm by 4 mm is not typical and can only refer plant(s) that Rausch was handling; in my experience the areole of S.krahnii is nearer 2 mm by 4 mm in maturity, which fits the 'short, linear' description in the Kakteen Lexikon.

"Krahn was in fact searching for Ritter's FR 944 and thought that his own 279 might be it. It was only in Europe that the difference between the two plants was observed. S.weingartiana is the plant that is commonly distributed; S.weingartioides FR 944 is very rare".

We have one slide in the library depicting S.weingartia. Slides of any of the new Sulcorebutia would be very welcome for the slide library - A.W.C.

THE GENUS TRICHOCEREUS (Berg.) Ricc.

In his Kakteenlexikon, Backeberg includes this genus in his Trichocerei group, which is divided into day and night flowering genera, as follows:-

Night flowering Trichocerei	Day flowering Trichocerei
Trichocereus	Leucostele
Rauhocereus	Helianthocereus
Roseocereus	Chamaecereus
Weberbauerocereus	Pseudolobivia
Haageocereus	
Eulychnia	
Philippicereus	
Samaipaticereus	
Setiechinopsis	
Pygmaeocereus	
Echinopsis	

Of the night flowering group, Setiechinopsis and Pygmaeocereus have already been discussed in these pages, where they were associated with Arthrocereus. Backeberg places the genus Arthrocereus in a group outside the Trichocerei; there is therefore the alternative of either bringing the genus Arthrocereus into the Trichocerei group or else of taking Setiechinopsis and Pygmaeocereus out of the Trichocerei and placing them elsewhere.

Plants which Backeberg lists under Phillipicereus may commonly be found in other literature under Eulychnia; those species which he lists under Rauhocereus and Roseocereus will often be found referred to as Trichocereus by other authors.

Many authors and catalogues list, under the genus Trichocereus, those species which Backeberg places under Helianthocereus. Some of the species in Helianthocereus are white flowered, some red, others yellow. Their flower characteristics differ from those of Trichocereus proper

in that the tube is funnel form, steadily tapering from the pericarp, whereas the Trichocereus flower includes a cylindrical portion in its tube.

All the Chileans species of Trichocereus are grouped by Backeberg into his subgenus Medioeulychnia; they have flowers up to 100 mm in diameter which are much smaller than the other species of Trichocereus which have blooms of about 180 mm across.

In Britton and Rose's 'The Cactaceae' one may find sketches of flowers of T.candicans - a larger flowering Trichocereus; of T.chilensis - a smaller flowering Chilean Trichocereus; and of T. pasacana, which Backeberg places under Helianthocereus. These three illustrations alone would suggest that the flower of Helianthocereus both in its size and in the scaliness and hairiness of its tube, is half-way between the large - and small - flowered species of Trichocereus and exemplifies the reluctance of some authors to accept the separation of Helianthocereus as a separate genus.

The genus Haageocereus includes both white-flowering species which bloom at night but remain open for a part of the day, together with species having flowers of red or reddish colour which open during the day. The Haageocereus flower - whether red or white - is usually smaller than the Trichocereus flower, with smaller scales on the tube and a more nearly cylindrical tube which opens abruptly into a rotate perianth. However, Haageocereus pluriflorus would seem to possess a very Trichocereus-like flower and might suggest that the Peruvian Haageocereus are not further from the Trichocereus proper than are the small-flowered Chilean Trichocerei.

There are yet further problems with the demarcation of Echinopsis from Trichocereus (or from Helianthocereus) so that, all in all, most authors are content to criticise the Backeberg nomenclature without proposing an alternative. The Backeberg classification of the Trichocerei, however, would appear to be quite a good foundation for study or discussion of this group.

H.M.

TRICHOCEREUS IN FLOWER

..... from Mrs M.Jones.

"The very first cactus plant I was given, which set me firmly on the downward path, was Trichocereus schickendantzii. That was twelve years ago. For the last two years it has come into bud but the buds did not develop. This year (1970) being forewarned, I enclosed the plant in a polythene tent as soon as the buds appeared in April. Nothing seemed to happen for two months, then on June 23rd one bud elongated, trebling in size within two days. Within another two days it had grown to 18 cm long. It opened at 6.30 p.m. on June 26th and by 11.30 p.m. it was fully open. It lasted until about midnight on June 27th.

"Diameter fully open - 16 cm. Tube green with black hairy tufts at intervals. Outer perianth pale green, inner perianth white. Stigma very very pale cream, 19 lobes, protruding above stamens. Filaments cream, anthers very pale yellow - attached basally. No fruit was formed. Diameter of plant clump - 30 cm, maximum height 29 cm."

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

"About five or six years ago I visited a commercial nursery which boasted a fine specimen Trichocereus with numerous branches, reaching up near to the roof which must have been fifteen feet or more in height. The owner showed me a snapshot of this plant in flower, with a crown of six enormous flowers right at the very top of the stem. Before leaving, I acquired an eight foot high cutting from the plant which was potted up when we got it home.

"My greenhouse was 7'6" to the ridge and the height of our rooms was the same, so the plant had to stand temporarily on the stairs until I was able to sink a hole in the floor of the greenhouse to accept it. This exposed natural yellow clay which apparently offered no encouragement for the roots to grow out of the pot. The plant flowered the year after I acquired it - I well remember

the occasion as it coincided with the arrival of an addition to the family and I was able to give my wife a day-by-day account of the progress of the flower - I seem to recollect that it remained open for two or three days.

"It was decapitated shortly afterwards, the residual stock producing two offsets which were removed not long afterwards and potted up - both of these now having flowered as well. I have noticed that the flowers always appear from the last areole of the previous seasons growth or the first areole of this season's growth - when these have grown out to or beyond the shoulder of the plant. During the move from Tonbridge to Sunderland the flowers were evidently delayed for they were later in the year and further down the stem, but still adjacent to the boundary between the two season's growth.

"From appearance, the plant would appear to be T.macrogonus, a view supported by visiting collectors".

..... from T. Lavender.

"The flower depicted in the accompanying sketch came on a Trichocereus stem about two feet high. The plant was obtained some years ago from a local collector whose collection was sold up, without a name.

"The flower appeared at the top of the plant near to the crown, starting as a small hairy bud which grew very slowly for the first three weeks or so and then when about two inches long grew rather rapidly. The bud grew from two inches to the final length of eight and a half inches in a matter of about nine days. The flower was eight and a half inches long to the tip of the petals, and eight inches in diameter. There were twelve stigma lobes and the stigma extended approximately two inches beyond the stamens. The stigma and style were cream, the stamens were a lighter cream colour; the petals were white, the throat pale green. The tube was hairy with slightly less hairs from half way up the tube.

"The flower opened fully at approx. 6.30 p.m. and lasted for a full day, fading the next evening; I detected a faint perfume of vanilla from the fully opened flower. The drawings are full size.

..... from B.S.Roberts.

"I obtained a plant of Trichocereus schickendantzii five years ago from a Mr Dougal of Snaith, Yorks. It had three stems at the time and was planted out in my open bed. It produced two rudimentary buds the second year which aborted and then the following year it produced eight flowers - after several buds had aborted. The following year about twenty buds appeared but unfortunately I lost the lot due, I think, to allowing the bed to get too dry during a cloudy spell.

"This year about 24 buds appeared and nine flowers actually emerged. The buds appear in May - usually a ring about $\frac{1}{2}$" from the growing point on the longest stems, with an isolated bud appearing about half way down some stems (facing south). They take two or three weeks to develop to brown woolly structures $\frac{1}{2}$" long at which stage they seem very vulnerable. During the subsequent week they elongate quite rapidly to about 4 - 5" long, turning green for their distal 2". I have found the time of flower opening to be quite variable but certainly they tend to open during daylight. The flowers on my plant last fully twenty four hours - the actual duration being very dependent on the temperature; very often it is from noon to noon.

"Incidentally my plant has now reached quite mammoth proportions. It has thirty stems, the largest of which is $3\frac{1}{2}$ ft. long. I fear its days are limited: this of course is the drawback of growing plants with a free root run - they become embarrassingly large. But it shows up the limitations of pot growing".

TRICHOCEREUS sp.
Collection T. Lavender.

..... from G.R.Woods, New Zealand.

"I have Trichocereus schickendantzii and T.shaferi out in flower at the moment, both in my outside garden. All the Trichocereus flowers are similar in that they open in the evening and remain open for three or four days usually, when they wither and die. They are also very strongly scented - the scent is neither pleasant nor unpleasant and on a still evening they can be smelt from about 15 to 20 yards away".

..... from Mrs L.E.McIntosh, New Zealand.

"What a wonderful sketch! Unfortunately I cannot reconcile it with Trichocereus schickendantzii (the specific name suggested for the accompanying illustration - H.M.) Trichocereus schickendantzii, spachianus and lamprochlorus are garden plants in New Zealand and grow in quite large clumps in pretty quick time; there is very little difference in the flowers, slight variation in the size, with greenish outer petals (the narrow ones) in schickendantzii and spachianus, pinkish in lamprochlorus. It is quite a common sight to see a clump with as many as 100 flowers out at one time, so common in fact that we hardly notice them and I am having quite a struggle to visualise an actual flower. My own clump grew to such proportions I removed it to make way for something less common. However I have found some slides taken several years ago which can go to the slide library if suitable (they are, and have done - H.M.).

"The first slide shows the flowers just starting to open, at the bottom a few offsets can be seen with the black fluffy buds just starting. The next slide shows the same flowers one hour later. These two slides would be taken about the last week in November 1960, the next two being taken on December 12th.

"The third slide shows the flowers on the offsets wide open - they would then have been wide out for at least 1 night and 1 day, possibly 2, depending on the weather, as I see that in the next slide they are beginning to fade and would be an awful mess by the following day. In the last slide the flowers still have a little further to go before being fully open.

"I can remember the occasion when these slides were taken: I had a visitor staying who was less blowzy than we cactophiles and so at midnight the flowers were viewed by torch light and measured across from petal tip to petal tip $8\frac{3}{4}$". To sum up: the buds appear as black fluffy dots and grow slowly for about 10 days when they would be about the size of a large walnut, round, and without any part of the flower showing. About noon a small white pointed tip would appear, about 3 p.m. as the heat of the sun was lessening the flower begins to expand rapidly, they grow longer and open at the same time and you can actually stand and watch them do this; the hairy tube is very thickly covered to the bottom of the petals and without stripping away these hairs one would not observe the scales. The tube is comparatively short in relation to the petals. By 5 p.m. (sun down) the flower would be full grown and beginning to open - this can be fascinating to watch as the petals open in little jerks.

"In the cool of the night the flowers are at their best and scent the whole garden with a strong perfume like a spicy magnolia; they will remain open for 2 nights and possibly 2 whole days if the weather is not too hot, slowly fading from dawn to noon of the last day, when they become a 'black hairy gooey mess'. They lose their perfume after the first night.

"Bees seem to be afraid of them, for I have observed a bumble bee for over an hour, hovering from flower to flower but seemingly afraid to settle. We never get seed pods unless they are hand brushed with another plant so I presume they are self sterile; they will hybridize with Cereus (another garden plant here), this produces a very good seedling stock for grafting, which makes me wonder if the sketch could be of such a plant - as the flower resembles a typical Cereus flower".

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

"I do not think that the time is right for a complete taxonomic survey of Trichocereinae except to say that I believe that a number of genera ought to be sacrificed. I have grown and flowered species from most of the genera represented in the following species list and have seen flowering specimens of the remainder at Les Cedres, Monaco, and Pinya da Rosa. The flowers are remarkably similar and one is very hard put to understand why so many genera were thought necessary by the late Curt Backeberg, if one considers the flowers alone. There are some minor distinctions if one includes fruit and seeds. There are some tremendous differences in habit, from great trees to minor shrubs down to tiny dwarfs but the flower remains constant or nearly so. As a rough guide to my ideas for condensing the group, I suggest the following:-

Trichocereus (Borg) Rice	Eulychnia
Rauhocereus	Phillipicereus
Weberbauerocereus	Echinopsis
Samaipaticereus	Pseudolobivia
Helianthocereus	Pseudoechinopsis
Leucostele	Arthrocereus
Roseocereus	Setiechinopsis
Haageocereus	Pygmaeocereus

"It is hard to draw the line between some dwarf Trichocereus and some columnar Echinopsis and it is really only the fruits and seeds that separate them. Echinopsis has much smaller fruits and generally lacks the bristles that occur frequently in the scale axils of the Trichocereus fruits - only a minor difference.

"The dwarf Trichocereus are quite easy to flower given plenty of root room, sunshine and air. They do best out of doors during the summer and do not need any protection from rain as they are very thirsty plants. In the milder counties they are best grown in unheated frames all the year round rather than in a greenhouse. In a greenhouse buds frequently fail to develop because of lack of moisture. As well as being thirsty plants they are also very greedy doing extremely well in soils of high organic and also mineral content. Plants grown out of doors produce wonderful spines up to 150 mm or more on some species.

"The columnar branching Trichocereus e.g. T.pachanoi, macrogonus, bridgesii are less easy to accommodate and are far more tender than the dwarfs and must be housed for the winter in a glasshouse - all do rather better when bedded out than in large pots, but of course they then quickly become too large and start pushing panes of glass out of the roof. I made a curious discovery some years ago when, not wishing to lop T.pachanoi, I pulled the top down by bending the stem so that it had to grow practically parallel to the glasshouse roof. The last 150 mm of the 3 m growth always pointed upwards but flower buds immediately developed on the horizontal part of the stem and have done so ever since, never on the upright stems. Applying the same technique to macrogonus and bridgesii also brought immediate flowering response.

"T.schickendantzii and its hybrids are very easy to flower; the individual stems grow up to 1.5 m long, usually sprawling with only the last 500 mm or so actually upright. Some of these hybrids have extremely beautiful colours, e.g. apricot, salmon, bluish pink, deep rose, scarlet, and crimson. The other parent is usually the dwarf T.grandiflorus which has scarlet flowers or its hybrids with various Echinopsis species such as kermesiana or aurea. In a way these Trichocereus hybrids are every bit as spectacular as the Paramount Echinopsis hybrids. Many were raised by Robert Graser of Nuremberg, others by the indefatigable Japanese hybridists.

"The true T.candicans is not easy to flower until quite large i.e. some 60 cm long and 120 mm thick and is of course best bedded out, similarly T.poco needs to be as large.

T.pasacana has to be larger still - well over 1 m tall - before flowering regularly.

"T.huascha and T.grandiflorus and the Vatter 15 types flower much more readily as young plants and certainly when less than 200 mm tall. Colours here are variable both yellow and various red tones are produced. T.purpureopilosus is possibly the easiest Trichocereus to flower and should do so when some five years old and then regularly produce its large white flowers with their purplish brown woolly tubes.

"T.camarguensis also flowers easily when young. Another is T.pecheretianus also known as T. sp. FR 426 from Famatima, with red flowers, but the best of all is T.randallii with its deep violet flowers - a glorious plant and in some ways similar to Lobivia caineana also from Bolivia.

"The Chilean Trichocereus seem to be more reluctant to flower with me whatever treatment I give them, so I am unable to comment upon the size of the flower vis a vis other sections of Trichocereus. The comment from H.Middleditch that in general the coloured flowered or day flowering Trichocerei have smaller flowers than the wholly nocturnal flowering species is from my observations substantially correct.

"T.spachianus appears to exist in two forms - one with much stouter stems than the other - the stouter stemmed form (ca. 50 to 60 mm thick) is probably the true type and certainly flowers more easily than the thin stemmed form (30 to 40 mm thick); both grow to more than a metre in length, the lower part of the stem normally prostrate and only the upper 500 mm or so upright.

"T.lamprochlorus or neolamprochlorus - I find it difficult to determine which I have - is wholly prostrate, forming thick stems (50 to 60 mm thick) that are a shiny green along their whole length and again flowers fairly regularly; individual stems are up to 600 mm long. Another prostrate species is T.strigosus with much longer and redder spines than the former but otherwise very similar in size and habit - this species also flowers reasonably well.

"T.smrzianus is one of the short cylindrical Trichocereus single or clumping in habit. Seedlings raised some 15 years ago are now 300 mm high and 100 mm thick and flower almost apically. The tube is rather shorter than most Trichocereus; while my plants are always white flowering, Brian Lamb - to whom I gave some seedlings - says that some flower pink. The majority of Trichocereus flowers are strongly scented, especially the night flowering species, with a very heavy jasmine like scent".

..... from H. Middleditch.

"John Donald's brief reference to "lamprochlorus - or neolamprochlorus" touches upon one of the (fortunately) few problems of nomenclature in Trichocereus. Britton and Rose (Vol II p.138) give their description of Trichocereus lamprochlorus (Lem) which is based upon plants collected by Otto Kuntze in Jujuy and by Dr.Shafer at Andalgala (for location see map on p.12 Chileans No.10), as follows:-

'Columnar, simple or branching at the base, 1.5 to 2.0 m high, 7 to 8 cm in diameter; ribs 10 to 17 low and rounded, spines 11 to 14, acicular to subulate, 8 to 10 mm long; central spines 4, 2 cm long.'

"In his Kakteenlexikon, Backeberg gives as the original description of Lemaire in Cact.Aliq. Nov.30 1838:-

'Ribs 15, spines stiff, sharp, almost reddish brown, in the new growth transparent yellow, brown tipped. Radial spines 12-15, 6-9 mm long, middle spines 4, in a cross, longer, stronger, the lowermost curved downwards'.

"If we are to accept this as an accurate quotation by Backeberg of the original description, it will be observed that Lemaire identified the plant as being neither erect and branching nor procumbent and caespitose. However, Britton and Rose clearly plump for the erect and branching plant as being the one to carry the name lamprochlorus, but they also add that "a caespitose plant with long procumbent stems is sometimes associated with this species, but whether conspecific

with it or distinct we have been unable to ascertain." Backeberg evidently decides, too, that what he is calling lamprochlorus is upright and that it has a rich green coloured epidermis, whilst he gives the name neolamprochlorus to the procumbent, caespitose plant with a pale shiny (later dirty) green epidermis.

"This would seem to be a reasonable method of dealing with what do seem, in fact, to be two fairly easily distinguishable body forms - more readily distinguishable indeed than a few other pairs of species that can be selected in Trichocereus. However, in his Kakteenlexikon, Backeberg gives as the habitat for his sprawling T.neolamprochlorus "Jujuy (Kuntze)", whereas Britton and Rose base their description of an erect lamprochlorus on a specimen plant found by Kuntze in Jujuy (!) together with plants collected by Dr. Shafer in Andalgala. In his 'Die Cactaceae Vol II', Backeberg suggests that this latter location is the habitat of Helianthocereus huascha and that it is one of these plants that is shown in flower as Fig.192 in Britton and Rose entitled T. lamprochlorus.

"In support of this suggestion, Backeberg observes that the flowers borne by the plant depicted in Britton & Rose Fig.192 are from close to the crown; on the other hand T.neolamprochlorus is obviously one of the T.candicans form-group of which Schumann said "lateral flowers on the previous year's areoles". If one refers to the photograph Abb.1083 in Vol II of 'Die Cactaceae' of neolamprochlorus, however, the flowers would appear to be coming from quite close to the crown, at the shoulder.

"However, comparing Fig 192 in Britton and Rose Vol III with Abb 1083 in Vol II of Die Cactaceae one is struck by a feature which does not seem to receive comment from Backeberg and that is the comparative number of ribs. Both T.candicans and T.neolamprochlorus have about ten ribs which are quite broad with gently sloping sides and gently rounded tubercles, as can be seen in Abb 1083 (Backeberg, Die Cactaceae), but the plant depicted in Fig 192 (Britton & Rose) has about 17 ribs which are fairly narrow, fairly steeply sided, divided into fairly sharply humped tubercles: this is no candicans-group plant. It would seem, therefore, that we must accept Backeberg's contention that the illustration Fig.192 in Britton & Rose does not merit its title, although not necessarily for the reasons which he quotes.

"In Die Cactaceae, Backeberg quotes Rumpler's description, originally for Echinocereus lamprochlorus, as supplemented by Schumann, as eminently suitable for his T.neolamprochlorus:-

'Fairly procumbent, branching from below; stem shiny pale - later dirty-green, about 80 mm diam: ribs 9-10, rounded, wavily notched between the spine cushions; spines radiating to all sides: radial spines fine, stiff, pale yellow, reddish below; middle spines up to 4 distinguishable in the form of a cross, the lowermost the longest, up to about 20 mm long.'

"There is one minor disparity in that Schumann gives for the spine colour "yellow, purple-red below". The quotation of Bolivia as habitat according to Rumpler would appear to be open to question, for, as Backeberg quotes from Spegazzini, this species "occurs frequently on the dry hills at Cordoba and Mendoza."

"Also from this same region - Mendoza, Cordoba, San Juan, Catamarca, and La Rioja - comes the closely associated T.candicans. From an adjacent region - Bahia Blanca, Sierra Lihuel Calel, and between the Rio Negro and the Rio Colorado, comes the somewhat similar T.courantii, originally described as Cereus candicans v. courantii by K. Schumann and as Cereus lamprochlorus v. salinicola by Spegazzini. It will be evident that this whole group is separated by an appreciable distance from the boundary of Bolivia.

"However, Cardenas found in Bolivia a Cereus which he took to be the true Cereus lamprochlorus Lem., which grew at 3,000 m altitude in the Province of Cochabamba on the road to Colonia from Cochabamba. Backeberg suggests that this may perhaps be the same species that Ritter listed in the 1956 Winter catalogue as FR 75.

"Armed with the foregoing information I am now able to put the name of neolamprochlorus on one of my Trichocereus plants, which has seven heads, the longest being about 240 mm, semi procumbent, generally matching quite well the description and illustration in 'Die Cactaceae'. The spines are in two colours, as described; on my own plant I would have called them yellow,

reddish-brown below - certainly nearer Schumann's 'purple-red' than Rumpler's 'reddish'! I also notice on my own plant that the areoles are on the upper part of the tubercle, immediately next to the groove across the rib which divides the tubercles one from another and which is not always clearly visible. This position of the areole relative to the tubercle appears on many of my plants of Trichocereus but not on all of them".

..... from D.J.Lewis.

"A quick look at the selection of Trichocereus seeds would seem to produce the following:-

First Group - (a) Smaller black shiny seeds with ridge.

T. schickendantzii
T.famatima
T.spachianus
T.schaferi
T.pasacana (the largest seed in this group of five).

(b) Medium seeds similar to the above but without the shine on the testa coat. Neat well defined testa cells. Both samples very similar to each other.

T.camarguansis
T.thelegonus

Second group - Depressed testa surface. Large area of small cells towards the hilum end. Both shiny and powdery testa surface present. This may be due to freshness of seeds or to seed treatment - possibly some form of disinfectant or insecticide applied to the seed after collection.

T.pachanoi
T.bridgesii Larger seed, some white coating over the testa.
T.courantii Larger than pachanoi but very similar.
T.rosei Exp. Bloss (i) Black shiny seed.
(ii) White coating over whole of testa; more flared hilum end and conical area round funicle.

TRICHOCEREUS (Berg) Rice - SPECIES LIST

T. bridgesii (SD.) Br. & R.	Bolivia, La Paz.
camarguensis Card.	Bolivia, Cinti, Camargo.
candicans (Gill.) Br. & R.	Argentina; Mendoza, Cordoba
v. gladiatus (Lem.) Berg.	
v. tenuispinus (Pfeiff.) Backebg.	
cephalamacrostibus (Werd. & Backbg) Backbg.	South Peru, above Mollendo.
chalaensis Rauh & Backbg.	South Peru, Chala.
chilensis (Colla) Br. & R.	Chile, Atacama Prov.
v. eburneus (Phil.) Marsh.	
coquimbanus (Mol.) Br. & R.	Chile, Coquimbo Prov.
courantii (K.Sch.) Backbg.	Argentina; Bahia Blanca, Rio Negro.)
cuzcoensis Br. & R.	Peru, Cuzco.
deserticolus (Werd.) Loos	Chile, Taltal.
fulvilanus Ritt.	Chile, Taltal to El Cobre.
glaucus Ritt.	Peru, Arequipa Dept., Ilo.
v. pendens Ritt.	Chile, Arica.
grandiflorus Backbg.	Bolivia.
knuthianus Backbg.	Peru, upper Maranon.
lamprochlorus (Lem.) Backbg.	East Bolivia.

T. litoralis (Joh.) Loos	Chile: Aconcagua, Valparaiso
macrogonus (SD.) Ricc.	
manguinii Backbg.	N.E.Argentina to Paraguay
neolamprochlorus Backbg.	Jujuy, Cordoba.
nigripilis (Phil.) Backbg.	Chile, Coquimbo.
pachanoi Br. & R.	Ecuador, Chanchan Valley
peruvianus Br. & R.	Central Peru.
puquiensis Rauh & Backbg.	Peru, above Puquio.
purpureopilosus Wgt.	Argentina, Sierra de Cordoba
rubinghianus Backbg.	-
santaensis Rauh & Backbg.	Peru, Rio Santa Valley
santiaguensis (Speg.) Backbg.	Argentina, Santiago del Estero
schickendantzii (Web.) Br. & R.	N.W.Argentina.
schoenii Rauh & Backbg.	S.Peru, Chuquibamba, Rio Majes valley.
shaferi Br. & R.	Argentina, Salta, San Lorenzo
skottsbergii Backbg.	Chile, Coquimbo, Frai Jorge.
v. breviatus Backbg.	Chile, Coquimbo, Frai Jorge.
smrzianus (Backbg) Backbg.	North Argentina, Qu. Esciope
spachianus (Lem.) Ricc.	Argentina, Mendoza to Jujuy.
strigosus (SD.) Br. & R.	West Argentina; Mendoza, San Juan.
tacaquirensis (Vpl.) Card.	Bolivia, Tacaquira
taquimbalensis Card.	Bolivia, Cochabamba, Taquimbala.
v. wilkeae Backbg.	Bolivia, Tupiza.
tarmaensis Rauh & Backbg.	Peru, Tarma.
terscheckii (Parm.) Br. & R.	Catamarca, La Rioja, Tucuman, Salta, Jujuy.
v. montanus Backbg.	Salta.
thelegonoides (Speg.) Br. & R.	North Argentina, Jujuy.
thelegonus (Web.) Br. & R.	N.W.Argentina, Catamarca & Tucuman.
trichosus Card.	Bolivia, Santa Cruz on road to Lagunillas.
tulhuayacensis Ochoa	Peru, near Huancayo.
tunariensis Card.	Bolivia, Cercado.
uyupampensis Backbg.	South Peru, Uyupampa.
validus (Monv.) Backbg.	South-east Bolivia (?)
vollianus Backbg.	Bolivia, Arque - Cochabamba.
werdermannianus Backbg.	South Bolivia, Tupiza.

HELIANTHOCEREUS Backbg.

H. antezanae (Card.) Backbg.	Bolivia - Oruro Dept.
atacamensis (Phil.) Backbg.	Chile - Atacama Prov.
bertramianus (Backbg.) Backbg.	Bolivia, Dept. La Paz.
conaconensis (Card.) Backbg.	Bolivia, Dept. Cochabamba
crassicaulis Backbg.	North Argentina.
escayachensis (Card.) Backbg.	Bolivia, Dept. Tarija.
grandiflorus (Br. & R.) Backbg.	Argentina - Catamarca Prov.
herzogianus (Card.) Backbg.	Bolivia - Dept. La Paz.
v. totorensis (Card.) Backbg.	Bolivia - Cochabamba on road to Totora.
huascha (Web.) Backbg.	Argentina - Catamarca
v. auricolor (Backbg.) Backbg.	
v. macranthus Backbg.	
v. rosiflorus (Y.Ito) Backbg.	
v. rubriflorus (Web.) Backbg.	
hyalacanthus (Speg.) Backbg.	Argentina - Catamarca
narvaecensis (Card.) Backbg.	Bolivia - Narvaez

H. orurensis (Card.) Backbg.	Bolivia - Oruro Dept.
v. albiflorus (Card.) Backbg.	
pasacana (Web.) Backbg.	Argentina - Catamarca to South Bolivia.
pecheretianus Backbg.	Argentina - Catamarca.
v. viridior Backbg.	North Argentina.
poco (Backbg.) Backbg.	Southern Bolivia.
v. albiflorus (Card.) Backbg.	Bolivia, Potosi Dept.
v. fricianus (Card.) Backbg.	Bolivia, Potosi. Dept.
v. sanguiniflorus Backbg.	Northern Argentina.
pseudocandicans. Backbg.	Northern Argentina.
v. flaviflorus Backbg.	"
v. roseoflorus (Backbg.) Backbg.	"
randallii (Card.) Backbg.	Bolivia, Tarija. Dept.
tarijensis (Vpl.) Backbg.	Bolivia - escayachi.

ROSEOCEREUS (Backbg.) Backbg.

R. tephracanthus (Lab.) Backbg.	Bolivia.

SEARCHING FOR PARODIA ECHINUS by Alfred Lau (Via P.G.Hallet).

The Kakteenlexikon of Backeberg states that the little known Parodia echinus grows in the La Paz gorge on the border between the two Provinces of Loayza and Murillo. This, I thought, would be a picnic - after all the capital city of La Paz is so close. Yet Friedrich Ritter warned me, when I visited him in Chile, that it was very far down the river and he never exaggerates. Last year the beginnings of the rainy season hindered me from going, as most of the roads are of dirt, being completely impassible after the first rain.

We left the City of La Paz, which is much smaller than most Europeans imagine, and headed for Rio Abajo, 'the river down below'. Really the La Paz river starts a little above the city of La Paz, taking all the refuse of the capital with it. The stench is unbearable. Little did we realize that we would have to cross this sewer 23 times on the way down, often as high as our hips in water.

We were told that we could drive all the way to Tirata, a small settlement with irrigated fields, but it would not be easy. With our Volkswagen minibus we headed for this village, stopping at the criminal police office on the way. The officer was most obliging and gave us a letter to ask one of his friends in Tirata to give us a room for the night. It was about 5.00 p.m. then, the peak of Illimani, the highest moutain in Bolivia and well over 22,000 feet high, gleaming in the dark blue sky. From the La Paz gorge it was an awe-inspiring sight. Soon we were surrounded by thousands of Echinopsis bridgesii and a low-growing Opuntia which I did not investigate further because of the approaching night. Just as we left the river bed with its big boulders and mud pools (you go at less than 5 m.p.h. there) we had a glimpse of the beautiful Cleistocactus glaucus.

Arriving in Tirata, it was dark already. The village's children came and scratched the car, moving its mirror, jumping on the fenders and contributed to the shortening of its life which, with the road conditions in Bolivia, is short anyhow. We were shown a room where we could throw our sleeping bags on the filthy floor, but to find a woman who could cook a meal for us was much more complicated. At last a lady of Aymara origin volunteered, naturally for good pay, but the meal that we got two hours later tasted flat. This matter of meals is one of my greatest problems while collecting in Bolivia and Peru and often I go hungry.

The next morning greeted us with a blue and clear sky. We drove another two miles and wondered how the car was able to make it at all. Fortunately there was a tent with a woman and

her children. She was responsible for the mule trains that would come through the gorge to reload their cargoes on to trucks that would arrive later in the day. Thus she could watch the car during our absence.

With me I had three boys; Jorge is the son of Ecaudorian missionaries who work with the Jivaro Indians - he is 14 years old. Another lad of the same age is Pedro Pujupat, a member of the savage tribe of the Aguarunas in Northern Peru, on the banks of the Maranon river. As we planned to start a new educational work in this tribe, I took along Pedro as he wanted to learn Spanish. His smaller companion was Wilfredo Cunachi, a cousin of nine years of age and son of the director of the Wycliffe school in the tribe. This tiny fellow has proved a great help. With his intelligence he led us on paths that I would have lost in the night. He could squeeze his little body into crevices and find the rarest Rebutias where I could never reach. He also proved a great help in the search for Parodia echinus.

Before we left, we showed the photo of the Parodia to the lady. She laughed and said "If you are looking for these silly spines they have no value whatever, you just walk up these hills and you will find millions". She referred to the Echinopsis bridgesii. We left without food but took along some oranges to quench our thirst.

During the first four hours and ten river crossings, we were met at intervals by mule trains of Aymara Indians, but then they stopped abruptly. At the same time a wind was coming up, increasing by the minute. The peak of Illimani, now straight ahead, was obscured by clouds. Then, in the distance, we saw one more Aymara coming up from the gorge. He looked at us incredulously as he watched us from his mule. We told him that we were hungry and behold, he shared his yucca lunch with us. It was in a kind of bag full of mildew and dirt, but we ate the roots. He told us that it would be impossible to reach our destination because of the velocity of the wind.

On this account, he explained, the mule trains would only be driven up the gorge early in the morning. After all the sacrifice we would not give up and continued. We advanced very slowly as the wind was against us and drove clouds of dust and sand into our faces. I believe that the wind reached hurricane force when after eight hours of walking we were directly below the peak of the Illimani. With a dark blue sky above us, raindrops whipped our faces, giving a very strange illumination of the valley as the sunlight threw back its reflection like millions of crystals. The individual drops fell in a horizontal direction and were carried many miles up the gorge with the tremendous force of the wind. We had almost given up and wanted to return, not having seen one single Parodia thus far.

I could understand the reason for the phenomena of the weather. The cold air from the glaciers of the Illimani come down from the mountain, descending into the heat of the gorge, increasing velocity as it warmed up and thus causing this phenomenon. And then, all of a sudden, on a very steep rock between Las Juntas (where another river meets the La Paz river) and Puente, we saw the beautiful Parodia echinus.

As we scrambled up the rocks, our baskets always maintained a horizontal position. We had to cling to the rocks with both our hands in order not to be swept into the gorge which was now 180 ft. below us. I was afraid that one of the boys would be simply lifted up by the wind to be deposited into the La Paz river below. But after all this I could not miss the opportunity to photograph them and the slides turned out excellently. Most of the plants had a fungus, and only the smaller specimens we discovered were still healthy. But seed we could obtain more than we expected. It was a long and dreary afternoon, the searching for the plants very difficult. Even when the baskets were filled, the wind was strong enough to lift the uppermost plants and drop them to the ground.

We still proceeded to the bridge: it was an old relic from 1909. There was no path leading to it as all had been eroded by water and wind in the past sixty years. It was an eerie sight, this iron bridge spanning the narrowest part of the gorge and yet inaccessible. All the mule traffic now goes round a small mountain.

At the bridge the Parodia habitat stopped abruptly so that according to my own observations the extent of P.echinus is a little more than half a mile - and that only on the north side (Murillo). Naturally, beyond the bridge there might be another habitat which was impossible to ascertain. But there the Sud-Yungas Province begins, and soon one can discover the similar Parodia comosa or miguillensis. Both plants are the same, comosa having been described by Ritter and miguillensis by Cardenas. Most of all these Parodias of the region, including the Parodia borealis, grow in slate rock.

As we returned with the cargo on our backs, we were drenched as we crossed the river another 23 times, for the slightest movement through the water sent the sewer spray into our faces. Soon it was dark, with the moon vanishing in the west. I became very preoccupied. But little Wilfredo asked me to confide in his ability to find the way. These people have an uncanny instinct. I could not see even his silhouette, but I heard his footsteps before me and walked blindly behind him. He could even find the same river crossings in the more shallow water.

At about 2 a.m. we arrived at our car, completely exhausted but very much rewarded not only by this rare find, but also by experience regarding the laws of nature of a remote spot on our globe which will never be forgotten.

Comments on 'Parodia echinus'

..... from H. Middleditch.

"I found the account of the collecting trip for this plant very readable, but I fear that Alfred Lau may have misunderstood the cause of the daytime upvalley wind which meted out so much punishment to his small party and which is a typical feature of so many of the Andean valleys. Chileans No.15 carried an article (p.97) covering features of the climate in these high altitudes, referring to the very marked heating of the ground exposed to the sun and - by contact - of the air close to the ground. This hot air flows uphill during the day and in a valley with little vegetation, exposed to the sun, this typical daytime windflow can reach quite a forceful breeze. This feature which Lau describes so vividly in the La Paz gorge will be repeated every day in many hundreds of valleys throughout the Andes.

"Parodia echinus was first described by Ritter in 1964, the discovery location being quoted as the La Paz gorge. In 1962, Ritter had described for the first time Parodia comosa and this species too, was stated to originate from the gorge of the La Paz. P.comosa is quoted as having a woolly crown, 14-18 very thin white radial spines and 6-9 thin, straight, brown centrals; echinus is illustrated in Backeberg's Kakteenlexikon without any wool in the crown and quoted as having 12-15 pale yellow or pale brownish yellow spines, never white, 4 yellow brown or chestnut brown straight or slightly curved needle stiff centrals in the form of a cross, with 1-4 somewhat thinner spines among them.

"On our 1971 Cactus Tour we found a selection of both species adjacent to each other on the staging at Su-ka-flor. Time did not permit a detailed analysis being made to see if the plants in the respective sections matched the known descriptions: however, it was observed that the plants labelled P.echinus had radial spines which were pretty uniformly white (which makes an interesting comparison with Ritter's description of "radial spines never white"), the more central spines being honey gold on some plants, chestnut brown on others, whilst one or two plants had quite deep reddish brown centrals.

"My own plant, about 5" high, flowers fairly regularly each year in a ring quite close to the centre, from what appears to be a woolly cushion over the crown. It has been labelled neither comosa nor echinus and, on present evidence, seems likely to remain that way for a while yet".

..... from A.Johnston.

"I have both P.comosa and echinus on their own roots; they now flower regularly each year. I find a lot of difference between them. On P.comosa the spines are light brown at first, then turn white with age. On P.echinus the spines are deeper in colour, longer, and still retain a dark colour with age. This plant does not have much wool in the crown but this is deceiving as the buds usually make it look rather woolly."

..... from D.Rushworth.

"I have Parodia echinus and also P.comosa and gigantea, but apart from a bit of difference in the colour of the spines, there is very little difference. Neither P.comosa or gigantea have flowered yet although their size suggests they might do so this year. P.echinus flowers several times a year and although the dried flower persists until pulled off, it doesn't seem to produce any seed - probably because I have only one plant, which must be self-sterile and flowers at a time when no other Parodias bloom - at least in my greenhouse."

We have no slide of P.echinus in the slide library, but we do have one of P.comosa - A.W.C.

NOTOCACTUS FRUITS by D.J. van Vliet.

(Extract translated by H.Middleditch from Succulenta 45.12:66).

Subgenus Paucispini - Notocactus ottonis with varieties.

Fruit thick walled and firm, sparsely clad with bristles, wool and scales. The contents vary just as much as the species itself and range from 15 to 100 seeds or more. One distinct difference from the species of the subgenus Setacei and Mammulosi, notwithstanding the later flowering of N.ottonis, is that the still green fruits split open vertically and expose the ripe seed.

Subgenus Setacei

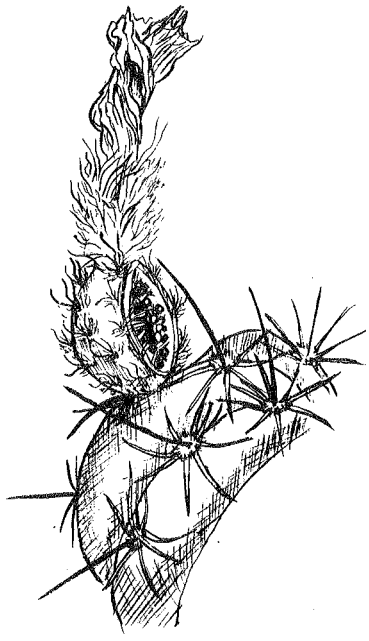
Fruit thinner walled in comparison with the Paucispini, and they hardly enlarge at all after setting. When ripe they dry up and disintegrate as it were. Just how this comes about is difficult to explain. The fruit berry remains in place a long time, now and then retained on the plant until on into the winter. Deliberate removal is often the cause of injury in which the areole becomes detached as well. The number of seeds varies from species to species: Noto. tabularis produces about the most seed - not infrequently up to about 150 seeds per fruit.

The species with these fruits are N.apricus, N.concinnus, N.muricatus, N.tabularis, and also N.herteri.

Notocactus scopa, the plant which is an exception in many respects does not stay in harness here either. On picking the fruit of N.scopa one commonly observes the same characteristics as in many Parodia species. The base of the berry remains behind like a little dish, catching the seed which drops out of the berry. The fruits form a garland round the crown of the plant which is characteristic for N.scopa. One fruit will contain $\pm$ 125 seeds.

Subgenus Mammulosi.

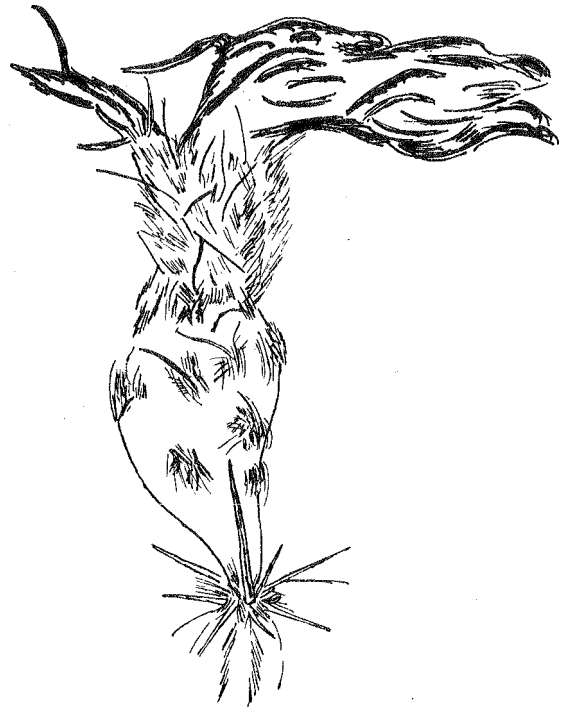
Fruit fairly soft, slowly growing out bladder-like. The berry wall becomes thinner and thinner and grows as if it were loose from the plant. Through drying out of the fruit the brown seeds fall out if the fruit is even slightly lifted up. These fruits can through elongation attain a fair length on occasions and moreover this varies from one species to another. The fruit of N.mueller-melchersii for example now and then takes on the appearance of a Malacocarpus and sometimes colours up pale rose. The number of seeds per berry is variable in this group too, from 50 to 100 or more.



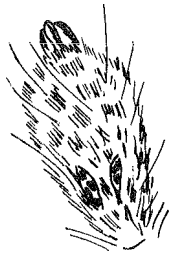
NOTOCACTUS OTTONIS
v. TENUISPINUS

NOTOCACTUS OTTONIS X 2

NOTOCACTUS CONCINNUS



NOTOCACTUS RUTILANS X 2



NOTOCACTUS SUCCINEUS. X 2

NOTOCACTUS FRUITS

Comments on 'Notocactus fruits'

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

"I was able to make some notes on a fruit which formed on a plant of N.ottonis v. tenuispinus in my collection; the accompanying drawing shows the fruit at approximately natural size.

"Due to the continued growth of the plant since flowering, the fruit as sketched was situated laterally on the plant, whilst a bud (not shown) was on top of the shoulder of the plant body. The fruit was pale green, contrasting with the much darker green of the plant body and the ovary wall was still fleshy and living when it split vertically in two places approximately at 180° to each other.

"The surface of the fruit has minute brown scales, from the axils of which tufts of pale brown wool grow out almost obscuring them. Also from the axils sprang small spines, wiry and irregularly twisted, of a ginger brown colour similar to that of the centrals of the plant body. The lower axils bore two or three spines, some of the upper as many as four or five. Seeds numerous, of a dark shiny brown colour similar to that of the centrals of the plant body. The lower axils bore two or three spines, some of the upper as many as four or five. Seeds numerous, of a dark shiny brown colour, remaining attached to the fruit by white fleshy funicles. The remains of the dead flower persist on top of the fruit.

"On the immature fruit the scales are much more conspicuous, being pale yellowish green against the darker green of the fruit itself. As the fruit approaches maturity, it becomes paler green in colour, the scales shrivel and turn brown and - due to the growth of the fruit - much further apart. There is little growth in the wool or spines during this time, these appearing to be more or less fully developed even at the early bud stage of the flower.

"It is interesting to note that the areoles on the fruit differ rather markedly from those on the plant body.

	Body areole	Fruit areole
Wool	White	Pale brown
Radials	9 Pale yellow with brownish base & tips.	2 - 5 All gingery brown, irregularly twisted.
Centrals	2 - one long, one short. Ginger brown.	

..... from H. Middleditch.

"At a Chileans get-together last season at the collection of D.Angus, I observed two fruits on a plant of Notocactus buenekeri. These fruits were fairly small - 6 or 7 mm in diameter - more or less globular in shape and pretty deep green in colour. The body colour of the fruit was readily visible as there were only a few brown woolly areoles near the top of the fruit. No observations were made with the assistance of a hand lens - which might readily have led to the identification of scales and minute bristles at each areole. I am rather conscious of the lack of such detail in comparison with the observations made above from G.Swales, but nevertheless it would seem that the fruit of N.buenekeri is very much closer to the characteristics of these of N.ottonis and other Paucispini than it is to the Setacei or Mammulosi fruit.

"During our 1971 Cactus Tour we saw a plant of N.crassigibbus in a Belgian collection carrying three rotund fruits, squat, bright green, with numerous small areoles. This would appear to place this species also in the Paucispini group.

"We would thus appear to be able to draw an interesting conclusion from observations on both flowers (Chileans No.18, pp.136-142) and fruits; N.buenekeri would seem to be a species which falls into one group in respect of its flowers and into another group for its fruit. Obviously it would be interesting to ascertain whether the other ex-Parodia Notocacti such as alacriportana, also have a similar fruit and likewise come within this duality. In this context, we also have the example of N.mueller-melchersii and N.rutilans, which follow the Mammulosi group in regard to the fruit characters and also in having the stamens bunching close round the style, but which exhibit a long funnelform tube instead of a bell-shaped flower receptacle.

"These considerations might lead to the idea of establishing three sets of classifications - that is, a classification by flower features, a classification by fruit characteristics, and another by seed types. It may then be found possible to form a group or groups of species with all three aspects in common, even though a given type of seed, fruit, or flower might well appear in more than one group.

"It would, after all, be somewhat surprising if we were to find that our plants could be divided up handily into nice little watertight compartments, with a form of seed, flower, and fruit peculiar to each group!."

We would welcome slides of Notocacti in fruit for the slide library - A.W.C.

MORE ABOUT CEREI by D.Rushforth.

I read with interest the article about Cereus species in the last issue, and was extremely pleased, as I feel these fine plants are neglected in our collections. Neglect, not in cultivation methods, but in the fact that very few collectors take advantage of the availability of many of the taller growing plants, and thus miss out on one dimension, for there is nothing like a few tall white, golden, blue, or green plants for showing off a collection to perfection. If I might cite an example, many of you will be familiar with the wonderful collection of Mr.Roy Martin of Tewkesbury, and will remember the effect of 100 or more tall plants (and by this I mean up to 2 feet) as you enter the larger of the two houses. These plants - Cerei, Espostoas, Arrajodoas, Cephalocerei, Haageocerei, Cleistocacti etc., situated as they are, in the bottom left hand side, draw your eyes to that quarter and give a tremendous impetus to the collection as a whole.

There is a great drawback to these plants, however, obvious from the previous article, this being the size that many of them must attain before reaching maturity and flowering, this applying particularly to the genus Cereus. I am anxious, therefore, to try some experiments to find a way of dwarfing them to produce a mature plant of say 1 foot, which has the same potentiality for flowering that a normal plant of 10 or 15 feet would have, in the same way that Chrysanthemums and other plants have been dwarfed. In this way many more of the tall genera could be cultivated by the average cactophile.

I am in possession of a drug called 2-chloro-ethyl tri-methyl ammonium chloride (or chloro-choline chloride for short) for which various claims are made. It is a plant growth regulator with the opposite effect of the well known gibberellins, in that treatment with a very dilute solution produces stockier plants with thicker stems and greener leaves. Recent work by E.C.Humphries at Rothamsted Experimental Station confirmed that the addition of this compound at the appropriate time in the season has the overall effect of reducing the growth of most plants. After treatment the plant is always shorter than the control, and the leaf area generally greater. The chlorophyll content of the leaves is higher, and is associated with an increase in protein nitrogen.

Tomatoes after treatment developed shorter, more powerful stems and large green leaves, flowering more prolifically, and produced under conditions of poor light. Tobacco plants and cereal crops have also been treated with similar results. Other plants tested include Azaleas

(which produced flowers in conditions which prevented or limited bud initiation in untreated plants), chrysanthemums and Poinsettias.

As I say I have a small quantity of this compound and am prepared to let a few growers have some if they will co-operate in carrying out a series of controlled experiments and keeping careful notes of results, so that they can be collated, to the possible benefit of others.

It is necessary to have seedling plants of 1 to 3 years of quick growing cerei (or Opuntias, or other genera which produce easily measurable growth in a season) or rooted cuttings. At least 4 of each type to be tested will be required as near identical as possible, at least one of which will be used as a standard.

If anyone is interested in this project, please contact me (address on back cover) mentioning type of plant material available, when further details of a plan of attack can be discussed.

Comments ... from H. Middleditch.

"On our 1965 Cactus Tour to Holland and Belgium, we acquired early on during the tour plants going spare from an amateur collector. Several of these were grafted and on digging them out of the bed it was quite clear that the main root had been cut short not long before. When we enquired whether this had been done to make them fit a pot, or for some other purpose, we were told that it was done to force the scion to flower.

"At first, we felt that we were having our leg pulled - if only somewhat gently; however, when the same comment recurred on more than one occasion later in the trip - and not only in connection with cacti - we came to the conclusion that perhaps our original informant had not been facetious, as we had imagined.

"Whether this method will work on tall growing plants, I do not know, but I suppose it is yet one other possibility. However, some Cleistocacti seem to flower on stems under two feet in height without any special treatment.

"The suggestion by John Donald in the comments on the "Trichocereus" may also be worth considering; by bending over the stem of the plant, the bent over portion of the stem is then at right angles to the noon sun, just as it would be in the tropics; each inch of stem then receives more sunlight - perhaps not as intense as it would receive in habitat, but certainly more nearly so than when growing vertical at this latitude. The response of the plant in the shape of flowers on this part of the stem thus becomes explicable".

A 30,000 KM TRIP IN SEARCH OF CACTI THROUGH SOUTH AMERICA by Karel Papousek.

(Translated by S.Kulig from Kaktusy 66, for July-August (Czechoslovakia).

This was the title of the talk by our guest speaker from West Germany - Mr.Werner Hoffman, who during the past years undertook four trips to South America seeking cactus. The hall was packed when he started his talk, he also showed some colour slides with commentary by his friend Dr.Schutz from Brno.

In his introduction, the speaker gave an account of how he became a collector of cacti:-

"When I decided to visit 'the home of cacti', I knew hardly anything about them. My first contact with cacti was in the South of France, in the Jardin Exotique in Monaco, where I travelled on a motor-bike. Here I would like to say that it was the encouragement of the late A.V.Fric and C.Backeberg, the latter advised me in France to get to know the natural home of cacti. Thus I inspected the Jardin Exotique, and here I was fascinated with the cacti which I had never grown. Thus it was that I decided to go to South America to seek them. This decision was an easy one, but it took considerable time to put it into practice. I did not speak Spanish,

I had neither contacts in South America nor any means of making them. So I started with the important matter - the Spanish language - when I was studying botany at Gottingen University. I was looking for a post on a farm with various companies in Chile and in Bolivia but without success. But I got to know about a foreign firm requiring an agent in South America. I applied and I got the job (I had 10 lessons in Spanish, which helped) and thus I started on the road which went through Uruguay, Bolivia, Chile, Argentinia and finishing in Rio de Janerio. Of this long journey I can only say it gave me experience and it helped to establish contacts. Financially it was a failure, because at the journey's end I was left without any funds and I had to borrow money to get me back home. The introduction to Prof.M.Cardenas in Bolivia proved of great value to my work, he showed me the growing places of cacti near Cochabamba, where I was collecting mainly Lobivia. Even during the first trip in South America I had decided that my travels would continue so I planned the route for the year 1959 which was going to take me from Peru to Chile, Argentina, Bolivia and back to Peru. I started this journey but it was not finished because I went off one day to collect cacti on some rocks and I fell upwards of 15 m and had to be treated by a German doctor. I had a few broken bones and some bruises.

So I had to abandon that second journey prematurely, but did not want to give up the next expedition. After returning back to my homeland I got married and started a family, but the following year I started again for South America, this time with my wife. About this third expedition, I will tell you the most interesting points and show you some slides".

After the short, but interesting introduction, there followed a report on the third expedition to South America by Mr.Hoffmann. Photographs were shown from Peru including some showing the life of the natives of Peru, also examples of Peruvian wild life and plants.

First in the cacti family was the enormous Neoraimondia roseiflora from the western valleys of Peru, whereas the related N.gigantia grows in the north and N.arequipensis grows in the south of Peru. Monumental columns of Espostoa melanostele with cephalia with a flower which opens only during the night (pictures were taken at dawn) grow in the Lima valley, then Haageocereus in full bloom, with the interesting news that it grows at 2,000 m above sea level. On the next picture we saw Opuntia pachypus; this type is doomed to vanish, because it grows only in a very small area and although it produces seeds the plant does not grow from them, but from a pod which drops off on the soil.

The next part of the journey went to mountains without rainfall, where the only source of humidity is the night fog. Here grow carpets of Tephrocactus floccosus and atroviridis. On the edge of the Peruvian jungle grows Lobivia wrightiana with typical coloured flowers and long spines. Further on we saw mature examples of Melocactus fortalezensis with magnificent cephaliums; these plants grow on ground made only of stones, where the only source of life is fog. Also we saw clusters of Oroya borchersii, its golden globes are 300 m in diameter and the colour is light to dark brown. Mr.Hoffmann stressed that despite the great variety, it is still only one type.

The red Volkswagen transporter, in which Mr.Hoffmann travelled, was packed full with boxes of cacti - about 3 cwts when fully loaded; each night these boxes had to be removed to provide the night's sleeping quarters. And now came the vast region round Matucana, where they found M. yanganucensis up to 1 meter high, some samples being posted to the Botanic Gardens at Heidelberg. The next picture was deceiving; on the western slopes of the Cordillera grow large columnar cacti which appear to have been planted out by a gardener. In complete contrast, visitors to Mr.Hoffmann's lecture saw Haageocereus repens, which grows in desert and is covered most of the time with 'moving' sand.

Near the town of Arequipa they made a magnificent discovery, namely the largest Melocactus - M.bellavistensis - interesting due to the fact that its pod grows and ripens inside the cephalium and when ripe is squeezed out to the surface to drop off. Next followed a group of shiny columnar cacti, pretty grey-blue coloured Armatocereus rauhii which is found near the equator, large columns of Espostoa lanata, which were discovered by the famous explorer Alexander Humboldt, also whole forests of Pilosocereus peruvianus. In south Peru pictures were taken of Matucana multicolor. The audience was very impressed with the beauty of the giant columns of Oreocereus

hendriksenianus, which has horn-coloured spines and snow-white hairs. From the same area we have a picture of the largest example of Browningia candelaris whose smaller relation, 3 meters high, is at Heidelberg and which decorates their Botanic Gardens. Also from Arequipa we had Corryocactus pulquinensis, a cristate Weberbauerocereus and Lobivia mistiensis.

The journey of Mr. & Mrs.Hoffmann continued from Peru to Bolivia round Lake Titicaca. In this country the first specimen they found was Oreocereus fossulatus, its seeds when ripe are completely dry and are easily removed from the pod. Near Cochabamba, the main town of Bolivia, they found Echinopsis cochabambensis, flowering Parodia schwebsiana, and covered with large blue-black spines the Sulcorebutia steinbachii which is completely different from home cultivated plants. On the way to Santa Cruz pictures were taken of plants growing in this area, namely P.elongata and mairanana. Both plants grow in forest in moss, which are ideal surroundings especially for small seedlings which are numerous here (in contrast to P.schwebsiana which grows in open ground).

The final type of the genus Parodia was P.maasii which grows in the area stretching from South Bolivia to Argentina; it is understandable therefore, that there is such a great variety in flowers and spines.

The slide lecture about this third trip to South America by Mr.Hoffmann was concluded by a series of pictures taken in the Gran Chaco area. We saw sunburnt columns of Helianthocereus poco, its tops covered with red flowers, a group of fallen Oreocereus trollii, Trichocereus talicensis, and in the middle of the Chaco a thick growth of Monvillea spegazzinii. Both travellers arrived safely in Buenos Aires, from where Mr.Hoffmann 'popped down' to Montevideo in Uruguay where he took some more pictures near the castle in Montevideo.

Comments on Hoffmann's account of his collecting trip

..... from H.Middleditch.

"In Chileans No.18 pp.145-148 it was postulated that the appearance of imported specimens of Parodia schwebsiana, with only the uppermost portion of the body green and free from evidence of immersion in soil, would suggest that the plant grew in open ground away from the other shade-giving vegetation. It is most interesting to see that this idea is confirmed from habitat observations made in this article by Hoffmann.

"The comment about the apparent lack of Opuntia pachypus seedlings would seem to be a little puzzling at first, until one considers that the collections and observations made on this trip may well have been confined to localities reasonably close to a travellable road; there is no reference to spending a day or two hiking across rough country away from the vehicle, for example. One might suspect that if the habitat of Opuntia pachypus is reasonably accessible to a motor vehicle plus a trek of perhaps an hour or so, that other collectors will have found it equally easy to visit the spot. The small seedlings would naturally offer prime pickings for commercial disposal, so that this might explain their apparent absence when Hoffmann visited the spot. Nevertheless, it would be of interest to know whether any of our members have had experience of raising this species from seed and whether it posed any problems or difficulties.

"The observation on the seed pod of Melocactus bellavistensis might suggest that this characteristic of the fruit appearing through the cephalium when more or less ripe is peculiar to this species, whereas in fact it is a common characteristic of many plants in this genus."

MY THIRD COLLECTING TRIP TO SOUTH AMERICA by W.Hoffmann.

(Translated by H.Middleditch from K.u.a.S. for December 1964).

In May 1963 my third study and collecting trip to the Cactus growing areas of South America began with the sea journey from Antwerp to Callao in Peru.

It was undertaken in conjunction with the Botanical Gardens of Heidelberg University and was intended, in the course of our travel from Peru as far as Uruguay, to give a cross section through the cactus vegetation between the Pacific and Atlantic Oceans.

The distance of more than 30,000 Kilometers (of which 23,000 was undertaken in our VW) demonstrates the size of the task we faced.

In Peru it was our objective to re-collect the species referred to in Professor Rauh's book "Contribution to the Knowledge of Peruvian Cactus Vegetation". This task filled the months of June to November, that is to say the time of the southern winter, which in our case should be taken literally. My wife who accompanied me maintains that she has never been so frozen in Europe as she was in the ice-cold nights in the Cordillera. At more than 4,000 meters altitude we often had mornings at temperatures below freezing inside the car, whose effects on the human body was increased by the oxygen-lean air.

As well as cactus collecting we also collected representatives of other plant families such as orchids, Bromeliads, and Piperaceae. Wild potatoes for the Max Planck Institute for breeding research in Koln-Vogelsang, completed our working programme.

To be able to work the widest possible area of Peru, we had to drive along the Peruvian section of the Pan-American highway repeatedly throughout its whole north-south extent. It goes for thousands of kilometers through the width of the coastal desert, which is again and again interrupted by the green of the irrigated river oases. These river valleys are the access to the cactus of the rock deserts, with their main representatives Haageocereus, Loxanthocereus, Neoraimondia, Espostoa, Mila, Armatocereus and Melocactus, which are followed in higher locations by Matucana, Oroya, Oreocereus, Lobivia and Tephrocactus. (This is not a list of Peruvian cactus-genera, but is only one separate cross-section.)

The following valleys were visited in Peru: Rio Rimac, Rio Laurin, Canta-Tal (Rio Chillon), Rio Fortaleza, Rio Santa (Cordillera Blanca and Cordillera Negra), Rio Casina, Rio Sana (Hacienda Taulis), Olmos, Rio Huancabamba, Rio Maranon, Rio Piura (Canchaque), Rio Mantaro, Rio Chanchamayo, Rio Grande (Nazca-Puquio), Rio Majes, (Hacienda Ongoro, Chuquibamba) and Rio Velcanota - Urumbaba (Cuzco, Machu Picchu).

After my wife returned home I reached Bolivia before the summer-like rainy season, where I awaited the arrival of my new companions in Cochabamba. Orchid hunting and cactus collecting in the vicinity of Santa Cruz de la Sierra filled the days until the further journey to Tarija via Sucre, Potosi and Camargo.

Lobivia, Gymnocalycium, Weingartia, Parodia, Trichocereus and Cleistocactus filled our packing cases, although it was difficult to send these away via Arica (Chile). Besides, the rainy season prohibited the collecting of the large quantities of cacti which were in full bloom.

In Tarija we found as before in Lima, Arequipa, and La Paz, how hospitable was the reception by German friends and acquaintances and so were able to prepare for an undertaking that all the natives indicated was impossible in this season - the traversing of the Gran Chaco from Bolivia to Paraguay. It so happens that not only is the 'Green Inferno' the native home of Gymnocalycium, Cleistocactus, Monvillea, Stetsonia, Quiabentia and Echinopsis, and the succulent Jatropha and Bombax, but it is also about the shortest road from Bolivia to Paraguay. Terrific floods forced us to turn back, after we had already reached Paraguayan territory. Since the Argentinian customs required a custom guarantee to the extent of 20,000 Dm. an escape route over North-West Argentina by car was impossible, so with heavy hearts we had to leave behind our VW transport after it had served as a mobile hotel for months on end and in Peru alone had transported more than

10,000 plants.

So our later task in Paraguay was certainly hampered, but we were able to reach by public transport the locations of Eriocactus and Gymnocalycium as well as many orchids.

The week I had to wait for the departure of my ship from Buenos Aires to Hamburg, I used for a short ramble in the coastal hills and centre of Uruguay and so completed my survey over the South American cactus localities.

These localities are so vastly different that they demand constant adaptability. The cactus in the Andean region can often be seen from afar and those of the Chaco are found under thorn-bushes. The collector in the undulating treeless grassland of Uruguay finds no evidence to lead him to cacti. Here merely endurance and fortune will help him, two things without which there can be no successful collecting trip.

THE CHILEANS PHOTOGRAPHIC ROBIN

..... from the No.1 Robin.

A query is raised in this Robin by Cecil Baxter who asks whether "any members have experienced difficulty in obtaining a correct colour rendering of any particular colour? My special problem is the flower of Rebutia kariusiana. The colour plate in Backeberg's Lexikon is very close to the colour of the flower on my plant but despite trying Kodachrome and Agfacolour, underexposing even up to three stops, and shooting when cloud covers the sun, the results are still washed out and not the proper shade of pink".

Following on from the discussion in the previous round concerning lighting of the plant, Cecil Baxter adds "surely side lighting is the only method which gives any depth to the slides - to my mind, frontal or direct lighting produces a flat and uninteresting effect. By using sunlight at 45° to the camera, with a reflector to add some light to the shadow, the plant then becomes a living thing and not just a piece of printed card".

Adding further to this subject, Colin Williams outlines the textbook approach to obtain modelling of features "by using -

1. Main light at 45° to the left or right of front centre and above - above because this is the angle at which light normally falls. This light is supplemented by -
2. A light slightly further from the plant than the main light and positioned at the other side of centre to the main light. The reason for this light is to illuminate the areas of shadow caused by the main light, but not so powerfully as to 'kill' all the shadows or the modelling effect will be negatived. This light controls the contrast range.
3. A further light to illuminate the background only, positioned either out of the field of view or positioned behind the object and directed onto it so as to give a rim light.

The choice of the actual power of the lights and so on is dealt with in full detail in various photographic handbooks".

A ready made example of this approach to lighting will be found in the studio shots in Television; by ignoring the programme and studying the lighting one may readily discern that the basic method of lighting follows that outlined above - Westerns tending to be particularly good examples.

There had also been a discussion about using a telephoto lens or a tele-adaptor lens as an alternative to the use of extension tubes and to this Colin Williams contributes "the reason for using bellows, extension tubes, etc., is that most people have as their prime lens one of 50 mm or 55 mm focal length. There are a number of unfortunate consequences of using this lens, one being that it can be difficult to get light to the subject with the equipment crowding in close.

By using a long focus lens e.g. 150 mm, a much larger working distance is obtained between camera and objective - perhaps five feet or more. A telephoto lens, however, does not have as good a definition at such short working distances as these, as a true long focus lens, especially when focussed down to short distances rather than at infinity. A true long focus lens is very expensive compared with a telephoto lens. They are also heavier than short focal length lenses and a sturdy tripod is required".

It would seem from this that unless one can stretch to a true long focal length lens that one must persevere with extension tubes and bellows.

Questions had also been raised about the desirability of including some object on the slide to provide a scale or measure of size and on this aspect David Whiteley comments that "I do not think that coins are a good thing as a scale on a picture - coins are now in the process of change anyway, and so are our rulers. But most botanical measurements have always been metric, so I have always used a metric rule in slides".

The Robin was accompanied by an extensive selection of slides and some Black and White prints.

..... from the No.2 Robin.

The question of backgrounds which could or should be used when photographing cacti was touched upon in our No.12 Journal in the very first article on this subject and it is discussed in this Robin, where P.H.Sherville rightly observes that "a number of schools of thought have been expressed in regard to backgrounds. Recently I heard a lecture dealing with photographing metallurgical specimens, where the lecturer suggested that the very best background was the one that you did not see. He advocated the use of out-of-focus, blurred, or moving backgrounds occupying as little as possible of the field of view. Suggestions for suitable background materials included sheets of arctic glass, ground glass and expanded polystyrene - either painted or left natural".

One or two slides included in the previous round by Mrs J.Hobart had exhibited a horizontal line running behind the plant, where the base and background joins, but she now says that "I have arranged my background to eliminate this horizon" and includes a slide to demonstrate this. Concerning the same problem Miss C.Fisher refers to "the difficulty arising with taller plants taken from one side, in which one tends to get a sort of horizon between whatever the plant is standing on and the background. I think the answer would be something like the background rolls used in portraiture which come down the back and are brought forward across the floor".

Once again a good selection of slides together with some black and white prints accompanied the Robin.

Would the members currently in possession of these two Robins please advise the Photographic Robin leader of their whereabouts?

SOME RECENT ADDITIONS to the SLIDE LIBRARY

..... from J.C.Chapman.

Just over one hundred slides of Rebutia (K.Sch.) Buin. & Don., encompassing Rebutia K. Sch., Aylostera Speg., Mediolobivia Backbg., etc., depicting specimens obtained from various continental suppliers including imported plants. Many of these plants are under collectors field numbers and so offer an opportunity to compare these un-named sorts with better-known species. A large number are of plants in flower.

This outstanding donation fills a long-felt gap in our slide library as previously we had very few slides of this genus; it seems that the prevalence of hybrids in cultivation has restricted the

depth of interest in this genus, but these slides afford a rare opportunity to view both imported and correctly-named plants. These slides have previously been circulated with the NC & SS Robin Rebutia and it is pretty certain that the names are in doubt on only those few slides where noted.

..... from B.Chudleigh, New Zealand.

Slides of a variety of species in flower, many of which are but rarely met with in flower in the U.K. - some, like Thrixanthocereus, hardly ever! Amongst these are slides of Arrojadoa, Pilosocereus, and two species of Melocactus in flower.

..... from P.H.Sherville.

A miscellany of species, mainly in flower - such as a Selenicereus, Monvillea, and Oroya, together with a very useful selection of Parodia species.

..... from R.H.Kirkpatrick, U.S.A.

On a number of occasions a letter has been accompanied by one or two welcome slides, often of rather unusual sorts such as Arrojadoa in fruit, Pygmaeocereus densiaculeatus in flower, and more recently a batch of Fraileas which has much improved our coverage of this genus.

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

Further additions including half a dozen species of Mediolobivia originating from Donkelaar and a batch of Sulcorebutia, making over fifteen species of Sulcorebutia on slides in the library.

..... from H.Middleditch.

Various subjects, most of which were taken during the Chileans 1971 Tour, including a few Brazilian cereiform cephalium bearing cacti and one or two Cleistocacti in flower.

..... and from D.Sargant we had the loan of a very broad selection of slides of imported plants, our budget permitting us to copy but a limited number of these.

..... In addition a large number of members donated slides in numbers from one upwards, which were all equally welcome in helping to improve the scope of the slide library.

Whilst many of the newer discoveries are - understandably - as yet absent from the slide library, it is surprising that quite a number of well-established species are not represented - even in the Gymnocalycium - whilst there are enormous gaps in the Lobivia. Any further additions to the slide library will naturally be very welcome, in any genus and species.

We are always pleased to receive comments and observations with any slides sent to the slide library e.g. source of plant, age, size, etc., as this permits an informative set of notes to be prepared to accompany the slides.

..... An up-to-date list of slides available on loan may be obtained by sending an S.A.E. to the Slide Librarian.

Owing to the recent increases in postal charges it has now become necessary to revise our charge for the loan of slides to 3/- per box (of apprx. 40 slides). Overseas loans will be at the discretion of the Slide Librarian and will be charged at cost plus 2/- per box. Overseas loans can be most readily accommodated during the period April to September inclusive.

A.W.C.

ANNUAL REPORT AND ACCOUNTS 1.4.70 to 31.3.71.

Income		Expenditure	
Subscriptions 1971-72	£ 79.16	Printing	£372.18
Subscriptions 1970-71	259.60	Postage, Stationery, etc.	65.30
Sales of Year Books	25.06	Plant purchases	62.20
Sales of Back numbers	161.54	Invoice outstanding £124.82	
Sales of plants and seeds	50.91	Nett balance c/f 243.14	
Receipts for Index	8.40		
Bank Interest	7.91	Balance c/f	£367.96
Sundry income	16.42		
Balance brought forward	258.64		£867.64
	£867.64		

It will be seen (from the accounts above and those for the previous year) that Subscriptions income was just in excess of £300 for Volume 4 whilst the cost of publication exceeded £450; this is a measure of the subsidy provided to each subscriber for the year.

Currently, the cost of back number reprints is covered by sales but a close watch is being kept on the financial viability of this service.

There are a number of plants still on hand which, when sold, should result in closing the gap seen above between purchase price and sales.

The latest increase in U.K. postal charges has had little impact on the accounts presented here, but will be felt in full for Volume 5. With further postal increases ahead, together with the general rise in costs, it seems quite probable that the increased subscription rate will merely keep in line with cost increases, rather than coming closer to actual costs of publication.

Once again, it is a pleasure to acknowledge the assistance given by many members towards the publication of this Journal, in all the aspects of administration, translation, and in providing illustrations and comments.

As a result of the minimal interest evinced in indirect exchange of seedlings through the seedling pool, it has been agreed with the organiser of this service that it shall be discontinued.

Following the recurring receipt of comments in correspondence, regarding difficulty experienced by many subscribers in finding collectors with similar interests in order to discuss their plants, arrangements have been put in hand for a National gathering in autumn 1972 (see separate announcement for further details).

H.M.

CHILEANS NATIONAL GET-TOGETHER - AUTUMN 1972

Following the local Chileans get-together meetings (principally in the north-east) and requests from other parts of the country to enable members to discuss mutual interests, arrangements have been made for a national gathering over September 8th - 10th 1972, at Brooksby Agricultural College, near Melton Mowbray. There will be both formal lectures and informal discussions on the programme, which will run from Friday evening to mid-afternoon of the Sunday. It is expected that the charge for the course, including board and accommodation will be about £6.00. All enquiries and communications regarding this course should be addressed to the Course Secretary: Mrs J.Hobart, 39 Woodside, Darras Hall, Ponteland, Northumberland, who will also be able to accept provisional bookings now. A deposit of £2 will be required by April 1st 1972 for a firm booking; as we are not permitted unlimited numbers, an early booking is recommended.

FORTHCOMING ARTICLES

We should be pleased to hear from any member who has flowered Pyrrhocactus bulbocalyx; or who has observed the differing times of day at which various species of Notocactus flower; or preserved flowers cut into half sections; or has a mature specimen of Gymnocalycium fleischerianum; or of Gymnocalycium valnicekianum; or has flowered any Gymnocalycium FR 437 (G.oenanthemum) raised from Ritter's seed or other imported seed; or possesses a Parodia malyana, or Parodia stuemeri.

H.M.

1972 YEAR BOOK - FIELD COLLECTION NUMBERS.

It is expected that our 1972 Year Book will be available early in 1972. This will contain lists of the following field numbers:-

FR - Friedrich Ritter (Updated from our 1967 Year Book)

HU - Horst - Uebelmann

Kz - Karel Knize

R - Walter Rausch

---- Alfred Lau.

These lists will contain all information at our disposal at the time of going to Press, but they will not necessarily be final or complete.

The 1972 Year Book will cost 65p; remittance with order to the Chileans Treasurer, please.

STUDY GROUPS / ROUND ROBINS

Cleistocacti	A.A. Sadd, 26 Carlisle Street, Island Bay, Wellington S.2 New Zealand
Copiapoa	D.J. Lewis, 80 Pencisley Road, Llandaff, Cardiff.
Epiphytes	A.J.S.McMillan, 5 Oakfield Road, Bristol BS8 2AJ.
Frailea	J.Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
Gymnocalycium	G.J. Swales, 5 Hillcrest, Middle Herrington, Sunderland, Co.Durham.
Hydroponic Culture	P.G.Hallett, Llaregyb, 20 The Garth, Bull Bay, Amlwch, Anglesey.
Lobivia	R.E.Hollingsbee, 46 Markland Road, Dover, Kent.
Matucana/Borzicactinae	E.W.Barnes, 22 Coniston Grove, Ashton under Lyne, Lancs.
Mediolobivia	J.R.Chapman, 5 The Crescent, Raunceby Hospital, Sleaford, Lincs.
Melocactus/Discocactus	Mrs L.Teare, Dellfield, White Horse Lane, Finchampstead, Berks.
Miniature Opuntia	Contact the Chileans.
Neoporterianae	D.Rushforth, 80 Cheltenham Road, Gloucester GL2 0LX.
Notocactinae	K.H.Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A.J.Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A.W.Craig, 16 Skeeby Close, Hartburn, Stockton on Tees, Teesside, TS18 5LY.
Sulcorebutia	W.G.Sykes, 10 Ashley Close, Thornton Cleveleys, Lancs. FY5 5EG.
Trichocereus	N.T.Hann, 5 Lake Road, Shirley, Croydon, Surrey, CR0 8DS.

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Slide Librarian	A.W.Craig, 16 Skeeby Close, Hartburn, Stockton on Tees, Teesside TS18 5LY.

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