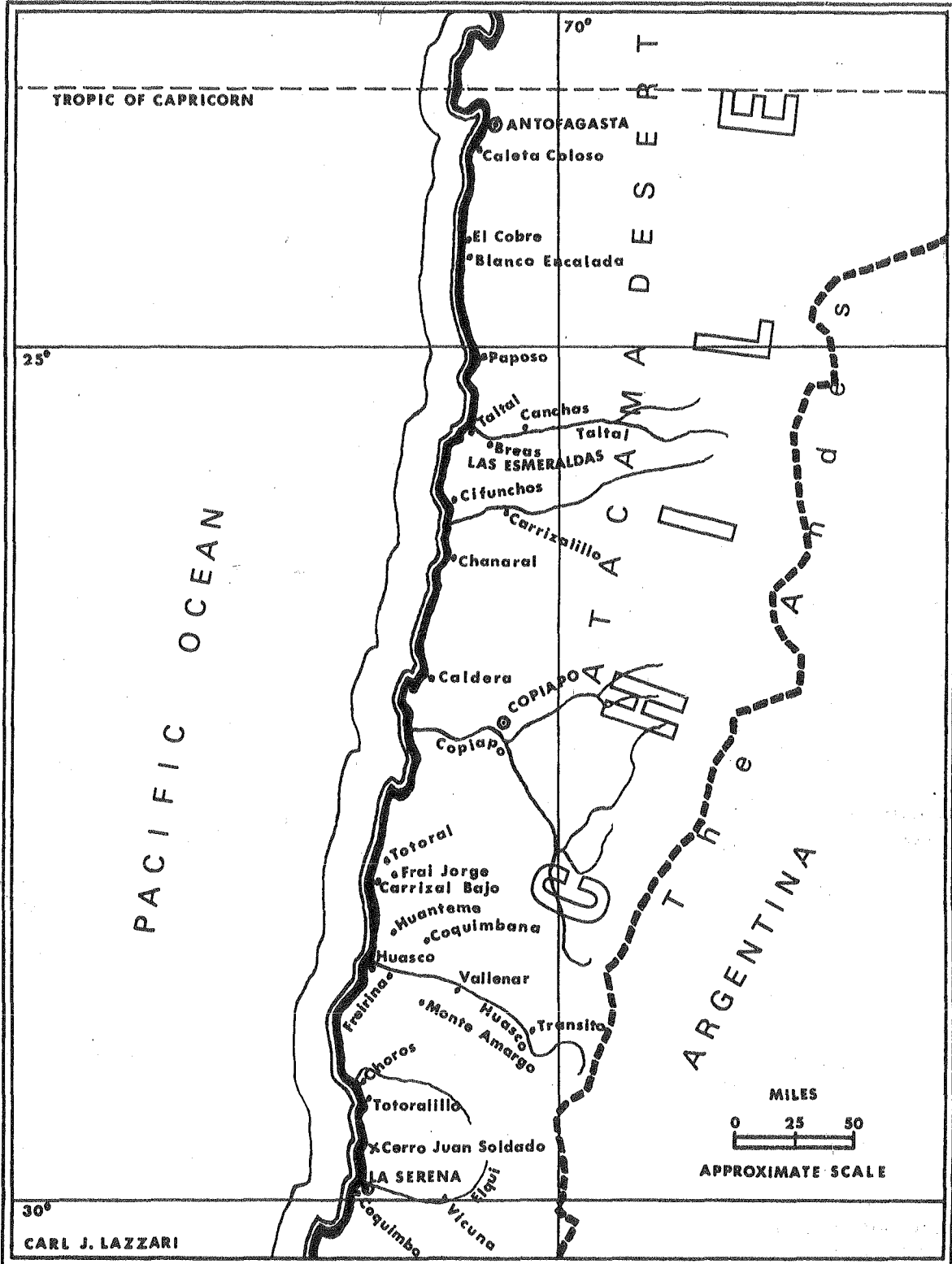
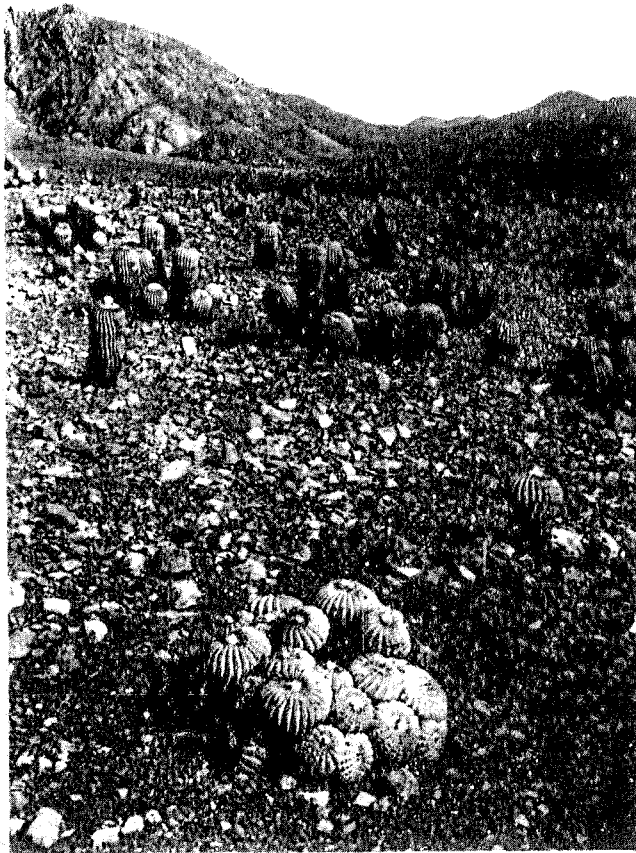


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*Copiapoa cinerea*

FOTO HANS LEMBCKE

## COPIAPOA - THE LARGEST CHILEAN GENUS

By Miroslav Voldan

Translated by D.W. Haigh from 'Kaktusky' (Czechoslovakia)

*Copiapoa* Br. & R. is the name of a specifically Chilean genus whose habitat is the inlets of the Pacific coast between 24° and 34°S latitude. We meet it both on dry crumbly slopes at more or less sea level and at higher altitudes in the Pampas uplands in the inland regions from Antofagasta to Coquimbo.

Some well-known species which used to be classed under *Echinocactus* were separated by the American experts Britton and Rose into the newly created genus of *Copiapoa*, named after the town of Copiapo, being one of the places where they were most frequently found. Like most Chilean genera, *Copiapoa* is very variable. Curt Backeberg - and recently F. Ritter in particular - have noted dozens of new species so that this genus has become one of the largest of all Chilean genera.

The characteristics of the genus *Copiapoa* are hairless flowers on a short tube with a few narrow scales on the ovary becoming more numerous towards the flower - similarly with the fruit later. The petals overlap, the outer ones being rounded or only slightly pointed. The flower tube is bell-shaped or funnel-shaped, opening out almost into a circle. The flowers are yellowish-white to rich yellow in colour. The fruit is covered by a circular lid which becomes loose on ripening and then the fruit opens in a star shape. The ripe seeds carry numerous fleshy remains of the fruit and are medium-sized, black and shiny. The dry, but as yet unopened fruit is hidden in the wool at the top of the plant which in most species is fairly thick. The cultivation of these plants is not particularly difficult.

During the winter period they require a dry and light position with temperatures of 8° to 15°C. The transition to active growth is slow and therefore it is undesirable to start watering too soon, to avoid deformities in growth. During the growing period they require a sunny position, not too much water and plenty of fresh air. Extreme temperature variation between day and night, which can easily be achieved by ventilation at night, is particularly beneficial. *Copiapoa* do well on their own roots, but as their growth is very slow we generally graft them, whether as seedlings or cuttings.

They grow quickest on *Trichocereus spachianus* but this stock is not permanent and so it is recommended once it has grown to the required size to cut off the graft and root it. *Eriocereus jusbertii* is a good and more lasting stock since, although growth is slower on it, the spines develop better. Some *echinopsis*, too, are suitable but *Trichocereus peruvianus* is less so because the plants tend to grow tall rather than round on it. The same goes for *T. macrogonus* where the stock tends to grow deeply into the graft.

At present the genus *Copiapoa* can be divided into six groups of which the first five consist of related species. The sixth group consists of newly discovered species which for the time being cannot be properly evaluated and classed into the group to which they rightly belong, because of lack of material for evaluation :-

- Group 1 - type *C. cinerea*
- Group 2 - type *C. malletiana*
- Group 3 - type *C. coquimbana*
- Group 4 - type *C. echinoides*
- Group 5 - type *C. krainziana*
- Group 6 - *Copiapoa* of other new species

The chief representative of the first group is *C. cinerea* (Phil) Br. & R. known since 1860 as *Echinocactus cinereus* Phil. It inhabits considerable territories from Antofagasta to Coquimbo, its main concentration being in the Taltal, Paposos, and El Cobre districts. The plants are globular at first later becoming columnar, frequently branching from the base. The outside is chalky white. There are up to 30 ribs, with very slight nicks between the areoles. The number of spines is variable, usually 2, 4, or 6, although specimens with more spines or only one are met with. The spines are pointed and always black.

Hutchinson has shown that the appearance of the plant depends to a great extent upon its habitat. Whilst at higher altitudes in the inland Pampas they grow single, are usually globular, and well furnished with spines, near the coast one finds many columnar and branched forms, or whole colonies with few spines - *C. cinerea* v. *albispina* has white spines and a brownish body. It has been argued that this might be a natural hybrid between *C. cinerea* and *C. haseltoniana*. Not very different (with a more greenish body and yellowish wool) is the cluster forming *C. dealbata* (FR 509) found by Ritter at 28°S latitude. *C. columna-alba* (FR 530) is columnar in habitat, with white body, brownish to black spines and yellowish wool in the areoles. This appears to be identical with the plant found by Hutchinson in the neighbourhood of Breas and which the finder considers to be a local form of *C. cinerea*.

Also in this group are two of Lembcke's new plants from Caldera and Blanco Escalado. They are *C. lembcke* Bkbg, which differs from *C. cinerea* only in its smaller number of ribs, and *C. ferox* Lembcke et Bkbg sp. nov. which has more numerous, sometimes mottled spines. Both seem to be varieties of *C. cinerea* rather than separate species. The same goes for the globular chocolate coloured *C. brunescens*.

Another member of this group is *C. haseltoniana* Bkbg which occurs particularly on the coast of the Taltal province. The grey-green matt body branches freely, the top is covered in brown wool and sparse spines. The ribs number about twenty, the spines are long and narrow and very sharp, yellow-brown to grey in colour. Similar, but with a shinier body and thicker spines at the top, is *C. gigantea* Bkbg, which Ritter considers to be a variety of the foregoing. Hutchinson goes so far even as to think that both of them are local forms of *C. cinerea*. Two further plants, *C. gigantea* de Taltal (FR 209) and *C. eremophila* Ritt (FR 476 and 208a) are undoubtedly forms of *C. haseltoniana*.

The second group is represented by *C. malletiana* (Lem) Bkbg which has been known since 1845 as *Echinocactus malletianus* Lem. Its habitat has not been defined with any great accuracy and the flower has not been described. The plant does not sprout until it is quite old, its shape is roughly columnar, and it is very slow growing. Its 15 ribs are divided into prominent warts but these are not separated by notches. The spines are black, thin and sharp. *C. carrizalensis* Ritt from the coast of Carrizal Bajo is probably identical. Its flower is described by Ritter as tubular and golden-yellow. Similar is *C. intermedia* Ritt. which the finder himself at first considered as *C. malletiana*. It is more globular, bluish green, and with shorter spines.

*C. marginata* (S.D.) Br. & R. has also been known for a long time. It grows in colonies on the coastal hillocks of Antofagasta. Its habit is columnar; it is grey-green with woolly areoles. The erect spines are brown at first, later grey. It is also possible to class *C. pendulina* Ritt FR 504 into this group. It grows on the Frai Jorge coast and is the tallest of the Copiapoas, for it reaches a height of up to 2m. (app 6'6" - H.M.) and grows mostly in colonies, sometimes prostrate. It has a tap root, dark green body, light grey-brown areole wool and intense black - later grey - spines. The warty ribs are arranged in a slow spiral. The flower is comparatively large and yellowish-white. Backeberg thought it a transition plant to *C. cinerascens*.

The third group is centred around *C. coquimbana* (Karw) Br. & R, described as *Echinocactus coquimbanus* Karw. in 1886. It is abundant in the Coquimbo and La Serena districts, where it grows in clusters. It is elongated in shape, the 17 ribs are divided into warts with distinct notches between. The narrow top is hairy, the spines fine, slightly curved, black to grey. Its nearest relation is *C. cinerascens* (S.D.) Br. & R, known since 1845. This grows along the coast in the Copiapo district (district in this sense is used like county or shire in English - H.M.), mostly in globular form; it has numerous narrow grey-white ribs, with wool at the top and erect, yellow-brown, later grey spines.

This same region is the home of the very similar *C. megarhiza* Br. & R, which grows singly on long fleshy roots. It has white wool at the top, yellow later grey spines, and short columnar habit. Another plant in this group is *C. pepiniana* (K Sch) non (Lem) Bkbg; its basic home is not precisely known. The pale green body has matt surfaces, slightly columnar. The yellow-white wool at the top is covered in well developed, honey-coloured to dark brown spines. The lower spines are slightly curved and grey. The ribs are divided vertically by deep furrows and horizontally into warts. F. Ritter describes this plant as grey-white, E. Schelle as grey-green. It appears that this plant is once again a variable type with several local forms. *C. pepiniana* var. *fiedleriana* (K. Sch) Bkbg, has fewer spines, whiter wool at the top and branches freely, forming whole colonies. Britton and Rose voiced the suspicion that it might be identical with *C. coquimbana*.

Also in this group one can include a few new plants; firstly the variable *C. calderana* Ritt. from the Northern Caldera coast; also *C. chanaralensis* Ritt (FR 527) from the Chanaral district, and the very similar *C. castanea* Ritt (FR 711). *C. montana* Ritt. is an attractive plant, which soon flowers with large, yellow-white, wide open flowers. Its globular body, divided into blunt warts, is grey-green in colour; the spines are fine, generally flush with the body black. Its habitat is the Taltal region. The variable *C. totoralensis* Ritt (FR 512) from the neighbourhood of Totoral also belongs in this group, and so does *C. wagenknechtii* Ritt. (FR 718). These plants have not so far been properly described

and it is hard to decide whether they are separate species, varieties or forms.

The fourth group comprises mainly soft bodied plants. Firstly, *C. echinoides* (Lem) Br. & R, also known since 1845 (*Echinocactus echinoides* Lem). In its home in the neighbourhood of Antofagasta it forms flattened globular shapes with a woolly top and somewhat indented ribs. The exceptionally long spines are usually slightly curved, the flower is pale yellow. One of the oldest is *C. bridgesii* (Pfeiff) Bkbg, which is elongated, almost cylindrical in shape; the wide blunt ribs carry woolly areoles close together. The erect, straight spines are grey-brown. Definitely a soft-fleshed plant is *C. taltalensis* (Werd.) Loose., which grows solitarily near the Sierra Esmeralda in the Taltal region. The spine-covered top has brown wool, the ribs are warty, the spines thin and erect. *C. humilis* (Phil) Hutch. from the coastal hills of Papaso is very similar. It is a small soft-fleshed plant, whose body is covered in warts with barely distinguishable ribs. The epidermis is blue-green, the spines brown, later becoming grey. The flower is yellow, pinkish outside. The plants collected by Lembcke with grey-green body and black spines are one more demonstration of the existence of local forms. Of the last two mentioned species, few specimens reach maturity in their native habitat, for their soft tissues are favourite food for larvae and there is a danger that they will become extinct in their native habitat in the foreseeable future.

A near relative of *C. bridgesii* is *C. cupreata* (Poss.) Bkbg, whose habitat is not known with certainty. It is globular, brown and warty, with black spines. *C. cuprea* Ritt (FR 510) is probably identical. An interesting plant is *C. serpentisulcata* Ritt (FR 246) from the neighbourhood of Chanaral, characterised by downward pointing, apparent overhanging areoles. It is white woolly, sprouting, with many ribs; the spines are black, later grey.

The fifth group is narrow and specific, represented by *C. krainziana* Ritt., one of the most beautiful plants of the whole genus. For the moment neither its habitat nor its flowers have been established (it is now known to come from the northernmost part of Chile covered by this genus - H.M.). It is notably different from all the others in its fine, bristly, mainly white spines, which later overlap. It grows globular to mildly cylindrical, and the tubercles which are prominent at first later flatten out. The areoles are woolly and round. This species too can be subdivided into forms and varieties according to the various types of spines. Among them is the undoubtedly even more attractive *C. scopulina* Ritt. (FR 209) with longer and tougher spines, which is still regarded as a separate species.

In the sixth group I include plants which can only with difficulty be related to any of the plants in the foregoing groups. They include *C. applanata* Bkbg., described on the basis of a single specimen found by Lembcke, who did not say where; it is the property of the Hamburg botanical gardens. Another specimen which was found later has considerably smaller spines and practically half the number of ribs.

Undoubtedly the publication of a new description on the basis of such a limited number of plants differing so substantially from each other is irresponsible. Recently this plant has figured as a novelty in the lists of certain firms, so perhaps the question of determination of the species has not much longer to wait for an answer. *C. grandiflora* Ritt. (FR 523) which is alleged to have the biggest flower might be identical with the above.

The interesting plant *C. desertorum* Ritt. (FR 529) which has not yet been described, lives deeply buried in the earth, with large tubercles but little in the way of distinguishable rib structure. One of the most attractive of the whole genus is the uncontroversial (as far as classification goes) *C. dura* Ritt. (FR 546). Its brownish-green body is covered by whitish spots, coarse tubercles, with well-developed spines. *C. echinata* Ritt (FR 506) is a tap-rooted plant from the Carrizal-Bajo coast. It forms flat hemispheres with blunt ribs divided by notches. Its variety *borealis* Ritt. has fewer spines; it comes from the southern regions of Monte Amargo.

*C. hypogea* Ritt. was earlier classed in error by C. Backeberg into the genus *Neochilenia* because of its marked resemblance to *Neochilenia mitis*. However its flower is typical of the genus *Copiapoa*. *C. barquitenis* Ritt. has thick, dark and fine spines. *C. tenuissima* Ritt. (FR 539 and FR 540) is greenish black, with fine spines of dwarfish habit.

Also in this section are *C. longistaminea* Ritt (FR 531), *C. rubriflora* Ritt. (FR 211), said to be the only *Copiapoa* with red flowers, *C. rupestris* Ritt. (FR 528) and others.

Ritters single species sub-genus *Pilocopiapoa* can also be counted in the *Copiapoa* genus. It differs in the thick white wool covering the lower part of the flower tube and ovary. At present it is represented solely by *Pilocopiapoa solaris* Ritt., which grows in clusters up to 1m (app. 3 feet - H.M.) high, with colonies averaging over 2m across. Individual heads of the plant are grey-green, the tops flat and woolly. The spines are long and irregularly distributed. The flower is reddish yellow, and the slowly forming fruits are green and, when ripe, rich red with dry prickly scales and the remains of white wool. Its habitat is south of El Cobre at 24°S latitude.

With many varieties of the genus *Copiapoa* only time will show - after long, systematic and responsible work by growers and, most important, after the necessary study of plants in different localities and at different times of the growing year - which of the varieties described in recent years are genuine species, and which are varieties, forms, or perhaps natural hybrids. Meanwhile, we are meeting with a wide range of new names given with an eye to commercial interests which have nothing to do with objective scientific systems.

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It will be observed that the writer refers to these plants inhabiting the coastal zone between 24° and 34°S, but the lowermost latitude habitat to which he later refers is the vicinity of La Serena and Coquimbo in latitude 30°S. However, in an article in 'Kakteen und andere Sukkulente' for March 1958, Hans Lembcke says 'The coast by Los Villos is the northernmost habitat of *Neoporteria subgibbosa*. It is of interest to note that with the disappearance of *N. subgibbosa* the first *Copiapoa* appears, and that is *C. coquimbana*. This species is one example of how far the coast plants penetrate into the southern fringe of the valleys and Quebradas in this territory'.

Los Villos is very slightly south of latitude 32°.

H.M.

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The following is a summary of the species referred to by Miroslav Voldan :-

Group 1.	<i>cinerea</i>	Group 2.	<i>malletiana</i>
	<i>cinerea</i> v. <i>albispina</i>		<i>carrizalensis</i>
	<i>cinerea</i> v. <i>dealbata</i>		<i>intermedia</i>
	<i>cinerea</i> v. <i>columna-alba</i>		<i>marginata</i>
	<i>lembckeii</i>		<i>pendulina</i>
	<i>ferox</i>		
	<i>brunescens</i>		
	<i>haseltoniana</i>		
	<i>gigantea</i>		
	<i>eremophila</i>		

Group 3. coquimbana  
cinerascens  
megarhiza  
pepiniana  
pepiniana v. fiedleriana  
calderana  
chanaralensis  
castanea  
montana  
totoalensis  
wagenknechtii

Group 4. echinoides  
bridgesii  
taltalensis  
humilis  
cupreata  
cuprea  
serpentisulcata

Group 5. krainziana

A check through our 1967 Year Book of F.R. numbers, Backeberg's Kakteenlexicon, etc., yields the following Copiapoa species not classified above :-

alticostata  
applanata  
barquitensis  
desertorum  
dura  
echinata  
echinata v. borealis  
grandiflora  
hypogea  
longispina

longistaminea  
mollicula  
pseudocoquimbana  
pseudocoquimbana v. vulgata  
rubriflora  
rupestris  
streptocaulon  
tenuissima  
tocopillana

together with plants to the following designations :-

F.R. 247, F.R. 532, F.R. 1091, U431 de Freirina, Vallenarensis, Valle de Huasco, in addition to *Pilocopiapoa solaris*.

#### Comments from J.D. Donald on M. Voldan's article

'This is an excellent article and I am in entire agreement with it.

The fruit, flower, and seed characteristics so clearly described should certainly dispel in the mind of any doubters why Copiapoa is considered to be a completely distinct line from Neoporteria.

The grouping of the plants is on a morphological basis and not meant to be a true guide to affinities nevertheless the article does underline the need for a certain amount of revision of the total number of species described. *C. taltalensis* might certainly be submerged in *C. humilis*. On the other hand, in the soft bodied group a plant not mentioned by Mr. Voldan, *C. mollicula* Ritter, is very distinctive. It is very easy to flower, doing so in four years from seed. The flower is quite large, deep yellow with rich red scales on the bud and receptacle - a very choice plant'.

## COPIAPOA

### Extracts from correspondence

..... from D.W. Whiteley

In the Chileans No.9 p. 10 the validity of the generic name of Copiapoa was questioned, on the grounds that Britton and Rose did not publish a Latin diagnosis in 1922 when they established this genus. However, Copiapoa is a valid generic name as it was published before a Latin diagnosis was obligatory. The rule on this point is as follows :- On and from January 1st, 1935, names of new taxa of recent plants (except bacteria) are considered as validly published only when accompanied by a Latin diagnosis. This however automatically validates publication of names of new taxa, effectively published 1908 - 1934 inclusive in modern languages.

..... from A.W. Craig

I have had both *C. humilis* and *hypogea* in flower this year and both have set fruit. The body of the fruit is purplish red in colour and after inadvertently detaching the flower remains I was able to see a brownish skin on the top of the fruit which is presumably the 'lid' referred to by Miroslav Voldan. This 'lid' on the *humilis* fruit has now split to reveal that the fruit does contain seeds.

..... from R. Senior

*Copiapoa montana* and *C. humilis* v. *remontana* flowered this year, both about 3 years from seed and *C. barquitenis* 2 years from seed. One seed pod set on *montana*. *C. cinerea albispina*, although only  $1\frac{1}{2}$ " in dia., is getting its white bloom.

..... from E.W. Bentley

I have now had flowers on a '*Copiapoa humilis niger*' and on two *C. hypogea*s - one was only  $\frac{3}{4}$ " across when I got it last year but had six flowers out at once this year. Buds are also showing on *taltalensis* and *tortalensis* (both names highly tentative).

..... from A. Johnston

The first Copiapoa I have flowered are in flower now - both grafted plants - *C. echinoides* and *C. bridgesii*.

(In our Copiapoa robin it was suggested that it was difficult to flower Copiapoa in Britain. We should be pleased to hear of any success in flowering these plants - H.M.)

## THE CEPHALIUM BEARING CACTI OF BRAZIL

by F. Ritter

Translated by R. Moreton from 'Kakteen und andere Sukkulente' for May 1968

### Introduction

The essay presented here was completed in June 1966. I had however kept it back this long in order to issue it with a complete presentation of the results of my research into South American cacti. Since however the question of the taxonomic place of Brazil's cephalium bearers has become acute, due to the researches of Prof. Buxbaum, I have decided to publish this essay before my larger work.



1) Corrections concerning Cephalocereus polyanthus and Cephalocereus purpureus.

First of all a false statement in the literature must be corrected: Werdermann published in his book 'Brazil and Its Columnar Cacti' in 1933, a *Cephalocereus polyanthus* Werd. from the state of Bahia. He placed it in *Cephalocereus* although he stated that it only developed a pseudo-cephalium. Actually this species in many cases does not pass through the pseudo-cephalium stage, in other cases one must already speak of a cephalium as the tubercles become flatter, lower and closer together and the growing tip bends somewhat towards the cephalium side. There arises a wool zone which fuses together, spanning several ribs, with a few fine bristles among the wool. I made my observations at the same location in which Werdermann discovered the species.

The flower description also needs some correction. Werdermann's statements lead one to suppose that he did not have a fresh flower in front of him. The tube is not, at the exit of the nectary clad with 1 mm. long scales, but towards the upper part the tube is packed with a palisade of much thickened stamens, 1 mm. across, directed obliquely upwards to the stigma and carrying on their thin ends the anthers. As the flower starts to fade these finally drop off, so that the impression of small scales can arise. The whitish, 2 mm. long stigma lobes, about six in number, are bent together. The petals stand upright and open only to about 3 mm. across. The sepals are thick and fleshy and thereby hinder the further opening of the petals. The flowers remain open for only one night, provided that the nights are not too cool; in culture, with cool nights they can also remain open during the day, closing finally at night. This species flowers extremely freely in the cooler part of the year and in culture also, at least out of doors in Chile. If Werdermann's specimens did not flower in Germany, it may be perhaps due to the lower light intensity during the cold part of the year. Backeberg erected for this species the genus *Micranthocereus*.

In the book mentioned Werdermann gave a description of *Cephalocereus purpureus* Gurke, together with his own observations in South Bahia, which varied widely from the original description which Gurke had given in 1908. On the basis of Werdermann's description, which did not belong to this species, Backeberg made it the type-species of his genus *Austrocephalocereus* and included two further species, *Cephalocereus dybowskii* (Goss) Br. et R. and *Cephalocereus lehmannianus* Werd. Since my own observations on '*Cephalocereus purpureus*', in the erroneous sense of Werdermann, and on *Cephalocereus dybowskii* have proved that all three species included in *Austrocephalocereus* are separable at generic level, it was important from the question of nomenclature to search out the type locality of the *Cephalocereus purpureus* as described by Gurke, in order to settle unequivocally this species and its systematic position. In 1965 I therefore made a journey by foot lasting several days in the fissured Sincora mountains in the state of Bahia where, according to Gurke, this species grows as the only terrestrial cactus, which also proved to be true. My supposition, that *Cephalocereus purpureus* was a totally different species, was certainly confirmed.

What influenced Werdermann to make such a false evaluation of a species he discovered I do not know.

Now, in addition, Werdermann wrote that the *Cereus goebelianus* described by Vaupel, 'After comparison with the original material undoubtedly belongs here'. The original material must obviously have been in Berlin-Dahlem and was later destroyed in the air raids. The description that Vaupel supplied likewise, even taking into account the wide variations of form at different localities, could not possibly refer to that species falsely described by Werdermann as *Cephalocereus purpureus* and so becomes a homonym. I have not been to the type locality given by Vaupel (Sierra des Almas); we must, in no circumstances however, refer a description to a species whose range of variation falls outside this description. I have therefore described the species wrongly introduced by Werdermann as *purpureus* under the new name of *pachystele*. The description by Vaupel for *Cereus goebelianus* is found in 'Zeitschrift für Sukkulantenkunde' 1923, P. 58 and in Backeberg's Handbook Vol. 4, P. 2497.

## 2) Facheiroa and Zehntnerella

The cephalium-bearing cacti of Brazil have almost all got scaleless or nearly scaleless flowers and fruit; they belong in a single related group. The solitary exception is *Facheiroa*. I have not been to the locality of the type species of the genus, *Facheiroa ulei*, in the state of Bahia, but I found in Minas Gerais state a second species, to which I gave the provisional name *Facheiroa pilosa*. As the details of the flower are not exactly known to me the species cannot be validly described as yet. However, I can make a number of remarks which relate to the status of the name *Facheiroa*. A union of *Facheiroa* with the genera of the Peruvian and Bolivian Andes, *Espostoa*, *Thrixanthocereus* and *Vatricania* to form a single genus *Espostoa* cannot be considered, especially including in each genus the nearest related genus without cephalium which is found in the respective areas of distribution.

I give here the typical characteristics of *Facheiroa*: much branched bushes and trees with 5 - 10 cm. thick stems and many notched ribs (15 - 20 in *ulei*, 22 - 32 in *pilosa*); with small close together areoles; short needle like spines; cephalium one sided, spanning several ribs, several cm. wide, not interrupted, sunken deep into the stem, often almost to the central core; bottom of the cephalium flattened, allowing no ribs or tubercles to be recognised, completely covered by brush-like, erect, coloured, straight, short hair (*F. pilosa*) or twice as long (to 4.5 cm) wooly hair (*F. ulei*); fruit twice as wide as high, scaly and hairy; nectary large and wide, closed by a horizontal diaphragm that extends to the stigma and (at least in *F. pilosa*) on its surface carries inserts of stamens and must thus have arisen from the wall. Tube short, slightly funnel shaped, outside scaly and thickly covered in hair. Stamens white, without an insertion space; stigma white, rising above the anthers; petals white (*F. ulei*). Fruit in *F. pilosa* is turbinate, 1.5 cm. long and wide, red, with many small tubercles; lower third almost without scales and hair; upper two thirds covered with triangular, 1-2mm. long scales and enveloped in 1.5 cm. long, straight, bristle-like hairs. Ovary  $\frac{3}{4}$ cm. dia. and above  $\frac{1}{2}$ cm. thick, but the base of the fruit, towards the pore is only a thin skin of less than  $\frac{1}{4}$ mm. Flesh white, sparse, sticky. It is a remarkable fruit which does not have its equal among the cacti, completely different from the fruits of the cephalium cacti of the Andes.

If we now ask from whence the genus *Facheiroa* is derived only the cephalium-less *Zehntnerella*, growing in Bahia state can be considered. The following points regarding *Zehntnerella* show this; the bushes and trees have about the same appearance; the stems the same thickness, the ribs similar numbers and of similar appearance, even the spination shows no substantial difference. The flowers are of about the same size (statistics for *Facheiroa* are not available); fruit somewhat wider than long, half covered in narrow triangular 1 - 3 mm. scales with thick bunches of 2 - 3 mm longer hair; nectary large, about as long as wide, closed by thickening of the wall and in the type species as well as in another species I discovered (*Z. polygona* nom. nud.) with a thick, wide ring of wool, arising from the wall; in a third species (*Z. chaetacantha* nom. nud.) the wool ring is very much reduced or completely missing; tube very slightly funnel-shaped, scaly and hairy like the fruit; stigma white, rising above the anthers; petals white, small. Fruit about 2 cm. long and thick, finely tubercled, covered as the seed vessel. Fruit wall 2 - 3mm. thick, but the base of the fruit, near the pore only  $\frac{1}{2}$ - $\frac{3}{4}$ mm. thick. Flesh white, sparse.

After all this one might well count *Facheiroa* with *Zehntnerella*, were it not for the cephalium. It shows that the genus *Facheiroa* must have arisen in its own area of distribution just as the above mentioned Andean *Cerei* with cephalia.

## 3) Melocactus and Discocactus

There have previously been no differences of opinion regarding the justification of these two genera. They are both genera from tropical and subtropical areas in which the temperature does not normally

fall to freezing point even in the winter. Accordingly, *Melocactus* is found in both northern and southern hemispheres, as far as the 23rd parallel of latitude, or even on the cool Pacific side only as far as 16 deg. south. *Discocactus* is distributed only on the southern peninsula, in fact up to 25 deg. south. This genus is restricted to Brazil, Paraguay and Bolivia. Both genera are closely related to one another and no doubt the distribution of *Discocactus*, solely in South America south of the equator indicates that its development must have taken place in that area. Added to this, *Melocactus* has its greatest development in northeast Brazil. The total number of species from this area is still unknown. I found, for instance, in one location alone (a small ravine near Ourives in Bahia) four distinct species which exist separately alongside each other without hybridisation, also all differing in fruit and flower. The differences in flowers of *Melocactus* species have hardly been taken into account in the descriptions, indeed, until recently almost nothing was known of the inner structure of the *Melocactus* flower.

Only the expanded petals of the tiny flower project beyond the cephalium; the ovary is without hair or scales and is slightly constricted at the upper end. The nectary takes up about half the length of the tube. Above it is closed by the lowest filaments which are inclined inwards for about 6 mm. Towards the top of the tube the filaments reduce in length and lie against the wall. The anthers form a covering on the wall. Thus is the primitive flower constructed. It has undergone a change in the way in which the lowest ring of stamens completely closes the nectary by leaning diagonally towards the style. The ring becomes as short as the direct distance to the style and the stamens close together tightly like a fence, being thickened at the base and tapering strongly towards the style. Only in this way can they build a complete diaphragm, although the stamens are not united. The remaining stamens, with or without a small insertion space towards the ring below, sit on the tube almost without filaments whereby the stamens, including the anthers, are only 2 - 3mm. long. They clothe the wall without a gap.

All *Melocactus* species (at least I established this for the South American species) open their flowers a few hours before sunset and close them in the evening or night, never to open again.

*Disocactus* has flowers of basically the same inner construction but they are much larger, purely nocturnal and strongly scented. I was able to examine closely the flowers of two species of *Discocactus*. I found a number of regional variations of *D. hartmannii* in Paraguay. Here the nectary is closed by a loose wool ring which arises from the wall and has a width of 2 mm. In between and above arise the numerous stamens which likewise close the nectary. There follows an insertion gap of about 5 mm. Over that again, insertions of stamens of about the same length as below, up to the edge of the tube.

In *D. placentiformis* from Minas Gerais the wool ring is missing completely, the nectary being closed only by numerous 6mm. long stamens which arise from 2mm. up the wall. There follows here a space of 5 mm. Above this the anthers rest directly on the wall, without filaments. Only at the edge of the tube are there again filaments of 2 - 4 mm. length.

#### 4) *Cipocereus* Ritter and *Pilosocereus* Byle et Rowl

*Cipocereus* is a genus discovered by me in Minas Gerais, which can serve as a forerunner of *Pilosocereus* and all night flowering, cephalium bearing cacti of South America and which, by its spiny and ribbed fruit, is shown to be a branch off the *Leptocereae*.

The justification of the name *Pilosocereus* has been disputed by Buxbaum, as the type species *leucocephalus* of the genus *Cephalocereus* is to be included. Obviously the species *Pilosocereus leucocephalus* Poselger 1853 has been falsely identified. As a type locality Rumpler gave 'Horcasitas in Mexico, Tamaulipas State' and this statement must have been taken from the original publication,

which I could not examine. Britton and Rose, however, gave 'Near Horcasitas, Sonora' as a type locality, obviously in error.

The first Horcasitas lies in the Atlantic coastal area, the latter in the Pacific area. The species which Britton and Rose regarded as *leucocephalus* was not found near Horcasitas but in the border region between Sonora and Chihuahua, i.e. in the high Andean area where no *Pilosocereus* could grow due to the cold climate, the genus *Pilosocereus* being in all its species as warmth loving as *Melocactus*. The species taken by Britton and Rose as *leucocephalus* must have been a *Cephalocereus*. Accordingly, the description given by Britton and Rose is not in agreement with the description by Rümpler which must have been taken from the original description by Poselger. It is understandable, since the original *leucocephalus* was specified as being from Horcasitas in Tamaulipas; that is a hill northwest of Tampico, where the hot climate would suit a *Pilosocereus*, but where no *Cephalocereus* would be expected. Not far from there, in about the same climate, grows *Pilosocereus palmeri*. The genus *Pilosocereus* extends to the north as far as Florida and along the east coast of Mexico. Correspondingly the name *Pilosocereus* should be retained as it includes the type species.

#### Comments on Ritter's article on Brazilian cephaloids

..... from H. Middleditch.

1. The terms cephalium and pseudo-cephalium tend to have slightly different meanings when used by different writers. In general terms a cephalium is a bushy growth of elongated hair rather like a brush down one side of the plant; a cephalium will extend right to the growing tip of a plant although, because it is often narrow and the hairs short in the vicinity of the crown, a close examination is necessary to reveal its presence there. A mature cephalium may cover the complete crown with long hairs. A pseudocephalium consists of elongated hairs growing from normal areoles; *Pilosocereus*, possibly containing most species, having typical growths of this nature.

We have an article by Prof. Buxbaum translated from K.u.a.S. which will appear in a future issue of this Journal which gives a botanical explanation of a cephalium.

2. Backeberg separated the genus *Micranthocereus* from the other Brazilian cephaloids on account of the very much smaller flower and fruit - less than half the size of those on *Cephalocereus*, *Coleocephalocereus* and *Austrocephalocereus*.

3. In our 1967 Year Book we have FR 1234 *Coleocephalocereus pachystele*. Presumably this is the plant which Ritter states was incorrectly attributed to *Cephalocereus purpureus* by Werdermann.

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..... from Dr. K.V. Mortimer

I am not in a position to comment on *Cephalocereus polyanthus* and *purpureus* since I have not had the opportunity of examining these species, although an examination of the two descriptions of *C. purpureus* certainly suggests that two different species were being observed. I am surprised that Ritter considers that *C. dybowskii* (Goss) Br. & R. and *C. lehmannianus* Werd. can be separated at generic level; however, without examining his reasons for this separation it is difficult to comment. My own observations on these two species would lead me to the conclusion that they are closely related.

The section on the *Melocactus* and *Discocactus* is certainly interesting. I have examined many melocacti and seriously doubt that all the so-called species are justified. Local variations are frequent (as with *Gymnocalycium* and *Islaya*) but they do not rate specific status. Ritter states that in one small locality he found four distinct species - this may of course be true, but I am very surprised that he states

that there is no hybridisation - how is this decided unless the colonies are observed over a period of years and large numbers of seedlings raised? I will, however, agree that all the species I have examined are self-fertile. Nearly all routinely set large quantities of seed with me when only one flower opens at a time and cross fertilisation between species cannot occur. This would account for lack of hybridisation in normal circumstances. The internal flower structure is as described, but the nectary is sometimes considerably less than half the length of the tube.

The West Indian species of melocacti flower for considerably longer than the South American - usually for 16 to 20 hours and, on two occasions, I have seen flowers open on a second day. The flowers usually open in the early afternoon, and when the sun is bright and the temperature high, the flowers of *M. broadwayii*, *M. amoenus*, *M. intortus*, *M. maxonii*, and *M. ruestii* project much further than on a dull day - I examined one which projected over an inch above the cephalium.

The Discocacti which I have flowered certainly agree with Ritter's comments and are extremely strongly scented - unlike the melocacti they do not appear to be self-fertile. I have not been able to set seed in cultivation.

I have as yet only seen seedlings of *Cipocereus* - they appear most interesting.

### MELOCACTI

Dr. Vertongen, Erembodegem, Belgium, writes 'On the question of Melocactus, I believe we all frighten ourselves with dreadful tales which come from I know not where. History tells us that the Dutch Doctor Suringar kept three very large specimens coming from the Iles Curacao, Bonaire, etc, for a period in excess of 15 years and that without any very special care. Just the same, we know full well that they can be very difficult to keep alive.

I should tell you that I heat my greenhouse by warm air; my greenhouse is 10m. by 5 m. (30 ft. by 15 ft.) The air from the heater is between 50 °C and 30°C in order to maintain an overall air temperature at all times of 10°C (=50°F). My Melocactus are placed above the heater where the temperature is between 15°C and 17°C. They have no water from October 1st to February 1st. After that they receive gentle spraying every ten days until growth commences usually 15th to 30th March. In the summer season they have great quantities of water. Above all, there is no humus in the soil.

I have kept for three years now a very large Melocactus macracanthus from Curacao, diameter 25cm, which is still in good condition. I also have *M. neryi*, a cultivated plant which has had a cephalium for some ten years. Every year this plant carries about 300 flowers and more or less 200 fruits. All told I have about 15 species of Melocactus in my collection.'

Also satisfied with these plants, P. G. Hallett says 'I am delighted to discover that my large Melocactus intortus - about 12" high and 9" dia., has survived the winter well and has started into new growth. A small Melocactus maxonii is also doing well and a 5" specimen of Discocactus hartmanii is rooting up and pushing ahead. I had my doubts about over-wintering these but they have come through with no trouble at all. I kept them on a seed propagator with a polythene sheet over them to conserve the heat and they appear to have responded well'.

## OTHER BRAZILIAN CEPHALOIDS

Following our note in the last Journal about the troubles Herr Uebelmann of Su-ka-flor had suffered with imported *Cephalocereus*, L. Nyman writes 'I had a *Cephalocereus dybowskii* from Uebelmann last year, which I lost and I am trying another one now. My own experience of keeping these Brazilian cerei is very sad indeed. *Cephalocereus* and *Pilosocereus* are all very difficult and after these plants I now have I shall not be inclined to try again if I am unsuccessful now - it's too expensive.

As a point of interest, from my own sad experience and from information from Uebelmann, I would not attempt to keep these Brazilian cacti at less than 50°F during the winter. I have no doubt that some will stand a lower temperature but it would be an expensive business finding out which. The temperature where most of the plants are collected never falls below 55°F.'

To save us all going through the expensive process of finding out which *Pilocereus* and *Cephalocereus* species will stand a cool - but presumably dry - winter, may we hear of any successes? Having brought my own cutting of *Vatricania* (complete with cephalium) through last winter, I am beginning to wonder, from the foregoing, whether the funeral oration has already started. - H.M.

### CHARACTERISTICS OF CACTUS SEEDS

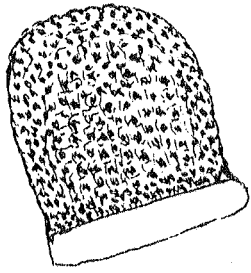
by D. J. Lewis

In the previous article (The Chileans No. 10 pp. 18-20) the main features of a cactus seed were described; the correct name for each of these features will be appearing frequently in our comparisons or descriptions of cactus seeds.

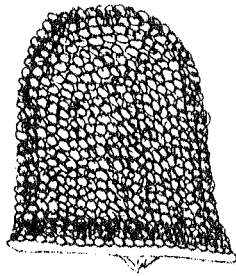
A number of seeds from cacti native to South America are illustrated below. Even within this small group of seeds it is possible to note some similarities but, as we shall see, these may not be from the same genus. In many genera, seeds of surprisingly different shape and size may be found.

These seeds are drawn at about twenty times magnification, most of those illustrated being between one and two millimeters broad.

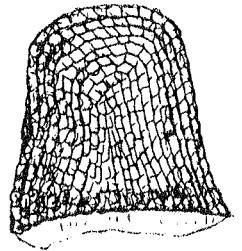
1. *Notocactus mammulosus*. The testa of this seed is a dusty chocolate brown with what might be termed eruptions from the middle of each cell. These are light in colour and appear stellate under medium magnification. The large basal hilum pad is very conspicuous and off white in colour. Backeberg refers this species, together with all other *Notocacti* except *ottonis* and *scopa*, to his sub-genus *Neonotocactus*.
2. *Notocactus ottonis*. The testa is shiny black, the cells being domed and set in straight lines. The hilum is basal and lies almost completely within the testa case. The area around the micropyle is conical and appears thus in a large number of seeds observed. Seed size and shape varies to a limited extent within the species.
3. *Wigginsia (Malacocarpus) erinaceus*. This genus has long been considered close to *Notocactus* and has been submerged in *Notocactus* by Krainz and Buxbaum. The helmet shape of the seed will be seen to be generally similar to the two previous *Notocacti*. The testa cells are not so domed and are more rectangular in shape. The colour is still shiny black. The hilum is slightly proud of the testa case, its colour being off white.



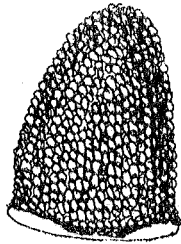
1.



2.



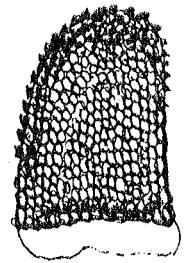
3.



4.

SOUTH AMERICAN

CACTI SEED.

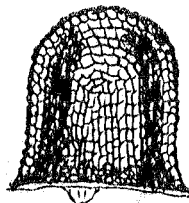


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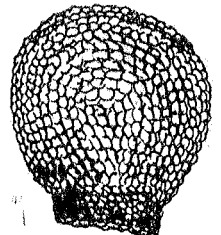
D. J. Lewis.



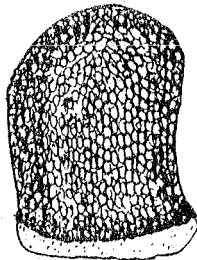
6.



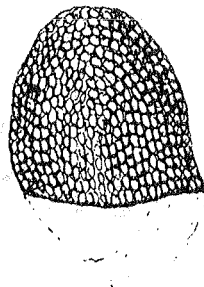
7.



8.



9.



10.



11.



*J.R.*

4. Notocactus (Brasilicactus) haselbergii. This seed resembles those of *Rebutia* but has a characteristic dip in the helmet shape causing the hilum to be curved. The testa consists of round domed cells similar to *N. ottonis*. The hilum on the seed observed was white.
5. Rebutia miniscula. This is seed from a very common plant but the seed still holds surprises. There remains the 'helmet' shape but the mid ridge cells of the testa have horn like appendages slightly curved one way. The cells are shiny black, the hilum area is off-white.
6. Frailea pulcherrima. An interesting seed with the hilum recessed somewhat to one side. The testa is a shiny reddish brown, the cells not raised. A number of the cells have a single, fine hair like appendage.
7. Digitorebutia haagei v. orurensis (Syn. Mediolobivia orurensis). In this seed the 'helmet' shape of testa has a very characteristic pinching front and rear, giving the seed a forward and rear ridge. The off-white hilum is flush and there is a raised area round the micropyle. The testa cells are shiny black, flat domed and in lines.
8. Melocactus sp. A seed with a small basal hilum, the micropylar opening being very small. The colour of the testa can vary between light red brown and black. The testa cells are slightly domed and shiny.
9. Weingartia multispina. A seed with many *Notocactus* characteristics. The testa is well curved in outline, the testa cells being shiny black and slightly domed. The hilum is wider than the seed so that the margin tends a little beyond the outline of the testa.
10. Parodia maasii. A rather squat testa case and a large area of white hilum. These characteristics were observed on a number of seeds examined. The testa is the usual shiny black.
11. Frailea castanea. (F. asterioides). The main characteristic of this seed is the huge hilum. In some respects it resembles *Astrophytum* seed, but the testa has the same colour and the minute hairs of *F. pulcherrima*. There is a thick swollen margin round the periphery of the hilum, somewhat darker in colour than the basal part of the hilum.

..... Comments from K. Halstead.

I have not yet had the opportunity to examine seed structure in detail under a high power microscope, although I have looked at a few *Notocactus* seeds under a strong magnifying glass, when it was evident that *ottonis* and *scopa* were similar. To a certain degree *apricus* bears a resemblance to both these two, whilst *N. apricus* looked akin to *Wigginsia (Malacocarpus) sellowii*.

#### ISLAYA

from Wolf Kinzel, Bonn.

When I was writing the article on *Islaya* for the Year Book I did not mention a problem that exists, but it has been raised by the photo in the Year Book of *Islaya islayensis minor* in fruit. If you would compare the photo of the *Islaya islayensis minor* in fruit (collection H.M.) with the other photograph of *minor* in the Year Book which is from my own collection, you will see that there are two forms of this species. The differences are: the areoles of the *minor* in fruit are much more woolly than those of my plant; also it does not have as solid, long black spines as my seedling plant nor as my imported *minor*.



Recently I received a photo of a minor similar to that pictured in fruit in the Year Book, from another Islaya friend. The seedling of this type in my own collection was received a number of years ago from St. Pie freres in France, together with other seedlings of *Islaya islayensis* minor. I wrote and asked them about the differences and they told me that the less woolly black spined plants were F.R. seedlings called *Islaya islayensis* v. *minor*, but that the woollier plant came from a mother plant which had been diagnosed shortly before by Backeberg himself as a genuine *Islaya minor*.

Thus I have plants from St. Pie grown from F.R. seedlings and a similar looking imported plant collected by Herr Hoffmann, together with a plant of the woollier sort. The question is, which is the right 'minor'? Herr Hoffmann assumes that Backeberg was in error when he diagnosed the mother plant in the St. Pie collection as a correct minor. He wrote me 'maybe it is a hybrid plant'. This may be true, but it will be very difficult to find out the background of that plant! I think that there may be another possibility; could it not be a so-called habitat variation?

Another thing altogether - in the Year Book of F.R. numbers and the supplements I miss the number F.R. 591, which covers, as Ritter himself wrote to me, *Islaya unguispina* n.n.; he found this plant in the south of Peru near the frontier to Chile, but does not possess any material for publication. However, the number is authentic.

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In correspondence R. Moreton comments 'As a result of reading the Year Book on *Islaya* I have moved my plants into full sun and cut down the watering, so we will see what happens. They are usually prolific flowerers, but rather late - July/August. From seed most species seem to be rather tricky so I graft *Islaya* seedlings nowadays.'

My own *Islaya* seem to have been growing rather better in July/August than earlier in the season - no doubt because these are the misty months on the coast of southern Peru. - H.M.

## NOTOCACTUS RECHENSIS BUINING SP. NOV

By A.F.H. Buining

Translated by E.W. Bentley from *Kakteen und andere Sukkulente*, February 1968.

Plants spherical to short cylindrical, up to 7 cm. high and 3.5 - 5 cm. in diameter, sprouting strongly from the base, fresh green, with fibrous roots. Ribs about 18, vertical or at times somewhat curving, about 4 mm high and up to 7 mm away from each other. Areoles round about 2mm in diameter, with short white wool in the crown, later bald, at the most up to 4mm apart.

Spines varying from white to yellow; in the crown the bundles of spines stand up vertically from the areole and thus cover the crown with spines; outer spines 4 to 6, radiating on each side, white to yellowish, 6-7mm long, in addition 2 to 4 spines below pointing somewhat sideways, at the top of each areole often also a few ancilliary spinelets; centre spines 3 to 4, mostly two laterally directed and one upright below, somewhat stronger and longer than the outer spines, especially the lowest (up to 10mm long) all somewhat darker yellow.

Flowers about 3cm long, 3 to 3.5cm wide, yellow; receptacle round, reddish with red scales, in the axils of which are some wool and white bristles; flower tube with lanceolate scales with very little wool in the axils and 5-7mm long white bristles; scales merging upwards into lanceolate yellow outer perianth leaves with a somewhat reddish tinted middle stripe; inner perianth leaves numerous, citron yellow, lanceolate, 15 mm long and 2 mm wide.

Nectar chamber half closed by the stamens, enclosing the style, inserted from about 1mm above the receptacle up to the margin (of the tube - H.M.). Stamens yellow with cream coloured anthers which surround the style, 5 to 6mm long; style with about ten cream-white, 2mm long stigmas, about 2cm long.

Fruit round, 6 - 7mm in diameter, red, with a few white spine areoles which are more numerous towards the top. Flower remains adhering, opening horizontally in the centre.

Seeds cap-shaped, 1mm long typical of the sub-genus *Notocactus* K. Sch. sensu Buxbaum.

Found near Ana Rech, Rio Grande do Sul, Brazil.

Holotype placed in the herbarium of the Botanischer Institute of the University of Utrecht.

This interesting plant was found by Herr Bueneker at Corvo, Rio Grande do Sul. On February 10th 1967, the 67 birthday of Herr Bueneker, he, Herr Horst and I drove to the very isolated discovery point on a small mountain. We found only a few specimens on one of the mountains lying on the other side of the road, otherwise nothing was to be found. The plants grow there on bare rocks where here and there they have gathered together a little humus. The pH value there lies at the most between 5 and 6 (such an acid soil also the plants grow faultlessly at home in Europe).

This district borders on the north-east district of Rio Grande do Sul, where occur the distantly related group of the former Brazilian *Parodias* (today validly *Notocacti*). There one finds *N. pavhamatus* (W Haage ex Backeberg) F. Buxbaum, *Notocactus alacriportanus* (Backeberg et Voll.) Buxbaum and *Notocactus buenekeri* (Buining) Buining. Between the two districts there grows here and there in rocky places in woods, forms of *Notocactus graessneri* (K Schu.) Berger, also species from a very large group around *Notocactus ottonis*.

It is certain that the known plants in the different localities must be carefully studied, because we still know very little, especially in Brazil, about the occurrence and distribution of the *Notocacti*. In my opinion perhaps 10% of these states of Brazil have been searched for cacti; the majority of the mountains there - often very difficult to climb - have never been explored.

## NOTOCACTUS RECHENSIS. BUINING

By A.F.H. Buining

Translated by E.W. Bentley from *Succulenta* for May 1968

These plants were found originally by Herr Bueneker purely by chance. Driving along the road in the north-east part of Rio Grande do Sul, his eye fell by chance on a high forested hill with a couple of bare open patches on the top. Although both Bueneker and Horst had frequently driven down this hill they had never noticed this place. The fairly steep place turned out to harbour an up-to-now unknown cactus.

The plants collected by Herr Bueneker perished so that we met only the mummies in his greenhouse. Luckily he was ready and willing to go back with Horst and I to the discovery spot. After a journey through mountainous country via Caxias do Sul we found at the place indicated by Bueneker, nice groups of plants, some with white and some with yellowish spines and even a cristate form.

To our surprise there was living in one of the groups a black-haired bird-eating spider. Basking in the warm sunlight, it held in its enormous forelegs a silvery spun ball the size of a chicken's egg in which

Areoles 10-12 mm apart, circular, 2.0-2.5 mm in diameter, furnished with sparse, whitish, almost grey wool-felt. Radial spines 8-10, spreading out in all directions, the central pair extending the furthest, but rarely exceeding 15 mm. Middle spines 2-3, somewhat larger and stronger; all spines are awl-like slightly curved, pale brown, then darker horn coloured, finally becoming grey and becoming damaged.

Flowers not far off the crown or more at the side; overall length 6-7 cm. Ovary spherical, dark green, furnished with short, triangular, greenish, transparent scales, dark wool projecting from their axils. Perianth short funneliform, largest diameter up to 8 cm. Outer perianth leaves (petals - H.M.) spatulate, truncated, diminutive pointed tip, green, with ascending red midstripe inner spatulate, blunt, pointed tip, denticular, magnificent scarlet-red, gleaming in the carmine colour. Filaments extend over half the length of the perianth tube. Filaments dark red, anthers chrome yellow. The pistil barely extends above the lowermost stamens, the 8 dark green stigma lobes remain closed up together.

Was sent to Kew from Bolivia by Bridges about 1846; flowers open in summer early in the morning and close up after two days.

#### Comments on *Lobivia cinnabarina*

..... from H. Middleditch

"It is rather puzzling to know just what Schumann means in his diagnosis by the term "13th and 21st spirals". One might perhaps assume that this refers to the Fibonacci spiral ratio, that is the number of left hand and right hand spirals in which the areoles are arranged. An attempt to count this spiral ratio from Schumann's illustration yields a figure of 9/18 for the spiral ratio, which is not much help at all."

..... from G.E.H. Bailey

"About 7 or 8 years ago I sowed some seed of *Lobivia cinnabarina* which I obtained from Uhlig, and I have retained one of the seedlings. It is a deep green colour, with tubercles just like those on Schumann's illustration; the ribs are disposed in a left-hand spiral and the areoles are a beautiful right-hand spiral. The plant has not flowered yet, although it is about 5" high and about as broad. The crown is very depressed and is completely without spines."

..... further from H. Middleditch

"A spiral count on this particular plant produced a spiral ratio of 13/21, exactly the same as Schumann's figures. Under the circumstances, a neat fitting ball and chain might be a suitable attachment for this plant."

..... from J. Hopkins

"There is no difficulty counting the spiral ratios on many of my imported *Lobivia* in the Group 5 (*cinnabarina* etc.). I have two plants of *L. draxleriana* - which John Donald suggests may possibly be the equivalent of the original *L. cinnabarina*; one of them has a 13/21 spiral ratio and the other plant is 18/11 spiral ratio. However, I do have an imported two-headed *L. taratensis*, both the heads being more or less the same size (about 3" in diameter); one of these two heads has an 18/11 spiral ratio and the other is 16/10. Two different plants of *pseudocinnabarina* also have spiral ratios of 18/11 and 16/10. But is this of any help to us?"

..... from G.E.H. Bailey

"My *L. oligotricha* has a spiral ratio of 16/10; it is seed grown".

..... from H. Ewald

"Last year I obtained a number of imported *Lobivias* from De Herdt; amongst them were three plants of *L. neocinnabarina*. Two of these have a spiral ratio of 7/11 and one has a ratio of 12/8".

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LOBIVIA OLIGOTRICHA Card. sp. nov. by Prof. Dr. M. Cardenas

(Translated by H. Middleditch from *Cactus* (France) 18.78: 1963

Simplex globosa vel breviter cylindrica 5-8 cm alta, 7-8 cm lata dilute viridis. Costis plusminusve 18 spiralibus in tubercula securiformia 4 mm alta 7 mm lata solutis. Areolis 8 mm inter se remotis ellipticis 4 mm long, cinereo tomentosis. Aculeis plusminusve 15 acicularibus radiantibus albidis ab basim incrassatus 6-15 mm long. Superne areoli aculeis intricatis fere cormum obtegentes. Floribus numerosis circum apicem umbilici exeunitibus, infundibuliformibus 3 cm long. Ovario 3 mm diam., viridi, paucis squamis 1 mm long, acutis rubidis, paucis pilis albis praedita. Tubus brevis 4 mm long, viridis, squamis paucis rubeis 1 mm long., pilis paucis albis instructus. Phyllis perigoni exterioribus lanceolatis 15 mm long, viridibus, interioribus purpuris. Phyllis interioribus spatulatis 15 mm long, dilute rubeis. Staminibus inferioribus ex fundo tubi usque 5 mm supra, 3-10 mm long; filamentibus inferne viridibus, superne purpureis. Staminibus superioribus 7 mm long., filamentis purpureis. Omnibus antheris flavis. Stylo 12 mm long, dilute viridi, 5 lobis stigmaticis dilute viridibus 2 mm long, coronato.

Patria: Bolivia, Provincia Punata, Departamento Cochabamba, prope Cuchu Punata, 2,568 m.

Plant solitary short cylindrical, 5-8 cm in height, 7-8 cm in diameter, light green. Ribs about 18 spirals divided into tubercles in the shape of a hatchet, at least 4 mm high, 7 mm long. Areoles 8 mm apart, elliptical, 4 mm long grey felted. Spines about 15, acicular and spreading, indistinguishable between radials and centrals, a few very slender, whitish, thickened at the base, 6-15 mm in length. Upper areoles interwoven, entirely hidden at the unarmoured crown.

Numerous flowers, about 15, surrounding the depressed crown, generally in the shape of a funnel, 3 cm in length, the limb of 2.5 cm. Ovary of 3 mm diam., green, with sparse reddish and pointed scales of 1 mm in length furnished with some white hairs. Short green tube, 4 mm long, clothed with some red scales, pointed, furnished with very sparse white hairs. The exterior perianth segments lanceolate, 15 - 3 mm, green on the outside, red on the inside. The interior perianth segments spatulate, pale red, 15 x 4 mm. The lower stamens inserted at the base of the tube and thence up to within 5 mm of the top, 3-10 mm in length, the filaments green below, violet above. The upper stamens 7 mm long, filaments violet. All the anthers are yellow. The style 15 mm in length, pale green. Stigma lobes 5, pale green, 2 mm in length.

Bolivia, Province of Punata, Department of Cochabamba, Cuchu Punata, 2,568 m. December 1963, M. Cardenas, No. 5,559 (type) in the Herbarium Cardenasianum.

This species has a resemblance in its flower to *Lobivia cinnabarina* (Hook.) Br. & R. but differs from it by its very thin yellow spines which are thicker and acicular in *L. cinnabarina* (Hook.) Br. & R., slightly adpressed to the body and whitish. It also differs from it by its generally funneliform flowers which are quite urn-shaped and whose sepals are of a very much paler green.

*Lobivia cinnabarina* (Hook.) Br. & R. which was discovered by Bridges in 1846 has been rediscovered by me. I have rediscovered this plant close to Colomi (Cochabamba, Bolivia) in 1942. It is a common cactus on the green slopes of the Provinces of Chapare and of Punata in the

triangular area which terminates dorsally in the usual V shaped groove. Spines, according to Backeberg shorter than in *S. aurantiaca* (an observation we cannot confirm on the basis of our material) stiff, sharp, yellowish brown to brown. According to Ritter growth wider than high. (From a letter from Buining, for which many thanks).

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In the above article the revised genus sensu Kimnach is referred to; this includes *Borzicactus*, *Matucana*, *Submatucana*, *Arequipa*, *Oreocereus*, *Morawetzia*, *Loxanthocereus* and *Maritimocereus*. This union is based on the general similarity of the form and structure of the flowers of each of the existing genera. On this aspect, L.E. Newton observes :-

' The *Borzicactus* revision was by Kimnach - KIMNACH, M. in *Cact. Succ. Jour. Amer.* 32: 8 - 13, 57 - 60, 92 - 96, 109 - 112. 1960. You should be able to borrow this volume of the journal from the N.C.S.S. library. As it is several years since I read the paper I cannot remember the text sufficiently to comment directly. However, I shall comment generally about generic limits.

A genus is supposed to be a group of fairly closely related species, and the relationship is reflected by similarities in structure, reproductive behaviour, etc. Most cactus specialists, however, have looked for differences rather than similarities - and certainly there are many differences to be found - that is why there are different species! A look around the plant kingdom generally shows that many of the characters that have been used to separate genera in the Cactaceae are really quite trivial, and have been emphasised out of all proportion by the ultra-specialist, who can't see the wood for the trees. When a new discovery shows an obvious link between two existing genera by being intermediate in its characters, the obvious conclusion is that the two genera are, perhaps, not as distinct as previously thought, and so it might be a better reflection of relationships to unite the two genera. The 'cactus taxonomist', however, immediately sets up a new genus, the name often beginning with *Pseudo* . . . , to accommodate the novelty. Kimnach simply pointed out that in spite of apparent differences, there are sufficient similarities between the 'genera' of the *Borzicactus* group to suggest that they are closely related, and that if one considers the importance of the generic characters in comparison with generic classification of flowering plants generally, they are not really good enough for separating groups of species as 'genera'. Degree of opening of corolla, hairiness of tube, extent of flowering region of stem - these are all good specific characters, but hardly good generic characters necessarily, especially when only one of these is used to establish a new genus, and when each may appear in a wide range of variation.

Thus Kimnach did not question the accuracy of observations on which the genera were separated. He used the same observations, but tried to bring the generic classification into line with that of flowering plants generally. Of course, in the absence of experimental and other modern taxonomic evidence, such work is still somewhat subjective.'

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In New Zealand *Matucana* seem to bloom readily, but in Britain it is regarded as pretty uncommon to flower one of these plants. Consequently I was very pleased to see two flowers on my *Submatucana paucicostata* this midsummer; also successful in flowering this species is R. Zahra (Malta) who writes on August 29th, 'I find today that my *Submatucana paucicostata* has opened its two flowers. The plant is quite small being only 4 cms dia. but it is grafted on a *cereus*. This year some offsets appeared on the *Matucana* and then later in Spring, two buds. They grew very slowly and it was only this week that they started to grow rather fast and now today they have opened properly. The flower is typical of the genus *Submatucana*. It is 6cms tall and 2.5 cms wide at the top. The stigma is greenish and the anthers yellow. The petals are flame red in the centre and rather scarlet at the tips. The tube is very tall and has some hair coming out from the tip of the sepals forming the tube! Successful, too,

has been R. Moreton who tells the Chileans that 'my *Submatucana myriacantha* has decided to flower and *Submatucana madisonorum* is making several offsets' and Miss E.M. Colley says 'to my joy *Submatucana ritterii* has flowered this spring'.

Writing from southern Germany, Frau Schwatlo tells us that 'A *Submatucana aurantiaca* has bloomed for me for several years running. Being a true child of the Cordillera he has retained his local customs and brings forth his buds at the end of the rainy season. Unfortunately this means in my case at the end of the summer just before the whole collection goes into its winter quarters. Thus only five or six flowers are produced outside, whilst a whole nestful of buds still await their turn to bloom. *Submatucana aurantiaca* has flowered twice on the windowsill, but I have to let the remaining flower buds dry up or the plant will not get enough winter rest.

'Another *Matucana* - bought a few years ago as 'sp. n. *Oyon*' - likewise brought a number of buds into the house during the first week in November. As it would have been the first time it had flowered I kept the plant in the warmth, but a few buds withered. As *S. aurantiaca* started in exactly the same way a few years ago, I had high hopes that Sp. n. *Oyon* might flower the following spring. This April it did flower whilst still in the house - a fascinating red flower with an orange tube'.

#### LOBIVIAS By R. Zahra, Malta

Having one or two plants in flower that I was unable to photograph I tried to draw one or two. The drawing of two *Lobivias* made me observe certain things which I had not observed before. When I went into the greenhouse about 8.00 a.m. the flower of *L. famatimensis* was wide open but when I went back to draw it at about 12 noon it was closing. At this time *L. hertrichiana* had its flowers as they are in the drawing below but at 10.30 p.m. I found them wide open as I had never observed them during the day. I always thought that *Lobivias* were supposed to open during the day whilst *Echinopsis* do so during the night however it seems to me that even *Lobivias* open during the night but unlike the *Echinopsis* the flowers fail to close completely during the day. I might be wrong because I only have a few *Lobivias* and was able to observe only one further *Lobivia* that I have - *L. peclardiana*. I have never seen its flowers wide open during the day so now I conclude that they must open fully during the night being partly closed by morning and remaining like this until the following night. (See Page 51 for illustrations).

#### GYMNOCALYCIUM AT LINZ BOTANIC GARDENS

By Alfred Bayr, President, G.O.K.

Translated from the July 1966 G.O.K. Newsletter by W. Kuegler

The protected collection of the Linz Botanical Gardens shelters a large quantity of South American cacti - imported plants throughout - amongst which the *Gymnocalycium* are represented in large numbers. This volume of plant material offers us the opportunity to study and compare the extraordinarily great variability of these plants. The separation of a single species is of great difficulty as we often find transitions from one species to the next, so that it becomes almost impossible to give a proper species diagnosis to separate closely related species.

This proves that *Gymnocalycium* in its evolution is still a very young genus whose environmental conditions have not yet reached their most advantageous form, but it strives to find its most optimal form as - for example - Mexican cacti have found already. In Upper Austria a lot of work is being done to clarify the species of *Gymnocalycium*. Naturally we consider not only the habit of the plants but also the structure of the flower as well as giving special attention to the systematic importance of seed



*Matucana paucicostata*



*Lobivia herrichiana*

form. Together with the head gardener Herr Schatzl, Dr. Albert Simo has lately examined closely the species *G. zegarrae* Card., *G. hybopleurum* (K. Schu.) Bkbg., and *G. nigriareolatum* Bkbg. The result of this work is now to hand. (It was presented to the Group meeting illustrated by colour slides of plants in fruit and flower).

*Gymnocalycium zegarrae*. from Bolivia was described by Prof. Cardenas in 1958 in K.u.a.S. To this form group belongs *G. marquezii* Card., *G. riograndense* Card. (which has never flowered here) and *G. eytianum* - still absent from the Linz collection. It is doubtful whether the last named are true species or only varieties or maybe only forms of *G. zegarrae*. *G. zegarrae* possesses a beautiful bluish-green body with well pronounced ribs which are broken up into large, mostly hexagonal tubercles. The mostly singular plants reach a diameter of up to 20cm. (about 8"); the number of ribs differ according to size. The areoles are round to elliptical and are covered with much woolly felt; in the new growth it is yellowish, becoming white later and slowly falls off altogether. The spines are very strong, greyish-brown at the base, always dark brown to blackish at the points.

The flower is comparatively short, the ovary round. The short flower stem carries green scales, whitish at the margins; when the flower opens the scales stretch somewhat and become brownish-green but keep the pale, somewhat reddish tinted margins. The flower petals are slightly pink in colour, small and spread apart from each other, the base of the petals inside is always a strong red. The style is placed deep inside the flower and is barely visible, colour magenta-red. The stamens are also red and originate deep down in the throat. The unripe pollen is red and changes to yellow when ripe. In his description, Cardenas informs us that the colour of the fruit is red. Unripe it is of a lovely shining blue; the scales remain and the dried-up flower remains on the fruit for a long time. In our cultivation the colour of the fruits goes from blue into yellow with the process of ripening. The fruit when ripe splits open longitudinally.

The habitat is the district of Cochabamba in Bolivia at 1,700m (about 5,200 ft.). Cardenas at first thought it to be *G. saglionis* v. *boliviensis*; later he recognised it as a true species which is related to *G. saglionis*, but not identical.

*Gymnocalycium marquezii* Card. never grows as large as *G. zegarrae*; body dia. up to 10cm. Cardenas gives the height of the plants as 4cm but ours are 6cm. and more, throughout. Body colour blue-green with the epidermis peculiarly granulated, a feature which was not mentioned by Cardenas in his original description; but Backeberg in his description of the var. *argentiniensis* mentions a conspicuous granulation. The tubercles are well developed and large; the spines, on the other hand are distinctively weaker than those of *G. zegarrae* but at the same time more numerous than the latter. The areoles, also large, at first with white wool, later brownish, lastly disappearing. According to the original description this plant never makes offsets but on one of our plants several offsets are present.

Whilst *G. zegarrae* is very willing, *G. marquezii* seems to be a lazy flowerer. The construction of the flower is identical in both species, but the colour differs slightly. The outer petals are greenish-yellow, the ovary very small, the tube short. The petals are fleshy and slightly pointed (different from *G. zegarrae*). Inner petals are white, sometimes with a pink sheen, the outer greenish. The style is slightly longer. Otherwise there is no difference from the flower of *G. zegarrae*.

The v. *argentiniensis* Bkbg has more, but smaller, ribs, the spines are different - more like on *G. zegarrae*. The areoles are more woolly than on the previous plant. This variety is moderately floriferous.



G. lagunillasense Card: ribs more numerous, the tubercles 4 - or 5 - cornered. Body yellowish-green (original description: green to yellowish green). At the upper edge of the tubercles are the areoles with numerous strong spines. Buds similar to those on *G. zegarrae*, scales bluish-green with paler margins, fleshy, but not as pointed as *G. marquezii*. Flower petals in three rows, stigma as *G. marquezii* but longer, pollen yellow.

One can recognise this plant at first glance by the very woolly areoles. Certainly there are also plants with less wool in the areoles. Spines short, more or less standing away from the body. Occurrence: near Lagunillas in Bolivia. Professor Cardenas gives the exact locality of all the aforementioned 'species' - including *G. eytianum* - as about 50km. (32 miles) apart from each other in a north-easterly direction. If, in habitat, one could establish the existence of any intermediate forms, their species status would be badly shaken.

G. hybopleurum (K. Schu.) Bckbg. was described by Hooker last century on the basis of a few available plants. K. Schumann described a *G. multiflorum* and with it three other varieties - *albispinum*, *parisiense*, and *hybopleurum*. The striking thing in Schumann's description is 'spines of *G. multiflorum* are flattened, those of *V. hybopleurum* are rather varying, perhaps this is a different species'. Backeberg has taken up this footnote and made *G. hybopleurum* a species on its own. The plant is pretty uniform; flattened spines, flower proportionately short, scales strongly succulent, outer petals with striking green midstripe, wool of areoles brown, the longer or shorter, flattened spines always pectinate. Wool on areoles is maintained for a long time. Body paler to dark green. Interior flower petals red at the base, getting smaller towards the inside. Style deep inset, stamens red at the base, silvery above, anthers yellow. Fruit green, relatively few scales, these green, pale at the margins.

v. euchlorum Bckbg. Flower as for the type. Anthers reddish brown, pollen expressly white. Karlheinz Uhlig traded plants under the name of var. *pirqu* whilst Backeberg described this plant as

v. breviflorum. Flower a little smaller, in structure and shape as for the type, only the scales on the tube are more rounded. Spines are not flattened so much. Central spine is present (not mentioned in the original description!)

v. ferox Bckbg. Stronger spined. Spines numerous, adjacent, pectinate, grey, brown at points. According to Backeberg no central spine. However, there are 2 - 3 present on our plant. Flower petals smaller at the base than other varieties, tinged greenish. Spines brown-pointed (but not always) areole wool whitish grey to brown-grey.

v. ferocior Bckbg. Substantially stronger spined. Spines brown at the crown (new growth) becoming grey with just a suggestion of brown, nearly covering the body. Flower as type, but substantially longer. The typical green tinge on the flower petals is missing, the outer petals are more strongly reddish. It is doubtful if those plants are indeed only varieties or forms.

Gymnocalycium nigriareolatum Bckbg. This species was and is doubtful. Backeberg found a few plants with black areoles amongst a consignment. At first it was thought that the dark colour was mud or soil. In our cultivation the plants keep the black areole felt. Plants with white and yellow areole wool do also occur. The spines are strong but variable. The very conspicuous flower reminds one strongly of *G. hybopleurum*. The body colour is paler, there are more ribs and the tubercles are more pronounced compared with *G. hybopleurum*. The spines are not flattened, but round, grey with dark points. Radial spines very much like those on *G. hybopleurum*. The flower is quite beautiful, the innermost petals are smaller at the base. It also has a red throat and the petals are whitish-pink, the outer petals greenish translucent. Stamens pink, anthers yellow. This species is disputed - I believe rightly so!

In Backeberg's Kakteenlexikon will be found illustrations of *G. marquezii* v. *argentinense* (Abb. 139) and *G. hybopleurum* v. *breviflorum*, v. *ferocior* and v. *ferox* (Abb 137).

#### MORE COMMENTS ON GYMNOCALYCIUMS — from E. W. Putnam

Ron Ginns ends his comments (CHILEANS, 2, 10, p.16) with the provocative question 'Perhaps Mr. Putnam can tell us what a species is?' I certainly wish I could! I entirely agree with Ron's wish for logical thinking in taxonomy. As a pure amateur I find much that is inconsistent and illogical in taxonomic literature. As to what a species is, at present it seems to be a matter of personal choice rather than science. Somewhere I read the rather pithy sentence that said 'the boundaries of taxa are marked by discontinuities of form'. This seems to put it in a nutshell, even though it does not answer the question fully . . . it still depends upon the degree of discontinuity which you are prepared to accept as a boundary.

But quite outside of any 'splitter-lumper' arguments we have the existence of names which seem to have no justification at all. I have yet to discover any evidence that *Gymnocalycium tuda* is distinct from *G. marsoneri* for example. I find it difficult to see much difference between *G. ungens* and *G. schickendantzii* . . . do these differ enough to be regarded as distinct species? There is a host of plants in the *G. quehlianum* group where the differences, such as they are, seem far too trivial to justify separate specific names.

But I fear that an all-out discussion on species boundaries would fill the pages of *The Chileans* for evermore, so I will leave the matter there.

As far as the generic boundary of *Gymnocalycium* is concerned, I see no blurring of this in spite of the Hutchison revision. If there are *Weingartias* or *Neowerdermannias* close to *Gymnocalycium* (*sensu strictu*) in appearance, I have yet to meet them, nor have I seen *Gymnocalyciums* of an intermediate character. The question of what may be exhibited in a *Gymnocalycium* class in a show is another matter altogether . . . the problem faced here is whether an exhibitor using Hutchison's nomenclature should be allowed to put *Weingartias* in *Gymnocalycium* classes. It does not alter the fact that *Gymnocalycium*, in the original sense of Pfeiffer's genus, is clear-cut. It is in fact one of the few remaining clear-cut genera of the Cactaceae.

#### THE CLASSIFICATION OF THE GENUS GYMNOCALYCIUM From G. J. Swales

Although the boundaries of this genus are relatively clear-cut and disputed by very few, if any, of the experts, within the genus much remains to be done. Recent work abroad has involved the use of seeds as a key to intra-generic relationships. Few details are available yet in English and I have therefore begun to look at a small selection of seeds to see if I could, in fact, detect groups having characteristics in common. Results so far have been encouraging but to be at all reliable, the widest range of material must be examined.

I should be very grateful, therefore, if any members who have fruits on their plants this autumn, and who do not require them for their own purposes, could send them to me when ripe (or a minimum of five seeds from them) giving the name of the plant together with any details you may have on size, shape, colour, etc., of the developing fruit. Any surplus seed will be forwarded to E. W. Barnes for the seed exchange scheme.

I hope to have the opportunity of publishing any worthwhile results in future issues of the Chileans.

(See last page for author's address - H. M.)

## NEOCHILENIA MITIS

*Echinocactus mitis* was first described by Dr. R. A. Phillipi, who also gave us the first description of *Echinocactus napina*. These plants emanate from the administrative district of Copiapo in Chile. Both plants have a remarkably swollen tuberous root which usually requires the plant to be potted up in a pot much larger than one might assume to be required solely by the size of the plant body. The body, too, is very similar in habit in both species, with slightly sunken areoles and rather short spines, more or less adpressed to the body.

Our slide library includes several examples of *N. napina* which illustrate the diversity of tubercle form in the species. At one extreme the tubercles are so flattened that they scarcely protrude above the general outline of the globular body (see Fig. 1). In an intermediate form, the tubercles are somewhat eggshaped, with a distinct chin at the lower part of the tubercle which is raised from the body rather more than the upper, rounded, part (see Fig. 2). At the other extreme are the pear-shaped tubercles raised well above the body and so enlarged that they obscure any sight of the body between them, the chin of one tubercle almost overhanging those beneath. (See Fig. 4).

A similar variation in tubercle shape can be found in *Neochilenia mitis* and in *N. glabrescens*. The difference in these three plants lies mainly in the body colouring and the hairiness of the flowers and fruits. John Donald observes that 'the epidermis colours of all these plants are quite distinct, *napina* is a deep green to grey-green rarely bronzed, *mitis* is a milk-chocolate brown, and *glabrescens* a pale reddish tinted light green. All easily distinguished. My plants of both *mitis* and *glabrescens* have much woolier fruits and flowers than *napina*. In *napina* the fruit skin is easily seen and the scale axils are only slightly woolly - in *mitis* and *glabrescens* the scale axils have tufts of long wool which can completely hide the fruit skin (see fig. 4 - fruit to left of flower).

'Is the variation in epidermis colour botanically important? Probably not, but for gardeners, yes. On account of the fruit and flower hairiness, Rowley and I put *glabrescens* with *mitis*, just as Backeberg has done. Admittedly we might be wrong and perhaps the best thing would have been to lump all three into *napina* and left it at that'.

There also appears to be a difference in the buds, for my *N. napina* has buds covered with dark grey wool which includes some black bristles up to 1 cm. long whilst the wool on the buds of *N. glabrescens* is a dirty cream colour, without bristles.

There is quite a different kind of plant which can now be found in collections under the name of *N. mitis* and that is the type illustrated in Figs 5 and 6. In this plant the tubercles are more or less elliptical shaped and more or less evenly raised from the body, which only a slight suggestion of a chin, the body being visible around the tubercle - this on a fairly young plant. The tubercle shape is rather reminiscent of *N. odierii* and *N. krausii*.

This plant first appeared in print in Vol. III of Backeberg's *Die Cactaceae*, on Tafel 133, from the Andreae collection at Bensheim. Backeberg says that Dr. Kraus had sold some of these plants as *N. mitis* and that the wool in the crown was not so marked as in *N. eriocephala*. Later, in Vol. VI of *Die Cactaceae*, Backeberg adds a brief note to the section on *N. krausii* to the effect that his Tafel 133 in Vol. III is not *N. mitis*. By the location of this comment one presumes he infers it may be closer to *N. krausii*.

We appear to be without any information on the habitat locality of this particular plant, which could be very helpful in assessing a possible link with *N. krausii*.

A translation of the description of *N. napina* will be found on p.102 of the December '66 N.C. & S. S. Journal. (See Pages 57-58 for illustrations).

H. Middleditch

#### SULCOREBUTIA ARENACEA (Cardenas) Ritter

Syn. *Rebutia arenacea* Cardenas in C. & S. J. Amer. 23;94 (1951). Originally described as a *Rebutia* by Cardenas, but correctly transferred to *Sulcorebutia* by F. Ritter in his important article on *Sulcorebutia* in the National Cactus and Succulent Journal 16:81:(1961).

This is a very rare plant and there are only a few examples in cultivation. The original plants were lost and it was not until 1963 that Prof. Martin Cardenas was able to send a few more plants to Europe. Unfortunately, in the intermediate period, a hybrid between *R. krainziana* and *R. marsoneri* was distributed as *Rebutia arenacea*. This plant was taken by Backeberg to be the genuine species which led to the erroneous statements in *Kakteenlexikon* that *arenacea* was in fact a true *Rebutia* and not a *Sulcorebutia*. (See Page 58 for illustration).

The plant is slightly variable with spine length varying from only a few millimeters in length in some examples to others five or six millimeters long. The two extremes might well be mistaken for different species. The plant is related to *Sulcorebutia kruegeri* to which some forms show a superficial similarity. Flower colour also varies from pure yellow in some forms to orange yellow in others.

#### SOUTH AMERICAN SAFARI - Markus & Rausch - 2

Translated by E.W. Bentley from the G.O.K. Newsletter

With the aid of a map, Herr Rausch showed the zig-zag road he and Herr Markus followed from Buenos Aires to Lake Titicaca. Numerous colour-slides of type-localities followed. One picture showed a group of *G. calochlorum* of which the fruits were easily visible while the body was completely covered by soil and sand.

After a flight to Santa Cruz, the two collectors encountered a very different type of vegetation. Pictures followed of a primary forest zone with *Tillandsia*, *Bromeliads* and *Peireskia* shrubs varied with pictures of localities of *Samaipatocereus*, of monster trees of *Neocardenasia*, of great clumps of *Echinopsis huottii* and of *Pseudolobivia obrepanda* in short and long spined forms.

Then followed pictures from Valle Grande with localities of *Lobivia torrecillacensis* and of *Sulcorebutia*. The latter are commonly very variable - which has led to the setting up of new 'species'. According to Herr Rausch, *Sulcorebutia tiraquensis*, *lepida*, *totorensis* and probably even others are nothing but forms of *Sulcorebutia steinbachii*. In habitat they are scarcely distinguishable and quite merged. Highly interesting were pictures of *precipices*, in the clefts of which *Parodias* twined splendidly also localities of *Lobivia caineana* and the free-flowering *L. cinnabarina*.

A shot of La Paz, which lies at a height of 9,000 to 13,000 ft., led to others in a magnificent mountain world with stands of numerous *Lobivias* (*maximiliana*, *caespitosa*, *pentlandii*, *schieliana*, etc.) also *Neowerdermannia vorwerkii* - including a very long spined form, *Cleistocactus tupizensis*,

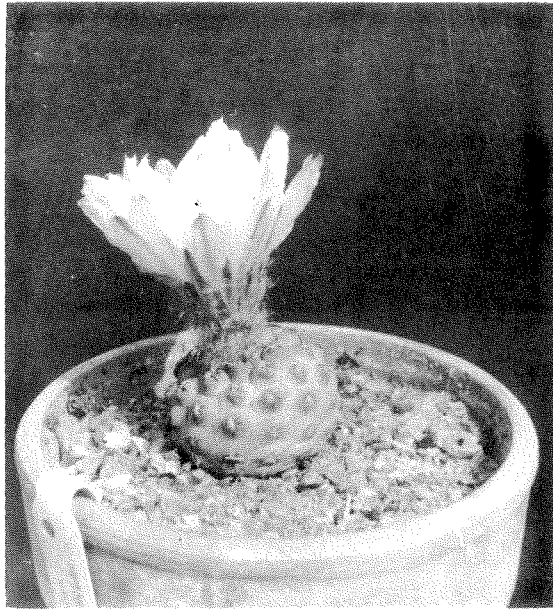


Fig. 1.

Figs. 1 & 2 *Neochilenia napina*

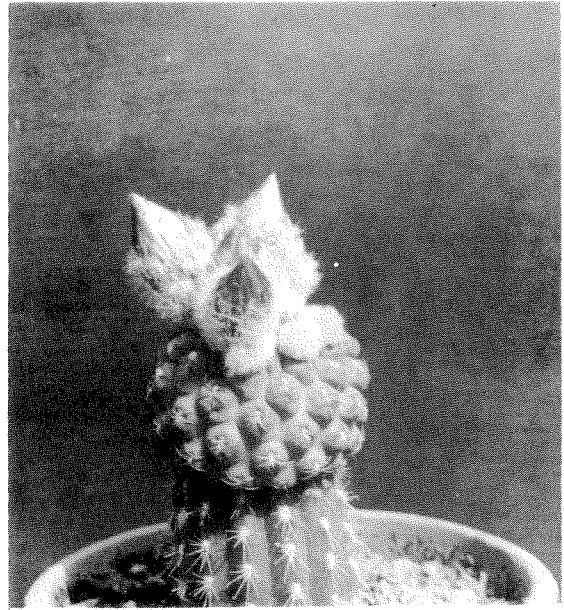


Fig. 2.

Photos & Collection - E. W. Bentley

Fig. 3. *Neochilenia glabrescens*  
Photo & Collection - A. W. Craig

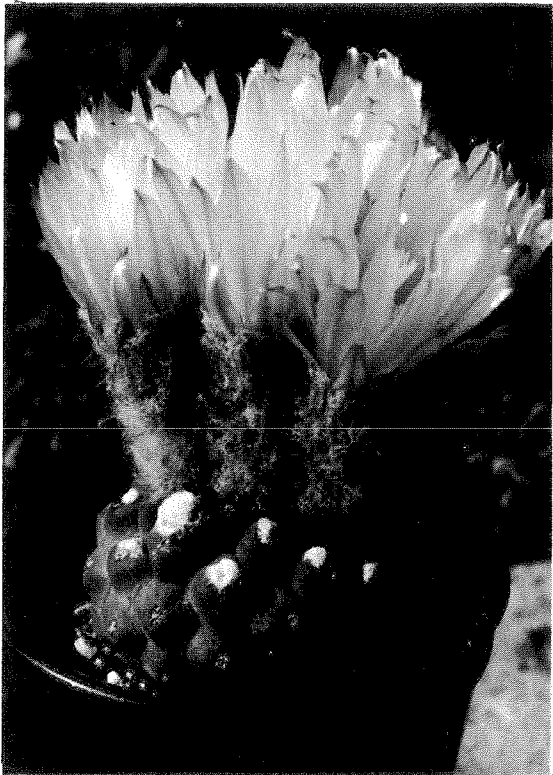
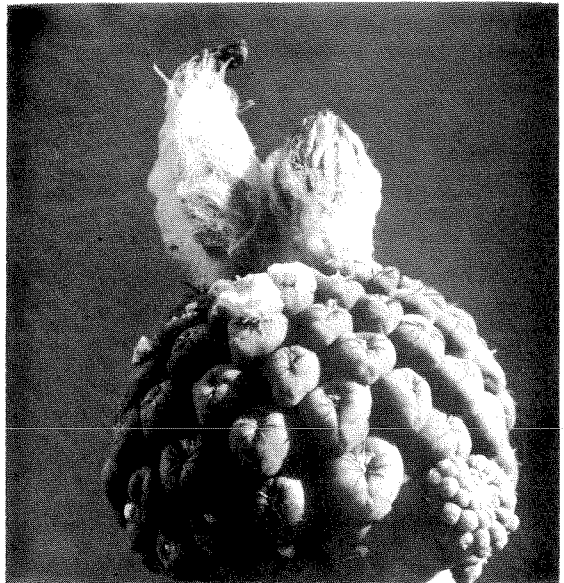


Fig. 4. *Neochilenia napina*  
Photo & Collection - J. W. Welsh





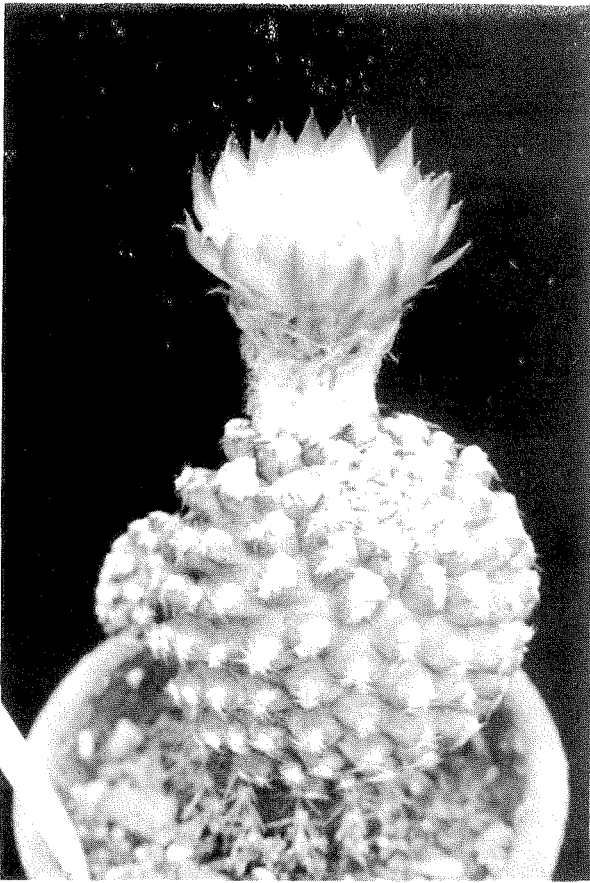


Fig. 5.

Collection - H. Middleditch

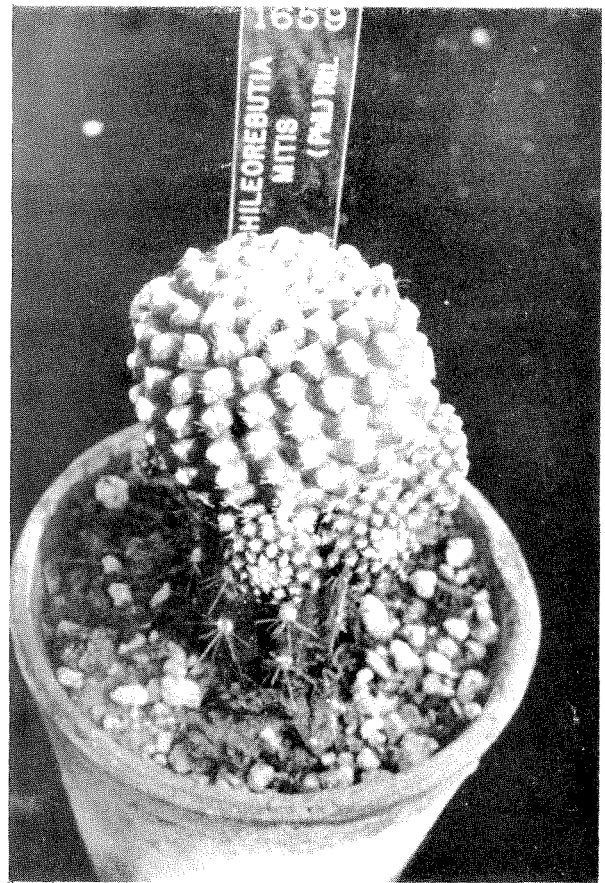


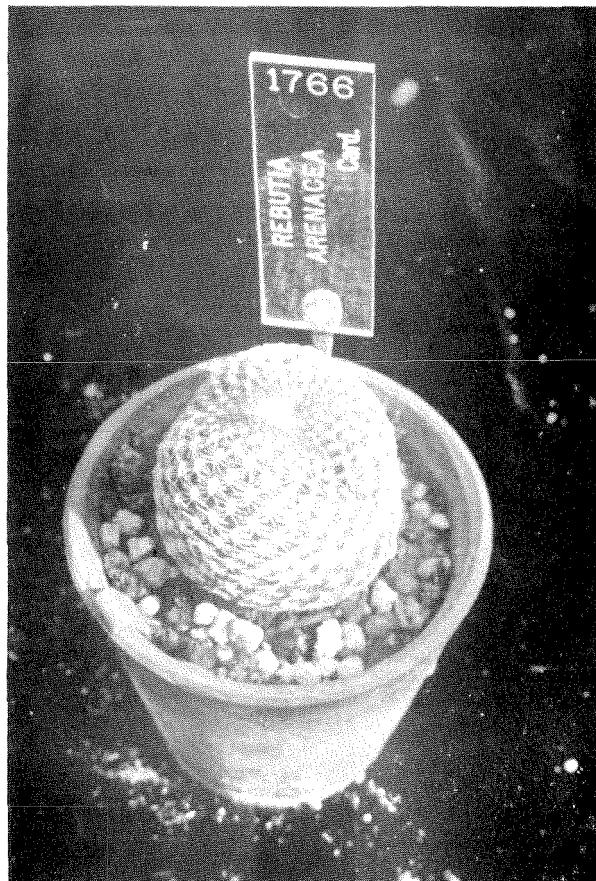
Fig. 6.

Collection - Jardin Exotique, Monaco.

Figs. 5 & 6 *N. mitis sensu andreae*

Fig. 7. *Rebutia arenacea*

Collection - Jardin Exotique, Monaco



(All photographs by  
H. Middleditch)

*Tephrocactus floccosus*, and others. On then to Lake Titicaca, in the vicinity of which were photographed *Weingartia fidaiana*, the very variable *Lobivia kupperiana*, *L. hastifera*, *L. markusii* (new species!), *L. pugionacantha* - flowering although frozen snow still lay on the body - *Oreocereus celsianus maximus* and the very variable *O. trollii*, *Tephrocactus* clumps, the sole locality of *Puya raimondi*, a fuchsia and *Parodia tilcarensis* and *P. chrysacanthion*. Of interest was a picture that showed a group of cacti in habitat thick with mealy bug. Noteworthy for us was the opinion of Herr Rausch that *Parodias* prefer shady places.

Next came the turn of the Salta district. Here were pictures of primaeval forest trees full of *Tillandsias*, habitat shots of *Gym. marsonerii*, *Pyrrhocactus umadeave*, *Soehrensia korethroides* and *smrziana*, *Lobivia kuehnreichii*, *Mediolobivia einsteinii* (from almost naked to thickly spined forms to which separate names have been given - these lack authority), *Acanthocalyciums*, *Lobivia drijveriana*, *Lobivia tiegeliana* and *L. thionanthum*, *Parodia rauschii*, *Tephrocactus weberii*, etc.

In a commendable way Herr Rausch interspersed pictures of the country investigated among the habitat shots - shots of settlements, of the people living there, of animals and remarkable buildings. Of especial value however were pictures of whole populations of plants of which the variety of form suggested several species from which it was understandable that it could lead authors to describe new 'species' when they did not know of the frequent enormous variability in the native habitat and believed that they had found something new in an import.

If, for example, one saw how *Lobivia maximiliana* in habitat varied in spination from quite short to very long and the whole body ensheathed, how different the flower colours of a species can often be, one learned to understand that there was seemingly good grounds for setting up more and more 'species'.

The lecture was highly interesting and the numerous slides were not only a sight for sore eyes but particularly, in a way not seen before, a valuable illustration of the contention that the systematics of certain genera needs most urgent consolidation, whereby undoubtedly a large number of species names could be eliminated because they refer only to more or less extreme forms of the same species.

The lecture made clear that in this respect, in the first place, one should be advised to seek the habitat localities, untrammelled by material considerations, and study the range of variation there.

(Part I of this article appeared in 'The Chileans' No. 10. pp. 11-14).

## CLEISTOACTI

..... from A. A. Sadd, New Zealand.

'Cleistocacti do not seem to be popular here, as a rule, so it is not easy to come by new species unless one imports; this is quite difficult due to our exchange regulations. A couple of local growers have some plants but can't sell them - it seems no one wants them. This, I feel is a pity, because they are fast growers and many of them flower very readily. The flowers, it is true, may not be very attractive, but the diversity of the flowers is astonishing. So many *Cleistocacti* look very much alike and I would hate to try and identify them on body characteristics alone, but each species has a quite distinct flower. Once having seen the flower, there is no trouble in identifying them correctly.

I find that some *Cleistocacti* are much faster growing than others. I would place *C. strausii*, *santacruzensis*, *candelilla* and *hildewintera* as slow growing, although other collectors here seem to get *strausii* and even *candelilla* to grow fairly quickly. On the other hand, many grow quite rapidly;

ujuyensis, hyalacanthus, tupizensis, micropetalus, areolatus, smaragdiflorus, buchtienii, and so on.

Flower colour varies considerably, as you'll see from some of the colour photos in Backeberg's *Cakteenlexikon*. *Cephalocleistocactus riteri* has yellow flowers, with the very faintest trace of orange - nowhere near the orange of *C. wendlandiorum*. *C. micropetalus* has a pale green flower which opens wide, much like *C. vulpiscauda*, but the plant body is very different, being very thick with fewer ribs and shorter spines. This is one *Cleistocactus* which has been difficult to flower; the larger of my two specimens flowered for the first time this summer and of about 20 buds, nearly all aborted at an early stage, so that I had only one or two flowers. I have not found any other plants in the genus which have done this. One of the most interesting from the point of view of flowers is *C. reae*, which has the entire tube covered with wine-brown hair; in fact I have never seen any cactus flower as hairy as this one.

Some flowers on *Cleistocacti* are quite straight, other species are distinctly curved, either in an elongated S shape or with a bend in the middle. Between species, flower tubes may vary from being lightly hairy to covered with dense hair. Species differ, too, in whether the flower remains closed or whether it opens slightly and whether, if closed, the stigma protrudes. Flower colours range through all shades of red and orange to very deep maroon and even light green.

I do not see the need for Backeberg to segregate some of the *cleistocacti* into *Seticleistocactus* and *Cephalocleistocactus*. I suppose Backeberg's justification for segregating the latter is the so-called cephalium. But this is not part of the fruit or flowers so I do not feel that it is a characteristic worthy of rank higher than sub-genus. It isn't a cephalium, in the sense of a *Melocactus*, but what other name is there for it?

I hope to get my notes on these plants sorted out and prepare a review of the genus, which will detail floral characteristics. I feel that it will be incomplete because there are plants which I do not have, like *C. wendlandiorum*. I shall be delighted to hear from anyone interested in corresponding about this genus.

### CALYMMANTHIUM SUBSTERILE

Writing from Schliersee, Bavaria, Frau P. Schwatlo says 'I collect mainly Peruvian cacti - my interest includes all genera within the borders of Peru, from *Neoraimondia* to *Rebutia*. *Lovibia* is fairly well represented in my collection, but where, or where, can I find *Calymmanthium*?'

Although it was nearly winter then, another of our members, R. Davison, Grimsby, produced an unrooted cutting which was sent to Germany. Frau Schwatlo wrote 'I really am most pleased with the shoot and have, after initial difficulties, high hopes of its survival. When I examined it more closely I found that it had shrivelled during transit, being very limp. This made the matter a bit of a problem. Had it been earlier in the year I should have tried rooting it by means of a hormone preparation with which I have had very good results. However, at this time of year, when the plants are all indoors and the sun hardly reaches our house all day, it seemed a little risky, especially as the plant had very little sap of its own. (Incidentally, we live in a valley and have hardly any sunshine during the month of December, and only very little in November and January).

For these reasons I decided to graft the cutting, but how? I tried using a sharp, thin blade of a knife, but it was rather like cutting into a bit of Turkish delight wrapped in paper - the tissue was too soft and spongy. I had a stump of *T. macrogonus* which had produced a small side shoot. I cut this early down through the centre leaving little more than half the shoot on the stump; I made a long



diagonal cut down the *Calymmanthium* cutting placing the two cut surfaces together and binding on the cutting. In this way the vascular tissue (Leitbundel?) of both plants is brought firmly together.'

R. Davison writes about the plant from which he took the cutting 'I grew some plants of this genus from Fearn's seed in 1963 and it has not appeared in his seed list since. I chose them because the plant was listed as a rare species and one of the few cacti with double flowers. The catalogue also mentioned that it was previously called *Diploperanthium*.

With regard to cultivation I'm afraid I am not really very successful. Left to its own devices the plant grows very quickly and easily in a mixture of 3 parts John Innes No.2 and one part coarse sand, but I have not yet managed to get it through the winter unmarked. Last year was the first year I did not try again with a fresh unmarked cutting and my plant is now about 14" high from a 3" cutting started about June '66, but very badly blotched with orange-brown marks which seem to eat right into the plant. This winter, I grew two plants side by side. The large one had normal winter treatment, the smaller one had modest amounts of water; but I am afraid the results were no better. The marking always seems to get worse towards the latter part of winter.'

D. Rowland, Kempston, comments 'I first heard of *Calymmanthium* in the H. Winter seed book of 1962-3, where it was described as '*Calymmanthium substerile* Ritter sp. nov.) the only species in the genus; loves warmth and moisture, strong grower'. The description of the genus was 'Gen. nova. new Peruvian genus, in habit like the Cuban *Dendrocereus*, but with most extraordinary flowers. On a unitary ovary and nectary two tubes, an outer one with spinous areoles on the outside, scaly on the inside, without petals. Within it a naked inner tube, with scales and petals.'

'I obtained my plant from Donkelaar in 1965; during transit it must have been damaged either by the cold or rough treatment and part of the stem was dried up. However, this dried part did not extend completely through the plant so it grew on in 1966 and 67; it grew a fresh branch last year.

'The *Calymmanthium* is a very distinctive cactus, columnar, the original stem being five angled and the new branch is four angled. The body is a light mid green, the ribs being very prominent; indeed the ribs are so tall and straight sided that they form the greater part of the body. These ribs are notched, with areoles about  $\frac{1}{4}$ " apart in the notches. Each areole has short white wool, spines about  $\frac{1}{4}$ " long, very fine, some white, some cream, but mostly gingery brown. It is difficult to differentiate the radials from the centrals - there are about 10 radials and 3 centrals.

'I recollect reading that this plant grows in winter and needs extra heat, but my plant grows in summer with the rest of my collection; it is grown in peat and sand mixture and is kept rather warm - I try and keep my greenhouse around 45° - 55°F - there are *Melocacti* in it too, on a hot bed.'

The uncommon flower morphology referred to by our correspondent even affords sufficient justification for retaining this genus under D. Hunt's proposed revision of the Cactaceae, wherein many other genera are lumped together.

In habitat this plant grows into a tree, some 25 to 30 ft. high, with spreading branches. It comes from northern Peru and is found in the lower Huancabamba gorge towards its confluence with the River Marañon (see frontispiece map Chileans No. 8) near Jaen.

Some notes on the climatic conditions in this location follow below.

## THE EASTERN ANDES OF PERU

In previous articles (Chileans No.2 p.1, No.4 p.1) we have described the Pacific coastal desert and the dry uplands of the western flanks of the Peruvian Andes. The eastern flanks of these same mountains face the vast tropical Amazon forest with its umbrella of ever-humid air.

This humid air drifts constantly westwards and provides a year-round rainfall for the eastern flanks of the Peruvian Andes. This rainfall supports a dense mountain forest or 'Montana' up to an altitude of some 6,000 ft. At the upper limit of the tropical forest there is an almost permanent cloud band in contact with the mountainside, shrouding it in mist. This upper edge of the forest is called by the locals 'Ceja de Montana' or literally eyebrow of the forest; it is real storybook jungle, dripping wet and thick with epiphytes.

Above this altitude the rainfall is less and together with a night temperature too low for deciduous trees, results in a vegetation cover of either grassland with shrubs or - on a favourable slope, facing away from the sun - coniferous forest. At roughly 10,000 ft altitude the coniferous forest moves off the shaded slopes into the sun, reaching up to within 2,000 ft. of the snow line in some places.

In the Montana the annual rainfall is in excess of 100 inches per year, so that the rivers are fed with great quantities of water year-round. They have carved out tremendous gorges, deep and narrow, through volcanic deposits, sandstone and mudstone, alike. Numerous main and side valleys are completely inaccessible for miles due to the steepness of the side walls - often nearly sheer vertical for two or three thousand feet. Even in the higher parts, the erosive power of the water cuts into the countryside and makes travelling difficult. Many ancient paths, scarcely wide enough for a mule to pass in places, hug rock faces or follow steps cut centuries ago by forbears of the Incas.

As the faults and folds in the Andean strata tend to run with the general line of the mountains (N.W. to S.E. in Peru), most of the intermontane river valleys are obliged to follow the general line of the Andes, collecting side tributaries until they break through the eastern wall, towards the far Atlantic. The line of the Marañon is typical (Chileans No.8 frontispiece). This drainage pattern produces a series of sawtooth ridges and valleys running at right angles to the rain bearing winds, which results in a series of highly localised climatic conditions. The typical effect of rain bearing winds reaching a mountain chain, producing appreciable rain on the windward side and distinctly less on the lee side, is repeated in miniature in the Eastern Andes as one ridge and valley succeeds another.

In the Montana forest predominant in Eastern Peru, many valleys are so deep that they approach a mile from bed to rim. With this degree of altitude change, the change in air density alone is sufficient to alter the relative humidity substantially for any given absolute quantity of water vapour. The temperature difference from valley rim to floor can be as much as 50°F. Air sweeping over the mountain peaks and down into such valleys has little chance of releasing moisture - indeed, it is more likely to absorb it. Much rain produced above the valley will re-evaporate before reaching the valley floor and only the rain from the heaviest storms will find its way to the bottom of some valleys.

The rim of one of these valleys could be in the zone of high rainfall - unless it is over about 6,000 ft altitude, when it will be in the grasslands. The valley sides will be clothed with forest, except the steepest parts where bare rock will be exposed. Further down the valley walls, the reduction in rainfall will produce more open forest then, lower still the trees will become more stunted with shorter and coarser grasses growing between. Near the bottom these will give way to thorn bushes and scrub and finally, on the valley floor, there will be mimosaceous trees, acacia, cacti and other xerophytes.

The rainfall on the valley floor could be under 20" per annum; coupled with a location not far from the equator this results, quite simply, in a semi-desert.

On the sloping sides of the dry bottom of one of these deep valleys near Chamaya, in northern Peru, Friedrich Ritter discovered *Calymmanthium* in 1956. From the above description the difficulty of access to this location will be self-apparent. Little if any information is to hand on the vegetation to be found in these dry valleys, but by deduction the *Corryocactus*, *Erdisia*, *Espostoa*, *Browningia* (*Gymnocereus*), *Monvillea*, *Morawetzia*, *Peireskia*, *Rauhocereus*, *Platyopuntia* and *Cylindropuntia* recorded with low-altitude habitats in eastern Peru must surely occupy a like situation.

Neither in Backeberg's *Die Cactaceae Vol. II* nor in his *Kakteenlexikon* is an altitude quoted for the habitat of *Calymmanthium*. But since it comes from the lower Huancabamba gorge near its junction with the Marañon where the Marañon is nearly down to 1,000 ft. altitude, we could probably place *Calymmanthium* at between 1,500 and 3,000 ft, probably at the lower end of that range. Since this is practically on the equator, it means the climate is not quite as mild as for *Melocactus* but probably comparable with *Cephalocereus*. Hence the suggestion for some extra winter heat and the probable cause of the cold markings noted by R. Davison.

#### PARODIA. Extracts from the English Round Robin on Parodia.

..... from H. Middleditch. 'I acquired a plant of *P. suprema* on our cactus Tour to Austria in 1964 and this flowered for me for the first time in 1967. I would have described the flower as a deep wine red, but I have been taken to task for being inaccurate in describing colours. A German collector has apparently prepared a colour chart for *Parodia* flowers and I could personally envisage this being invaluable.

I have unfortunately had a number of examples of *Parodia* losing their roots during the winter, and they are rather reluctant to produce new ones again for me.'

..... from K.R. Smith. 'My compost for *Parodias* comprises four parts of leafmould (bracken, beech and oak mixed), three parts of 1/8" pink granite, two parts of peat and one part of vermiculite. This serves very well both for seedlings and for older plants. I would like to know of any experience in degrafting *Parodias* - I am thinking of taking my *P. bueneckeri* off its graft. I have had no trouble with any of my plants losing their roots during the winter.'

..... from Miss E.M. Colley. 'I also find some of my *Parodia* tend to lose their roots, mostly the ones with small hooked spines like *P. rubriflora*, *aurispina*, *erythrantha*, *sanguiniflora* and *catamarcensis*. In a recent article in *Practical Gardening*, Margaret Martin and P.R. Chapman also say that *Parodia* have a tendency to do this.

My two plants of *P. schwebsiana* vary slightly - the ribs spiral clockwise on one and anticlockwise on the other, the centrals also vary in length and colour slightly: similarly with my two plants of *P. maasii*, whose ribs spiral opposite hand, whilst one has golden spines, the other red-brown spines. Perhaps this is a variable species? I wonder if there is any significance in the direction of rib spiral?

I have a *P. chrysacanthion* about 4" across which flowers regularly and is the first species of the genus to do so for me each year.

I think the idea of a colour chart is a good one, as I find it very hard to describe colours and feel that what I would call deep crimson might be called something quite different by someone else<sup>1</sup>.

..... from P. S. Down. 'I have about 30 Parodias, of which over twenty have flowered for me. My compost is 75% John Innes No.2 plus 25% sharp sand and a spot of bone meal.

One of my plants has the title *P.andalaga*. I cannot find it mentioned anywhere now, but remember seeing Andalaga in a catalogue as a habitat of a new species, before I acquired my plant. Can anyone help with a name? It has a deep red (colour chart please!) cup shaped flower with a smooth edge to the cup.<sup>1</sup>

..... from G.H. Linney. 'I have quite a few Parodias in my collection, some of which I grew from seed. My largest Parodia is *P.auriespina*, it has ten heads and is in a ten inch pan. In 1967 it had about 130 flowers, with 94 open all at once. My *P.nivosa* has another eight pups forming on one side now, the largest already  $\frac{1}{2}$ " across. My *P.mutabilis* has two pups just starting.

I have had one odd thing happen to my *P.chrysacanthion*; a week before Xmas 1966 one flower opened and lasted three weeks, possibly because there was no sun to help it fade. When this closed another opened up and lasted about ten days. There was no sign of any new growth on the plant at the time and it had not been watered for five weeks at least. It then flowered twice normally in the 1967 season.

I pot on each plant in my collection each year, usually doing the Parodias first as they begin to bud and flower early. All my plants are kept completely dry over winter but all my Parodia have good roots when I repot.

I have grown a number of Parodia from seed; they germinate well, but the tricky period is from when they have germinated until they have formed spines. During this period I find that they need more light - but still part shaded - and a little more warmth. A nice warm shaded and airy position in the greenhouse seems to be best.<sup>1</sup>

.....from A Johnston. 'I have over sixty Parodia now which are a mixture of seedlings, grafts and imported plants from Uhlig. Those on their own roots are in various compost mixes which seem to give little trouble.

The first Parodia to flower each year is *P.echinus*, which was in bud in early February this year. One year I tried growing all my Parodia in partial shade and they flowered as well as usual.

*Parodia gracilis* has grown quite well from seed for me - this plant is one with the larger sort of seed. In 1966 I had self-sown seedlings round the base of my *P.gracilis*, which suggests that it is one of the easiest species to grow from seed.

I have a collected specimen of *P.tilcarensis*, which was a terrible sight when I obtained it. The new growth had already started in cultivation, much less in diameter than the plant body as it was in habitat - it resembled a milk bottle, so I cut off the top and rooted it. The bottom part is now putting out offsets. The only other plant I have to offset so far, without topping is an ex-grafted plant of *P.macrancistra*.<sup>1</sup>

Describing his experience in raising Parodia from seed, N.L.Browne says 'I have raised a number of varieties but find them not easy. *P.maasii* germinates well and is as slow as all the others. I found that *maasii* shows very little variation in spine form or colour; I saw some 50 plants about  $1\frac{3}{4}$ " dia.

at a nursery near here and on examining them they also showed little difference between each other. *P. obtusa* did not germinate too readily - about 20%. This is a strong hooked spine type. With *P. formosa* I have only managed to rear two out of 25 seeds; the white to cream spines may become more pronounced with age - they are only two years old. I have but one plant of *P. subterranea*, a 3½ year old seedling, with a strongly hooked spine. I seemed to have success with *P. maxima* - germination was good, about 80%. I feel this is a most outstanding plant, but I find it can be difficult at times. '

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Our *Parodia Robin* is just back from New Zealand: there is room for three further members for a second ring in Britain - contact the Robin leader (see last page), if you would like to join.

We should be particularly pleased to hear if you can provide named *Parodia* seed - even if it is only a few seeds - to assist in the classification of *Parodias* by seed types, (see Chileans No.10 p.10).

## FRAILEA CATAPHRACTA

By F. Guldemont

Translated by Miss J. Sleeman from *Dodonaeus Journal* January-February 1965

I would like to discuss with you *Frailea cataphracta* (Dams) Br & R. which is the type plant of the genus - *cataphracta* signifying armour-plated - which distinguishes itself by the manner in which the body of the plant is garnished with markings in the form of crescents of a different colour. This is the reason why it is also called 'cactus of the moon' by virtue of the markings which are in the shape of lunar crescents. These very same markings give to this species a characteristic colour which makes it immediately distinctive from other *Fraileas*. When cultivated in full sun the globular body of this plant takes on a beautiful tint which becomes all the more pronounced away from the growing point, but which however never obscures the markings in the form of the crescent moon.

This species was described for the first time by Dams in 1904 and has been considered as rare until very recently. I had the opportunity to obtain some seeds of this species in 1963. Four germinated - I grafted them immediately and from these seedlings I obtained further seeds the same year which I sowed immediately and which gave me a good number of seedlings. From these I grafted 54 plants, some on *Echinopsis*, others on a *Trichocereus* which I had sown under the name of *T. fulvilanus* but which must, according to me, be *T. tacaquirensis*. All seedlings made good growth and it seems that the latter continue to do rather better than those grafted on *Echinopsis*. It must always be borne in mind that this *Trichocereus* possesses long strong spines which it is advisable to cut off as far as the root of the areole and for at least a row below the junction with the scion. In effect, when the *Frailea* matures, it overflows the stock rather easily and would risk being damaged by these aggressive spines which could easily be the cause of rotting.

It is easy to see the advantages of grafting for multiplying a species and for obtaining seeds, from this. This form of cultivation has enabled me to make several recorded observations which I believe are worth passing on, as follows.

In 1963, I had collected seeds on three occasions; each time I sowed them immediately. At the beginning of July all the seeds germinated and of those sown in mid-August 70% germinated; not one seed germinated of those sown in mid-July. I had been at pains to gather the seeds from fruit ripe, perfectly healthy, and dry on each occasion. This year I have sown none of this species but I entrusted my seeds to two colleagues: at the first, success is complete whereas at the other not one seed

has germinated. What happens therefore and what conclusions can we draw from these diametrically opposed results?

For the full length of the fine sunny summer which we have had this year (1964), not one single flower opened out whilst many opened out completely during the last fine days of September. Who will dare now to pretend that the *Frailea* flower only opens wide in full sun?

I deem equally interesting the observation that the fruits originating from flowers which did not open out (the *fraileas* are largely cleistogamous) contain on average 40 seeds (minimum 24 - maximum 56) whilst the fruits resulting from opening flowers contain an average of 78 seeds.

Backeberg mentions in *Die Cactaceae* Vol. III p. 1656 the following species of *Frailea*: *F. knippeliana*, *gracillima*, *alacriportana*, *chiquitana*, *cataphracta*, *pygmaea* (with its varieties *dadakii*, *atrofusca*, *phaeodisca*, and *aurea*), *pulcherrima*, *grahliana*, *schilinzkyana*, *colombiana*, *castanea* (= *asterioides*). I am also aware of the following names:- *pilisipina* and *uhligiana*, but I would not know whether these are distinct species or if they have already been described.

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In Backeberg's *Lexicon* we find the following species of *Frailea* listed:- *alacriportana*, *carminifilamentosa* & v. *winkelmanniana* *castanea* (= *asterioides*), *cataphracta*, *cataphractoides*, *chiquitana*, *colombiana*, *gracillima*, *grahliana* & v. *rubrispina*, *knippeliana*, *pseudopulcherrima*, *pulcherrima*, *pullispina* & v. *atrispina* and v. *centrispina*, *pumila*, *pygmaea* & vvs, *schilinzkyana* and *uhligiana*.

The following article may explain some of the peculiarities upon which F. Guldemont comments above.

#### A CACTUS GROWER'S OBSERVATIONS : SIZE OF CACTUS FLOWER NOT SPECIES DIFFERENTIATING

By Udo Kohler

Translated by E.W. Bentley from the December 1967 'Kakteen und andere Sukkulente'

It struck me that Backeberg speaks about different *Frailea* species - on one occasion of 'a fairly small-flowered perhaps yet undescribed species' and at another time of a 'fairly large-flowered specimen', so that here and there a new species would be set up. It could mean indeed, if in many *Fraileas* it depended on the respective flower size then really one may have different plants. I received the plant illustrated here as *Frailea knippeliana* - which naturally it isn't (species recognition in *Frailea* in the commercial world is very poor). *Frailea knippeliana* (Quehl) Br. & R. is cylindrical, 6cm high and 2-3cm thick. This is not true of this spherical plant. With the help of Herr Gunter Kilian, Mainz Kostheim, who has a good knowledge of *Fraileas*, I have identified the present plant with brush-like spine formation on the new growth as *Frailea pumila* (Lem.) Br. & R. The name is however not so important here.

My photograph shows two flowers differing strikingly in size on one and the same plant. I could not ascertain whether the different flowers appeared alternately, small - large, as Herr Kilian has observed. I am much more of the opinion on the basis of my observations that the large one is the 'full flower', while the smaller flowers are the fore-runners. Naturally, another weather sequence could have caused the rhythm observed by Herr Kilian. I might endorse the experiences of Herr Max Schleiher who, in his 1967 Plant List, pp. 25-6 wrote that flowers are produced in spring and

autumn (the 'cleistogamous' without coloured floral leaves) which do not open but produce viable seed. Frequently as I have also observed in other *Frailea* species first of all seeds are produced in order to maintain the species before (the plant) treats itself to the 'de luxe' flowering. The flower is certainly not only dependent on sunlight but also on sun warmth.

For those who want to see *Frailea pumila* in the mass and in full flower - look up the article of Adolf Apel in 'Kakteenkunde' 1939 pp.40-41, 'Kakteenbluten - Kakteendank'. It may be mentioned that *Fraileas* are midday bloomers and therefore should be grown specially by collectors for whom a long midday break is possible for flower observation.

That the flowers of *Frailea pumila* close finally at 4 o'clock, as Apfel claims, must perhaps not be taken as a 'Law of the Medes and the Persians'. They close with the setting sun, as also an over-shadowing cloud brings about the closing of the flowers, until the sun again is fully out.

In conclusion, it may therefore be said that the size of the *Frailea* flower cannot be species differentiating because flowers strikingly different in size can be found on the same plant. There follows here the opinion of Fr. Buxbaum (Sukkulentenkde, V. 8, p.82 et seq. 'Variabilitat und Kakteen'): 'Appearance (here: the size!) is not important, but structure'. One can get considerable differences in the flower in one and the same individual without a 'new species' being involved. "What however is not altered is the structural plan - the morphological type of the flower!"

## HYDROPONIC CULTURE

By P. G. Hallett

I began trials with hydroponic culture for raising my (then) small collection of plants in 1964 - this included Echinocactanae, Echinocereanae and Coryphanthanae with a fair proportion of South American species. I felt that this method of cultivation would allow me to achieve a much better control of pH and of mineral concentrations.

I decided to start trials on a wide range of species, reasoning that any species which showed themselves either very adaptable - or alternatively very sensitive, could form the basis of a later experiment with more detailed controls.

The question of soil type and pH value has been discussed at length, but hard facts seem rather sparse. Buxbaum indicates that the majority of cacti are found in association with acid soils and other references may be found which tend to confirm this. The weight of evidence to date would seem to point towards acid composts with fairly high mineral content as being the most satisfactory starting point from which to make up a growing medium.

The main problems with hydroponic culture are the selection of a suitable aqueous feed solution and devising a satisfactory means of supporting the plant. It is the latter problem which may create the greatest difficulty since the chemical constitution of the feed solution can be chosen from published data and a pH of between 5 and 6 may easily be obtained by the addition of nitric acid.

Supporting the plant presents some problems; special containers have been constructed which hold the plant and allow the roots to hang in the feed solution. Apart from any aesthetic objections, the cost and difficulty of providing a large number of containers to hold plants of a wide range of types and sizes usually renders such a method impracticable.

"Planting" the cacti in a suitable granular medium which is watered in the normal way with a feed solution seems to be a good answer. Ideally, this medium should only provide a physical location for the plant and not effect cultivation in any other way. Finding such a material is not easy, however. Vermiculite, after it has been wet for a while seems to consolidate into a thick sludge and also - due to its low density - the support offered to tall plants is poor. This latter also applies to perlite which in many ways is rather a good medium apart from its low moisture retention.

My next step was to try ordinary sand. This gave excellent support, was very cheap and readily obtainable, but after using it with a wide range of plants for a whole season it soon became clear that it was not entirely satisfactory. Some plants grew well and others had either exhibited a much slower growth rate or had stopped altogether and looked distinctly sick. A simple experiment soon showed the cause; I mixed up a sample of sand and pH4 feed solution and found that the pH value of the resulting mixture rose steadily from the initial value of 4, reaching 7 in less than twelve hours and then continued to rise to 8 or 9. In retrospect this appears obvious, since the weight of sand is very much greater than that of the solution with which it is in contact, so that it is the sand which alters the pH value of the solution, not the other way round.

This experiment showed that my plants were in an alkaline and not an acid environment for the majority of their time. The unhappy plants were therefore removed from the sand and placed in a mixture of peat and cornish grit, being watered with the same feed solution. All improved steadily.

Following these results all the plants have now been transferred to the peat/grit medium which had a pH value of about 5.8 when last measured. This year I have sown my seed in this same medium and results are promising.

Members interested either in corresponding on this subject or partaking in a Robin on hydroponic culture should contact the author of this article - address on last page.

The reference to the peat-grit mix is quite interesting as my own plants are almost all in clay pots plunged in a peat-grit mix. Often bits of plants drop on to the plunge mix between the pots and there is no doubt that these 'weeds' usually grow much better than the ones in the pots that I am actually trying to grow. - H.M.

### SEED RAISING By H. Middleditch

Earlier this year when we were starting our Members' seed exchange, questions were raised on the possibility of cross-pollination in a greenhouse which could result in the seed acquired through our seed exchange not being true to type. This stimulated a few thoughts.

On our Austrain Tour in 1964 we encountered a collector in Salzburg who had a double door to his greenhouse, arranged so that only one would open at once; he also had muslin over his ventilator openings, with the object of excluding the ingress of insects. He kept one little pollinating brush per species, in an enclosed bottle (just like Krainz at Zurich). If he had kept a polythene bag over any plant in flower or setting fruit, to exclude pollen wafted round by air drift in his greenhouse, one might perhaps have accepted seeds from this collection as true to the type of plant in that collection.



If a collector uses a pollinating brush which he does not confine to one plant, there would seem to be an inevitable possibility of hybridisation.

Where pollination is by insects, which are no more discriminating than one brush wielded by the owner of the plants, or by chance pollen wafted round the greenhouse, the same probably applies.

As the number of collectors taking positive controlled steps to try and eliminate chance pollination is probably infinitesimal, is there any point in trying to differentiate between chance cross-pollinated seeds and more chancy cross-pollination i.e. insects or brush?

It would seem that the best attitude is to make clear that the seeds available through our seed exchange are offered at face value insofar as name and trueness to type are concerned. My own personal opinion is that in these respects they are quite probably only little, if at all, inferior to seed obtainable commercially.

It would seem that a number of subscribers have been trying a soil-less compost for seed raising. We hear from V. J. Corbett that "I have been trying Levington compost for seeds this year and have had good germination, but I find the green growths which arise after a while a bit of a nuisance. Unless your seedlings have come up pretty thickly, then these green growths can fairly take over. Something I did find out this season regarding growing from seed was that some seeds seem to take a fair time to germinate, but if you go the trouble to turn each seed to stand on its hilum then germination takes place very quickly. Whether the seed is softer in that region or not I don't know."

This comment was received before our No. 10 Journal was distributed, but one would imagine that the reason for better germination from seed placed hilum downwards is that the moisture will evaporate less rapidly from the underside of the seed but probably more important is that in this position moisture can more readily find its way through the micropylar opening, by capillary action. Until moisture has entered a seed through this opening, it will not germinate.

D. Angus has also tried seed growing in soil-less compost, filling the seed pots about two-thirds full of peat and then topping off with a mixture of two parts Levington compost to one part of sharp sand. This has retained its moisture much better than the more 'orthodox' composts used for some seed sowing. Growing very satisfactorily in the soil-less compost are *Brasilicactus haselbergii*, *Bolivicereus saimapatanus*, *Cephalocereus aureus*, and *Filosocereus palmeri*. Very little algae is in evidence on the surface of these pots, which were given two waterings with dilute aluminium sulphate solution in June.

We wonder if any other of our Members have tried growing from seed in a soil-less compost?

#### NEOPORTERIANAE

We have received one or two plants from friends on the Continent labelled *N. klugii* - although this name is conspicuously absent from literature. We have now received an explanation from Flor. Guldemont who suggests "The name *N. klugii* originates from Holland from a plant sent there by Frau Winter. The writing on the label was not too clear and was interpreted as 'klugii'. To my mind the plants carrying this name are nothing but *N. esmeraldana*".

Another rather interesting looking seedling from the Continent was one labelled *Neochilinia N. 17* with sharply pointed tubercles having areoles on the upward facing slope (rather like the *hankeana-taltalensis* group) and a little curling white hair arising from the new areoles, a little reminiscent of *Pyrrhocactus floccosus*. Flor Guldemont tells us that "I bought this plant from Uebelman when I

visited Switzerland three years ago. He had seven seedlings which were not all identical - some were more woolly in the crown than others. Some had a brownish epidermis, some more greenish. He obtained the seeds from Frau Winter. This plant has indeed a resemblance to *N. floccosa*. The latter is much more woolly in the crown and the flowers of *N. 17* are a much darker red.

(I suppose there will be such a thing as hybrid seed, even from a commercial nursery - H.M.)

### COLLECTOR'S CORNER

Those of us struggling with the inevitable no-space in which to house our latest acquisitions might conjure up a glorious vision of being in the place of N.T.Hann who would like suggestions for the layout of 'a new greenhouse about 10'6" x 15' to house an increasingly large collection. I am wondering what kind of staging to use. There seems to be two choices, ordinary slatted wood or an asbestos top, surrounded by boarding and topped up with shingle or peat in which to sink the pots'. I have seen collectors who make a success of either method, but I prefer solid staging and peat-sand plunge for my clay pots. Keep a sharp hatchet handy for those plants whose roots get out of the bottom of the pots, however.

In past issues several correspondents have referred to PVC roofing for their greenhouse - R.E. Hollingsbee says that 'my new greenhouse is rather experimental. The roof is corrugated P.V.C. sheeting, the south facing side is made of different kinds of plastic, whilst the ends and the north side are of glass'. The results from that should be interesting.

### STUDY GROUPS/ROUND ROBINS

English	Cleistocacti	A.A. Sadd, 26 Carlisle Street, Island Bay, Wellington S.2., New Zealand.
	Copiapoa	D.J. Lewis, 16 Brundall Crescent, Cynwell, Cardiff.
	Epiphytes	A.J.S. McMillan, 5 Oakfield Road, Bristol 8.
	Frailea	J. Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
	Gymnocalycium	G.J. Swales, 5 Hillcrest, Middle Herrington, Sunderland.
	Hydroponic Culture.	P.R. Hallett, Llaregyb, 20 The Garth, Bull Bay, Amlwch, Anglesey.
	Lobivia	R.E. Hollingsbee, 46 Markland Road, Dover, Kent.
	Miniature Opuntia	D.E. Watling, 52 Frances Road, Windsor, Berks.
	Neoporteriae	H. Middleditch, 5 Lyons Avenue, Hetton le Hole, Co. Durham.
	Notocactinae	K.H. Halstead, Little Fir trees, Wellington Close, Dibden Purlieu, Southampton.
	Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
	Photographing Cacti.	A.W. Craig, 16 Skeeby Close, Hartburn, Stockton on Tees.
	Sulcorebutia	Contact the Chileans
	Trichocereus	N.T. Hann, 30 Cope Avenue, West Wickham, Kent.
German	W. Kinzel, 53 Duisdorf / Bonn, Bonhoefferstrasse 16, West Germany.	
	Parodia. Rebutia & Lobivia. Chileans. Gymnocalycium. Echinopsis. Epiphytes. Islaya.	

## THE CHILEANS

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## CONTINENTAL CACTUS TOUR 1969

Preliminary information on this forthcoming tour appeared in our last Journal. Events in central Europe may necessitate an adjustment to the proposed itinerary. For an outline itinerary and anticipated cost, contact H. Middleditch, 5 Lyons Avenue, Hetton le Hole, Co. Durham.

## COMING SHORTLY

Mediolobivia, Discocactus, Acanthocalycium, Matucana, Arequipa. It is expected that we may be able to publish a few notes on the above groups of plants - we should be very pleased to have any comments or observations from members who have either grown - or flowered - any species of these plants. Black and white prints or sketches would be particularly welcome.

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