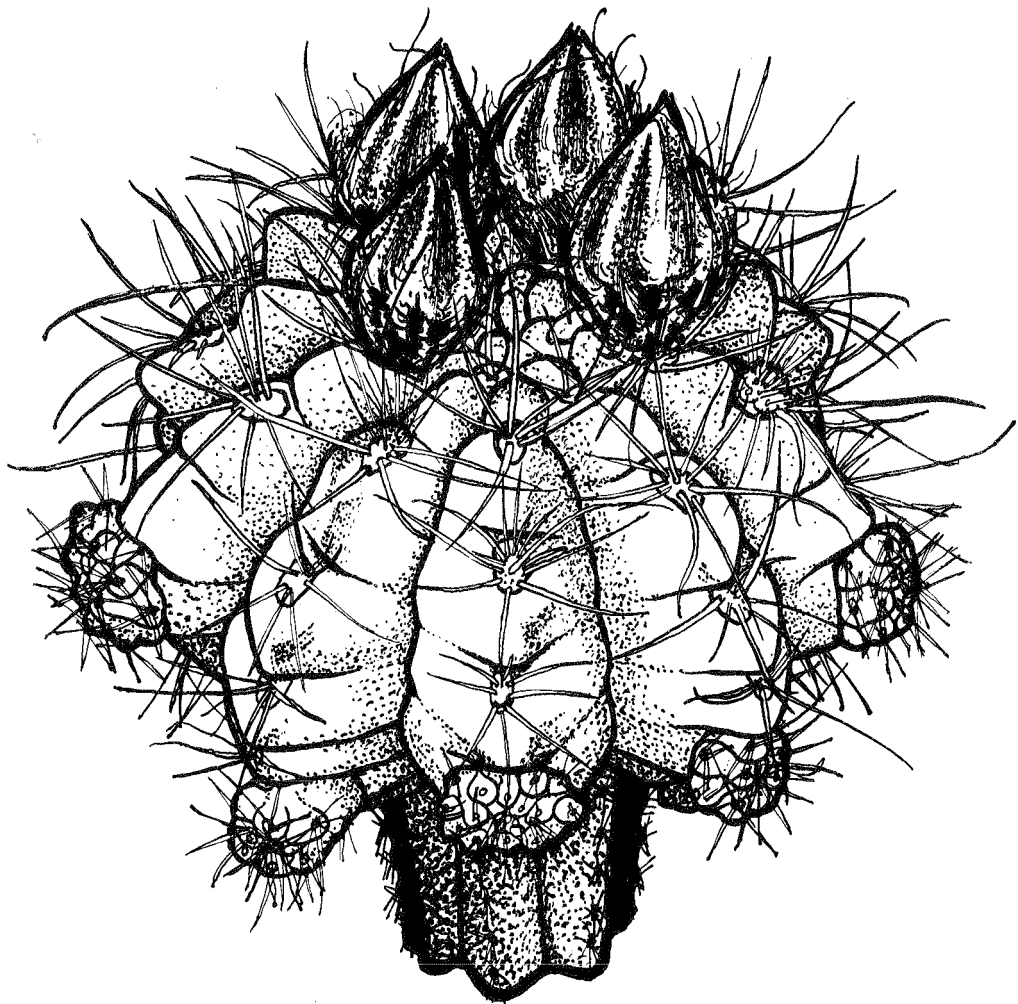


# THE CHILEANS '70

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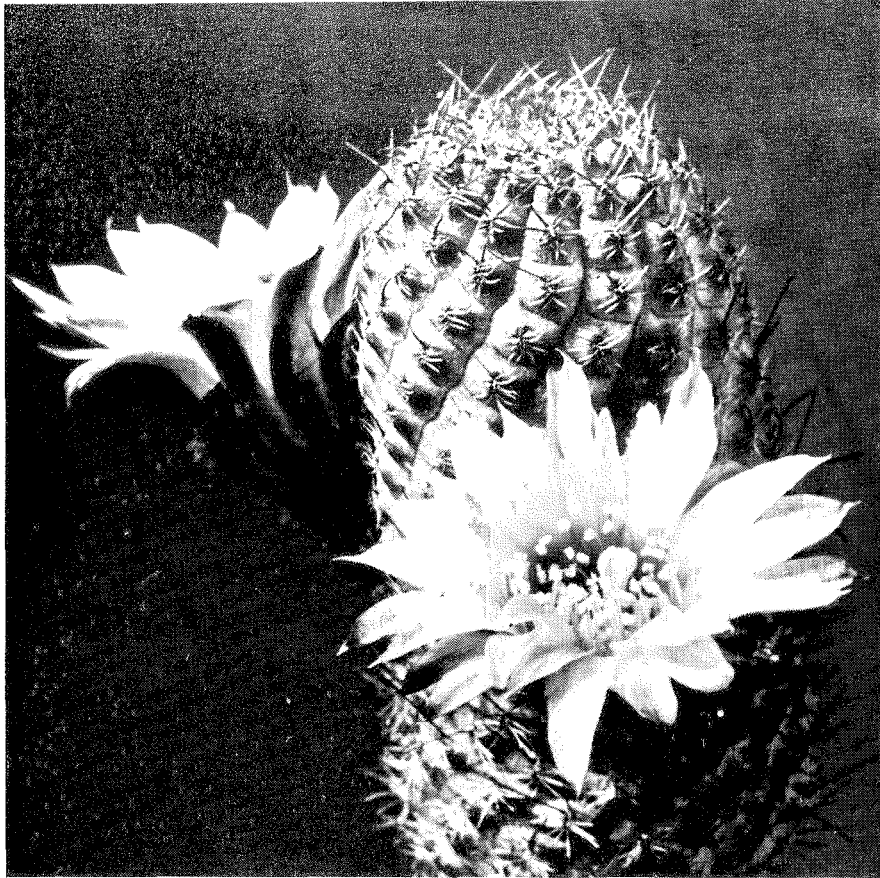


NEOCHILENIA ASPILLAGAI

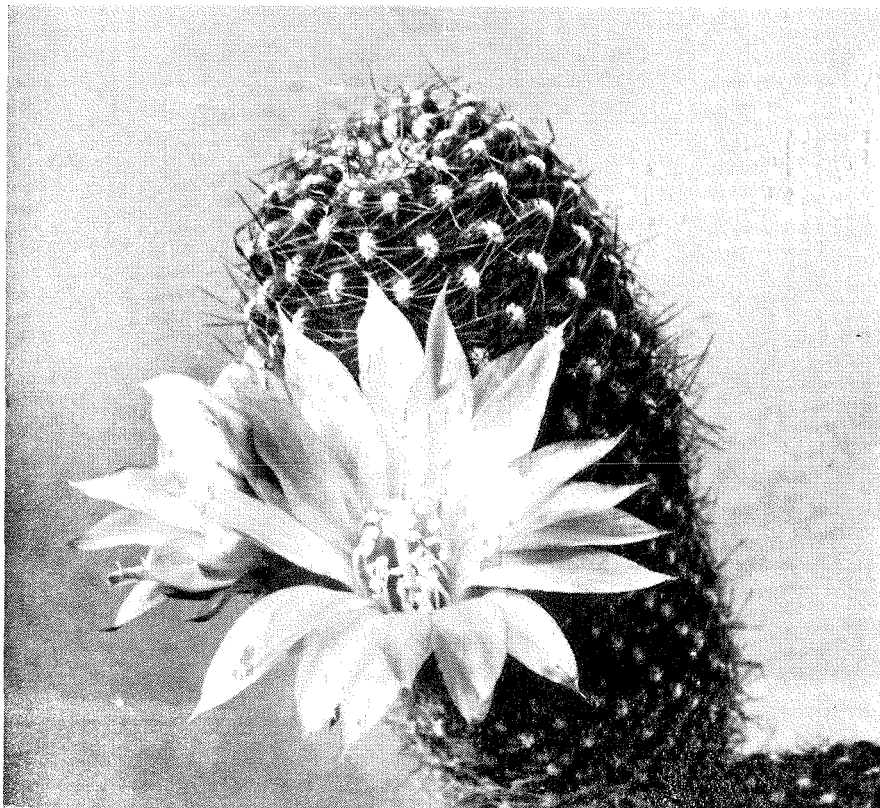
enlarged x 1½

COLLECTION : H. MIDDLEDITCH

CARL J. LAZZARI



CYLINDROREBUTIA KARRERI Fric.  
succulenta 49.3.70



CYLINDROREBUTIA RUBRIVIRIDE Fric.  
succulenta 49.3.70

## CYLINDROREBUTIA by A.F.H. Buining

(Translated from 'Succulenta' for March 1970 by J.R. Chapman).

At the beginning of 1966 Heer F. Pazout of Prague sent me a review by R. Subik, dealing with the group of plants which had been described at that time by A.V. Fric as the genus *Cylindrorebutia*.

I think that many *Rebutia* lovers would be pleased with this article, if only for historical reasons. The *Cylindrorebutia* plants which Walter Rausch found in a relatively small area, (which I studied at his house for the second time in July, 1969) show very well that these plants are very variable in colour and spination. It is certain that the different plants collected through A.V. Fric - whether by himself or the Indians - show that they are closely related to the first published *Rebutia einsteinii* Fric. Whether we consider these plants as forms, varieties or species is frequently only a matter of opinion. Modern investigation methods and a wider knowledge of the growing places will however, bring more clarity to this situation.

For historical considerations then it is my wish to publish these studies as a contribution to the knowledge of these interesting miniature plants.

The material concerned for these studies was grown in the Botanical Gardens in Prague where Heer Subik is employed, and, as far as is known, they stem from the original collection of A.V. Fric in Prague, where I also resided with Fric for three weeks so that I might study with him.

In honour of my friend A.V. Fric, who died in 1944, I have pleasure in promoting this publication.

## MORE ABOUT THE CYLINDROREBUTIA COLLECTED BY FRIC

By: R. Subik and F. Pazout - (Translated from *Succulenta* for March 70 by J.R. Chapman).

.... In the first series of the journal 'Friciana', I wrote on the *Cylindrorebutias* of A.V. Fric. Here one finds a very interesting and unfortunately little known genus, and because of this I write once again about them. In comparison with other cactus genera, these plants in general are seldom encountered in our collections. Fric brought this about largely by his failure to observe that their descriptions are only valid if defined in the accepted botanical manner.

In collections occurs - most often on its own - *Cylindrorebutia einsteinii* which was described in 'Moellers Deutscher Garterzeitung' of 1931, and in the periodical 'Kaktusar' in 1932. All the remaining plants from this group are merely known out of the so-called 'Blaue Liste' of 1931 and out of Kreuzingers 'Revision' of 1935, in which all species were illustrated and given a short description. Fric considered *Cylindrorebutia einsteinii* as a very special plant and gave them only to his better friends. They were therefore spread around very slowly: even after the two World Wars there were only a few solitary examples to be found in the European collections. I collected together as many of these plants as was possible in the botanical gardens in Prague, where they were collectively studied and increased.

I will not here carry on a controversy with Backeberg, who described these plants as forms of *Mediolobivia schmiedcheniana*, nor with Buining and Donald and other specialists, in that they should be considered as varieties of an independent species. In my opinion one should consider *Cylindrorebutia steineckeii* as a form of *C. einsteinii*, but all the remaining sorts are so different in many characteristics that they may be correctly considered as species. For one species I am lacking an accurate description of the flowers and I can only examine seeds of three species, but the differences in habit and spination is great.

Cylindrorebutia einsteinii Fric. Syn: *Rebutia einsteinii* Fric 1931 - M.D.G., *Rebutia einsteinii* Fric 1932. *Kaktusar.*, *Lobivia schmiedcheniana* Kohler 1947. JSK.

- Plant : Up to 20 mm diam. and to 150 mm tall.  
Crown : somewhat depressed when comparatively young; radiating rust-brown spines.  
Epidermis : top matte green, later red-brown with a violet tint.  
Tubercles : in proportion flat, but higher above.  
Areoles : oval, 1.1 mm long with short light brown felt.  
Spines : radials 10-11, brown later grey, 5-7 mm long; centrals frequently first wanting, later 3-10 or more, thickened at the base like an onion, brown.  
Flower : 25 mm diameter, bell shaped (campanulate), king cup yellow with a darker mid-strip, petals in two series, small, pointed and somewhat arched.  
Ovary : skittle shaped, 8 mm diameter, shiny dark brown, slightly roughened, well furnished in the scale axils on ovary and tube with fuzzy, brown wool.  
Seed : ca. 0.6 mm in size, grey-brown with a granular testa. The flowers and seeds are similar in all species. Only *C. karreri* has larger flowers with a darker mid-rib.

Cylindrorebutia einsteinii var. steineckeii Fric. Syn: *Cylindrorebutia steineckeii* Fric 1936, *Blaue Liste*, *Rebutia steineckeii* Fric. *Kaktusar* 1932, *Rebulobivia steineckeii* Fric. Revision Kreuzinger, *Mediolobivia schmiedcheniana* var. *steineckeii* Backeberg in *Descr. Cact.* 1956.

- Plant : Up to 20-25 mm diam., up to 100-200 mm tall.  
Crown : more tapered than the others, dark brown spines.  
Epidermis : dark green, passing to violet below.  
Tubercles : striking, ca. 2 mm high, almost rectangular and spirally arranged.  
Areoles : oval, 1 mm long with some brown wool.  
Spines : radials ca. 15 comb like, at first rust-brown, later greyish. At the base brown, thickened like an onion, 10-14 mm long, projecting near the top.  
Flowers) - : similar to type.  
Seeds ) -

Fric wrote about this plant in 'Kaktusar' 1932, that it was 153 mm high and had a light green body; that it was thickly covered with spines and like an old fashioned lamp brush. He did not reveal the place of discovery, he could not as he did not know it. The plant is superficially relatively similar to *Cylindrorebutia einsteinii*. The relatively long spines which are on this plant thickly clad, gives it however a peculiarly distinctive character.

Cylindrorebutia rubriviride Fric, 1936 in 'Blaue Liste'. Syn: *Rebutia rubriviride* Fric. Revision, Kreuzinger, *Mediolobivia schmiedcheniana* var. *rubrivirides* Backbg. in *Descr., Cact.* 30 November 1956, *Cylindrorebutia rubriviride* (Fric) Donald 1956.

- Plant : up to 30 mm diam. and to 200 mm long.  
Crown : apex somewhat depressed, broad, flat and with rust brown spines.  
Epidermis : at the top, light dull green and to the base, a violet tint that is frequently very intense.

- Tubercles : large and well developed, up to 3 mm high, rectangular, arranged in spirals.
- Areoles : oblong, 1 mm long with brown wool, 3-5 mm apart.
- Spines : radials ca. 13, projecting somewhat and comb like in nature, 6 mm long, at first rusty brown later whitish. Centrals ca. 7-8, stronger, brown or rust-brown, 12 mm long, projecting upwards and onion-like enlargement of the base.
- Flowers )  
Seeds ) - : Similar to type

*Cylindrorebutia rubriviride* is the most striking of the genus because of the intensely violet green epidermis and rust-brown spines.

*Cylindrorebutia karreri* Fric 1936, in 'Blaue Liste', Syn: *Rebutia karreri* Fric. Kaktusar 1932, *Rebulobivia karreri* Fric. Revision, Kreuzinger, 1935, *Mediolobivia schmiedcheniana* var. *karreri* Backbg. in Descr. Cact. Nov. 1956.

- Plant : 25-30 mm in dia. and up to 80-100 mm long.
- Crown : somewhat depressed, broad, with brown spines.
- Epidermis : dull green, reddy-brown below.
- Tubercles : acute, more or less rectangular, 1-2 mm high, arranged into 18 series.
- Areoles : oval, 1.5 mm long with short whitish wool, 3-4 mm apart.
- Spines : radials 9, light brown, 5 mm long; central spines at first only 1 stronger, darker spine, later growing a few 2 mm long brown spines, that become somewhat twisted above. All spines are enlarged like an onion at the base.
- Flower : king cup yellow, ca. 30 mm diam., petals arranged in two series and have a darker middle stripe. The flower tube is clothed in grey-brown wool.

*Cylindrorebutia karreri* is an interesting plant, that is sufficiently different from *Cylindrorebutia einsteinii* by the absence of the violet colouration of the body. In habit it is only short, and when young, more or less bullet shaped. The central spines are pretty well projecting. Fric put the first picture of this plant in his provisional catalogues as *Rebutia karreri* sp.n. Fric. 1932/33. Later, this picture appeared also in the 'Revision' of Kreuzinger 1935, under the name of *Rebulobivia karreri* Fric.

The photo lacks definition and because of that I can only ascertain with difficulty, that my plant - coming from Neumann in Berlin and originating from the Fric collection - agrees with the plant photographed in the 'Revision'.

*Cylindrorebutia nicolai* Fric 1936, in 'Blaue Liste'. Syn: *Rebulobivia nicolai* Fric, 'Revision', Kreuzinger, 1935., *Lobivia conoidea* Wessner, 'Beitrag Succ. K.u. Pflege, 1940, *Cylindrorebutia monstrosa* 350, 'Friciana I', 1962.

- Plant : 15 - 30 mm in diam. and 100-150 mm long.
- Crown : somewhat depressed, with light brown spines.
- Epidermis : at the apex a light dull green, at the base violet brown.
- Tubercles : oblong, oval, ca. 1 mm long with a little light brown wool.
- Areoles : large, almost square, 1-2 mm high arranged in 17-20 spirals.
- Spines : radials 12, 4 mm long, straight, fine, brown on their bases. Centrals 4, twisted 5 mm long, one up to 8 mm, somewhat outstanding. All spines have an onionlike enlargement at the base.
- Flower : still unknown as this plant has yet to flower with us.

Cylindrorebutia nicolai is identical with the plant called Cylindrorebutia monstrosa 350. Although the plant shown as Cylindrorebutia monstrosa in Friciana seemingly deviated from C. nicolai, it appears that, from grafted plants cultivated over a number of years, both sorts are similar. The plant that was shown in 'Friciana I' 1962 as a second type of Cylindrorebutia einsteinii (Kertorik), was most probably a hybrid that Fric had already originated.

Both plants were shown by Fric in two differing photographs, in the journal 'Kaktusar' 1932, and propagated in our collections as C. einsteinii. Fric, however, had only one original plant of C. einsteinii, from which he could not obtain any seed. The second plant was from the collection of Rektorik and is much broader and grows into larger specimens. In addition, the larger flowers which it is true are also yellow, have however a reddish-orange tint that is reminiscent of Mediolobivia aureiflora. The 13 spines are radial, light brown, 6 mm long, the 3 uppermost are brown, longer and one is up to 18 mm in length.

To the descriptions of these plants, which carry the correct names given to them by their collector Fric, I will also add the history of their discovery. This story is derived from an old account that A.V. Fric published more than 25 years ago in 'Kaktusar' 1932 under the title: 'Rebutias from the High Mountains'.

It appears in there that Fric collected these plants - partly by himself and partly by the Indians - and without any labelling they stayed in their box. On the way, many of these soft and often damaged, dwarf plants rotted and others grew so that from the 1 cm long little bullet-like plants with thick, carrot like roots, long white sprouts stood out. On arrival in Europe they were hardly recognisable, so Fric grafted the remaining tips - of which there were few - onto different stocks.

With this he saved some plants, to which he gave new names, for it seemed that they were different new species. Fric could not recall the growing places of the plants. His Cylindrorebutias were never again brought from their homeland to Europe and we knew as little of these as we knew of the remote, mountain ridges where they occur and where at the time in 1928/29, their ailing collector sought relief for his sick lungs, and therefore went as high as possible near the top of the Andes, every now and again becoming lost.

Fric's Cylindrorebutias have acclimatised themselves well with us, but they are seldom found in our collections and stem from one motherplant that was vegetatively increased. We must carefully look after these plants and carefully preserve them against hybridisation.

The present botanical authorities, it is true, place all the above-named plants as varieties of one collective species and so form a very interesting group. These plants are indeed closely related to one another and come from the same surroundings but the specialist, if successful in bringing together all these high-mountain Cylindrorebutias of Fric, shall live to see very much joy with such a group.

#### Comments on Cylindrorebutia

.... from H. Middleditch. "During our 1969 Cactus Tour to Czechoslovakia we were able to visit the Prague Botanical Gardens and view quite a number of the plants, originals and progeny, which Fric had brought back home from his collecting trips in South America and which he classed as Cylindrorebutia. Regrettably we did not have knowledge of the above article at the time of our visit, or else we might well have taken more particular notice of these interesting plants and made some observations on those we did see.

"One may find listed in Backeberg's Kakteenlexikon, three of the plants described above, viz:- einsteinii, rubriviride, and karrereri, designated as varieties of Mediolobivia schmidcheniana where they are grouped in the Conioidae section of Mediolobivia, along with M. conioidae. This grouping was reviewed in Chileans 12 p.85, wherein the characteristic flower for this group was quoted as short-tubed, campanulate. Bearing this in mind, it is of interest to see

that the photographs of the flowers which accompanied the original Dutch article show that the flower on Cylindrorebutia einsteinii is indeed relatively short, but the flower depicted for C. karreri is of a greater length which is perhaps comparable with other Mediolobivia or Rebutia.

"On perusing the list of FR numbers one is struck by the remarkable absence of Mediolobivia; this leads to the thought that perhaps Ritter referred to these plants as Rebutia, rather than as Mediolobivia, in which case it is quite possible that some of the un-named FR Rebutias might be the same as the Fric Cylindrorebutias. Since Ritter has traversed most of the Cactus country in South America, it would seem somewhat remarkable if he had failed entirely to re-discover at least some of these Fric plants."

(Note. The appearance of the two words 'Kertorik' and 'Rektorik' in the above article suggests to me that one of these was misprinted in Dutch).

..... from J.D. Donald

"It gives me great pleasure to be associated with this second promotion of Subik and Pazout's excellent review of this group of plants and thus to pay homage to the memory of the late Alberto v. Fric.

"It is a very sad thing that Fric published so little in his lifetime. He was an extremely clever man with many brilliant and advanced ideas and a great sense of humour - sometimes though it is difficult to know when he was being serious and when he was poking fun. Hence he was not always appreciated or understood and history has not treated him well or honestly. Many of his plants and ideas were plagiarised by others who should have known better.

"It has been my privilege and honour to read much of the correspondence between him and his friends, especially his letters to Albert Buining and Erwin Kreuzinger in connection with Rebutias and from this stemmed my early determination to see a system of classification that would honour the memory and ideas of Fric. Hence I hope I will be forgiven if I take a more partisan attitude to the classification of Cylindrorebutia than that taken by Subik and Pazout.

"Backeberg considered these plants to be part of his Mediolobivia subgenus Pygmaeolobivia in the section Conoidea. This is purely on the basis of an apparently similar body morphology - a thin cylindrical stem. It pays no heed to the floral or seed morphology at all or to the substantial isolation of the habitat.

"However, a statistical analysis and calculation of the percentage similarity values over thirty characters proves that Cylindrorebutia is closer to Backeberg's Mediolobivia subgenus Mediolobivia and not Pygmaeolobivia (see Donald, Succulenta November 1970). The same analysis proves that it is hardly possible to accept Mediolobivia as a discrete genus nor Aylosteria either, but that all should be reunited with Rebutia as first suggested by Bertrand in 1951 and formally proposed by Buining and Donald in Sukkulentenkunde VII/VIII of 1963. The latter classification has also been adopted by Prof. Franz Buxbaum in Die Kakteen 1.x.1967.

"In this classification, Rebutia is divided into two subgenera, Rebutia and Aylosteria, and these two subgenera are divided each into three sections:- Rebutia, Setirebutia, Cylindrorebutia; and Aylosteria, Digitorebutia and Mediorebutia. The statistical analysis justifies this division and it also happily coincides with their geographical distribution, the Rebutia subgenus and its sections occurring to the south of the Aylosteria subgenus and its sections, (if the centre of many foldness is taken as Dept. Tarija in Bolivia).

"It was a great pleasure to be able to use the old Fric names for the sections, the only exception being Aylosteria which, in the rank of subgenus, has priority over the equally acceptable and perhaps more apt Fric equivalent Echinorebutia. In any subsequent division of the category, the name must be perpetuated, hence Aylosteria must also be the name of the section as well.

The sections correspond to the old six divisions of Rebutia-like plants, excluding, of course, the lobivoid Sulcorebutia. The section Rebutia corresponds to Backeberg's subgenus Rebutia but excluding all the Bolivian species and R. marsoneri; Setirebutia corresponds to Backeberg's Mediolobivia s/g Mediolobivia; Digitorebutia corresponds to Backeberg's Mediolobivia s/g Pygmaelobivia, section Pygmaeae. The Fric names are much more apt as they do not involve the name Lobivia with which, of course, Rebutia has little to do. Mediorebutia corresponds with Beweringer's s/g Neorebutia but includes all the Bolivian Rebutias as well as R. marsoneri. Mediorebutia was a name coined by Fric for the marsoneri type plants and he was the first to realise that these plants were not directly related to R. miniscula.

"The Cylindrorebutia occur extremely locally in Salta Province of Argentina. The Fric plants were alleged to have come from the Volcano Chani part of the Nevada de Chani on the borders of Jujuy and Salta at heights of around 5,700 m which seems rather high. Walter Rausch and Ernst Markus eventually found a small stand of these plants further south at a much lower altitude. In this stand are representatives of all the so-called species - plus yet another form, according to Rausch. The habitat was west and slightly south of the habitat of the very polymorphic Setirebutia aureiflora. Cylindrorebutia is very close in relationship with Setirebutia but differs in habit, cylindrical as opposed to globular; shorter and wider receptacle; narrower and more numerous perianth segments and rounder and broader hilum on the seed. Cylindrorebutia, like Rebutia and Setirebutia has a completely free style and open nectary whereas Aylostera, Digitorebutia and Mediorebutia have partially to wholly restricted styles within the receptacle and closed or partially closed nectaries.

"The distinction between the 'species' has been well covered by Subik and Pazout and I cannot add to them, except to say that Cylindrorebutia schmiedcheniana as we know it today differs from the original Cylindrorebutia einsteinii in one small point. Fric's einsteinii always had a conical body narrowed at the top, whereas Kohler's schmiedcheniana has a nearly cylindrical body with a rounded top. A trivial difference perhaps and should not be made much of especially if one considers the very dubious political climate at the time which made the name einsteinii unacceptable in certain quarters. A similar attitude may have led to the naming of Cylindrorebutia karreri as Lobivia columnaris and Cylindrorebutia nicolai as Lobivia conoidea by W. Wessner. However, in their defence it must be said that neither Kohler nor Wessner were aware that einsteinii had indeed been validly published in Moeller's Deutscher Gartnerzeitung 1931 p. 23 and hence the name schmiedcheniana was superfluous.

"Regrettably Fric had only given brief notes on the descriptions of karreri and nicolai in Kreuzinger's "Verzeichis" dated 1935 but which appeared too late for the dead line given by the International Committee for Botanic Nomenclature for lingua barbara descriptions. Hence Wessner's names must stand. However, in the case of Cylindrorebutia karreri it is felt that Wessner's columnaris is not strictly identical with Fric's karreri and thus karreri should be allowed to stand as a form, despite Wessner's statement of their synonymy.

"Cylindrorebutia rubriviride and Cylindrorebutia steinecke somehow escaped, despite their very distinct appearances, description by Wessner and the names were not officially published until 1956 by Backeberg along with C. karreri all as varieties of schmiedcheniana (Descr. Cact. Nov. 30, 1956).

"Fric produced several hybrids and actually named two in his famous Blue list of 1936 - Fric 576 pseudoeinsteinii and Fric 127 pseudosteinebachii.

"Two other species have been tentatively placed at times in Cylindrorebutia by several authors including myself. One, Rebutia aurantida (Wessner) Buin. & Don., closely resembles them in having a very short tubed flower, but the body is nearer the Digitorebutia section. It is believed to have come from Bolivia but its exact habitat has not been rediscovered. A. J. Brederoo has confirmed that the internal structure of the flower and also the seed are similar to Digitorebutia and so it is close to Rebutia brachyantha.



"The other plant, Cylindrorebutia spiralisephala Jajo n.n. now appears to be a hybrid between C.einsteinii or C.rubriviride and Setirebutia aureiflora. Successful selfing experiments have produced seedlings that are a mixture of Cylindrorebutia types and Setirebutia type plants. The suspected original cross has been repeated but it is too early to judge the offspring.

"My own opinion, in view of the fact that all the described 'species' can be found on the same habitat without any segregation, is that we have here only a single species that is extremely variable in spination and size of flower and moderately variable in flower tone. The name of the species is without doubt Rebutia einsteinii Fric.

"Despite the variation in flower size and subtle changes in colour, the basic structure remains the same for all the forms, as indeed does the body structure particularly in the podaria and areole formation. Individually the forms are easily recognised but the features that distinguish them are wholly plastic and hence of little botanical significance.

"Seeds produced in crossing experiments show little variation from one form to another. Horticulturally each form is quite desirable but since their propagation has been entirely by vegetative processes, they should strictly not have Latin names but trivial or cultivar names. But in view of their rediscovery by Walter Rausch and Ernst Markus I believe that their original Latin names may be preserved under 'forma' status:-

Rebutia (Sec. Cylindrorebutia) einsteinii Fric.

Syn. Lobivia schiedcheniana Kohl.

Rebutia einsteinii f. columnaris (Wessner)

Syn. Lobivia columnaris Wessner.

Rebutia einsteinii f. karreri (Backbrg)

Syn. Rebulobivia karreri Fric n.n.

Rebutia einsteinii f. conoidea (Wessner)

Syn. Lobivia conoidea Wessner.

Rebulobivia nicolai Fric n.n.

Rebutia einsteinii f. rubriviridis (Backbrg)

Syn. Rebulobivia rubriviride Fric n.n.

Rebutia einsteinii f. steineckeii (Backbrg)

Syn. Rebulobivia steineckeii Fric n.n.

....from J. Chapman

"My collection of Rebutias and Mediobivias is still very young but rapidly increasing and I only have one plant of most species at the moment. However I do have two forms of Cylindrorebutia rubriviride Fric (Syn. Mediobivia schiedcheniana v. rubriviridis Backbrg.), one of which agrees more or less with the second illustration of Cylindrorebutia rubriviride published in 'Succulenta'. I believe that the other illustration (reproduced herewith - H.M.) is of a hybrid crossed with - perhaps - Mediobivia duursmaiana, for it possesses far too much wool on the areoles. This areole wool formation is similar to the aureiflora group, which includes Mediobivia duursmaiana under the designation of Setirebutia Buin. et Don.

"At first glance my two plants appear to be similar but on a closer examination one notices on the one larger tubercle dimensions, longer, paler spines which fade faster and a broader, depressed and almost naked apex, save for one or two white transparent bristles.

"Looking at the two forms in more detail, the one has a thinner body, with stiffer and more needle like spines at an oblique angle to the top, darker in colour which are retained longer, ginger at first then fading to straw colour; body tapering slightly towards the apex which is well bedecked with spines; the tubercles are smaller, their square bases shrinking later and arranged into 13 distinct and regular spirals. The plant reminds me of the text for Cylindrorebutia einsteinii v. steineckeii Fric.

"The second plant has longer, paler, twisting and flexible spines, only well coloured on the shoulders of the body, fading to a dull white afterwards; the tubercles are larger and more rounded, not shrinking - looking like an ear of maize or corn on the cob - only very slightly spiral and then not in a regular pattern. Although the violet colour is present, the apex appears to be a lighter green.

"I queried the existence of any *Cylindrorebutias* in the F.R. List with John Donald and in reply he remarks "Ritter did not find any *Cylindrorebutias* - he looked in the wrong place! However, Walter Rausch and Ernst Markus did find some and their sad comment was - there is only one species. On the ground every plant is different in body colour, spine colour, spine length, and flower size. All have pale straw flowers with campanulate, reddish tubes with greyish brown fluffy scale axils." To me this describes *Cylindrorebutia einsteinii*.

"I find these small and perhaps elusive plants very interesting and I would be pleased to correspond with other readers who grow these plants. We can accommodate one or two further participants quite happily in the 'Mediolobivia' Robin, too."

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We would welcome slides of *Cylindrorebutia* and *Mediolobivia* in the slide Library - A.W.C.

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#### BURIED STEMS AND SHRINKING BODIES

Following the notes and comments on the shrinkage of plant bodies in the dry season and the contribution to this phenomenon made by the swollen root - or the buried part of the stem - in Chileans No. 15, R. Ginns observes that "I feel that I must challenge some of John Donald's statements in his comments on my article on *Noewerdermannia* (Vol. 3, p. 53). John Donald's collection consists mainly of collected plants whilst the majority of my cacti have been raised from seeds. For this reason I imagine that I have had more opportunity to study the behaviour of seedlings than John. I specifically stated that my remarks only applied to young plants.

"In view of John Donald's comments which I saw last September I selected certain seedlings, *Fraileas* and *Gymnocalyciums*, and potted them singly so that the body of the plant was entirely above ground. By now (March) the top of the plant is level with the surface of the soil. On removal from the pot, the body, somewhat shrunken, was found to be below soil level. Even the areoles could still be recognised on the buried portion. It is, of course, not possible for this to happen with larger plants and shrinkage of the body would take place as noted by Eddie Barnes.

"On the question of tap roots John Donald seems to be rewriting some old established botanical terms. If a stem can regenerate roots why should not a root regenerate stems? Both possess cambium cells. Lowson's "Text Book of Botany", used up to ordinary B.Sc. level, mentions dandelions and docks as examples of tap roots. Anyone who has tried to eradicate these from his garden by breaking off the head will not need convincing that in these cases roots can regenerate stems.

"*Morisia hypogaea*, a little crucifer grown on alpine gardens, is propagated by root cuttings. It has not the usual single tap root but a cluster of slightly fleshy roots, any of which can be used as cuttings. *Pelargonium bowkeri* has a caudex and a thin woody tap root. This pushed out through the drainage hole of its pot and grew in the ashes covering the stage, extending for over a foot. Left undisturbed, it sent up a number of young plants. Other *Pelargonium* species can be propagated by cutting a root into 2 inch pieces and burying them in compost. Many other plants can be propagated in the same way from roots totally lacking

the fleshy nature of the plants figured in Eddie Barnes' excellent sketches.

"I was interested in John Donald's notes on the FR 199 plant of Ritter. In view of this the title of my article should have been *Neowerdermannia chilensis sensu Ritter, non Backeberg*. This is confirmed by the flower colour."

Also finding that his *Gymnocalyciums* shrink alarmingly in winter is A. Appleby who comments that "My *Gymnos. bodenbenderianum, baldianum* and ? *baldianum x denudatum - denudatum* Jan Suba, all shrink during the dry season so much that the body flattens down until it is almost only a disc level with the surface of the soil. But all three return rapidly to normal when I restart watering in Spring."

From E.W. Barnes we hear that "After I read John Donald's comments in No. 15 p. 53, it seems quite obvious to me that many of the Chilean cacti are of the 'underground stem' type. The thin necks to which I referred are clearly thrown out by such structures. Incidentally, it is interesting to note that these underground stems contain a small percentage of chloroplasts, which are absent in true tap roots and indeed in all root structures, and when exposed to strong light these increase to some extent, even though the thick, corky epidermis is somewhat impervious to light and this must restrict development of these minute bodies. The greatest concentration of chloroplasts can be found in the cells closest to the epidermis. Indeed the upper part of the buried 'stem' closest to the surface of the soil can quite often be noticeably green in colour.

"The remains of areoles can be found on some of these 'stems' or sometimes a node is formed complete with a great number of small areoles from which runners are produced that probe their way to the light, after which they develop into the characteristic plant bodies. It appears that during severe drought these thin necks may dry out and sever the surface body from its subterranean counterpart. This will conserve moisture in the underground portion of the plant until such times that growth can begin again and more runners are produced. Quite often a conglomeration of dead and growing heads can be found on a collected plant, all springing from well defined growth areas on the underground stem.

"Tap roots, like dahlia tubers, are unable to regenerate stems if they lack a small portion of the stem structure (in dahlias this is the dormant bud or eye, in cacti the areole). They are reservoirs for holding moisture and plant nutrients. The underground stem is superior to the tap root in that it can sever all connection with the surface and stay dormant during severe droughts, whereas the tap root must still supply the surface plant body with a certain amount of moisture. If this plant body fails to survive, then the tap root must die also as it cannot regenerate. Therefore a tap root can never remain dormant in isolation.

"It would seem that terminology is again causing some confusion" observes David Lewis, who then goes on to add "The relatively old plants of *N. reichei* which I raised from Winter's seed in 1958, have a constant root system that does not seem to alter: this lies about  $\frac{1}{2}$ " to  $\frac{3}{4}$ " below the surface of the gravel top dressing. Above this line there are a number of rings denoting the concertina action over the last ten winters. The thin neck exhibits most of the shrink rings, but it is possible to observe a concertina line higher on the plant body. The high creases may be taken up later by turgidity of the plant body.

"Regarding the plants that pull themselves into the ground, such as *Gymnos* and *Fraileas*, etc. I consider that this is no more than stem shrinkage and a clever method of moisture conservation. Just to further confuse the situation, may I point out that lignified tissue, i.e. the hard central core in cacti made up of xylem cells, cannot be easily compressed. There are such things as contractile roots but as yet I have seen no actual proof that these are present in cacti or any signs of their action. I would consider that all the action is in the stem.

"I repotted a *Gymnocalycium* the other day and noted how it had flattened - and I attach a sketch of the sort of sequence that must have taken place. This is similar to *N. reichei* but the folds on *reichei* are more obvious because the plant body is more cylindrical.

"I believe John Donald may not necessarily be correct in calling the storage parts underground stems. It is quite in order that some plants can regenerate shoots from such storage roots, providing formation of adventitious buds is possible. This is determined to a large extent at generic level and may not be a character of the family as a whole. Ron Ginns referred to a number of plants propagated by root cuttings. I could add many more. One of interest is Drosera binata, a sundew with roots little more than 1/16th of an inch across but still able to regenerate two or more plants per 2" length of root.

"By definition a tap root is a long central root descending vertically far into the sub-soil; or alternatively it is the primary root of a plant formed by the elongation of the radicle. A Dahlia tuber is not a tap root but is a root tuber and must carry a vestigial plant stem to enable it to regenerate. A potato on the other hand is a stem tuber formed from swollen underground stems and will sprout, the sprouts forming new roots.

"The plants Eddie Barnes drew are all those with storage roots, some resembling in shape root tubers. Thus SH 842 has at some time lost its original head and developed two others from a part of the original stem material. This portion of the plant, due to accumulation of surface deposits, may be well below soil level but still capable of some growth activity.

"Harry Middleditch's Notocactus was producing stoloniferous offsets - these come from a stolon, not from a root."

"Orchid roots have chlorophyll on the tips when growing well, and some other roots will go green if exposed to light."

Referring to the 'Introduction to Biology' by D.G. McKean, H. Middleditch finds that 'The flowering plant consists of a portion above ground - the shoot - and a portion below ground - the root; this does not imply that any part of the plant below ground must be a root' and further on "Commonly the stem is erect and green; but it may be horizontal as in strawberry runners, underground as in rhizomes, or very short and never showing above ground as in bulbs and corms'.

"Many of the foregoing observations bear out the comment (in Chileans 15 p.53) by J.D. Donald that the swollen underground portion of many cacti is a stem and not a root. However, his further comment that 'roots cannot regenerate stems' would appear to be a generality which holds over a very wide field of plants but is subject, like all rules, to exceptions. Some of these exceptions are quoted above for plants outside the cactus family and it may well be that J.D. Donald's comment that 'roots cannot regenerate stems' does hold for cacti.

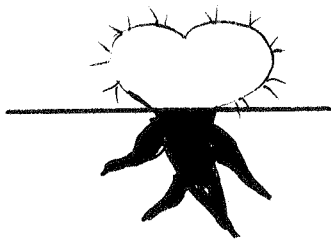
"Likewise the suggestion put forward by E.W. Barnes that chloroplasts are absent in true roots also appears to be a generality which holds over a wide field but to which again there are exceptions, such as that quoted by D.J. Lewis. Again, the comment may well hold if it is confined to cacti.

"The suggestion by D.J. Lewis that the plants sketched by E.W. Barnes (in Chileans 15 p.54) all have 'storage roots', rather presumes that they are not underground stems, whereas the weight of evidence would suggest that botanically they are correctly described as underground stems.

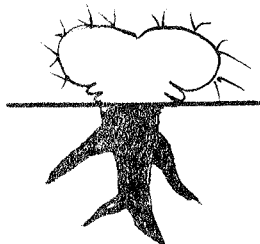
"After decades in which the only evidence of these rather unusual growth forms was either the illustrations in Backeberg's Vol III of Die Cactaceae, or the occasional import, or the even rarer home grown seedling, there has recently been a remarkable change due to plants of this type becoming quite readily available from importers in this country. Amongst these, a plant was obtained from P. Hallett under the name Copiapoa olivarna, shown in the accompanying sketch by Mrs. N. Swales. The aerial head of about 1" in size was joined by a small neck to a much larger swollen underground stem. An inch or so below the thin neck, a new offset complete with areoles and spines had burst its way through the



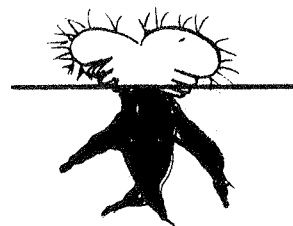
HT 816  
COPIAPOA  
OLIVARNA n.n.  
New offset  
just forming.



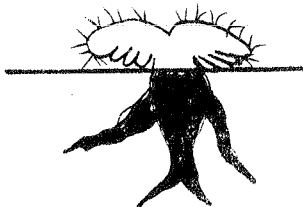
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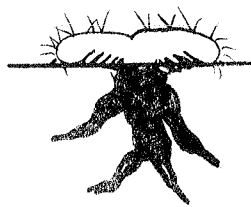
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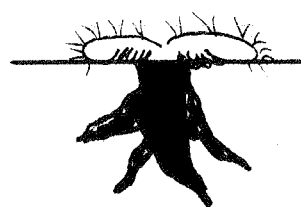
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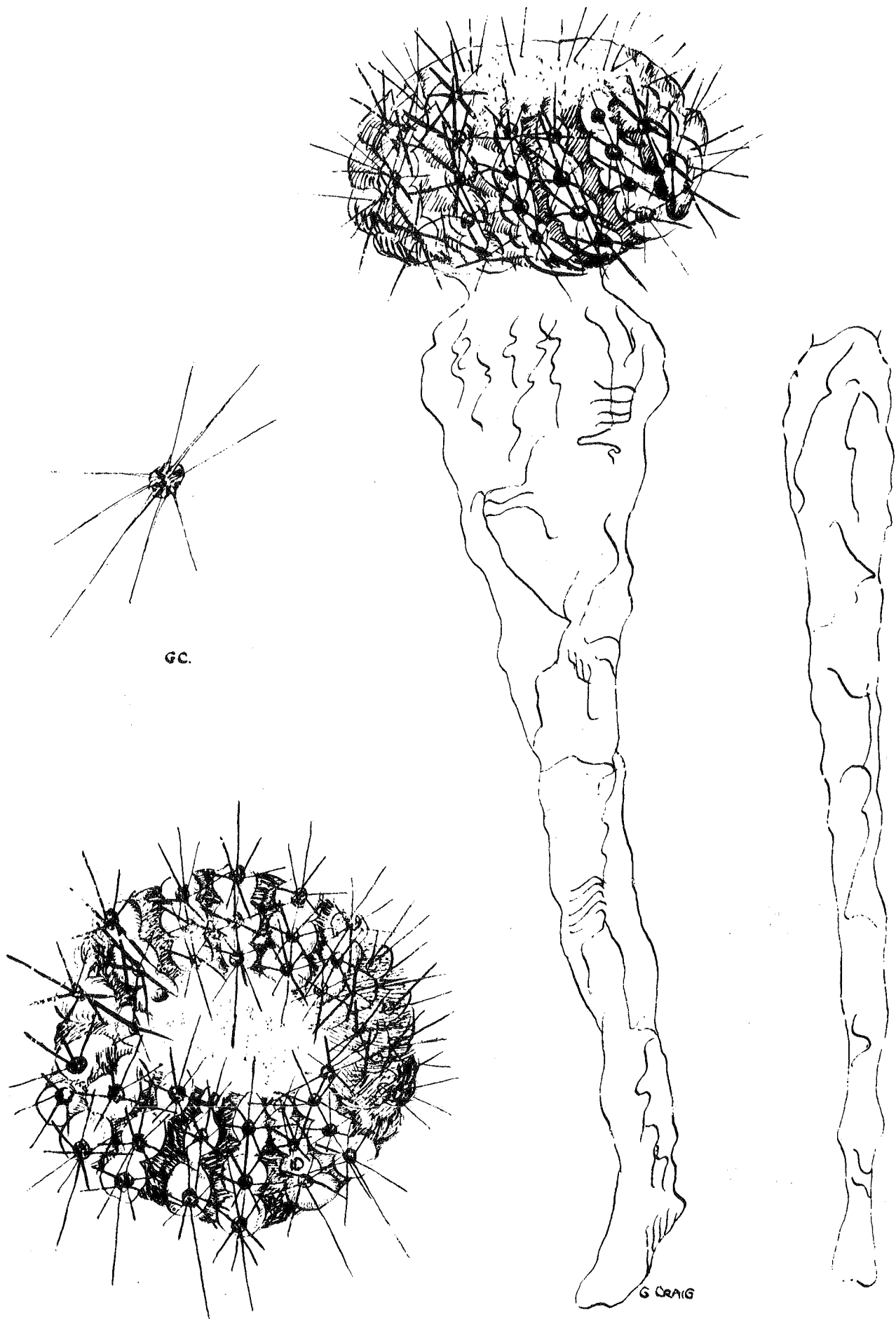


5.



6.

Winter shrinkage of *Gymnocalcium* — D.J.Lewis.



HT 819 ERIOSYCE Sp. Collection — A.W. Craig.  
 from Cifuncho 40 km. s. of Taltal.  
 lant app.  $\frac{2}{3}$  full size. Areole app. 1.5 $\times$  full size.

tough epidermis, in the same way that new offsets appear on aerial parts of the Copiapoa stems. This would appear to support the contention that this swollen underground portion is a buried stem.

"This particular plant probably had an even longer swollen buried part when growing in habitat, the lower part having broken off and probably remained in situ when collected. As there was a trace of fungus at this broken surface, when examined, it was cut back a short way to check its condition; instead of exposing a large area of soft tissue, as anticipated, a very woody central core was found which was practically solid and formed more than half the cross sectional area.

"A superb example of swollen underground stem was seen on an *Eriosyce* obtained by A.W. Craig from P. Hallett. This plant was lying amongst a consignment of recent imports and was hidden from view by a stack of various *Parodia*, *Weingartia* and *Copiapoa*. It was seen by chance from outside the greenhouse, right at the very back of the staging and was extricated only after shifting a dozen or two plants out of the way. One presumes that the swollen portion was growing in a cleft between two rocks, since it was about one inch thick over its length whilst the breadth was just over three inches at a point just below the thin neck, from which it then tapered downwards, as shown in the accompanying sketch.

"I was interested in the article about underground stems" writes E.W. Bentley, "I got a shock the other day when I discovered a fourth head to a three-headed *Copiapoa chanaralensis* (rather similar to E.W. Barnes' sketch of SH 842) that I obtained from Uhlig last autumn. I did not unpot the plant to see completely what was going on but the new head certainly has a very thin neck and has arisen an inch or so down below the surface.

"With regard to plants 'flattening to soil level' (which I would rather describe as getting pulled below soil level) there are two possible explanations. First, as seems to have happened to one of my *Copiapoa tenuissima* this winter, the tap-root is not straight, but coiled; and so an approximation of the coils without alteration in length is theoretically possible. Secondly, the woody tissue in the root is more prominent where it is thickest and shrinkage of the most distal parts - the rootlets etc. - might be enough to pull down the upper parts. And of course it does not have to be shrinkage - it can be a barrelling out and shortening as a result of greater turgidity resulting from downwards movement of materials within the plant body."

"A thing various and manifold" is how G.J. Swales introduces his comments upon the subject of swollen root or buried stem, then going on to say "When a seed germinates, the young plant produced consists of the primary shoot above and the primary radicle (or root) below. Between these two lies an intermediate region which is strictly neither root nor shoot, known as hypocotyl. In this region, the typical arrangement of the vascular tissue of the plant stem gradually changes as one proceeds downwards from the point of attachment of the cotyledons (seed leaves) until the typical root configuration of bundles is achieved. From here on, the axis becomes a true root. Above the hypocotyl, the axis becomes a true stem. At this early stage in development, it is immaterial whether the future plant mature will develop a tap root or a fibrous root system.

"As the seedling gets older, however, if it is destined to develop a fibrous root system, the primary radicle developed very little and eventually disappears completely. In the mean time, adventitious roots (that is, roots originating from higher up the stem) develop and become established to form the hunch of fibrous roots of, for example, a grass plant. If, however, after emergence from the seed, the primary radicle establishes itself to become a permanent and clearly defined organ, then together with its lateral branches, it forms a tap root system and the primary radicle becomes the tap root.

"A tap root can be a fleshy food and water storing organ, or woody in nature, and generally penetrates more or less vertically downwards to a considerable depth. When a tap root is woody and not unduly swollen, then the transition from stem to hypocotyl to root is gradual and externally undefined. When the lower portions of the axis become swollen, there is often

a very obvious and abrupt change between them and the true stem. What is not obvious however is where the root/hypocotyl/stem boundaries are and in the everyday example of a carrot, the stem proper is minimal with leaves appearing to emerge in a tuft from the top of the "carrot". The hypocotyl then forms the upper, quite small portion of the "carrot" and merges imperceptibly with the true tap root which forms the bulk of the structure.

"This fact would remain of purely academic interest if it were not for the potentialities of the two regions being somewhat different. The hypocotyl is stem-like in that shoots can frequently arise from this region, especially if stimulated to do so by the injury or removal of the existing aerial portions of the plant. Thus in the carrot plant, shoots may be produced from the upper portion of the "carrot" only (the hypocotyl) but not lower down (the tap root). Unfortunately, to add further complications, in some plants, roots are capable of producing adventitious shoots on true roots, as well as from the hypocotyl, so that any particular case, especially amongst less well known plants such as cacti, must be approached with caution and if shoots appear from an apparent tap root, as far as I can see, the only way to be sure what the plant structure really is, is to cut sections of the region and study the pattern of the vascular tissue under the microscope - a rather drastic method especially with one's treasured imported plants!

"I fear that some of my fellow enthusiasts have gone a little astray in their terminology of 'true roots', 'tap roots', 'underground stems', etc., but this is hardly surprising considering the complexity of the problem. As one of our predecessors, Theophrastus the Greek botanist, in circa 370 B.C. declared: 'In fact your plant is a thing various and manifold, and so it is difficult to describe in general terms'. It is indeed!"

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HOW DOES ONE INVESTIGATE AND DESCRIBE A CACTUS FLOWER? by Dr. F. Buxbaum.  
(Translated by E.W. Bentley from *Kakteen und andere Sukkulente* for August 1965).

I am obliged to comment repeatedly that the systematics - in modern parlance the phylogenetics - of cacti could have been cleared up long ago if we had had useful descriptions of the flowers of the species.

Anyone who concerns himself with the systematics or even only questions of boundaries of a genus, is invariably forced to carry out investigations on every species anew. Not to think of the ever more frequent instances in which in the setting up of a new species it is stated 'Flowers unknown'. One practically never finds a description of the fruits or even of the seeds.

One example may serve to illustrate this situation and throw light on the indefensible muddle among flower descriptions.

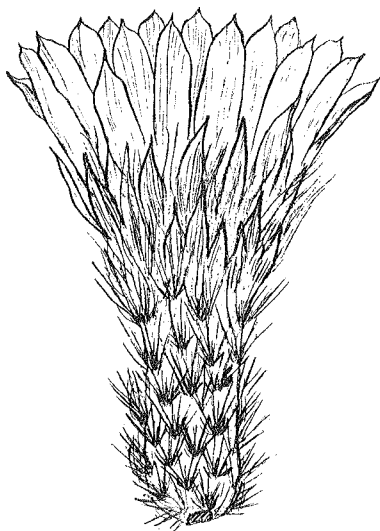
In a very expensive and recent - but in no way more up-to-date - 'Handbuch der Kakteenkunde' we may find the following description of the well-known Notocactus ottonis, which is particularly important since it is the type species of the genus:

"Flowers 4-6 cm long, lasting 3-4 days, with grey or brownish wool and solitary brown bristles on the outside; sepals lanceolate, somewhat reddened; petals almost spatulate, coarsely toothed, deep shining yellow; stamens often carmine-red below, or light yellow like the style; stigma dark red."

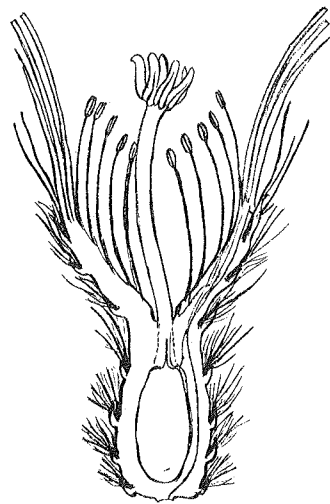
The description of Notocactus mammulosus reads as follows:

"Flowers about up to 4 cm long, yellow, white-woolly and brown or black bristled; sepals with reddish stripes; petals lanceolate-spatulate, coarsely toothed, canary yellow; stigma purple-red."

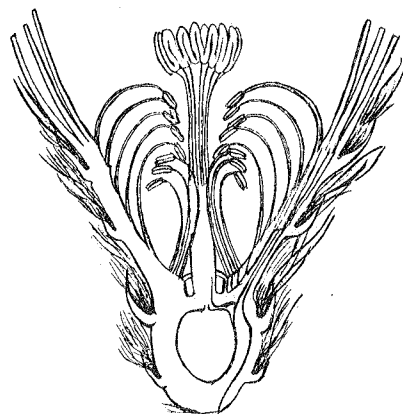




NOTOCACTUS  
APRICUS



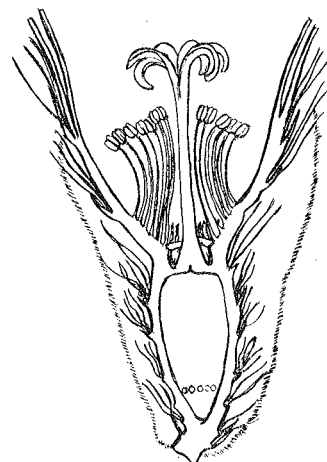
NOTOCACTUS  
OTTONIS



NOTOCACTUS  
SUBMAMMULOSUS



F. BUXBAUM  
NOTOCACTUS  
FLOWERS  
K.u.a.S 16.8:65.



NOTOCACTUS  
MUELLER - MELCHERSI

But what do the flowers actually look like? Above all, what do they look like inside? You might think that this might be dealt with in the description of the genus and is not then necessary in the species description. You would be quite wrong. There it only says:

"The flowers bear wool and bristles and are funnel-shaped and variously sized, often fairly large, rarely comparatively small. Style and stigma are red coloured with occasionally - but not typical - exceptions (seen by me however for example in N.mueller-melchersi)".

So there is not the slightest information about flower structure. Experience has shown that many collectors have penned vastly better descriptions. This example is the more instructive since the flowers of these two quoted species of Notocactus exhibit in external appearance - but much more so in inner structure - completely different Notocactus flower types from each other and belong to two different development branches of the genus.

In external appearance (Figs 1 and 3) this difference is admittedly not so striking because the relatively small pericarp of the mammulosus group is extraordinarily thickly clothed with white wool which makes the flower look more or less broadly campanulate although it is broad and short in proportion to the flower of the ottonis group. The cross section, however (Figs 2 and 4) shows a striking difference and it is remarkable that for all this, no other author apart from myself has mentioned it up to the present.

In Notocactus ottonis and its series, a group of stamens emerge directly above the nectarine groove and stand straight out from the pericarp wall and then, close to the style, bend over and describe an arch outwards. A second group, inserted directly after the first, emerges tangentially and curves over inwards. This basic formation of two distinct groups of stamens is characteristic of the tribe Notocactae, beginning with Corryocactus - but becomes very varied through augmentation or reduction as far as loss of one or the other group of stamens.

In N.mammulosus and its relatives the receptacle widens out just above the nectaries into a flat basin; on the bend stand the stamens of the inner group. From the outer edge of the basin-like receptacle spring the perianth leaves which at the bottom are united in an admittedly very short but true perianth tube and of which the very narrowed leaf bases clothe the inner receptacle, running down to about the place of insertion of the stamens. As a result there is no room for the outer (secondary) stamen group which is completely lacking - as is also clear from the course of the vascular bundles. The scales on the pericarp are diminutive and bear either only copious wool or, especially in the upper region, single bristles: but the scales on the receptacle which are substantially larger, carry long rigid bristly spines as well as the wool.

In the closely related Notocactus mueller-melchersi (Fig 5) the receptacle is not spread out flat but is broadly bell-like and also the scales of the pericarp bear bristles. The absence of the stamens of the outer ring however, is the same as in N.mammulosus - just as the downward running of the perianth leaf bases is too.

However, yet a third flower type may be demonstrated: Notocactus apricus, which is especially important and interesting, because this type assumes an important bridging position. The flower of N.apricus is described in the aforementioned book:

"Flowers large, 8 cm long with a firm tube: petals obtuse and toothed, yellow: stamens outer yellow, inner red." But this description is valueless and useless.

How does it really appear? Covered in wool, the flower appears narrowly funnelform, almost tubular and very little spreading out. (Fig 6). Pericarp and receptacle bear bristly but sharp little spines in the axils of the scales, flexible above, rigid in the lower part of the flower. The section (Fig.7) shows however that this flower shows yet another type within the genus. Above the relatively long pericarp the receptacle contracts so strongly that it has coalesced with the lower part of the style. As a result, the lower circle of stamens that would emerge upright are completely missing and all stamens emerge tangentially after the manner

of the secondary stamens: exactly the opposite development then to Notocactus mammulosus. Nowhere in literature can one find the least hint of this important difference.

These examples have been quoted because they show clearly how valueless are existing descriptions of even those species which are very commonly kept in collections. But they also make clear how important is a painstaking investigation of the inner structure of the flower and what can come of it.

In contrast to this, colours are most unimportant; many plant species even including cacti have yellow and red (or yellowish and reddish) flowering specimens, because both colours derive chemically from the same dyestuff. Size ratios in the cacti are particularly variable; they depend on culture conditions or original habitat and can be different in one and the same individual.

The same goes also for hairiness, spine length, etc. But usually these are almost the only characteristics that are brought into 'descriptions'. Here lies an enormous field of work for every collector who will interest himself deeper in his cacti and undertake much spade-work for science.

(The following are captions to the accompanying illustrations). - See p. 137

Notocactus apricus. The external view shows the strong spination of the pericarp and receptacle which is self evident on account of the reduced density of the wool. The section shows that the lower group of stamens adopt a similar profile to that of the upper stamen group. The wool on the pericarp is very short.

Notocactus ottonis (type species of the genus). The external view shows the more or less narrow funneliform appearance of the receptacle. In the section the receptacle is expanded somewhat to improve the clarity of the stamen arrangement - it thus appears wider than in the external view.

Notocactus submammulosus. The external view shows that the broad bell-like appearance and the widening out of the receptacle above the pericarp is not so obvious on account of the thick coating of wool. The section is not artificially expanded! The upper stamen group is lacking. The bases of the perianth leaves come down quite close to the outermost stamen insertion.

Notocactus mueller-melchersi. This belongs to the same structural group as the preceding illustration but it is not so obviously widened out. The wool zone is here depicted in outline and the nectary is also drawn in.

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## NOTOCACTUS AND RELATED GENERA by D.J. van Vliet.

(Translated by W.W. Atkinson from Succulenta for May 1966).

In spring, when the members of the genus *Notocactus* are in full bloom, we can see how thankful these 'ordinary' cacti are for good treatment. Once they were known as the 'Busy Lizzie' of the cacti. And they certainly flower well and abundantly. However, we must not let this rich flower season pass, without taking the opportunity of a closer study of the blooms.

If we cut through a few flowers, we see that they vary not only from one species to another, but between individuals, in form and colour. Apart from one or two exceptions, the flowers can be divided into two main groups, funnel form and bell shape.

In the funnel form group are included not only the *Notocactus* sub-genera *Paucispina* and *Setacei* but also the species of *Malacocarpus*. *N. scopa* is an exception, but I will return to this later.

The bell-shaped group contains the species of sub-genus *Mammulosi*. Here, the exceptions are *N. herteri* and *N. mueller-melchersii* - which also see later.

I have not been able to include *N. caespitosus* and *N. minimus* in the study as I do not have the necessary material.

As one can see from the names of the groups, they vary especially in the shape of flowers. But the colour also differs. If we add the positioning of the stamens, then it becomes obvious that there is not much in common between the two groups. This could possibly be a basis for separating the bell shaped group from *Notocactus*, but I hasten to add that it is not at all my intention to increase the large number of cactus genera by yet one more. But a different grouping of the species would be quite feasible.

The sub-genera *Paucispina*, *Setacei* and *Mammulosi* were set up in 1935 by Fric and Kreuzinger, but alas not validly published by Latin diagnosis and this should certainly be done, at least when the division appears to be completely accurate.

Subgenus *Paucispina* consists only of *N.ottonis* and varieties; *Setacei* of *N.apricus*, *N.concinnus* and *V.joadii* (which is sometimes incorrectly named *N.caespitosus*), *N.muricactus* and *N.tabularis*. Contrary to Kreuzinger, I exclude *N.scopa* from this subgenus.

The flowers of *Malacocarpus* also belong to this latter group. This might meet with some resistance, but you must remember that we are dealing here with grouping of flower forms. *Malacocarpus* is separated from both subgenera through its small flowers, short ovary and short petals which scarcely come beyond the outer flower-sheath. On further study it becomes evident that *Malacocarpus* actually unites the flower characteristics of both the above subgenera.

From one species to another differences are apparent - which, however, can be very variable in themselves. Also the form, size and colour of the flower of one single plant vary from year to year, dependent on the feeding and position. Even in one year they usually vary, the first blooms being larger than the later ones. So I thought at first that where the flower base joins the style, where the so-called nectar chamber is formed, was a characteristic of the subgenera, but as I examined more species and varieties I changed my view. It is thus advisable to study a great deal of material under various conditions and flowering at different times of the year.

The differences between the subgenera *Paucispina* and *Setacei* are numerous. Much new material has been imported from South America recently, but that has all still to be studied.

I have left *N.scopa*, *herteri* and *mueller-melchersii* to one side so far. The flowers of these species did not fit into one or other of my two groups. Although in this article I am not dealing with habitat, I should at this point mention that in the case of these three species this does not affect the differences in characteristics with the subgenus to which they belong. Fric placed *N.scopa* in the subgenus *Setacei* and *N.mueller-melchersii* in subgenus *Mammulosi*. Werdermann, who described *N.herteri*, placed it in subgenus *Mammulosi* on account of its spination. By comparison with the analysis of the flower in my schematic arrangement of the two groups, I shall clearly show that he was mistaken in that.

The flowers of *N.scopa* and *N.herteri* belong to the funnellform group, especially in the stamen arrangement. These are leading features: there are enough secondary characteristics to justify treating them apart. The flower of *N.mueller-melchersii* belongs with the funnellform group from its shape though by the insertion of its stamens, to the group with bell-shaped flowers. This poses a problem, but the weightiest factor must count. This is the insertion of the stamens and therefore the plant must be placed with the bell-shaped flower group. The broader flower base also suggests this course. One could presume, also because of these contradictions, that *N.mueller-melchersii* is a natural hybrid. This is difficult to substantiate and it is also an incorrect basis for deduction.

Plants are continually being imported. If they do not fit into our categories, then the scheme and not the plants must be altered.

Comments on Notocactus classification from H. Middleditch.

"We have already carried in this Journal a number of articles dealing with the classification of *Gymnocalycium*, current thoughts on that subject being based to a very large extent upon the system originally proposed by Fric and Kreuzinger in 1935. It is of interest to see the suggestion by van Vliet that the classification of *Notocactus* also put forward by Fric and Kreuzinger in 1935 may still be used as a primary division for grouping *Notocacti*.

"The author of this 1966 review very properly suggests that if plants do not fit into any system of categories, then that system requires revising. Close scrutiny of the complete article would suggest that author could have done worse than take that philosophy to heart. The latter half of the article has therefore been omitted.

"If we are to consider the observations recorded by van Vliet in conjunction with the examples quoted by Buxbaum, it would appear that we have immediately four distinctive groups, as follows:

"The *Paucispina* group of Fric, typified by *N. ottonis*. This will include *N. ottonis* and all its varieties and *N. megapotamicus*. The species in this group will occasionally form new heads from underground stolons.

"The *Setacei* group of Fric, typified by *N. apricus*. The stamens are inserted down most of the length of the tube with filaments which are more or less curved away from the style, the anthers more or less filling the flower receptacle. The anthers are sensitive to touch and respond by bending sharply in towards the style. This group includes *N. apricus*, *muricatus*, and *tabularis*. The flower of *N. concinnus* is similar and if this species is included in this group then the *arachnites* - *uebelmanniana* - *crassigibbus* complex should also be included. One could also follow Fric and include *N. scopa* and varieties in this group, although the flower is markedly smaller in size.

"The *Mammulosi* group of Fric has squat, campanulate flowers with a dense outer coat of wool and bristles: the stamens are inserted only at the base of the tube and cling closely around the style - they are not sensitive to the touch. Geographically plants from this group - *mammulosus*, *pampeanus* and *floricomus* - will be found much further to the west into Argentina than other *Notocacti*, as far as Cordoba Province.

"*N. mueller-melchersii* has a similar stamen formation to the *Mammulosi* but the flower tube is slender funnellform in shape. *N. rutilans*, *N. herteri* and *N. purpureus* could also be included in this group.

"In addition to these four groups (or five, if one prefers to keep *N. scopa* with its distinctly smaller flowers separate from the rest of the *Setacei*) we have the *Ex-Parodia* group of *N. buenekeri*, *alacriportana* and *brevihamata*; also the *N. minimus*, *caespitosus* and *tenuicylindricus* complex. The stamens on these latter flowers more or less fill the flower receptacle, as on *N. ottonis*, but both on my *N. minima* and *caespitosus* they are not sensitive to touch. The body grows columnar quite quickly, whereas *N. ottonis* grows columnar only in old age. *N. caespitosus* will produce offsets from root stolons just like *N. ottonis*. Taking spination into account it would seem reasonable to consider these three species in a group of their own."

...from K. Halstead

"In addition to the characters discussed above, there are differences in the fruit characteristics. The *Ottonis* group (Subgenus *Notocactus* Backeberg) has more or less spherical fruit which is fleshy and splits at the side. The subgenus *Neonotocactus* Backeberg has fruit which elongates as it ripens, becomes dry and hollow, the base opening and the fruit then disintegrating".

.... from Mrs. J. Hobart.

"I would go along with H. Middleditch's grouping of *Notocactus* flowers, from those that I have observed, but would include rutilans and brasiliensis in the *Mammulosi* group.

"I think that it is arguable that, wherever *N. scopia* comes in the scheme of things, *N. succineus* should be included with it. Both these species, incidentally, have sensitive stamens moving towards the style.

"I have not noticed differences in form, size or colour in my *Notocactus* flowers from one year to another or indeed from the first to later blooms. This year certainly, the difference in size was only in the nature of 1 to 3 mm. All the *Notocactus* I have studied produce flowers in quick succession or in groups at once - unlike *Parodia* and *Gymnocalycium*, for example, some of which have two separate groups of flowers in a season".

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### COPIAPOA - Extracts from The Chileans Robin - 3.

.... from G.W. Sykes.

"It is pleasing to note how water tolerant are Copiapoa, considering that in habitat they rely on sea-mists or mountain fogs. Mine are regularly soaked from overhead in season and appear free from any temperament - except in reluctance to flower.

"Last year I obtained an imported turnip-rooted *C. desertorum* of some 9 cm in diameter. The root was remarkable in that it was rigidly bent at an angle from the body, thus enforcing the use of a large pot to accommodate it. Perhaps the plant was originally growing in the cleft of a rock. I have a grafted seedling of *C. desertorum* bearing little resemblance to imported specimens, so that plant descriptions must vary between imported plants and seedlings. Surely imported plants are the only logical basis for description?"

.... from C.C. Baxter.

"My seedlings, now 16 months old, are nearing 4 cm dia. and 5 cm high: they seem to have slowed down after their initial burst of growth. These were raised by what I would describe as normal methods i.e. using a variation of John Innes seed compost for sowing and J.I.No.2 for pricking out. The seedlings are still on their own roots. I have had no trouble at any stage except that generally the percentage germination was low and I should be glad to know of any similar experiences.

"This summer ('69) we have had our best summer for fifty years - perhaps the good weather may have had its influence but I have at last had flowers on some of my Copiapoa. Flowering began in July and went on at intervals until the end of September. Those which flowered were much smaller than I expected they had to be to flower - *C. montana* 6 cm, *C. coquimbana* 5.5 cm, and *C. echinata* 6 cm. The first sign was the growth of heavy tufts of wool which began to cover the crown of the plant. Then from the wool, buds suddenly appeared and at this stage they seem to be well developed. The growth of the buds was very rapid and within a few days of their appearance the first flowers opened.

Following Ron Ginns comments in Chileans No.13 about scorching of his *C. krainziana*, Miss Colley from Eire also had her "*C. krainziana* quite badly scorched through a dull chilly morning becoming a bright sunny day whilst I was out at work". Also very sad is A. Bates who moved his plants into a new greenhouse and "some of my Copiapoa have suffered from sun scorch - *C. barquitenensis* is looking sick and a grafted *C. krainziana* has passed on. The others are now growing well again, being shaded rather heavily. I had not realised that Copiapoa were prone to scorch but I am now much wiser".

No so sure about watering freely is Mrs. Z. Andrews who feels doubtful whether "one can generalise on the water tolerance of Copiapoa. Most of them certainly like a fair amount in summer but there seem to be some species where more care is needed as the epidermis is likely to split. I had this happen to my C. haseltoniana.

"This year both C. krainziana and C. hypogaea v. barquitensis have been degrafted: both have since rooted and look healthy. Also on the credit side, both C. humilis and C. wagenknechtii have grown two new offsets each.

"I am fairly convinced that flower production can be related to temperature range, not only in Copiapoa. Several genera need low temperature during their resting period before they will reward us with flowers e.g. Echinocerei. Miroslav Voldan considers a sharp rise and fall in temperature between day and night an advantage for Copiapoa. As paraffin stoves cannot be controlled as much as electricity, my own plants certainly get their share of that and as I flower quite a few varieties, could that be the reason? Perhaps I can thank the temperature for my lovely C. montana flowers this year.

A new acquisition by D. Angus was "a prolifically offsetting C. humilis which, since I bought the plant as a solitary specimen in May, the main body has grown slowly but it has produced fifteen offsets at the base during the season, six of which were over 1 cm in diameter.

"All my plants are growing in plastic pots in my usual soil mix of 2 parts of J.1.No.2 (home made, with gypsum) at pH 6, and one part of coarse sand. I use no drainage material in my pots, but place about 1" of peat at the bottom. The plants seem to appreciate this as the roots of several species could be seen through the drainage holes within a month or two or their being potted up. By this means the plants always have a supply of moisture as the peat never dries out during the summer. I find that I get much better results this way than I used to when I put crocks over the drainage holes - and spines are not adversely affected".

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We do have a selection of Copiapoa in the slide library but I am interested in extending our coverage of Copiapoa by obtaining slides of other species - A.W.C.

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Our Copiapoa Robin unfortunately got lost for many months in New Zealand when a participant was moving house; I gather that it is now on its way again and I would appreciate hearing of its subsequent progress. We will have to divide this Robin into two on its return home in order to give all participants an opportunity of receiving it less infrequently - David Lewis.

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#### CHANGES OF CLIMATE WITHIN A SHORT DISTANCE - by D.J. Van Vliet

(Translated by W.W. Atkinson from Succulenta for June, 1968).

Anyone who has travelled in S. America knows that this sub-continent experiences more different climates than similar, and often larger areas of the world surface. The origin of this is the fact that the land-mass is divided by the longest mountain range in the world, running from north to south, and from both sides the oceans exert their influence to produce climates of every kind. These can change in quite a short distance, a fact that the traveller should take into account if he wants to avoid running into difficulties.

Now in the Netherlands we are accustomed to very changeable weather, but that is not what is meant here; rather several actually different climates exist within very short distances of each other. In this respect Bolivia is one of the most interesting countries of South America. If one travels from Cochabamba to Incachaca in the province of Chapare, a specific example can be experienced.

Cocabamba lies 2500 m above sea level and has a moderately warm and dry climate. In what is here called winter - but in our experience would pass for summer - the night temperature can drop dramatically, with frost being far from rare. However, in this period there is continuous sunshine during the day which is in contrast with our winters. In a European way of thinking there is another difference, for there the mountains are capped with snow in the winter while in South America this occurs in the summer. Summer here is the rainy season and also the time for the snow. The winter is sunny and dry. The climate here is favourable in all respects to the growth of cacti.

Here are a few species that grow in this area. Parodia schwebsiana and var. applanata, P. ayopayana, Echinopsis obrepanda - which is very variable in form and also blooms in several colours, e.g. white, orange, red, violet - Echinopsis huotii (syn. E. cochabambensis Bckg.). Cleistocactus bachtiensis, C. herzogianus, C. laniceps, Sulcorebutia kruegeri, S. steinbachii, S. verticillacantha, and S. candiae. Roseocactus (presumably a misprint for Corryocactus - H.M.) melanotrichus, Trichocereus tunariensis, T. bertramianus, the as yet undescribed Echinopsis megacarpa, and several Opuntias including O. vestita and Tephrocactus pentlandii. In short it is ideal here for cacti. Going north-easterly in the direction of Chapare, the mountains go up to 4000 m. The climate stays dry and here can be found Sulcorebutia steinbachii in all its forms. Long or short spines of brown, ochre-yellow or black; flowers of red, violet, yellow and matching colours; the sight of these very variable plants would make the European name-inventor's mouth water. At this altitude we find Lobivia caespitosa too, also variable in form, and a little higher a form of L. pseudocinnabarina which looks very much like Weingartia. And everywhere Opuntias and Tephrocactus pentlandii.

On the highest peaks there seem to be no cacti. The nice dry climate has made way for a more humid type, more like an Alpine climate. This is caused by the clouds constantly shrouding these mountain tops in mist. Here, one finds plants which require more moisture, rarified air and humus, such as a Gentiana species with white and violet flowers and a Lycopodium.

Thick layers of various mosses cover the stone formations, and the high precipitation causes multitudes of rivulets, also underlining the climate change. The water that runs off in the direction of Cochabamba washes a good deal of lime away, and soon becomes what we call "white coffee".

On this side of the mountains grow very few plants because of the dry climate, and those which do occur are those which keep the soil in place with their roots. Once over the top, the scenery changes very quickly. The permanent mist produces constant drizzle and thus an extremely humid climate. Everything drips with the water that on this side finds its way to lower levels in crystal clear streams, which eventually add their contribution to the mighty Amazon River. By then it has travelled several thousand kilometers.

In this natural hot-house is a tropical jungle where one plant has to live on or from the other (epiphytes and parasites). To walk through this jungle one must be equipped with a machete and it is hardly an exaggeration to say that if one turns round the jungle has already closed in again. The most gorgeous butterflies and birds are to be seen, but for our especial interest also plants, including a fern tree (Cyathea) with its magnificent crown - Cedrela, related to the mahogany and representatives of the following genera: Aralia, Areopauca, Bocconea meliceae, Begonia (large and small flowering, in all colours) Bromelia, Fuchsia with orange and red flowers, and naturally orchids and Passiflora in lilac, bright red, blue and dark violet flowers. The undergrowth is covered in a ghostly manner with Tillantia species. Of cacti we find the highest, but also the most extreme. Several Rhipsalis species occur and I am very conscious of having named only a few of the many plants represented.

These three climates occur within a travelling distance of 70 km and are of a permanent nature. It is interesting to note that it is not the tropical climate that has the highest temperatures. In the orchid area it was 16°C and always misty, this mist mantle ensuring that the



night temperature falls by less than 2 degrees. Summer temperatures fluctuate about the 20°C because of the ever present mist clouds.

(Here we appear to switch to the first climate type, though there is no such explanation in the text - W.W.A.).

Although it was autumn, and around 3000 m high the temperature was 22°C and at night, especially in the winter, it can freeze sharply. Summer temperatures can reach a value of 25° to 30°C. Taking these particulars into account it will be seen that we can allow higher daytime temperatures in our greenhouses than is sometimes advised. Similarly a possible low night temperature should not have a particularly adverse effect. Plant losses occur here, as with us, through too much water. In a certain area we found no living cacti, but only the remains thereof. On later enquiry we found that a climate change was in process. Years ago a large number of trees had been planted and now that these were fully grown they were attracting the rain and, especially in the summers, had become much wetter. So, my friends, be careful with the water, even in the summer, and make sure that the soil can dry out quickly after watering.

Finally the alpine climate, where sun and clouds are in continual conflict. Here the temperature was 12°C, and this was most certainly a top point. Temperatures here are mostly very low, with snow and hailstorms. It should be noted that the temperatures were measured in the middle of the day, and that it was autumn.

The other temperatures were given us by the weather station at Cochabamba and are average.

And yet the influence of the seasons is not so noticeable as in our country, and we shall not be held up on our journey by slippery roads so that we shall have more to tell another time.

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The city of Cochabamba will be found on the accompanying map of Central Bolivia : Incachaca is on the other side of the Cordillera Oriental.

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## SOME BOLIVIAN PARODIA

Recent imports of *Parodia* from the Bolivian Andes have demonstrated how familiarity with the typical European greenhouse grown plant may be misleading when classification of species or optimum growing methods may be under discussion.

The group of plants round *P. maasii* will - by now - be fairly familiar to most collectors, with their generally rather long spines, usually of a slightly twisting or curling character, somewhat hooked at the tip. In cultivation these plants are usually globular or slightly elongated. Imported plants from this group have - not surprisingly - rather more tightly packed spines than commonly seen on cultivated plants. This could be due to the fiercer insolation encountered in habitat, although there is always the possibility that the imported plants could have shrunk in transit; this would draw the areoles closer together and the spines would become more tightly packed together.

If the body expands in the better growing conditions in a greenhouse, the areole spacing will increase and the spine density will reduce. Would the plants respond in a similar manner at the onset of the rains in habitat, or does the 'expanded' form represent a condition which does not occur in habitat?

A close examination of the neck of several imports of plants from this group reveals many areoles with comparatively minute spines, similar to those on immature cultivated seedlings. The neck also often exhibits marked indentations as if it had grown close to a solid object or objects, not much smaller than the mature plant itself. Does one presume that this represents

the early seedling growth of an immature plant sheltered from the fierce sun by broken rock, or by large gravel - but that once exposed by continued growth to the undiffused daylong glare of full sun, the protective armour of long dense spines is then developed?

If this is the case what, then, are we to make of those imported *Parodia* which appear at first sight to be largely green body, with a sparse coat of short but strong spines - like *P. schwebsiana*. If these plants are examined carefully, they are usually found to have a soil level apparently near to the flattened top of the plant, the large part of the body below this level, more or less tapering conical in shape, being coated with soil. Does this suggest that only the flattened upper part of the body, some one or two cms in height, is all that projects above the ground? But even this dwarf stature would hardly be sufficient defence against high altitude insolation - unless the sunlight was diffused by grass and bushes.

Now if these plants do indeed grow in locations possessing a modicum of soil cover, it is quite probable that the soil may also support a mantle of perennial grass and possibly some dwarf xerophytic bushes. This other vegetation would then protect the flat-bodied *Parodias* from direct sunlight.

The difference here between the flattened plants, almost level with the ground, as received from habitat, and the elongated specimens found in collections, is most marked. But under conditions of ample rainfall, does the same thing occur in habitat? Does the plant collapse concertina fashion in the dry season to gain what protection it can from withered grasses, expanding like a jack-in-the box at the onset of the rainy season so that the flowers in the crown may compete for the attention of passing insects, even though the grass alongside is growing further and faster upwards?

The rocky ground surmised for the *maasii* group plants is hardly likely to support much grass cover - if indeed it supports any - so the *Parodia* growing there need a dense spine cover as a permanent defence against the sun. Recent imports of plants which appear to fall within this category include: *P. escayachensis*, *obtusa*, *camargensis*, *maasii* v. *albescens*, *splendens*, *maxima*, *fulvispina*, *carrerana*, *taratensis*, 903, 924, 925 and 926.

The dwarf grassland types are typified by *P. yamparaezi*, *schwebsiana* and v. *applanata*. From the above considerations one may wonder if *P. schwebsiana* in the wet season turns into *P. schwebsiana* v. *applanata* in the dry season.

Yet a third group is represented by *P. procera*, *ocampoii*, and 997 (similar to *gracilis*), with a fairly dense armament of quite short straight spines, the central being of similar length and thickness to the rest of the radials. One presumes that these come from an altitude and/or area of associated vegetation, differing from both the two preceding groups.

H.M.

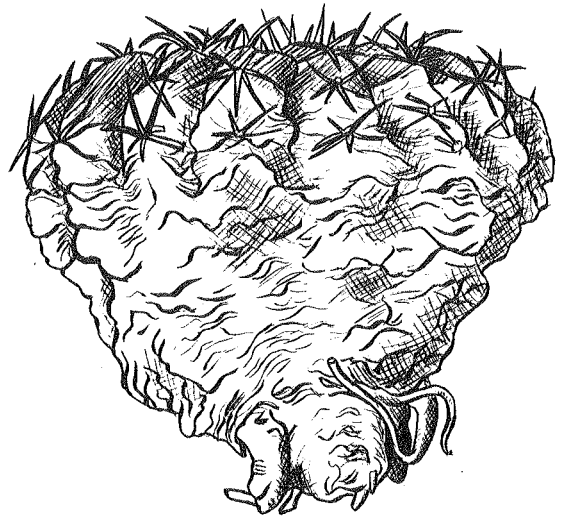
Comments on the preceding article on *Parodias* from C. Webb.

"My *Parodia schwebsiana* v. *applanata* is identical with the sketch as I believe it was the model for the artist. I also noted how little green plant there was compared with the size of the rootstock. It was noticeable that as soon as the plant had rooted (in ordinary compost, in the propagator but with the top glass removed and watered over the plant just a little every third day) the first thing it did was to form a dense covering of white fluffy wool which quickly extended over the whole of the top of the plant leaving only a narrow green belt of plant exposed to the sun.

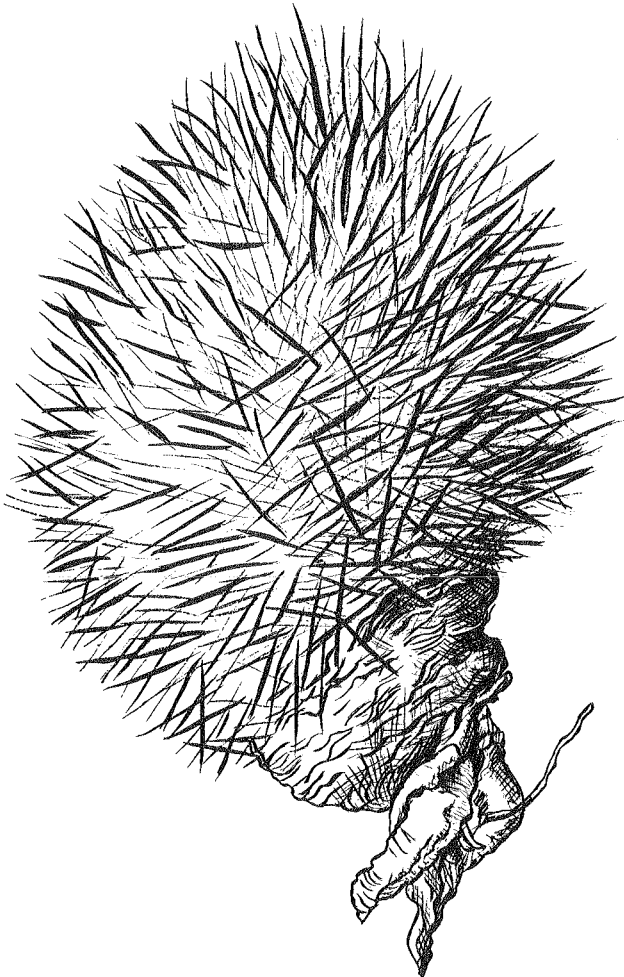
"The flowers were produced just off centre and appeared first as pointed hairy buds dark gingery brown and developed over two weeks into medium sized orange red blooms rather similar in colour to *P. maasii*. I have no notes as to stamen and stigma but I think that these were pale creamy yellow. The flowers were pollinated but there did not appear to be any signs that it had set fruit. The flower remains withdrew right back into the wool - which extended right out to the shoulder of the plant - so I decided to have a poke about in the wool, about the end of the



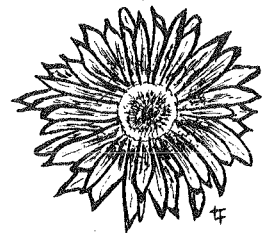
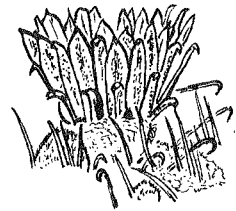
HT 978  
PARODIA SCHWEBSIANA  
V. APPLANATA



HT 989  
PARODIA YAMPARAEZII.



HT 930 PARODIA CARRERANA v.?



PARODIA  
YAMPARAEZII Card.  
Collection - T. Lavender.

summer. I found some flower remains and pulled them out with the tweezers - there was no immediate evidence of any dried remnants of fruit attached to the flower remains so I merely tossed them to one side. However, on looking carefully into the wool I discovered that, left behind there, was a little egg cup full of seeds, so I immediately picked up the flower remains again and had a good look at them. However, on close examination, there was only a very small remnant of dried up fruit wall to be seen on the flower remains. It was not possible to examine the precise nature of the remnants of the seed pod on the plant, to see if it had split open in a clean peripheral break. Oddly enough, although my *Parodia* in general do not grow very well, they flower profusely and most produce fruit and seed.

"I also have two small cultivated plants of *P. schwebsiana*. They are very different from the variety *applanata*. The larger one is 45 mm high and 40 mm in diameter, cylindrical and flat topped. Ribs 13 slightly spiralled, areoles 7 mm apart, oval with 11 or 12 radial spines, straight, stiff, pale cream tipped ginger brown 5-7 mm long. There is a single central spine, stout, chestnut brown when young, paler later except the hooked tip, up to 14 mm long directed downwards. The plant is very woolly at the top, later areoles are bare. Neither has flowered. There is a slight indentation between the areoles, not large enough to form tubercles.

"I have always had a lot of trouble growing *Parodias*. Smallish plants get a ring of brown scorched tissue like red spider damage. This year I have kept all the *Parodias* in slight shade - or rather reduced the light by using polythene under the glass. Results so far seem fairly satisfactory as I have had no scorching this year".

.... from T. Lavender

"I obtained my plant of *Parodia yamparaezii* from H. Middleditch, as a freshly imported plant and it was rather shrivelled but with a certain amount of strong root, almost a turnip root. I planted it in a very coarse compost a little higher than the corky portion at the base of the plant. The plant took about three weeks to get established and is now very plump and showing signs of new spines and body growth, since taking up water the plant has about one and a half inches of green body above the soil level".

"The plant has 15 ribs spirally arranged, with the ribs divided into tubercles similar to some of the *Gymnocalyciums*. The majority of the tubercles carry eight radial spines, the three at the top of the areole being slightly longer than the others and somewhat stronger, and one central spine which is strongly hooked. This plant was checked by me before being potted up and I found that the soil around the corky part of the root was of a very sandy type but a dark brown colour, I assume that this was the soil from the habitat. Around the lower spines I found an amount of fine dried grass, it appears therefore that this plant grows amongst this type of grass.

"Not long after settling down the plant produced a bud in the crown wool, chestnut brown and starting to show the colour of the flower when approximately a quarter of an inch across. The flower is coloured orange red with a slightly darker mid stripe, the edges of the petals are almost transparent. There were eight stigma lobes, the stamens, stigma and style were all creamy yellow. The petals appeared to be in three rows, with not necessarily the same number of petals in each row."

.... from H. Middleditch

"My own imported plant of *P. schwebsiana* is about the same size as that illustrated and was obtained at the same time. It was potted up after roots started to form and the upper portion must have taken up quite a lot of water for the green part of the body is now quite turgid and without creases; the upper part of that portion which - to judge by its colour - was below soil level in habitat, has also elongated and lost all its creases. As a result that plant is now standing about two inches above soil level.

"It is located about a foot from the glass on the south side of the greenhouse but there has been no new growth of wool over the body apart from the thick cushion in the crown of some 25 mm in diameter which was present when the plant was obtained. Ribs twenty (Backeberg's Lexikon gives 'ca. 17 ribs' for *v. applanata* and for *schwebsiana* 13-20 ribs) which have virtually no notching at all to form tubercles. The centre spine is a distinctive pale yellow colour, is downward pointing and slightly hooked at the tip, whilst the radials are quite distinct, finer, needle like, spreading. The comment of Backeberg in his Kakteenlexikon that 'the three uppermost radial spines are later somewhat stouter and could be considered as central spines' could hardly be applied to my own plant. The body is about 60 mm in diameter and as Backeberg gives 7 cm for body diameter then it could hardly be a question of immaturity in my case.

"The new spines are growing through the wool in the crown of *P. schwebsiana v. applanata*, almost to the centre, whereas my imported plant of *P. yamparaezii*, with its somewhat broader cushion of crown wool of ca. 35 mm diameter, only exhibits growth of new, short, spines round the periphery of the wool cushion. This plant of *yamparaezii* has 19 ribs and again there is virtually no sign of the ribs being notched to form tubercles.

"Amongst my other *Parodia* I can only see a cultivated, grafted, plant of *P. otuyensis* which seems to have an affinity with the two preceding species. This plant possesses quite short radials, a single central, stoutish in comparison with the radials and longer, downwards directed and hooked at the tip; an appreciable amount of the body is exposed to view. Thus one gains an impression of similar habit to *schwebsiana* and *yamparaezii*, but the 13 ribs are quite distinctly notched to form tubercles, to about one third rib depth. This plant has red flowers - on my own plant these were only about half the size of that illustrated by T. Lavender for *P. yamparaezii*.

"In view of the relative proximity of *Yamparaez* and *Otuyo* (see accompanying map), it is understandable that the *Parodia* species from each locality could be of similar habit, but it is perhaps rather more remarkable that there should be such similarity between both habit and flower of *yamparaezii* and *schwebsiana* when they are separated by a much greater distance, *yamparaezii* coming from the Sucre watershed or Cordillera Central whilst *schwebsiana* is found in the Cordillera Oriental. HT 978 was collected at Arani whilst HT 989 was collected 10 miles west of *Yamparaez*.

"In the German *Parodia* Robin for 1967 one finds "Herr Brandt conjectures that *Parodia multicostata* and *P. schwebsiana* are one species. According to Herr Urbrock *P. multicostata* has not so pronounced ribs as *P. schwebsiana*." Being without a *P. multicostata* I am unable to add further to this comment. Also in the same German Robin is a suggested classification for *Parodia*; one section contains the following species names:- *carrerana*, *columnaris*, *mairanana*, *multicostata*, *otaviana*, *otuyensis*, *schwebsiana*, *sotomayorensis*, *tarabucina*, *taratensis*, *tridimcostata*, *yamparaezii*. No explanation for what feature or features are considered in this classification are given, but perhaps body and spine habit might have been the leading characters considered. From this list of species, seed studies by D. Lewis suggest that *otuyensis* and *multicostata* fall within the *Oblongispermae*, *columnaris* is *Microspermae*, *mairanana* is *Macranthae* whilst *schwebsiana* is *Brachyspermae*. This might suggest that there could be problems to face in preparing a classification of *Parodia*.

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We do have slides of a number of *Parodia* in the Slide Library, but not of those described above and I should like to fill this gap. - A.W.C.

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SULCOREBUTIA from the Chileans Robin.

Writing in the first week in May, John Donald opens his contribution by observing that "The plants are once again in flower - I suppose some four to five weeks late - but are making up for lost time with fantastic bouquets in riotous colour". H.Middleditch comments upon how the slides accompanying the Robin "show considerable diversity in petal shape between species; some of the petals e.g. on *glomeriseta*, *weingartiana* and *candiae* seem fairly narrow, whilst on others such as *sucrensis*, *tiraquensis* v. *electracantha*, and *kruegeri*, the petals appear to be broader. I have also seen a *Sulcorebutia* with a well developed bud about to open, where the stigma just showed through the very tip of the sepals - this proving to be the day prior to the flower opening. Presumably this would only occur with a pointed bud?" To this R.E.Hollingsbee adds "I have noticed with *steinbachii* the stigma protruding from unopened buds".

In response, J.D.Donald comments that "Almost all the *Sulcorebutia* can and do show exerted stigmas through the unopened bud. This is a lobivoid characteristic and occurs mostly during warm dull spells; if there is plenty of sunshine the bud bursts before the style lengthens sufficiently to penetrate the bud point, otherwise there is a delay and only the style continues to grow. *Weingartia* shares this characteristic.

"Petal shape is often a mark of individuality of a single plant and can but rarely be taken as a characteristic of significance; particularly with regard to the petal tips being rounded or pointed. I have observed several times on a single plant one flower having rounded tepals and another pointed. There are, however, certain stable features in petal shapes that are generally characteristic and these are the ratios of the major and minor tepal axes and also the position on the major axis of the maximum value of the minor axis. Combinations of these two are very significant."

From Mrs J.Mullard we hear that "I am now growing a lot of plants in large clay pans, and am amazed at the difference in their growth and general appearance. I realize they will have more root room, but when a pan is repotted the roots are quite separate still, not all entangled as one would expect. Another point - has anyone noticed that after the lovely summer in 1969, the spines on a great number of their plants are now much stronger and longer than before? This is quite noticeable in our collection now (Jan '70) even mature plants are producing great thick, long, spines and this has not happened with us before. It is happening to several *Sulcos* also - *S.tiraquensis* which has very corky roots and is a really old imported plant, is going to look really daft with a top tuft of long spines now. *S.steinbachii* v. *gracilior* obtained from Uhlig is doing the same thing. Another variety had long spines when imported and had about halved their length and ferocity in our greenhouse - now they are back as when imported; this also originated from Uhlig. It begins to appear that the sun makes spines, both strength and length."

To this R.E.Hollingsbee adds "The remarks about sun affecting the length of spines are certainly true. My degrafted *Sulcorebutia tiraquensis* now resembles an imported specimen much more closely after a good year or two with lots of sun and - as Jo observes - even the imported plant has better spines, although I doubt if they will ever be quite as thick and strong as when imported. One grower of imported plants told me that habitat type spines can be approached quite closely by feeding with a tomato fertiliser and I am trying this. In the case quoted, however, plants were grown in clay pots which were said to hold the chemical feed when pots dried out and released it again when plants were watered".

And J.D.Donald adds further "Tomato fertilisers are perfect for the Cactaceae as they have a high P to N ratio. Most artificial fertilisers have a high N to P ratio, which promotes rapid growth. High P favours harder growth and better flower and fruit production - hence the better spination."

On the questions of setting seed raised in the previous round, E.W.Barnes now comments that "*S.steinbachii* sets seed without assistance, but the others set seed best if hand pollinated. The seed pods on my plants were approximately the same as those on Bob's and also contained

very few seeds in which case the pod was filled with pulp. S.steinbachii and varieties produce seed in profusion with very little pulp. This is the only species, as far as I am able to judge, which produces a large amount of seed, the rest are way below steinbachii's average of 50 seeds per pod, 80% at least of the pods of other species contain less than 10 seeds. Indeed I consider even 10 seeds to be quite exceptional in certain species." To this, R.E.Hollingsbee responds "I simply cannot understand Eddie's steinbachii setting pods without assistance; I have several plants but none do this for me." and Mrs J.Mullard adds "several of my Sulcos did set seed this year for the first time ever, but I admit to going over them with a soft brush."

Commenting upon a slide of S.candiae from R.E.Hollingsbee which accompanies the Robin, H.Middleditch says "Your slide of candiae is not quite what I have come to associate with this species, as your plant seems to closely resemble my kreugeri and sucrensii in the neat pectinate spines just overlapping from those on one areole to the next. My own candiae has yellowish spines, which stand out further from the body than your slide but curve back to be parallel with the body contour, overlapping much more than kreugeri. One collector in Hexham has an even better specimen with longer spines still and Horst Ewald's plant looks like Matucana comacephala as the spines are so long and overlapping as to almost obscure the body and seem at first sight to be wound round and round the body." He then takes up a previous comment by J.D.Donald and says "I am surprised that you give candiae as brownish spines - surely these are yellow, as Backeberg gives in his Lexikon?"

In response, John Donald suggests that "Candiae is like a yellow spined kreugeri and can have long or short spines overlapping and wrapping round just as in the case of kreugeri. The only form of kreugeri not paralleled by candiae is the pure white short spined pectinate form. Candiae can have brown spines as well and it is interesting to note that the darker spined forms have darker flower buds as well as more orange in the flower. Candiae has greenish buds - menesesii has brownish buds; xanthoantha has greenish buds but with the same pale flower of menesesii."

A recent acquisition was referred to by H.Middleditch, "a small plant of Sulcorebutia taratensis v. minima, which has very very fine white pectinate spines, pressed close to the body but commonly curved downwards, very similar to taratensis. In view of this similarity I am rather puzzled to have read that this is now a variety of another species" and in response John Donald says "that as far as I am concerned, this is still a variety of taratensis, but Walter Rausch thinks it is better named as a variety of Sulco. verticillacantha and his R.196 will be distributed as S.verticillacantha v. minima but officially it is still S.taratensis v. minima. My own plant (on its own roots) now stands 20 mm high and 8 mm wide and has six flower buds. Rausch believes that S.verticillacantha with S.steinbachii are the two dominant species and that many current species may be reduced to varietal status of these two e.g.

<u>S. steinbachii</u> v. <u>tiraquensis</u>	R 187
<u>S. steinbachii</u> v. <u>lepida</u>	R 189
<u>S. steinbachii</u> v. <u>totorensis</u>	R 190
<u>S. verticillacantha</u> v. <u>mizquensis</u>	R 194
<u>S. verticillacantha</u> v. <u>minima</u>	R 196"

A further query was raised concerning Sulcorebutia hoffmanniana, which is quoted in Backeberg's Lexikon as having a habitat at Oruro, well away from any other Sulcorebutia growing areas. H.Middleditch asks "Is there an error here somewhere? Also what are the views on the slide (accompanying the Robin) of the Lobivia hoffmanniana taken by R.Hollingsbee at Heidelberg on the 1969 Chileans Tour?" Bob Hollingsbee adds to this that Lobivia hoffmanniana "is quoted by Backeberg in his Lexikon as a Sulcorebutia, having been transferred from Lobivia. My slide depicts the nude ovary and tube of the dead flower lying on the surface of the soil below the areole from which the force of heavy rain appears to have dislodged it. From the areole and spination it is surely no Lobivia - on the other hand it is quite different from the hoffmanniana at Les Cedres depicted in a slide by John Donald (also with the Robin). I wrote to John Donald about this species and he tells me:

" 'The plant originally described indeed has the long areole and pectinate radial spines of *Sulcorebutia*, together with an extraordinary pair of centrals, very strong and twice to three times as long as the radials. These centrals arise in the upper part of the areole, one behind the other and stick straight up vertically - not from the areole, but literally 90° to the horizontal. The original plant does not offset at all freely. However, there is a plant called *Lobivia hoffmanniana* which does - this also has long areoles but generally lacks the centrals. I have neither sort myself as all the so-called hoffmannianas which I get are always grafted *S. kruegeri* with brown spines!

" 'The slide of the plant at Heidelberg is a very good study of the typical *Lobivia hoffmanniana*, as I recall it at Heidelberg and it also resembles the photograph in *Die Cactaceae Vol III* given as *Lobivia hoffmanniana*. Backeberg, you will recall, was conservateur at Marnier Lapostolle's magnificent collection at Les Cedres for some time and it was there that he made many of his new descriptions, including *Lobivia hoffmanniana*. It was also there that he decided the plant might be a *Sulcorebutia*. There is, I agree, a difference between my slide of Backeberg's *S. hoffmanniana* at Les Cedres and Bob Hollingsbee's slide of *L. hoffmanniana* at Heidelberg. The former lacks the form of strong central spine characteristic of the original *Lobivia hoffmanniana* which Backeberg quotes as synonymous with his *Sulcorebutia hoffmanniana*. My slide is of a plant about 150 mm long and 50 mm wide at the top - rather cylindrical and floppy (it is not at all upright) for a *Sulcorebutia*. I suspect that it was grafted'.

Here Bob Hollingsbee observes that he closely examined the slide taken at Les Cedres and found John Donald's assumption to be correct "a short *Trichocereus* stock still very green and obviously a vigorous one" and then continues with further comments from J.D. Donald "If the plant at Les Cedres is grafted this is quite significant as grafting *Sulcorebutias* on to vigorous stocks does not usually cause elongation, as it does with other plants like *Thelocephala* (*Chilcorebutia* - H.M.), but does cause the production of central spines if these are normally absent e.g. on *S. kruegeri*. The *Lobivia hoffmanniana* already has strong centrals; the grafted *Sulcorebutia hoffmanniana* at Les Cedres does not have strong centrals - are they indeed the same plant then? It is negative evidence in a sense but does suggest that direct synonymy may not be the whole truth.' "

Following this up in the light of current field work, John Donald adds "Recently Alfred Lau collected a number of plants in Bolivia and has distributed them to Sargent, Uhlig, De Herdt, and others (and Hallett - H.M.). Amongst these plants were several *Sulcorebutia* species including '*S. hoffmanniana*' which are now being offered by these people. I have acquired three plants as different as possible of No. 977 '*S. hoffmanniana*' - fine plants they are - but I believe that they are after all *Lobivias* belonging to the *neocinnabarina* group, that has almost naked flower tubes and which I believe are the precursors of the lobivoid branch of *Sulcorebutia*.

"Lau collected these plants near Arani not Oruro: according to Rausch, Hoffmann collected the original plants near Obrajés on the Oruro to Chochabamba road where it crosses the Rio Caine. Obrajés is about 50 miles west of Arani! The plants are very flattened globular, similar to the photograph in Backeberg's *Die Cactaceae Vol III* and in some respects to Bob Hollingsbee's photograph of the Heidelberg plant, but not to the plant at Les Cedres. The areoles are somewhat broader and shorter than most species of *Sulcorebutia* but of a similar structure. I await the flowers with some anxiety."

A map covering the area of *Sulcorebutia* habitat accompanied the Robin (reproduced herewith - H.M.) annotated for the discovery locations of various species. Upon this and previous discussion regarding classification of *Sulcorebutia* species (*Chileans* No. 17 p. 98 ) J.D. Donald comments "*Sulcorebutia steinbachii* and *S. tiraquensis* are almost conspecific with *S. glomerispina* and *S. polymorpha*, all of which intergrade with each other. *Tiraquensis* also intergrades (to the south east, geographically) with *totoensis* and *totoensis* itself is only a long spined form of *lepida-mentosa* - hence the direct line from *tiraquensis* to *lepida* is logical. The new plants from Lau from between Tiraque and Totora and from Totora to Aiquile clearly reinforce this argument for a continuous cline from Coloni to Sucre i.e. from *steinbachii* to



sucrensis.

I admit that the inclusion of *canigueralii* is a little difficult to swallow; it is a bigger jump than any of the 'specific' steps in the former cline. The bicoloured flower is clearly quite distinct - but nevertheless the spination of some forms of *canigueralii* approach *sucrensis*. The route from Sucre to Zudanez via Tarabuco is littered with isolated species in the order *sucrensis* - *frankiana* - *canigueralii* - *rauschii* - *tarabucoensis* - *zavaletae*. I suspect that they are possibly the remnants of a once much more widely distributed population derived from a very polymorphic single species, so that in this period of climatic deterioration in this part of Bolivia, only these isolates remain, the intermediates have vanished. A similar situation is now developing in the Tiraque - Totorá - Aiquile area and soon possibly there again will be left only a few isolates and none of the intermediates we know exist at the moment.

Rausche, Knize, and Lau have all commented that the deterioration has been very rapid in the last five years and that one finds today mostly dead or dying plants. A large proportion of the Lau *Sulcorebutias* sent to Sargent and De Herdt have failed to survive, either dead on arrival or failed to establish - all seem to suffer from a form of 'dry rot'. The plants from the Rio Caine area that is Arani - Tarata - Arque etc. are not yet affected and are easy to establish.

J. D. Donald also offers suggestions for further links in the systematics of this genus - "*Weingartia* FR 816 is very similar to *S. glomerispina* whilst *Weingartia multispina* connects 816 to *W. pulquensis* and *W. neocummingii*. Some of the imports of *Weingartias* collected around Aiquile (affinity *pulquinensis* - *neocummingii*?) show some similarity to *Sulcorebutia krahni* (synonym *S. weingartiana* n.n.).

A query is raised by R. E. Hollingsbee that "I gather one of my plants of *S. tiraquensis* v. *electracantha* is the Hutchinson form of *tiraquensis*, from the notes in de Herdt's catalogue. I do not know the significance of the 'Hutchinson form' - has Hutchinson been collecting in the field?" To this, J. D. Donald responds "Paul Hutchison (not Hutchinson) when gardener at the University of California, Berkeley, visited Cardenas at Cochabamba and collected a number of plants near Tiraque. The Hutchison form is a pale yellow to white spined form of *tiraquensis* with orange to scarlet flowers, differing thus only slightly from var. *electracantha* with its deep yellow very strong spines and pure orange flowers."

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There is room in the *Sulcorebutia* Robin to accept one or two further participants and I should be pleased to hear from any members wishing to participate. - G. W. Sykes.

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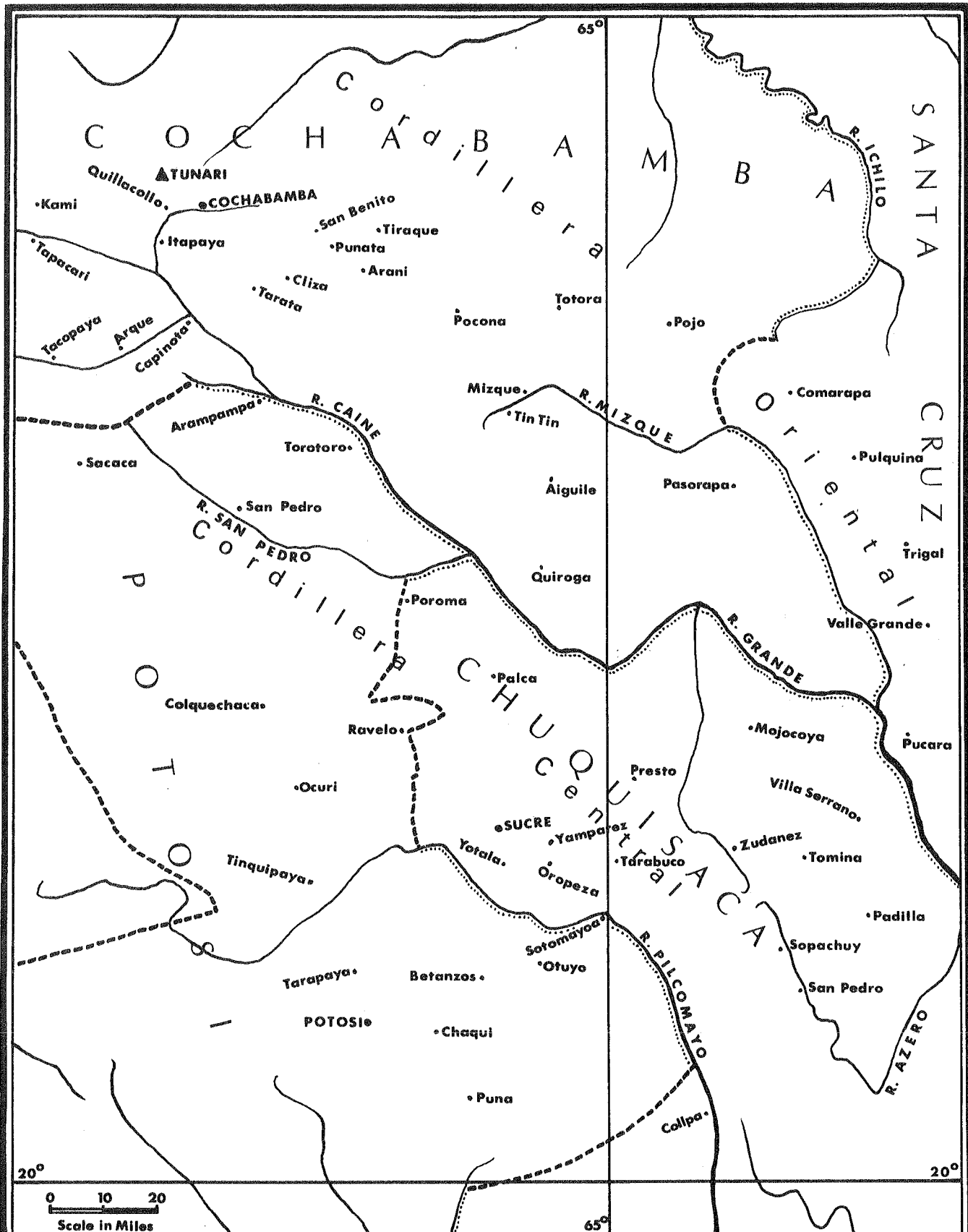
In addition to the foregoing, John Donald also made the following contribution to clarify and add to the habitat locations for various *Sulcorebutia* species:

"*S. menesesii* is reported from Ayopayana near Naranjito and *S. candiae* from Ayopayana by Tiquirpaya; Ayopaya or rather the Rio Ayopaya upon which both Tiquirpaya and Naranjito stand is west of Cochabamba on the new connection of the Pan American Highway from Cochabamba to La Paz, just north of Quillacolla off the south western slopes of Mt. Tunari. Rio Ayopaya flows to the Rio Caine.

*S. arenacea*, *S. xanthoantha* and *S. glomeriseta* also occur to the west or north west of Mt. Tunari between Quillacolla and Kami on the road to Independencia.

*S. kruegeri* occurs just south of Mt. Tunari and immediately north of Cochabamba city.

*S. tunariensis* occurs on the eastern slopes of Mt. Tunari facing Prov. Chapare across the Rio Chapare. Mt. Tunari acts as the divide between the Rio Caine southwards and the Rio Chapare which flows northeastwards to the Rio Mamore and the Amazon basin.



# CENTRAL BOLIVIA

Carl J. Lazzari

S.verticillacantha occurs near Arque.

S.brachyantha, S.haseltoniana and S.caineana occur just west of Tarata and southwards to the Rio Caine. S.taratensis occurs to the east of these species.

S.glomerispina is reported from Huankani; this place is just east of Coloni on the road from Cochabamba to Tiraque in Chapare province. The group glomerispina, polymorpha, tiraquensis and steinbachii are all stretched out along this road. Between Tiraque and Totorá is the boundary between the Chapare and Carrasco Provinces, whilst between Totorá and Rio Mizque is the boundary between Carrasco and Campero Provinces. S.totorensis extends from Chapare through Carrasco down to Campero Province. South of this distribution zone of totorensis we find S.lepida and then just north of Aiquile we come to S.mentosa."

These habitat references can almost all be located on the accompanying map of Central Bolivia; as a result of enlarging the scale of the map from an original it is not advisable to use it for scaling off distances with fine accuracy.

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We have a fair selection of *Sulcorebutia* species in the slide library but there are still a number of gaps - any help in filling these will be very welcome - A.W.C.

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#### SULCOREBUTIA RAUSCHII Frank by Gerhart Frank

(Translated by P. Waterman from K.u.a.S. 20. 12: 69)

Simplex vel proliferans, ad 15 mm alta, ad 30 mm diam., atroviridis ad violacea, apice umbelliforme, radice napiforme. Costis ad 16, spiraliforme in ca. 5 mm longis et latis humilis mammillis dissolutis. Areolis oblongis, ad 2 mm longis, pauce alba tomentata. Aculeis radialis ad 11, 1-1.5 mm longis, subulatis, adpressis, basi incrassata, nigris. Aculeis centralibus 0. Flore ca 30 mm longo, 30 mm diam., magenta-roseo, fauce alba. Staminibus rubris, antheris claro-flavis stylo albido. Fructu globoso, ad 4 mm diam., paucis squamis acutis praedito, periantho adherente. Seminibus ca 1.5 mm diam., ovalis, hilo basale, testa griseo-brunea, minute verrucosa.

- Patria: Bolivia, Dept. Chuquisaca, prope Zudanex, 2,700 m.

Body: single or clustering, height 15 mm and up to 30 mm in dia. Apex depressed centrally. Epidermis black-green to violet. Tap root present.

Ribs: up to 16 spirally arranged about 5 mm wide and dissolved into flattened tubercles.

Areoles: elongated, up to app. 2 mm with a little white felt.

Spines: up to 11 radials 1-1.5 mm long, awl-shaped; the lower subsequently claw-shaped or bent and adpressed to the plant, with thickened foot, black. Centrals absent.

Pericarpel globular, pale green, naked, crowded with pointed scales.

Perianth light yellow-green, becoming a dirty rose towards the top. A few narrow scales present, these are rose-brown as are the outer sepals. Inner petals broad, spatulate, magenta-rose. Throat white.

Stamens red with pale yellow anthers.

Style and stigma both white, the same length as the stamens.

Fruit globular, about 4 mm in diameter, green at first then becoming brown and covered with pointed scales. Flower remains strongly attached.

Seed about 1.5 mm in size, oval with an obliquely based hilum. Testa covered with diminutive humps, grey-brown.

In 1965 Dr. M. Cardenas (K.u.a.S. 9, 177) described a new species of *Sulcorebutia* which he named *Aylostera zavaletae*. The habitat was indicated as Zudanez. Unaccountably Cardenas had not recognised the valuable and distinctive genus *Sulcorebutia* and had placed the plants of that genus mainly in *Rebutia* and occasionally in *Aylostera*.

While studying the habitat of *Sulcorebutia*, the Viennese collector Walter Rausch came to Zudanez in Dept. Chuquisaca to search the area thoroughly for *Sulcorebutia*. He discovered in a high mountain area a minute, very striking species of *Sulcorebutia* which he at first took to be *Sulcorebutia zavaletae* Card. However, during a later comparison with the original description and with plant material sent to Europe by Cardenas, he found that he had a very interesting new species.

Walter Rausch today possesses not only the largest and most comprehensive collection of the genera *Lobivia*, *Rebutia*, and *Sulcorebutia* but is also a very learned connoisseur of them. In three very extensive collecting expeditions he has searched out all the known and many new habitats in Bolivia and Argentina.

From field observations, comparisons, and numerous collections of plant material he has been able to clarify many relationships and problems of the very variable forms of the species. Likewise in the course of the last year he has unmasked many so-called species and varieties as synonyms.

It is therefore both a necessity and a pleasure for me to name this singularly pretty new species of *Sulcorebutia* after the dedicated and athletic collector Walter Rausch.

Habitat: Zudanez, Dept. Chuquisaca, Bolivia. 2,700 m.

Holotype: In the collection of Walter Rausch. Collection No. 289.

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During our Cactus Tour in 1969 we were privileged to see several plants of this new species. The spines were indeed minute and they looked at first sight for all the world like *Neoporteria napina*.

It will be seen that the description given here uses the term pericarpel while that of Cardenas for *S. zavaletae* uses the term ovary. Strictly speaking the term pericarpel is correct since this refers to the outer wall of the ovary, while strictly speaking the ovary excludes the outer wall. Cardenas uses the German word 'ovarium' whilst Frank adheres to the use of the word 'pericarpel'. Ritter uses the German word 'fruchtknospe' for this purpose, which literally means fruit-bud. When one examines the Latin diagnoses it is possible to find similar divergence in words for the same part that is being described. Herein lies a potential source of ambiguity for future cactophiles.

**SULCOREBUTIA ZAVALETAE** Cardenas sp. nova by Martin Cardena, Cochabamba, Bolivia.

(Translated by P. Waterman from K.u.a.S. for 16. 9:65)

Caespitosa, radicibus carotiformibus 5-6 cm longis. Caulis globosus 15 mm diam., atroviridis, umbilicatus, costis plusminusve 9 in tubercula sphaerica 3 mm diam. solutis. Areolis 2-3 mm inter se distantibus, linearibus, 3-5 mm longis, paulo albidis, tomentosis. Aculeis pectinatis 9-10 tenuibus, setiformibus, 2-3 mm longis, compressis, albidis ad basim brunneis. Floribus ex basi caulis orientibus, 4 cm longis. Ovario 4 mm dia. albido. Tubo 15 mm longo. 2 mm crasso, squamis erectis 4-6 mm longis, acutis, brunneis instructo. Phyllis perigonii exterioribus lanceolatis vel ensiformibus 18 mm longis, laete magentibus. Taminiibus ex superiore parte tubi usque ad basim petalorum nascentibus 5-7 mm longis; filamenti magnetibus; antheris albidis. Stylo 2 cm longo, inferne albo, superne dilute viridi, 7-8 lobis stigmaticis dilute viridibus 3 mm longis coronato.

Patria: Bolivia. Province Sudanez. Departamento Chuquisaca, in itinere Rio Grande, 2,000 m.

#### Clustering.

Root carrot like, 5-6 cm long and about 12 mm thick at the surface.

Body spherical, 15 mm diameter with a depressed apex.

About 9 ribs, indistinct and dissolved into rounded notches of approx. 3 mm diameter.

Areoles 2-3 mm apart, straight, 3-5 mm long with a little white felt.

Spines comb-shaped, arranged in two rows of 4-5 spines and always with a terminal spine at the end of the areole; 2-3 mm long, very thin, bristle like, adpressed, white with a brown base.

Flower, from the base of the body, 4 cm long, 3.5 cm broad.

Ovary 4 mm in diameter, white, naked.

Tube 15 mm long, narrow, 2 mm thick with brown, straight, pointed scales 4-6 mm long.

Sepals lanceolate, 18 x 4 mm, magenta red on the inner surface and brown on the outer.

Petals also lanceolate 20 x 4 mm lustrous magenta red.

Stamens arising from the upper part of the tube and reaching to the base of the divided petals, 5-7 mm long.

Filaments magenta red.

Anthers white.

Style 2 cm long, the lower portion white and the upper green.

Stigma light green, 7-8 lobed, 3 mm long.

Habitat: Bolivia in the Zudanez Province of Dept. Chuquisaca from the Rio Grande basin at an altitude of 2,000 m.

Holotype: In Herbarium Cardenasianum No. 6142.

Collected by Agronomist Moises Zavaleta in February 1963.

I am very pleased to name this interesting species after its discoverer Herr Engineer Agron. Zavaleta.

This new *Aylostera* is totally different from all other known species of this genus. It has been characterised by its longish flower of lustrous magenta-red colouration and by the unusual erect scales on the flower tube.

#### Comments from H. Middleditch.

"This plant was described as an *Aylostera* by Cardenas since he does not recognise the genus *Sulcorebutia*. It was transferred to *Sulcorebutia* by Backeberg in the addendum to his *Kakteen Lexikon*. Backeberg comments therein that the style is quite independent of the flower tube, unlike other *Aylostera*. The flower cross-section accompanying Cardenas's article confirms this and, together with the illustration of a plant in flower, shows the rather elongated and thin funneliform flower tube and also the slim, pointed petals.

"The term 'sepals' used above refers to the outermost petals which commence with the uppermost scale on the flower tube where it forms a transition from a scale to a petal. A careful examination of the flower will reveal that the scales, sepals, and petals are in fact one continuous single or double spiral."

.... and from V.J. Corbett.

"On the subject of S. rauschii I should hardly think that it is like S. zavaletae, or at least like the zavaletae in my possession. S. rauschii was reminiscent of Neoporteria napina. I only obtained my S. zavaletae last year from De Herdt so it is not very large. The following are its details at the present moment:-

Body 20 mm diameter x 10 mm tall, light green around the base of chubby darker green tubercles in 9 rows, clockwise.

Areoles offset to the left, off white and clearly defined, long and narrow.

Spines - pectinate, adpressed, curving downwards, 11 or 12 per areole, largest spines 5 mm. No centrals. Spines commence a very attractive purple-brown for a third of the length, then light brown for a further third, and off white for the final third.

No flowers to date.

.... from J.D. Donald.

"The two species are not closely related even though they come from the same part of Bolivia, near Zudanez in Chuquisaca Department. S. rauschii is very distinct in its very dark body and minute black spines, often said to be like N. napina but I think that this is rather misleading - in body appearance it is rather more like a miniature Copiapoa. S. zavaletae is greyish green, very pale in comparison with the deep tinted S. rauschii, with pale yellow curly spines. Rather than considering S. rauschii and S. zavaletae to be related, it is more pertinent to consider the relationship between S. canigueralii and S. zavaletae. S. canigueralii comes from Oropeza quite close to Zudanez and it is my belief that many plants earlier imported as S. canigueralii and which have all magenta flowers rather than the bicolored orange and red flower of the true species, are in fact S. zavaletae.

These two species when not in flower can be easily confused, both have greyish greenish bodies, both have yellowish spines at maturity (young spines are frequently much darker coloured), though those of zavaletae are more curled and less regularly displayed than for canigueralii. The colour of the flower is the only foolproof method for separating them. Thus any magenta flowered 'canigueralii' is zavaletae and any reddish orange flowered 'zavaletae' is canigueralii!"

Description of Sulcorebutia canigueralii (Cardenas) Buin et Don., based upon observations on two collected specimens in my collection obtained from K. Uhlig:-

Body: caespitose forming many headed clumps, individual heads up to 20 mm diam. and 30 mm high; epidermis grey green in colour; ca. 10 spiralled ribs divided by transverse grooves into diamond shaped tubercles, each 5 mm long by 4 mm wide by 2 mm high; areoles set in longitudinal groove on upper surface of tubercle, 2.5 - 3 mm long by 1 mm wide, cream felted and ca. 5-6 mm apart. Strong tap root.

Spines: white with dark-brown swollen bases, regularly pectinate and reflexed, consisting of 5-6 lateral pairs and one pair directed downwards, none longer than 3 mm.

Flower: arising from near base of plant, appearance in bud round and dark brownish red in colour, opening to a large tricoloured flower ca. 40-50 mm wide by 40 mm long. Flower is somewhat smaller on the first day of opening and more red in tone, becoming more orange and yellow on subsequent days.

Pericarp: 3 mm diam. red-orange in colour with pale olive brown white tipped scales.

Tube: red-orange in colour, 8-12 mm long, funnel form 2.5 mm at base to 7 mm wide at corolla, scales as for pericarp.

Perianth: two rows of 10 - 12 segments each, yellow at base shading through orange to deep red at tip, spatulate up to 20 mm long by 5 - 6 mm broad. Outer segments deeper red on dorsal surface for at least 4 mm from tip. Tepals tend to be reflexed when fully open in sun. Throat red-orange in colour.

Filaments: yellow up to 10 mm long arising in two series within receptacle. Upper series exert beyond perianth by 5 mm.

Style: greenish yellow, 10 mm long with 6 lobed cream coloured stigma.

This form approximates to the description given by Prof. Martin Cardenas for *Rebutia canigueralii* in the *Cactus and Succulent Journal of America* XXXVI, 1: 26-27 (1964). The main difference is that the body tends to be longer, more cylindrical, and that the outer perianth segments are more red rather than yellow brown.

Description of *Sulcorebutia* species received as '*Rebutia canigueralii*' from Martin Cardenas, September 1965; based upon a single imported plant.

Body: somewhat caespitose up to 20 mm diam. and 30 mm high, with epidermis grass green in colour. Ca. 14 spiralled ribs divided into prominent diamond shaped tubercles each ca. 5 mm long by 4 mm wide by 3-4 mm high, bearing long narrow areoles set in a longitudinal groove on dorsal surface, each 2.5 - 5 mm long by 1 mm wide, cream felted, ca. 6 mm apart. Strong tap root.

Spines: white with swollen brown bases up to 4 mm long but usually less in 6 - 8 lateral pairs and one pair directed downwards. Sometimes pectinate and reflexed, sometimes elevated and curled or twisted to interlace with spines from neighbouring areoles, particularly near crown.

Flower: arising near base of plant, pointed reddish green in colour in bud opening to ca. 35 mm wide and 30 mm long. Flower does not appear to increase in size after initial opening.

Pericarp: 3 mm diam., yellow green in colour with pale yellow green white tipped scales.

Tube: pale rosy-mauve up to 12 mm long, funnel form 2.5 mm near base widening to 7 mm at corolla, scales similar to those on pericarp.

Perianth: two rows of 10 segments, spatulate-acuminate, pure rosy-mauve in colour up to 12 mm long by 5 mm broad. Outer segments tipped green on ventral surface.

Filaments: white arising in two series up to 10 mm long.

Anthers: cream coloured exerted beyond stigma.

Style: white up to 12 mm long with 6 lobed white stigma.

This plant is clearly not *R. canigueralii*, the flower and the spine formation are quite distinct. It was collected at a later date than the originally described plants and was not in flower at the time. Superficially the plant looks like a *canigueralii* and comes from the same region near Sucre. It is possibly *S. zavaletae* (Card) Backbg. *K.u.a.S.* 16: 9, 1965; *Die Kakteen Lex. Nachtrag* 460, 1966.

#### SOME FRAILEA FRUITS by J. Forrest.

Last year I grew a number of *Fraileas* in shade - a pan covered with a muslin cloth - and found that they grew better and set more fruit than those in the sun. But the only *Frailea* flower which actually opened was growing in full sun. Perhaps a little shade might be the correct thing for growing these plants.

Of the seventeen or so species and varieties of *Frailea* in my collection, a large number set fruit last year. These fruits seemed to be of three basic different shapes. First there is the long conical fruit, as typified by *F. horstii*; second, the long cylindrical fruit as typified by *F. pulcherrima*; and thirdly the fat onion-shaped fruit typified by *F. pygmaea*.

In addition to F. horstii, F. gracillima, F. alacriportana, F. asperispina HU 56, and HU 322 carried long conical fruits. Long thin fruits appeared on F. pulcherrima, F. schilinskyana, and F. colombiana, whilst onion-shape fruits were to be seen on F. pygmaea v. major, F. grahliana, F. pygmaea v. aurea, F. uhligiana, and F. cataphracta.

F. horstii carried large conical fruits about 14 mm long and 8 mm in diameter. It was thickly covered in grey bristly wool and a few light brown spines. The fruit itself was green in colour.

F. gracillima has basically the same shape of fruit but very much larger with thick bristly wool, grey in colour, covering it completely. It also has long brown spines.

F. alacriportana has a small fruit by comparison with the previous two but large by comparison with the plant; it is of the same shape. It is covered with greyish bristly wool with a few long brown spines.

F. asperispina HU 56 has the same shape of fruit but it is small even by comparison with the size of the plant. It is sparsely covered with light grey bristly wool with a few light brown spines.

Frailea HU 322 is a new Frailea, large by Frailea standards, densely covered in spines which are grey in colour and about 5 mm in length. The fruit is the same shape as F. horstii but larger like F. gracillima, with very thick grey bristly wool with long dark brown spines.

F. pulcherrima has a small cylindrical fruit with long grey wool and long light brown spines.

F. schilinskyana has basically the same shape of fruit but larger, with very little wool and a few long brown spines. The fruit is green in colour.

F. colombiana also has this fruit shape but small, like pulcherrima. It has a covering of grey wool and a long yellow spine; the colour of the fruit is very light green.

F. pygmaea v. major has a small roundish fruit with light grey wool which is very sparse and a few light brown spines.

F. grahliana has a medium sized fruit of the pygmaea shape with light grey wool and light yellow spines.

F. pygmaea v. aurea also has a fruit of the pygmaea shape but small in size, with light grey wool and light brown spines.

F. uhligiana has a medium sized fruit of the pygmaea shape with sparse grey wool and a few brown spines; the fruit colour is red.

F. cataphracta has the same type of fruit as F. uhligiana but it is green in colour.

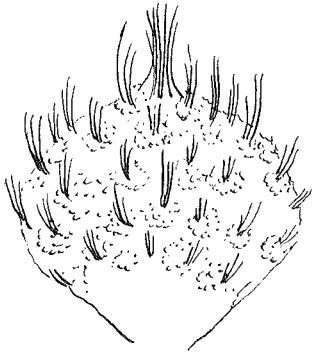
On quite a number of these fruits the wool covering is so thick that one cannot see the body of the fruit and I have not been able to quote a colour for the fruit.

#### Comments on Frailea Fruits from A.W.Craig.

"After having read the notes by Jack Forrest I had a look at the fruits on my own Fraileas, and found some difficulty in obtaining correlation between the two. I have therefore given a list of all my plants and the type of fruit they were carrying; the fruit types are designated by reference to the accompanying sketches.

"There does appear to be wide differences in the fruits of Frailea, but I find it very difficult to describe them as three distinct types. The accompanying sketches give the three extreme types - numbered 1, 2 and 3 - and where, for example, a fruit is similar to type 1 but rather than being identical is tending towards type 2, I have indicated this as 1+.





F. ASTERIOIDES  
(1)



F. GRACILLIMA  
(2)

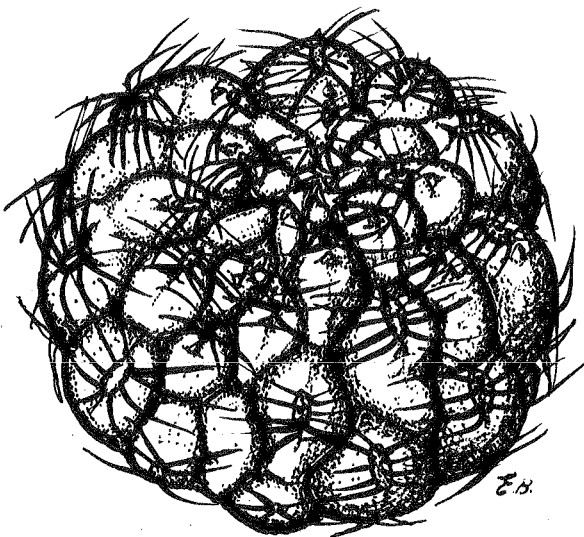


F. PUMILA  
(3)

FRAILEA FRUITS

All x 4

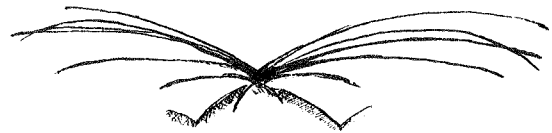
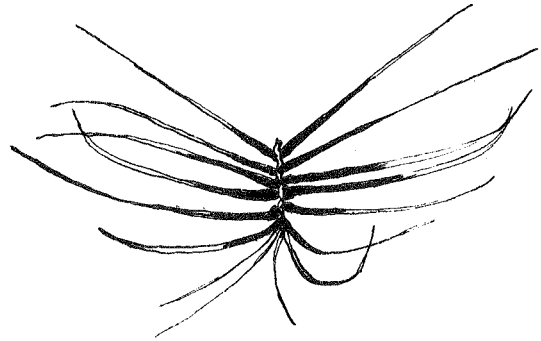
Collection - AW.Craig



MATUCANA AUREIFLORA

SH 104

Collection E.W.Barnes



MATUCANA AUREIFLORA

Single Areole - Full size

Type 1, typified by *F.asterioides*. Fruit flattened globose, with short regular reddish brown spines and dark epidermis almost completely covered with grey-brown wool. Two fruits examined, where neither flower had opened; they contained 49 and 72 seeds respectively.

Type 2, typified by *F.gracillima*. Fruit elongate globose, with long irregular dark brown spines and greyish white wool almost covering a dark green epidermis. One fruit examined, contained 175 fertile and 5 infertile seeds.

Type 3, typified by *F.pumila*. Fruit elongated conical, with long regular yellow-brown spines closely pressed to the fruit, and some white wool. Three fruits were examined from each of two plants, those on the first plant contained 48, 56 and 58 seeds respectively and those on the second plant contained 99, 93 and 111 seeds respectively, the last two fruits having been formed after the flowers opened.

"In the list below the body types are:-

T - tall cylindrical, height 2 - 5 diameters.

G - globose, height  $\frac{3}{4}$  - 1 diameter.

F - flattened globose, height  $\frac{3}{8}$  -  $\frac{5}{8}$  diameter.

alacriportana	Body T	fruit 2 +
asterioides	F	1
carminifilamentosa	G	
cataphracta	F	1
gracillima	T	2
grahlia	G	
horstii	T	2
pseudograhliana	G	3 -
pseudopulcherrima	G	3 -
pumila	G	3
pygmaea v. aurea		
v. atrofusca?	G	3
schylinskiana	G	

"From these observations it may be seen that the fruit types and body types do seem to match fairly well and so the division among the three fruit types might have more significance than was originally envisaged when deciding upon which to sketch.

"Many of the fruits were formed by flowers which I knew had opened and I observed that these can be identified on close examination of the fruit because of the dried flower remains persisting and protruding slightly beyond the terminal brush of spines.

"All these *Frailea* were grown on the staging but in the shade of a low shelf - this quite intentionally as I have found it seems to give much better growth and also flowering - many flowers have opened, especially on hot humid days, sunshine not being necessary. "

.... from K.Wahle.

"After reading the article by J.Forrest and the further comments, I still find it quite difficult to make any decision on the grouping of my *Frailea* fruits. A.W.Craig shows three sorts of fruit, which in my opinion may only be fruits of flowers that have not actually opened. I have found fruits on one plant named *F.gracillima* (which could be a *F.alacriportana*) looking like fruits 2 and 3 in the sketch - the fruit from an opened flower belonged to the fruit type 2 and from the unopened flower to type 3. There is one difference from the sketch in that the bristles are lying much closer to the body of the fruit than type 2. This difference of fruit shape occurs with many of my plants, as does also the bristle formation on type 2 fruits.

"The only exception to this variation in fruits seems to be F. castanea (= F. asterioides); this name castanea is much more appropriate as it means 'chestnut'. This fruit is fat and round, looking very much like the plant itself. The fruit detached from the plant looks almost like a new species of Frailea. The very dark body of the fruit is chestnut brown and the lighter coloured wool almost hides the fruit body completely. The fruit body can only be seen when the fruit is swollen by the ripe seeds. I have even had seeds germinate inside the fruit before the skin had burst open. The darker brown bristles, which appear to come out of the areoles on the fruit, are somewhat longer on my plants than in the sketch by A.W.Craig, getting longer towards the crown of the fruit, where they are as long as the fruit itself, sometimes 20 mm long - especially if the flower has been open and the dried up flower remnants are still showing. I have had flowers up to 60 mm in diameter; in these cases the fruits were 17 mm in diameter and the seed count around the 120 mark. The seeds are best sown straight away, as the % germination of the seeds is very good at that time - nearly 90%.

"Concerning the fruit colour of Frailea, I have noticed that there seems to be a relationship with the plant body:-

Light green body = light green fruits.

Dark green plant body = dark green fruits.

Brown plant body = brown fruits.

"All my Fraileas grow in full sunshine, with one exception - F. cataphracta, which seems to thrive better in the shade. Flowers on my plants open regardless of light-brightness in the greenhouse. The main factor is temperature, which must lie above 25°C (= 77°F). In lower temperatures the flowers on my Fraileas have never opened.

.... from H.Middleditch.

"On receipt of the first observations from Jack Forrest, I had a look at my own plants of Frailea; I found a couple of fruits still remaining on my F. cataphracta, which were about 3 mm broad and exhibited the decided onion-like shape described.

"Shortly afterwards I was able to have a look at six or seven different species of Frailea in Alan Craig's collection, all bearing fruit. These were compared with the notes received from Jack Forrest and it became steadily more obvious that there appeared to be appreciable differences both in form and size, between the fruits described in those notes and those on the plants being examined. However, after careful scrutiny it was found that a number of the fruits on the plants before us bore evidence that the fruit was not necessarily cleistogamous, since the dried up remains of the flower petals could be seen protruding slightly above the brush-like bunch of bristles surrounding the top of the fruit. Once having discovered this feature on one fruit it then became quite easy to look for it on other fruits and it soon appeared that, in general terms, the fruits bearing flower remains were somewhat larger than those which had presumably set seed cleistogamously.

"It would seem fair to assume that the size of seed is sensibly constant in a given species, so that presumably fruits of different sizes must contain different numbers of seeds. This would suggest that the fruits set cleistogamously, being smaller, might contain less seed than those which flowered. Botanically speaking this might be expected, since cross pollination with an open flower is much more likely to fertilize a high percentage of ovules in the ovary and form viable seed. This is confirmed by the observations made by K.Wahle (Chileans 16 p.59) and in the notes from A.W.Craig.

"Not long afterwards, a plant of Frailea grahliana was seen in the collection of T.Lavender which carried three fruits, all of the same general shape but of different size. A close examination revealed that the smallest fruit was cleistogamous, the largest fruit exhibited quite obvious flower remains and was seen when open; the fruit mid-way in size between the other two also carried some flower remains which were shorter than those on the largest fruit and it was therefore surmised that this flower probably did not open wide. This, then afforded a

reasonable explanation of the apparent discrepancies between the fruit sizes described separately by J. Forrest and A.W. Craig. It would suggest that any reference to fruit size on *Frailea* might usefully be accompanied by an indication of whether the fruit is cleistogamous or whether it carries visible flower remains.

"This apparently much neater picture was then sadly upset by the arrival of the comments from K. Wahle, who referred to fruit sizes of relatively gargantuan proportions when compared with those already observed; so much so, indeed, that there were even lingering doubts raised in discussion regarding the possible accuracy of the measurements. However, any such doubts were quite dispelled by finding one of these colossal fruits on a *Frailea gracillima* in the collection of David Lewis. It might even be considered more apposite to say that the plant was found on the fruit, since the fruit was 12 mm broad and 15 mm high, with a further 15 mm of bristly hairs at the crown of the fruit surrounding the dried flower remains, which projected a further 2 or 3 mm above these bristles. On the same plant was a cleistogamous fruit of more 'normal' size. From personal observation I can confirm that the fruit as such was not grafted on to an *Echinopsis* stock, so now I am left wondering whether they grow giant *Frailea* fruits just in Wales. The fruit would be approximately half the actual size of the accompanying illustration of *F. gracillima* fruit.

"In the same collection there was a *F. phaeodisca*, a flattened globular shaped plant body with a similar shape of fruit - the 'onion' shape as described by J. Forrest - which would seem to fit nicely into the table put forward by A.W. Craig. This particular fruit was again outstandingly large, being about 10 mm broad and carried its dried flower remains.

"I am now looking forward to the possibility of hearing about the seed count on these fruits as either the fruit must have a remarkably thick wall or else one would expect to find a very high seed count. What is not at all clear is why fruits of this size should be found in certain cases.

"Yet a further permutation of fruit sizes was observed on a plant of *Frailea* HU 83 seen in the collection of R. Martin. This particular plant was cylindrical in growth with an epidermis so bright and shiny that one might suspect it had been polished. Below each areole on the previous season's growth was a small patch of purple coloration, reminiscent of *Frailea cataphracta*; the absence of these markings on the current season's growth was a help in confirming whereabouts this had commenced. Just above the start of the current season's growth there were three fruits in a ring around the plant, which had been produced at the end of May. Much further up the body, not far below the shoulder, there was a further ring of fruits which had appeared about August. Comparing cleistogamous fruits on each ring, the mid-season fruits were about twice the size of those formed in May. Since the general level of metabolic activity throughout the plant would be lower in Spring when growth was just starting, than in midsummer when growth rate would be round about maximum, this may be considered an explanation of the cause of the different fruit sizes. At the time of observation, in mid-September, further fruits were in the course of formation on both the May ring and the August ring; no doubt this will, in due course, result in one ring or the other carrying cleistogamous fruits of different sizes, which would have been quite inexplicable had the plant not been observed in the particular state of fruit formation that existed in September.

"I have tried to establish whether any correlation exists between the fruit forms tabled above by A.W. Craig and the apparent seed groupings brought out by the review of *Frailea* seed (Chileans 15 p.100), so far without success.

"It would seem to me that the original notes from J. Forrest have been most valuable, to me at least, by stimulating observation of and discussion upon features which might otherwise have gone un-noticed."

... from T. Lavender.

"A seed count was made on the F. grahliana with the three different fruits, referred to above, with the following results:-

- Cleistogamous fruit - 44 seeds
- Opened flower fruit - 55 seeds
- Unopened flower fruit - 5 seeds, dull and shrivelled, probably not viable.

All these appeared as buds within two weeks of each other, this year, during the month of August. In 1969 the plant also carried three fruits from flowers which did all open, this time in early summer; here the seed count on the three fruits was 37, 20 and 33. In 1968 it produced two cleistogamous fruits and the seed count then was 45 and 37.

"The fruits on Frailea horstii were fairly large this year - round about 10 mm in diameter; on opening three fruits which had set seed cleistogamously, the seed count was found to be 280, 261 and 237 respectively.

"My F. asterioides also had a very large fruit on it earlier this season - indeed it was even larger than the foregoing fruits on horstii. In colour the fruit was a dark brownish green, very shiny, and slightly hairy. This size would suggest a very large number of seeds would be found in the fruit, but when gently squeezing the fruit it seemed to be quite soft like a balloon and when finally opened there were no great number of seeds inside. Even before the fruit split it was possible to see that there were dark coloured seeds inside as the walls of the fruit were so stretched as to be almost transparent.

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MATUCANA (subgenus Incaica) AUREIFLORA spec. nov. Ritter by Friedrich Ritter.

(Translated by E. W. Bentley from K. u. a. s. 17.1:66)

Matucana Br. & R. subgen. Incaica Ritter subgen. nova.

Differt subgenere Matucana floribus actinomorphis, diurnis ac nocturnis. Camera nectarifera rudimentari et sine nectare, diaphragmate bene formato, staminibus annularibus terminato. Filamentis et antheris aequaliter distributis, in toto tubo insertis. Stigmate inter antheras locato. Phyllis perigonii ample infundibuliformibus, interioribus non rubro-coloratis.

Typus: Matucana (Subgen. Incaica) aureiflora.

Subplana ad subglobosa, glauca, dura, simplex, ad 13 cm crassa. Apice depress, non aculeato. Costis 11-27, 3-7 mm altis, obtusissimis, gibbosis, latis, in crenis angustis, ex areolis in sulcos costales sulcatis. Areolis albotomentosis, 5-8 mm longis, 2 mm latis, 7-11 mm inter se distantibus, ad crenas pertinentibus. Aculeis paene subulatis, rigidis, basis versus nigris vel rubiginosis, superne flavidioribus; marginalibus pectinatis, ca. 10,  $\frac{3}{4}$ - $1\frac{1}{4}$  cm longis, centralibus 0-4,  $1\frac{1}{4}$ - $2\frac{1}{2}$  cm longis. Floribus prope apicem orientibus, 3- $4\frac{1}{2}$  cm longis latisque, inodoris, diurnis ac nocturnis. Ovario lana floccosa et squamis parvis praedito. Camera nectarifera rudimentari, sine nectare. Diaphragmate fundo receptaculi incumbente. Tubo tubiformi, superne subinfundibuliformi, 12-17 mm longo, ovarii modo tecto, extus rubiginoso. Filamentis luteis, aequaliter distributis. Stylo luteo, 22-28 mm longo, stigmatibus inter antheras locatis. Phyllis perigonii ample infundibuliformibus, interioribus ca. 20 mm longis, 5 mm latis, aureis, exterioribus rubiginosis, aureo-marginatis. Fructu Matucanae typo, inferne purpureo, obtuso, superne angustiore, rubiginoso, latere submediano striato-disrumpente. Seminibus higris, 2 mm longis,  $1\frac{1}{4}$  mm latis, vix tuberculatis. Hilo  $1\frac{1}{2}$  mm longo, valde obliquo.

Locus typi: Cajamarca, Dept. Cajamarca, Peru.

Matucana Br. & R., subgen. Incaica Ritter, subgen. nova.

This new subgenus *Incaica* is distinguished from the subgenus *Matucana* in the following characteristics: the flowers are actinomorphic and open day and night; the nectar-chamber is retrogressed and without nectar, but with a well-developed diaphragm which ends in a ring of stamen filaments. Filaments and anthers are symmetrically distributed and the filaments are inserted over the whole tube. The floral leaves are widely funneliform, the inner ones without any red. Type: *Matucana* (subgenus *Incaica aureiflora*) Ritter, spec. nov.

Body: half flat, later hemispherical, with short conical tap-root; smooth dark grey-green, hard fleshed, solitary, up to some 130 mm thick. Crown deeply sunken, spineless.

Ribs 11-27, 3-7 mm high, when old levelling off towards the ground; very blunt, with narrow, sinuous dividing furrows; tuberculate, the tubercles hump-back shaped; ribs between the humps some  $\frac{1}{3}$  to  $\frac{1}{2}$  lower and narrowed. From the upper end of the areole run side furrows into both the rib-dividing furrows or there is only a single furrow into one of the two dividing furrows; it is somewhat so in *Matucana aurantiaca*.

Areoles white felted, 5-8 mm long, about 2 mm wide, 7-11 mm apart. Areoles stretching from the humps to the cross-furrows. Frequently the upper end of the areoles stretches almost down to the base of a furrow. The youngest areoles in the crown bear no scales.

Spines almost awl-shaped, the smaller more needle-shaped, stiff, sharp, black to red-brown below, above mostly yellow or yellow-brown. Outer spines comb-like, mostly 4-6 on each side and often one unpaired at the bottom end, directed half out to the side and curved towards the body, 7-17 mm long; centre spines only on old plants, 1-4 almost over each other, straight or lightly bent, 12 to 25 mm long.

Flowers around the crown, radiating, wide open, scentless, 30-45 mm long and opening just as wide. The flowers can open first in the evening just as likely as in the early morning; they remain open some 24 to 48 hours, the latter especially in cool weather. They can begin to wither in the evening just as well as in the early morning. They stay wide open continuously: only if it becomes especially warm or especially cold do they close a bit, they open fully again when the temperature is back to normal.

Receptacle 4-5 mm long and wide, green to red-brown, somewhat humped, with a few narrow triangular, similarly coloured,  $1\frac{1}{2}$  to 2 mm long tipped, flat scales and white tufts of wool.

Nectary completely reduced and without nectar, but with a well-developed diaphragm, emerging from the wall, that reaches to the style and ends in a ring of stamen filaments. The diaphragm lies quite or nearly on the floor of the receptacle.

Tube cylindrical, narrowly funneliform above, 12-17 mm long, 3 mm wide below and 5 mm above, light yellow inside, red-brown outside, clothed as the receptacle. Scales merging above into perianth leaves.

Filaments pale yellow at the base, the colour of the perianth leaves above; 16-22 mm long below, those at the rim 10-12 mm long.

Anthers very pale pink, evenly distributed in the flower opening. Insertion over the whole tube.

Style light yellow below, the colour of the perianth leaves above, 22-28 mm long, of which  $2\frac{1}{2}$  - 4 mm comes as the 5-7 somewhat spread-eagled pale yellow to pale green stigma lobes that are amongst the anthers.

Perianth leaves spread out in a wide funnel, the ends somewhat curved outwards, overlapping each other; the inner ones 18-22 mm long, 4-6 mm broad, spatulate, narrower below, above shortly tipped or almost rounded, with tiny teeth; full golden yellow (DIN 6164 Colour 2 Saturation 6, degree of darkness 1); the outer linear 15-25 mm long, 3-5 mm broad, pointed,

golden yellow, the outermost more red-brown, golden yellow edged.

Fruit like *Matucana* fruit, some 14 mm long and 10 mm broad, blunt below, half the width above: purple, brown-green above with a few coarse, flat humps and in addition fine-humped, covered like the receptacle. Bursts open at the side in the lower half in strips, however not to the base.

Seed-strings thread-like, drying up.

Seeds black, dull, 2 mm long,  $1\frac{1}{4}$  mm wide, 1 mm thick; very fine and with flattened humps. Hilum very oblique, long oval,  $1\frac{1}{2}$  mm long. Seed shape typical for *Matucana*.

Type locality: Cajamarca, Dept. Cajamarca, Peru.

Holotype in herbarium of the University of Utrecht. I found this species in July 1964; it has my field number FR 1310.

Comments on *Matucana aureiflora* from H. Middleditch.

"On reading the above article I found myself rather puzzled by the reference to the youngest areoles in the crown 'bearing no scales'. On referring back to the original German I can construct no better form of wording, and remain puzzled.

"The original illustration by Ritter accompanying the article in K.u.a.S. shows a plant carrying three flowers which seem to be wide open; these are rotate i.e. daisy-like in appearance which differs somewhat from the usual appearance of *Matucana* flowers which usually have half-open inner petals whilst the outer petals open much wider. The photograph accompanying the article by John Donald in the N.C. & S.S. Journal 25.3: 1970 would appear again to illustrate a rotate flower. In that article the flower of this species is described as having a 'remarkably short tube' and if one consults Backeberg's *Kakteenlexikon* it would seem that only *Matucana breviflora* is quoted as having a flower as short as the 30-45 mm quoted by Ritter for *Matucana aureiflora*.

"On first seeing one of these plants I would have quite happily placed it as an *Oroya*, from the elongated areole and pectinate spine formation."

... from E.W. Barnes.

"I have three plants of *Matucana aureiflora*, all have settled down quite well and grown quite well too. I understand that Lau showed these plants to Ritter, knowing that Ritter had traversed the habitat area the year before he had. Ritter immediately recognised the plant and informed Lau that he proposed naming it *aureiflora*. So the plants I have are authenticated by Ritter as his new species.

"I agree that at first glance these plants do resemble *Oroya* to some extent. My own plants and those I observed at Sargent's nursery match up well to Ritter's description. There is some variation in those plants which I observed at Sargent's nursery, but variation is rather limited compared with other species of *Matucana*. From my observations the plant is either very flattened with more ribs and longer, thinner, fewer spines that may be lighter in colour or it may be slightly more hemispherical, with fewer more rounded ribs and more spines, these being shorter and stronger and slightly more curved imparting a distinctly pectinate effect and they may also be stronger coloured. However, all the plants that I observed were easily recognisable as *Matucana aureiflora*.

"I am interested to read that Ritter describes this plant as having 1-4 central spines on old plants. I could find very few plants with any central spines at all, but what I did find was that the older areoles towards the base of many plants possessed radials that appear to have slowly moved across to form centrals. The transition of these spines from radials to centrals can

be noted if you look about the middle of the plants - half way along a rib. Certain radials will be noted that are losing their pectinate appearance and are slowly moving across to the centre of the areole; at the same time they are becoming stronger, longer, and developing a distinct basal node. They never appear to project at right angles to the plant body, but always at an angle and curved back towards the plant body. I have a plant which has proper central spines and I did see one or two others that also exhibited proper centrals, but most did not have what I would call proper centrals.

"I did see this species in flower at Sargants and have just had one of my own in flower. The flower is just as Ritter describes it; it is clear yellow in colour. The flower is distinctly wider opening than many other *Matucana*, just as the photograph in the N.C.S.J. shows. The tube is almost straight and the flower as a whole is almost actinomorphic, being quite unlike many other *Matucana* flowers in this respect.

.... from A.W. Craig.

"I obtained a plant of *Matucana aureiflora* HT 104 in 1970 which is about 70 mm in diameter. The areole formation matches the description given by Ritter and the accompanying sketch shows the spines on one areole; the completed sketch seemed at first sight to show much too wide a spread on the spines for the size of plant, but when I looked more closely it became obvious that the spines from one areole spread over the crowns of three ribs. Indeed spines from one areole crossed spines from areoles on the next rib but one away, so broad was their spread."

.... and further from H. Middleditch.

"On examining two plants of *Matucana aureiflora* with E.W. Barnes, it is quite clear that the young areoles in the crown carry no spines, which leads one to presume that the reference to 'scales' in this context in the K.u.a.S. original is a misprint. One very uncommon feature was observed, however, on the young tubercles. That part of the tubercle which later formed a hump or chin below the areole, was extended, pointed, and flattened on all the young tubercles in the crown. These extensions on the tubercles lay horizontal, pointing towards the centre, overlapping the subsequent tubercle like a set of scales and so offering protection (one presumes) to the growing point of the plant in the absence of any spines at the crown. Botanically speaking, the position on the tubercle occupied by this protuberance, immediately below the areole, is where a leaf would be borne if the plant were to produce such an organ. One wonders therefore if this growth is a partial reversion to the production of a vestigial leaf stalk or petiole.

"Having had an opportunity to compare this species side by side with *Matucana ritterii*, I find it rather remarkable to observe just how much similarity there is between the two. The body colour is a lively green, slightly shiny, in both and the spines are dark towards the areole and yellowish towards the tip, also, in both. The spine formation on *M. ritterii* is perhaps not quite so distinctly pectinate as on *M. aureiflora*, however. Most interesting was to see evidence of the tubercles forming the same sort of protective scales at the growing point on *ritterii*, which also tends to be rather bare of spines over the crown.

"*Matucana ritterii* emanates from Otuzco and *M. aureiflora* from Cajamarca; reference to the map on the cover of Chileans No.8 will show that these places are about sixty miles apart - not a vast distance."



A TRIP WITH FRIEDRICH RITTER ALONG THE COASTLANDS OF CHILE AND PERU  
by A.F.H. Buining.

(Translated by H.Middleditch from Succulenta 49.8: 1970)

One of the highlights of our stay in South America was undoubtedly the day when we stepped out of the aeroplane in Santiago de Chile and there recognised straight away our good correspondent-friend Friedrich Ritter, who had come to meet us with his faithful Ford pick-up.

Since neither Ritter nor my wife and I wanted to drive through a great city such as Snatiago, we went away from the densely built-up area in the direction of our host's residence. Before long we came into the mountainous terrain of the coastal cordillera, where we saw the first striking cactus, one of the many forms of Trichocereus chilensis. In this region there has been prevalent for many years a steadily increasing drought, on account of which scarcely sufficient water has come down out of the hills to irrigate the very fertile valley in which Olmue lies. The best tomatoes in Chile are grown in this valley.

Olmue is a cosy village-like town with a little plaza. Ritter's actual residence lies a little further off up towards the hills, namely at the village of Granzio, which is also the terminus of the bus-service.

Ritter conveyed us to a most pleasant guest-house of a certain Mrs Kern, an acquaintance of his, in which we had to live temporarily. Later the same evening we visited Ritter in his home. It is a very pleasant house, which stands in the middle of high hills. Beside the house is an enclosed garden in which stand planted out in the open but a selection of those cacti he had collected. A little below is an enormously deep well which must supply the water for Ritter and the plants on his estate. Since in the past year a total of only 9 mm of moisture fell, this well must be deepened once more to a considerable extent, since the level of the water drops lower daily.

From out of his study-room Ritter has a brilliant prospect of the coastal hills of the Andes which are up to 2,000 m. high in that locality. One of the remarkable things is that Ritter must water his cacti regularly and must protect them effectively from the fierce sun by covering up the plants with palm leaves. This experience has taught him that even plants from the bare torrid desert in the north of Chile without water and without any shading go to rack and ruin, although a thousand kilometers further north they live sometimes for several years without moisture and shade. From this it is evident how careful we must be about trying to imitate the living conditions under which the plants grow in their habitat.

It was also remarkable that the snow-white Copiapoas growing farther to the north, had lost much of their white coating in Ritter's garden.

The greatest enemy of Cacti is undoubtedly an insect that lays eggs in the plants. The caterpillars or maggots subsequently produced eat the cacti completely hollow or damage them so severely that the plants die. One encounters these insects more or less everywhere in cactus country. Damage also occurs from rats which migrate in dry periods and then eagerly eat cacti for food and moisture.

The house and garden of Mrs Kern, who lived in Valparaiso, was a veritable paradise. In the garden full of fragrant eucalyptus trees and all kinds of fruit trees, glittering humming birds droned during the morning around the shrubs with tube-like flowers.

With Ritter, and on one occasion also with his neighbour Herr Winterhalder, we went into the hills where we collected rare specimens such as Pyrrhocactus garaventai, P. horridispinus v. robustus and P. curvispinus v. campanense.

My wife and I celebrated Christmas together in the house of Mrs Kern in the company of Herr Ritter whom we had invited. It was an unusual but very choice Christmas dinner, with candles set among the cut eucalyptus branches.

Alas everything must still be stowed on to Ritter's Ford pick-up so that our departure was to be delayed. Thereby was one blessing, in that we found a further opportunity to ascend the steep hill where Pyrrhocactus engleri grows. During twelve years Ritter had not been there. During the climb we saw the commonly occurring Trichocereus chilensis. A little higher was Pyrrhocactus curvispinus reaching nearly as far as the peak of 2,000 m. Here at the crest of the hills we found P. engleri with richly varying spine colours. The seeds proved Ritter's proposition, that this species diverges very strongly from those of the remaining Pyrrhocactus, so that one must not be too hasty to join similar but insufficiently known plants in synonymy with others as Hutchison, among others, did.

After this very good practice in hill-climbing we could finally start our trip to the north. Mrs Kern gave us some covers, a sleeping bag and various household articles also, since we would often have to camp in the wide-open spaces. The Winterhalder family spoilt us with a great sack of lemons and eggs from their business and so equipped and accompanied by many good wishes we went in the Ford pick-up via Limancho towards the coast. It was a tremendous thrill for us to reach the Pacific Ocean, the interesting coast where years ago Darwin was journeying, quite different from the coast along the Atlantic Ocean.

Among barren and lifeless inhospitable rocks we soon found Pyrrhocactus chilensis and its variety albiflorus. Unreachable rocks along the coast and rocky points in the sea right opposite the coast were white from the droppings of thousands of grey seabirds. Further along we found Pyrrhocactus horridus, Trichocereus litoralis, Eulychnia castanea and Neoporteria subgibbosa.

As evening fell the vigorous onshore wind died away and it was remarkable how cold it became. This was also apparent during the first night in our 'Hotel' - the cargo-deck of the pick-up. Ritter slept forward in the cab and my wife and I lay like sardines in a tin, stretched out between the walls full of luggage. This first night did not appeal to me, but as it gradually became evident later, one could become accustomed to many situations. The following morning it was unexpectedly bleak and cold and we were really pleased when the warm summer sun shone down upon us.

On this day we encountered a great variety of cacti. In the coastal hills many Trichocereus skottsbergii occurred. Beyond a level area without any particular road, we came to the Ocean. On some rocks which were difficult to ascend we found the most southerly occurring Copiapoa pendulina. Going inland once more we found on one particular hill the very widespread Tephrocactus berterii and further on the following interesting species - Trichocereus serenanus, Eulychnia acida, E. castanea, E. breviflora, Pyrrhocactus setosiflorus var. grandiflora, Eriocyce ihotzkyana, Copiapoa coquimbana and Neoporteria litoralis. The flowers and fruits of Eulychnia were of especial interest.

Early in the evening we came at last to the city of La Serena, where we were able to find a very simple little hotel. The following morning we talked to Herr Wagenknecht, a friend of Ritter's living there, paying a visit to him at his office. While we were there he showed us a bulky golden-yellow spined unknown Copiapoa which he had discovered. He was most friendly towards me, giving me a large offset from that clump, which now resides in my greenhouse.

That day we went with Ritter up one of the many valleys down which the rivers come out of the high mountains of the Andes lying to the east. We found at various spots Copiapoa wagenknechtii, Neoporteria nidus, Pyrrhocactus jussieui with its variety spinosior, Pyrrhocactus eriozyzoides and quite lofty Eriocyce sandillon.

The hills here are perfectly bare and exhibit all sorts of shades of ochre yellow. One comes across almost nothing else but cacti. The smaller globular kinds can only be found by literally going with ones nose against the ground and looking between the gaps and clefts in the rocks.

Comments from H. Middleditch.

"It is most interesting to read in the above article the observations recorded upon the sea breeze prevailing until the evening. The anti-cyclone which is pretty static in the south-eastern Pacific generates a somewhat southerly airflow during the daytime along the coast of Chile. The land surface is warmed up rapidly during the day by the sun so that by about noon a typical sea breeze will be blowing onshore, becoming quite stiff during the afternoon. As the sun descends towards evening, the land surface will cool down just as rapidly as it heated up in the morning and so there will be no hot air to rise over the land and draw in air from the sea - thus causing the sea breeze to die away just as Buining observes.

"We gather this trip took place at Christmas time, which would be around midsummer in Chile; at La Serena the sun would be barely six or seven degrees of latitude away from being directly overhead, so that the daytime heating effect would be almost at its maximum. During the winter, when the sun would be over fifty degrees of latitude away, the daytime heating effect would be very much less and in consequence the sea breeze would be much weaker, the air pattern much more stable. There would then be better opportunity for the deck of stratus cloud to form at the typical height of about 1,500 feet; we find no mention of this feature in Buining's article, nor of the coastal mist which again tends to be more extensive and persistent in the winter months.

"Because of the absence of surface vegetation and the lack of night-time cloud cover, radiation of heat from the ground at night is relatively unimpeded; despite being nearer the equator, the night temperature in northern Chile will be less than it is around (say) Santiago, hence Buining's comment about the chilly evening and early morning.

"The article by Knize in *Chileans* No.15 pp. 81-83 describes his collecting trip up-valley from La Serena, thus covering the same ground as in the latter part of Buining's article above. In the notes following Knize's article we referred to the variation in spine length observed and recorded by Knize on *Neochilenia napina*; it is quite interesting to note that Buining refers to a variety spinosior of *N. jussieui*, thus suggesting that a similar diversity of spine length may also occur in this species. My own seedlings of this species certainly bear no resemblance in spine length to the photograph in Borg, Plate XLIII. At present I am unable to find any other reference to a 'variety spinosior' for *N. jussieui*.

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NEOCHILENIA ASPILLAGAI (Sohr.) Backbg. by Udo Kohler.

(Translated by K. Wood-Allum from K.u.a.S. 17. 5:66).

*Neochilenia aspillagai*, which was described in 1929 by J. Sohrens in the monthly *Journal of the German Cactus Society*, belongs to the 'older' species of *Neochilenia* which have been known for four decades. Like almost all other species of *Neochilenia* this species flowers readily. The beginner may flower it without undue difficulty, particularly when it is grafted. The plant was discovered by Don Manuel Aspillaga on his Hacienda which is called Tanume, which is situated in the low-lying Cordillera de Costa in Central Chile. He called it an 'underground *Echinocactus*'.

The plant may be described as a 'cave-builder'. It grows in hollows which form in the clay soil during the rainy season. Plant, offsets, and seedlings completely fill the area of the hollow in which the plant is growing. In the dry season the crown of the plant is sometimes found a finger's-width below the edge of its hollow. Besides protecting the plants from the sun the hollows also hold the water which would otherwise be lost, owing to the position of the plant on the slopes of hills. Anyone who has an example of this 'cave-builder' in his collection is the owner of an interesting little plant. I know of no other plant with similar characteristics.

Collectors have often reported that they have found normal plants almost entirely covered

in sand. Castellanos once reported simply that Lobivia schreiteri Cast. was growing approx. 10 mm below the surface of the soil. This observation seems, however, to be attributable to the drifting of the sand.

The flowers, which are pale pink on the outside and light yellow with green stripes on the inside, evoke in my mind a cool dewy glass of Moselle wine. I hope that you will permit me this comparison for my home is not far from the Moselle valley!

Comments on Neochilenia aspillagai from R.E. Hollingsbee.

"I am interested to read that you flower Neochilenia aspillagai. I had a plant from Winter with a note that it was scarce and a plant to look after, but it is not growing particularly well, let alone producing flowers. It is about 1¼" diameter by 1" tall and on its own roots. I think it would be of interest to all collectors with Neoporteriae if we had an article giving the kind of size these plants have to reach before they produce flowers. I imagine it is quite variable. I also imagine that it is easier to flower the Chileorebutia types than the spinier Neoporteria.

.... from H. Middleditch.

"On our 1965 Cactus Tour I acquired a grafted plant of Neochilenia aspillagai. This species seems to me to compete with Notocactus crassigibbus for the honour of looking more like a Gymnocalycium rather than the rest of its own genus, which probably tempted me to buy it at the time. It possesses radial spines which wander from the straight just like those of Noto. crassigibbus and some yellow-flowered Gymnos. do. It was a very welcome surprise to find it produced three or four flowers the following year - at that time it would be about 60 mm in diameter. The flowers were accompanied by the appearance of one or two offsets - the number of offsets having increased steadily each year and the flowers continuing to appear each season. I am sure I would agree with the author that this species flowers readily - but doubtless, as Bob Hollingsbee suggests, when large enough.

"My plant was labelled 'Pyrrhocactus aspillagai' when acquired and the young buds carry somewhat more woolly hair than appears on the young buds of those Horridocactus which have flowered in my collection, but not as much woolly hair as on many Neochilenia and Chileorebutia. There are a few wispy bristly hairs in the upper part of the tube some of which curl around close to the bud while others curl away from it. The sepals become visible when the bud is very small and when the bud is approaching maturity the sepals are predominantly reddish brown in colour. The flowers do not open wide for me but maintain their fairly neat funnel form for two or three days - even four days if the usual English summer weather prevails.

"A plant of this species in the collection of P. Cowgill, also grafted, was observed to be rather less open in the spination than the plant depicted on the cover; the spines were slightly longer, but of comparable thickness.

.... from A.W. Craig.

"I obtained a small offset from the plant shown on the cover of this Journal, in the spring of 1967, from Harry Middleditch. At the time I happened to have a rather scarred stump of Trichocereus - probably Trichocereus spachianus - about 5" high and almost 1½" across. The top of this plant had been lopped off to use as grafting stock and this residual stump was rather woody in texture, but I attempted to graft the aspillagai offset on to it. In the event, the graft took successfully, the scion growing so well that it has now just about outstripped the parent plant in size and has produced its own offsets. This plant flowered first in 1969 and then again this year.

"In the 1969 flowering season it also set three or four fruits; these remained small, round, and green for many weeks, showing no signs of turning pale pink and elongating in the manner

of many *Neochilenia* fruits. Eventually I split open the still green fruit and found it full of ripe seeds which I then sowed; these have germinated quite well and now I have some small seedlings coming along.

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We have slides of this species in flower in the slide library - A.W.C.

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## THE GENUS *MONVILLEA* Br. & R.

The genus *Monvillea* was erected by Britton and Rose in "The Cactaceae" Vol II. Their diagnosis went as follows:-

"Night-blooming cacti with long, slender, half-erect stems, often forming thickets; flowers borne towards the top of the stem, of medium size, without felt or spines; tube proper in typical species slender, tapering into a short throat; scales minute; outer perianth segments greenish or pinkish; inner perianth segments white or yellow; stamens white, not in definite rows but scattered over the throat; style slender, white, with linear stigma lobes; flower tube rigid after anthesis, withering on the ovary; scales on the ovary minute, their axils naked; fruit glabrous, red, plump, spineless; flesh of fruit white, juicy; seeds small black.

"Type species *Cereus cavendishii* Monville".

If this diagnosis is compared with that also quoted by Britton and Rose for *Cereus* (Hermann) Miller, one may find there two features which differentiate *Monvillea* from *Cereus* - *Monvillea* is a much more slender plant and its flower remains are persistent when withering. In regard to flower and fruit, both genera show a fairly close degree of similarity.

Backeberg in his *Kakteen Lexikon* has in his section *Gymnocerei* the three genera *Cereus*, *Monvillea* and *Brasilicereus*. This last-named genus emanates from north-eastern Brazil and bears short funnel-form flowers which do not appear to open wide, but which are otherwise generally similar to the flowers of *Cereus* and *Monvillea*.

Collectors who have grown *Monvillea* will have no difficulty in distinguishing these plants from *Cereus* Spp., for *Monvillea* grows with slender stems which after the first foot or two of growth commonly require some supplementary means of support if they are not to trail over the floor or staging. The usual problem then becomes manifest after a further year or two's growth - the plant becomes too large for the usual size of greenhouse. This at least provides one advantage in that most collector's plants are cuttings from another's 'oversize specimen' - or from a plant which has gone through more than two collections in a series of cuttings! This could account for the frequent readiness of many *Monvillea* to flower after growing only two or three feet in height.

The inclusion of 'yellow petals' in the diagnosis by Britton and Rose would appear to have been provided to cover one plant then (but not now) considered to be a *Monvillea* which had been reported to carry a yellow inner perianth. Backeberg has no hesitation in describing the flowers of *Monvillea* as whitish and this would appear to be quite justified. This provides an excellent example of those several cases which exist of generic diagnoses which are now known to be imperfect to a greater or lesser degree but which are still quoted as the authoritative diagnosis for the genus.

In the *American Cactus and Succulent Journal*, Buxbaum compared the flowers of *Monvillea* and *Cereus* and described their basic differences. He also pointed out that the differentiation between these two genera adopted by Backeberg viz:- that *Cereus* has the style only persistent on the fruit, does not fit the characteristics observed on a number of *Cereus* flowers and therefore cannot be considered valid.

Buxbaum describes and illustrates a *Monvillea* flower - actually *Monvillea balliviani* - showing that the stamens occur in the uppermost, funneliform, part of the flower, whilst the greater length of the cylindrical portion of the tube is quite lacking in stamens. The lowermost, short, residual length of tube is occupied by the nectary. In the *Cereus* flower the stamens are inserted lowermost very close to the top of the nectary so that we do not find a long length of tube without stamens. Buxbaum also puts forward a further characteristic by which the flowers of the two genera differ - the nectary glands on *Monvillea* are glabrous whereas those on *Cereus* are velvet-like.

The flowers of *Praecereus* are stated to exhibit a comparatively short interval between the top of the nectary and the lowermost stamens, the inner wall of the tube being striated over this interval.

The following species names are listed by Backeberg (excluding those placed under *Praecereus* by Buxbaum).

*Monvillea balliviana* Card.

- calliantha Fuau & Backbg.
- cavendishii (Monv) Br & R.
- euchlora (Web.) Backbg.
- haageana Backbg.
- lauterbachii (K. Sch.) Backbg.
- lindenzweigiana (Gurke) Backbg.
- paxtoniana (monv.) Borg
- phatnosperma (K. Sch.) Br & R.
- rhodoleucantha (K. Sch.) Berg.
- saxicola (Mor.) Berg.
- spgazzinii (Web.) Br & R.

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In the slide library we have the *Monvillea* flower shown in the accompanying sketch - any slides of other species in flower or fruit would be very welcome - A.W.C.

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Comments on *Monvillea* from A.W. Craig

"The plant shown in the accompanying illustrations was obtained about four years ago and although it was not named, it would seem to match the description of *M. spgazzinii* - the stem being five-angled, 20 mm thick, marbled light grey and dark blue-green. The areoles are 20 mm apart with a small amount of white wool and four spines, adpressed to the stem, the upper three lying fairly close together, 8 mm long, dark brown, the lower one 6 mm long and horn coloured.

"The original stem was damaged by cold, which occurs every winter even though my fan heater is set at 45°F. This left a 5" high stem which produced two new 8" side shoots. The flower buds appeared on this year's new growth, about 50 mm below the growing tip, in early July and opened during the second week of August. I presume that they would open during the early hours of the morning and they faded by 10.00 a.m. the next day.

"The flower tube was apparently completely free of scales but had shallow longitudinal grooves. The joint between the perianth and ovary was not discernible as it is with *Cereus* flowers. The inner petals were white, the outer petals metallic bronze with greenish edges, the tube a bronzed green. The stigma had eight lobes, white in colour with a slight pinkish tinge".

.... from D. Angus

"I obtained an 8" high cutting of Monvillea spegazzinii in 1963; it puts on about a foot of growth every year and now trails along under the roof and curls over the top shelf. It flowered the year after I acquired it and has continued to flower each year since. The flowers arise both from the present season's growth and from that part of the stem which grew during the previous year. This last two years it must have produced upwards of 40 buds, but some of these drop off every year in hot weather - perhaps I allow the plant to dry out too much.

"The flower buds appear towards the end of June and the flowers will be opening at the end of July. Each flower opens at about 8.00 p.m. when the sun is only just above the horizon - the flowers seem to have quite a strong scent".

.... from R. Martin

"I have a plant of M. spegazzinii which is now over four feet in height; this flowers regularly for me, the flowers always appearing on the previous season's growth".

.... from J. Forrest

"About seven or eight years ago I obtained from Afflek's nursery a seedling Monvillea spegazzinii, which probably stood about six inches high at that time. Over the following years it put on about four feet of growth, until January 1967 when we had the hurricane which did so much damage in Glasgow. Being nearly on top of the hills we were exposed to the full force of the winds. The greenhouse stayed put but during the night most of the glass was torn out by the hurricane. In the early hours of the morning, when sleep was impossible on account of the noise of the wind, I looked outside - to see gaping holes in the greenhouse with some tattered remnants of the polythene lining flying like a torn sail in the wind. At the time it was impossible to do anything out of doors; the next day I sorted out the debris - many plants had been chopped by flying glass, most of the pots had been blown over and rolled about, with many plants out of the pots and numerous pots broken. I moved all the salvageable plants into a shed and there they stayed until the greenhouse was repaired, amongst them the Monvillea spegazzinii.

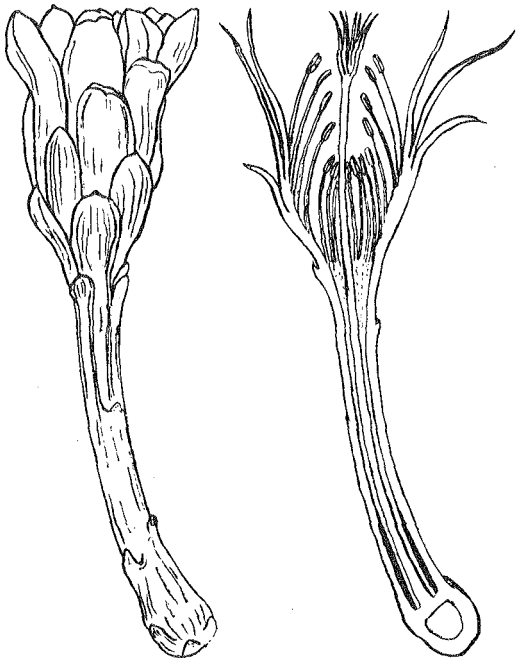
"For the following two years the plant made no further growth, but during that time the base of the stem gradually thickened out until now it looks almost caudiciform. This swollen base is about 2 or 2½" across and still carries the lowermost areoles down the sides - the stem immediately above is about an inch thick.

"In 1970 it put on about six inches of new growth and it also produced a crop of eight flowers - some on the new 1970 growth and some from the growth previous made in 1966. The flowers appeared in late June and early July; they started to open just as the sun was finally setting, being fully open at midnight and were finished by eight the next morning. The flowers opened one at a time with an interval of an odd night or two between openings."

#### THE GENUS PRAECEREUS BUXBAUM.

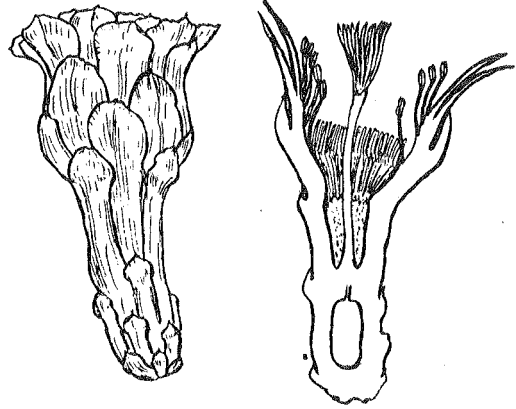
With the valid publication of a new generic name we may find some well-known plants appearing in catalogues under a new guise so a few notes on this new genus might be appropriate at this time.

The Monvillea with which many of us are familiar produce buds which grow a long thin tube carrying a fairly huge white flower which opens at night with many thin, widespreading petals. Lamb illustrates Monvillea spegazzinii with partly opened flowers in his 'Illustrated Reference on Cacti and Other Succulents' Vol. III and in Backeberg's Lexikon there is an



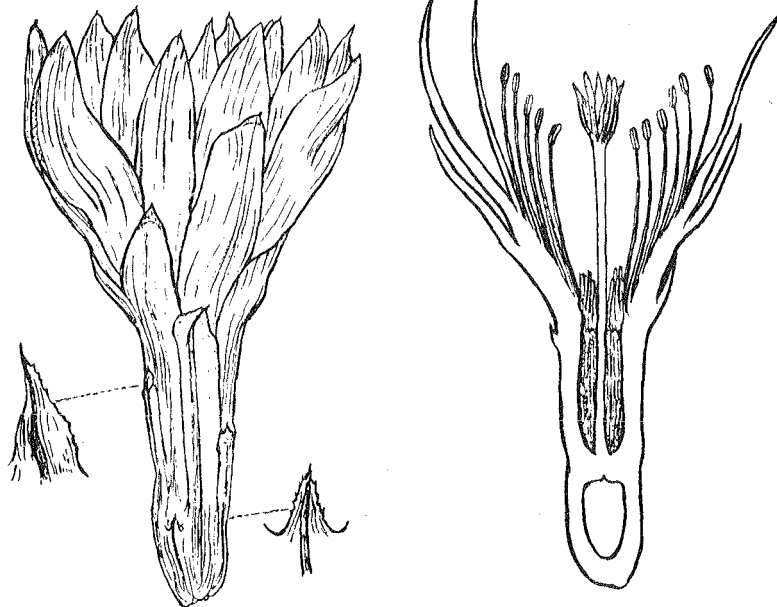
MONVILLEA BALLIVIANI

Flower half-open.  
(Buxbaum, C. & S. J. Am)



PRAECEREUS SMITHIANUS

Krainz, Die Kakteen I. VII 1968



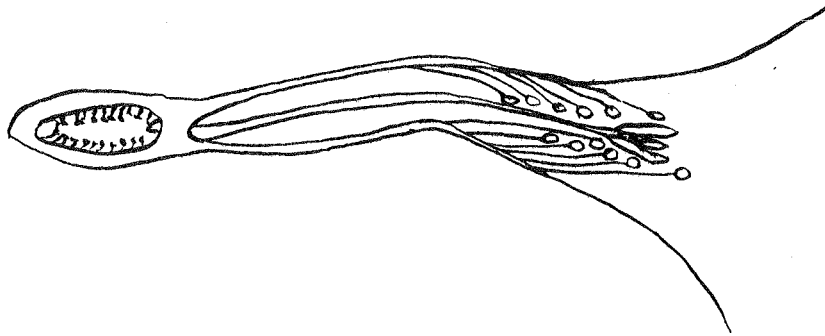
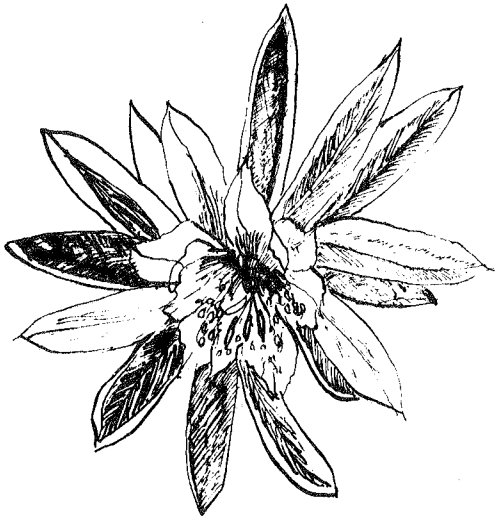
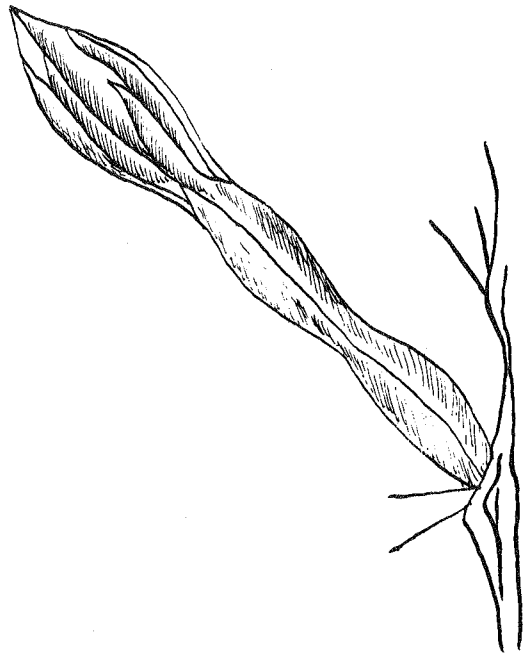
CEREUS VALIDUS

Showing enlarged scales  
(Buxbaum, C & S. J. Am)



Collection - A.W. Craig

Section - x 1<sup>1</sup>/<sub>4</sub>  
Others full size



MONVILLEA SPEGAZZINII (Web) Br & R.

illustration of *M. haageana* in bloom.

In Vol. VI of Backeberg's 'Die Cactaceae' one may find over pages 2293 to 2315 several photographs of plants of this genus in flower, from which it becomes readily apparent that some species have funnel or bell shaped flowers with much shorter petals which do not open wide-up like those with long petals. Backeberg places those *Monvillea* with this type of flower in his genus *Monvillea* sub-genus *Hummelia*. It soon becomes apparent that these species (with one exception) emanate from Venezuela, Ecuador, Peru, Northern Bolivia and adjacent parts of Brazil i.e. the north-western parts of the *Monvillea* habitat, whereas the species with wide opening flowers emanate from southern Bolivia, Paraguay, northernmost Argentina and south-eastern Brazil.

Buxbaum has now transferred those *Monvillea* with short, stout, flowers which do not open wide, to his new genus *Praecereus*. The following species may now be found under this new generic name:-

- Praecereus smithianus* (Br. & R.) Bux.
- diffusus* (Br. & R.) Bux
- maritimus* (Br. & R.) Bux.
- jaenensis* (Rauh & Bkbg.) Bux.
- amazonicus* (K. Sch.) Bux.
- apoloensis* (Card.) Bux.
- campinensis* (Bkbg. & Voll.) Bux.

In Britton and Rose's 'The Cactaceae' Vol. II p. 37 one may find a description of *Cephalocereus smithianus* (now *Praecereus smithianus*) with a sketch of the flower and fruit. On p. 24 of the same book will be found some information on *Monvillea diffusa*, *M. maritima* (both from the coastland of Ecuador), and *M. amazonica* - from eastern Peru.

*Monvillea apoloensis* was described by Cardenas as originating from near Apolo in the province of La Paz, Bolivia, at a height of 1,400 m. (4,500 ft.) i.e. in the Andean front ranges.

*Monvillea jaenensis* was discovered near Jaen in northern Peru; this location is one of the dry valley bottoms of the eastern Peruvian Andes (see the Chileans No. 11 pp. 62-63).

Rather isolated from the preceding group is *P. campinensis* which is found in the State of Sao Paulo, Brazil, between Campinas and Mogy Mirin.

Further information on this new generic name may be found in the American Cactus and Succulent Journal for July-August 1968 and in the Krainz-Buxbaum 'Die Kakteen' No. 111, 1968.

H. Middleditch

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## THOSE LETTER-NUMBER COMBINATIONS

From time to time correspondents enquire from the Chileans about the origin and meaning of the variously prefixed numbers, with or without species names, which may be found in catalogues and plant descriptions.

FR. This is probably the most widely known prefix and is used by Friedrich Ritter for the plants and seeds which he collected from all parts of South America. The field numbers carrying an FR prefix now exceed 1200 and a list of all those known was published as our 1967 Year Book. Additional numbers which have since come to our attention have been published from time to time in these pages.

A number of seeds and seedlings sold by Frau Winter of Frankfurt were obtained from plants flowering in cultivation in her nursery. A number of F.R. plants imported were supplied to

collectors in New Zealand who subsequently provided Frau Winter with seed (still under the FR numbers) from these cultivated plants. In consequence one cannot assume that plants or seeds carrying FR numbers are free from the usual problems of hybridisation in cultivation.

HU. Again this is a widely known prefix, now possibly becoming almost as well known as the FR prefix. It stands for Horst - Uebelmann; Leopold Horst resides at Arroia de Seca in the Province of Rio Grande do Sul in south eastern Brazil and he collected cacti privately over a fairly wide area of the Brazilian highlands before selling plants to Europe. The greater quantity of his collected plants coming into Europe commercially have passed through Uebelmann in Switzerland who has financed Horst's more recent and more extensive collecting expeditions. All HU plants come from Brazil or closely adjacent territories. Some accounts of Horst's collecting trips with Buining have appeared in these pages.

U. A reference to any of the catalogues emanating from Karlheinz Uhlig, who has a commercial nursery in a pleasant small village near Stuttgart, will immediately reveal that this prefix is used by Uhlig to identify his plants and seeds and does not specifically relate to imported plant or seed material.

Kz. In the last two or three years plants and seeds with this prefix have begun to appear in collections - they originate from a Czech collector, Karel Knize who lives at Kladno, a large town about forty miles or so out of Prague, the capital of Czechoslovakia. Knize has made several trips to Chile and also to the Andes of Peru and Bolivia. An account of some of these trips has appeared in our recent issues.

R. Plants with this prefix originate from Walter Rausch, who lives in the village of Aspern, about ten miles out of Vienna (when you don't lose your way), the capital of Austria. Rausch, too, has made several trips to the high Andes of Argentina and Bolivia and also a collecting trip to Uruguay. Some account of his travels have also appeared in our pages. Most of the plants with an 'R' prefix are Lobivia and Sulcorebutia, Rausch's speciality, but also include some Notocacti and other genera.

SH. This prefix is used by D.W. Sargent for plants collected by Dr. Alfred Lau in Peru, Bolivia and Chile, using Lau's field numbers. This collector has also sent plants to Uhlig who sells them under the same field number but without a prefix.

HT. Plants collected by Dr. Lau are also sold by P. Hallett who again uses the same field numbers but with a different prefix. One may place reasonable reliance on the same number representing the same plant from all three sources. Lau is apparently on good terms with Ritter and the plant naming seems pretty reliable.

HK. This prefix is used by Horst Kuenzler of New Mexico Cactus Research, who wrote "I use the HK numbers only on a few of the seeds I collect myself in the Southwestern U.S.A. and Mexico, especially when I find new forms or varieties. From next year (1969) on, I shall probably use the HK numbers on all seeds I collect. The only other time I have used HK numbers was with certain Neochilenias etc., collected by a good friend of mine who lives in Prague."

UN. This prefix was used by Gjeltma for plants and seeds sold by himself; it does appear possible that a proportion of these are seeds from cultivated plants which exhibit signs of the inevitable hybridisation which cannot be avoided in cultivation.

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#### MELOCACTI - from Mrs L. Teare

My correspondent from Brazil tells me that *Melocactus violaceus* is the smallest of the Melocacti. It appears to be fairly common in habitat and grows along the coast further north than Rio de Janeiro. I believe that *M. melocactoides* and a few varieties grow on the beaches at Rio de Janeiro, where they grow in the sands, their roots spreading a long way and protected

by low growing bushes. From seedlings a plant reaches maturity in three years, they develop their cephalium - but a low one, which never takes the columnar shape of the larger growing species. My plant of this species flowered this summer, but I have not seen any seed pod yet.

My unnamed species from Sao Paulo, Bahia, is I think *habiensis*. Our French cactus friend came to stay with us in August and he brought me some rare plants among which was a grafted *habiensis* and I have now another on its own roots from an exchange, I find that the spines are very much alike.

One further point on *Melocacti*, I noticed that Borg states that *Melocacti* have few roots. Mine have to be repotted each year, the pot always being full of roots.

I should be pleased to hear from any members who would be interested in participating in a Robin covering *Melocactus*.

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### COPIAPOA - A QUERY.

I have been scrutinising Vols. III and VI of Backeberg's "Die Cactaceae", together with other literature; in the course of this I have come across the following names of *Copiapoa*. I should be grateful for any information regarding the origin of these names, any references to them, or the source of any description.

<i>aurata</i> Knize	<i>microcarpa</i> Knize ( ? ) KZ 44
<i>barquitensis</i> Ritt. FR 654	<i>multicolor</i> hort.
<i>brunnescens</i> Bkbg. nom. prov.	<i>tocopillana</i> Ritt. FR 1057
<i>castanea</i> Ritt. FR 711	<i>vallenarensis</i> FR 1087 ( ? )
(Winter's catalogue, 1959)	sp. Vallanar KZ 93.
<i>chanaralensis</i> Ritt. FR 527	
(Winter's catalogue 1959)	
<i>coquimbana</i> v. <i>macrocarpa</i> Knize	
<i>desertorum</i> Ritt. FR 529	
(Winter's catalogue, 1957)	
<i>dumetorum</i> Uhlig (Catalogue 1969)	
<i>eremophila</i> Ritt. FR 476, 208a.	
(Winter's catalogue 1958)	
<i>imbricata</i> Knize ( ? ) KZ 57	
<i>intermedia</i> Ritt. FR 216	
(Winter's catalogue 1958)	

Comments from H. Middleditch: In *Succulenta* 48. 12:69 an article reporting a talk by A.F.H. Buining refers to *C. tocopillina* as the most northerly, and *C. pendulina* as the most southerly, species of *Copiapoa* in Chile. There are also references in the same article to *C. hornilloensis*, *boliviana*, *melanohystrix* and *tenebrosa*, all of which are new to me.

In looking for references to the specific name *aurata*, the following extract came to light in the Sept. 1936 *Journal of the C.S.S. of G.B.* in an article by Curt Backeberg:-

"About 1843, Pfeiffer and Otto gave a description of an *Echinocactus auratus*, which in size and appearance is as near as makes no matter an *Eriosyce*; this I have found in Chile but it is very rare. It is near *Echinocactus sandillon* or *ceratistes* (*Eriosyce*). The likeness to the Mexican *Echinocactus grusonii* is striking." Accompanying these notes is a (mistitled) illustration of a young seedling of *Eriosyce ceratistes* v. *tranquillaensis*, which Backeberg there quotes as synonymous with *E. aurata*.

One obviously tends to wonder whether Knize has come across what he believes to be this plant but regards it as a *Copiapoa*.

## AN AUSTRALIAN COLLECTOR

Some 40 odd years ago, Ralph Field started to collect cacti on his ranch at 'Whiora', Tennyson, Australia. He now has something like 1,600 plants spread over two and a half acres of garden and he writes to the Chileans 'It was a long job when I came here to find out what plants could take our open garden conditions. There were only three of us in this state of Victoria interested in cacti and probably not a dozen folk in Australia. Knowledge was very limited and the only books available were Britton and Rose in the Public Library and Watson's Cactus culture - so it was a matter of nursing the plants until I could get a duplicate and then trying it outside. The ground here is quite soggy following rain yet I wish you could see the great assortment of cacti growing in the heavy clay loam. Sometimes after what with us is a lot of rain, water will be standing round the plants for days on end - the wonder is how they survive. Winter is on us this morning (June 22nd) with a dense fog - we do not get many of these in the inland plain country.

Weeds are a problem during winter - we just can't do much about them other than hand weeding round the small plants where the ground permits and running a motor mower among the plants whenever we can use it. Do you know of any weed spray that can be used without harm to cactus? No one here seems to have any knowledge of any product available.

We have many *Cleistocactus*, *Oroocereus* and *Borzicactus*; our *Seticereus icosagonus* is eight feet high with 30-40 stems and, with *Borzicactus morleyanus*, produce masses of flowers. *Cephalocereus senilis* is also quite hardy - there are a dozen or so round the garden and have taken everything that has come our way without turning a hair. This years' growth on one of them is 10" - fairly consistent on this plant which is 11 or 12 feet high."

## SEED EXCHANGE

Our most recent seed list included quite a wide range of species, but this wide range does pose its own problems when we often have only a limited quantity of many species. In addition, as we receive seed almost all the year round, our available range is constantly changing. In order to cope with this situation I should like to obtain a second hand duplicator to take A4 paper (the size of this page). I would be very pleased to hear from any reader who may either have such an item available or can assist in obtaining one, in working order.

The amount and variety of seed received from several members in New Zealand, Australia, and North America, has been most acceptable, permitting us to meet a considerable number of requests for certain species. However, I am always pleased to receive any surplus seed from your collection, however small the quantity, in order to maintain the breadth of variety in our seed list. - E.W.B.

## ERRATA No.17

- p.85 The illustration of *Notocactus pulvinatus* should be credited to the Dutch Journal 'Succulenta'.
- p.87 The last line of the article on Uruguay should read 'is not allowed to fall too far'.
- p.103 The first line at the head of the page should read "Comments on Endogenous Vivipary in *Neoporteria*" (Not, 'Comments on *Sulcorebutia*').

## CONTINENTAL CACTUS TOUR 1971

Our Tour for 1971 will be to Switzerland, via Belgium and Germany, returning via Germany, Holland, and Belgium. We expect to visit various public and private collections and nurseries en route, including De Herdt in Belgium, Su-ka-flor in Switzerland, and Herr Krainz at the Zurich City collection. There will be opportunities to look around Antwerp, Heidelberg, Zurich, Interlaken and Arnhem.

The Tour will take place from May 22nd to June 5th and the cost per head will be £67.10.0 (£67.50) which covers transport, accommodation, three meals per day, certain insurance, and entrances to collections.

We shall be using an English coach again which we expect will return with slightly more luggage than it takes out. Anyone wishing to join the party or obtain more details please contact me. - H.M.

## SEEDLING PLANTS

It is hoped that when this Journal reaches you, that we shall have some seedling plants - mainly grafted - available. Would anyone wishing to receive a list of plants available please send a S.A.E. to A.W.Craig.

## FORTHCOMING ARTICLES

We should be pleased to hear from any members who have been successful in cultivating imported cuttings or plants bearing a cephalium, especially *Austrocephalocereus*, *Coleocephalocereus*, *Thrixanthocereus*, *Micranthocereus* or *Espostoa*.

## 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 Hillcreast, 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.
Neoporteriae	D.Rushforth, 80 Cheltenham Road, Gloucester GL2 0LX.
Notocactinae	K.H.Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A.Johnston, 11 Malvern Road, Scunthorpe, Lins.
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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