

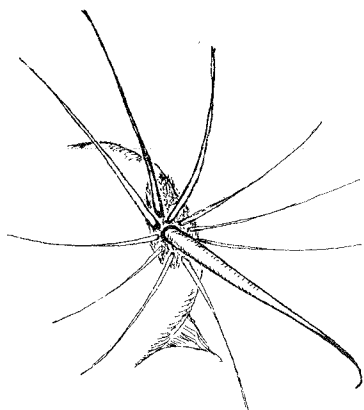
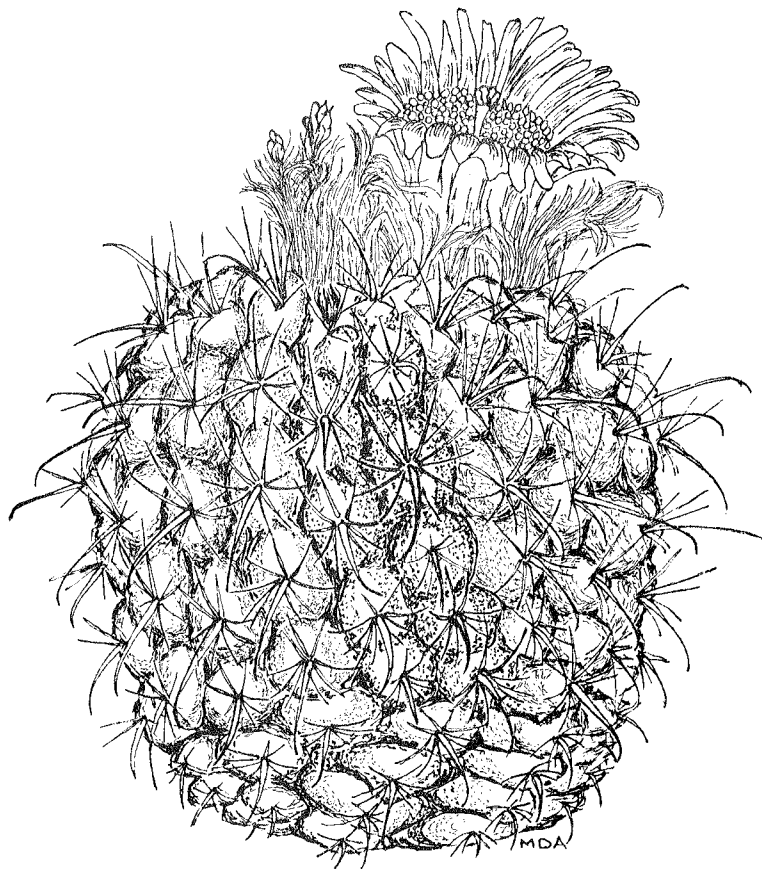
# THE CHILEANS '77

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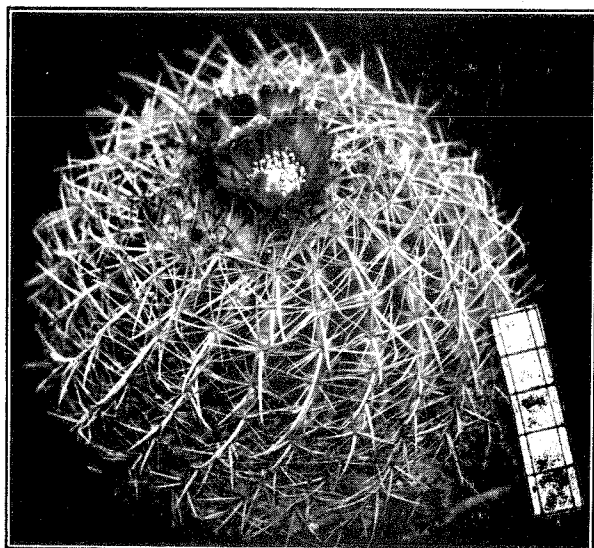


*Borzicactus fieldianus*

Collection - Mrs. J. HOBART



PARODIA  
MULTICOSTATA



PARODIA  
YAMPARAEZI

CACTUS FRANCE 19.82.1964

**6) *Parodia schwebsiana* (Werd) Backbg.**

This species represents one of the oldest *Parodia* species. The type locality is on the eastern edge of the town of Cochabamba, on the extremely dry rocky slopes of the north side of the San Pedro rocks, at ca. 2,600 m. (According to Krahn).

**7) *Parodia salmonea* (Backbg.) Brandt comb. nova.**

(*Parodia schwebsiana* (Werd.) Backbg. var. *salmonea* Backbg., first described by the author in B.f.K. 1935 — 3, without Latin description. Latin description first in C. & S. J. (U.S.) 84:1951).

The variety *salmonea* of *P. schwebsiana*, described by Backeberg in the American Journal in 1951, differs in several ways from the typical species. In particular the seeds of these two species are completely different and leave no doubt that *P. salmonea* can be regarded as more than just a variety. I include a drawing of the seeds of the plant in question.

As Backeberg described this species first, I do not want to alter its name and will satisfy myself by making a change of rank, from variety to species.

I only wish to state further that the plants grown from FR 733 seeds, which are circulating under the name of a nom. nud. *Parodia multicostata*, represent a synonymy of the above species. However, I must add that the plants offered in recent years as *P. multicostata* no longer correspond to the earlier ones. They have much stronger ribs and pure orange flowers. These appear to be cultural hybrids.

The body of *P. salmonea* is thick-set, growing wide and more flat, grass-green in colour, ca. 11 cm tall, 10 cm across. Ribs about 1 cm high, very sharp edged and narrow, only weakly tuberculate. The tips of the ribs are ca. 1.5 cm apart, areoles strongly woolly, about 1 cm apart, the wool crisp and not so completely white as with *Parodia schwebsiana*, but more cream coloured, appearing almost dusty. Radial spines 10-11, acicular, all reddish-brown, upright, later bent in towards the central spines. Central spines 1, ca. 1.5 cm long, of the same colour as the radials, the strongest of which are directed upwards and could be regarded as centrals, in which case they would be only 7-8 in number. The crown is strongly woolly, but almost flat, as in the variety *applanata* (Hoffm. & Backbg.) Brandt comb. nova.

The flowers of *P. salmonea* appear in large numbers in the woolly crown, opening to 3-4 cm in diameter and are salmon-red to salmon-pink in colour, becoming more yellow in the throat. Pericarpel greenish-ochre, passing into salmon-red above, similar to the wool on the receptacle, which is at first pale whitish, then becomes dark rust colour. The wool surrounds the buds very thickly. The upper scales are salmon-red, becoming much paler below, scarcely visible at times. Isolated, very fine black hairs project from the upper scales.

The outer perianth segments are salmon-red, later tinted yellow towards the base. Inner perianth segments salmon-red at the tips, then towards the inside becoming more pink, tinted yellow above and becoming almost completely yellow in the throat. Style 1.8 cm long, cream coloured, similarly the stigma lobes. Filaments yellowish, very short, anthers yellowish. Fruit hard, ca. 4 mm diam., dark carmine-brown, darker on the upper edge, with a crown of white hair. Seeds ca. 1 mm long, 0.7 mm wide, oval. Testa black, tubercles slightly elongated and strongly marked, shiny. Hilum only slightly arched forward. Strophiole projection a scarcely visible tube-like cone, close by which the micropyle and the micropyle pore are clearly to be seen. At the basally narrowed end of the hilum are found, barely visible, a raised area, covered by the strophiole tissue, which indicates very probably, the funiculus, but very rarely is the remnant of the placenta visible. The strophiole projection is creamy-white, but very delicate and transparently weak, often being hardly visible on the hilum.

Habitat: probably South of Monte Punco; from Cochabamba to Comarapa.

**8) *Parodia salmonea* (Backbg.) Brandt var. *applanata* (Hoffm. & Backbg.) Brandt comb. nova.**

(Backbg. in Die Cactaceae Vol. III; 1958-1959)

Latin diagnosis: "Differt a typo corpora applanato, aculeis centralibus adpressis".

The variety has the same fresh green body colour of the type *P. salmonea* and also grows wide and depressed-globular, ca. 8 cm tall and 9 cm diameter. Crown also flat as in the type. The ribs are likewise steep and placed closer to each other. In *P. schwebsiana* they are wider and with a flattened apex. The spines are as in the type *P. salmonea*. The flowers appear more in bunches from a thick woolly crown and are dark red to carmine coloured.

Habitat: West of Monte Punco, on the road from Cochabamba to Comarapa, near Arani.

The seeds are ca. 1 mm long, 0.7 mm wide, oval, Testa black, tubercles slightly elongated and strongly marked, shiny. Hilum slightly arched forward, only slightly covered by the strophiole tissue. The strophiole projection exists only as a hardly visible tube-like tip, where the micropyle is found and sometimes the micropyle pore is easily visible. At the basally narrowed end of the hilum is found, barely visible, a slightly raised area, covered by the strophiole tissue, which indicates the funiculus, but only rarely is the remnant of the placenta to be seen. The strophiole tissue is creamy white, but is so weakly developed as to be as good as transparent.

I also show here the seeds of *P. schwebsiana*, where the great difference between the two seed forms is immediately apparent.

In *P. salmonea* and its variety *applanata* the micropyle is visible as a small raised tubular organ, from which a delicate band is extended towards the base and which at times ends in front of the funiculus in the flat part of the hilum. The funiculus is located in both cases at the outermost, basal end of the hilum. In the case of *P. schwebsiana*, on the other hand, the funiculus lies right close to the micropyle and both are covered by a strong, spongy strophiole tissue, which is missing in *P. salmonea*.

#### **17) *Parodia backebergiana* Brandt**

This species has a silky shining wool crown from which the 3 cm diam. blood-red flowers appear, bedded deeply in the wool but opening fully. They thus present a wonderful contrast to the shining wool of the crown. The body is very dark blue-green. The number of ribs is 13, but there are said to exist plants having up to 16 ribs. The areole wool, like that of the crown, is very long and wispy up to 1 cm. The spines are very thick and strong, the lowermost central hooked and up to 2 cm long. All spines are brownish.

This species was found by Herr Krahn on 14.7.64 on the road from Sucre to Tarabuco, at Km 16. Of the discovery of this species Krahn writes as follows "All the plants come from a population within a radius of a few meters! The greater number of the plants grew in a particularly exposed stony crevice. Such plants were completely flat, disc like, the central spines short and thick. I also collected plants which grew in the protection of dry bushes. These were much larger and taller, the spines longer and thinner. From my observation flower colour and shape is also variable." As far as it goes, Krahn's observation is completely correct, since in the exposed places grew plants which were all *P. backebergiana*! Those under the bushes were really *P. otuyensis* Ritt. Thus it appears that as so often happens, *Parodia* plants growing at one locality are not always all of one species. The exact habitat of *P. backebergiana* lies at 2,900 m altitude.

Herewith the description of the fruit and seed: Fruit small, brownish-green, dark, hard, 3 mm diam. Seeds about 1 mm long, 0.7 mm wide. Testa shining black. Warts round, small. Strophiole flat, somewhat raised in the centre, the micropyle particularly projecting, but the micropyle not clearly defined, being covered with strophiole tissue; equally the remains of the funiculus are hardly distinguishable. The strophiole is brownish-white, the projecting part creamy white.

#### **18) *Parodia yamparaezi* Card.**

Is very close to *P. backebergiana*. The wool of the crown is however of a completely different sort, also this species has 19-21 ribs which are much flatter. The body colour is lighter green, the wool crisp and without shine. Found near Yamparaez. Flower blood-red, becoming paler.

#### **19) *Parodia tarabucina* Card.**

All the plants in collections bearing this name do not include one of this species! They are either *Parodia backebergiana* or *P. otuyensis* due to a plain mis-identification. *P. tarabucina* is said to come from the interior of Tarabuco province, hence probably its rarity, since collectors collect in the vicinity of easily reached roads and paths, but avoid the trackless interior of the country.

#### **20) *Parodia krasuckiana* n.n. Brandt**

This species forms a transition to *P. tuberculata* Card. *Parodia krasuckiana* in external appearance is near to *P. yamparaezi*, though according to its buds it approaches *P. tuberculata*, also on account of its flowers one can regard it as a transition species. It is medium sized, appearing to remain smaller than *P. yamparaezi*, has 13 well developed ribs, the body colour is more grass-green, slightly darkened. The areoles show slightly wispy wool and in the crown some wool is also formed, but this is soft however. The buds are brought into prominence as they appear as small red dots around the edge of the crown, as do those of *P. tuberculata*. The flowers become up to 4 cm long and are deep blood-red, but remain cup-shaped. The receptacle is about 1 cm long, in contrast to *P. yamparaezi* and related species. It is supposed to come from east of Tarabuco, on the eastern slopes of the Cordillera, on the road from Tarabuco to Zudanez. Found by Rausch — R 482. I dedicate this species to my friend Werner Krasucka of Dresden.

#### **21) *Parodia sotomayorensis* n.n. Ritt**

A beautiful new and good species, with a thick woolly crown, the wool however cream-white and dull, not shiny, but almost as long as that of *P. backebergiana*. The flowers are small, as in *P. schwebsiana* group but of a beautiful golden-ochre colour. Habitat locality near Sotomayor, south of Sucre.

#### **22) *Parodia tuberculata* Card.**

This species does not form a wool crown but has thickly woolly areoles, which in age decorates the entire rib of the plant with a white band running from the crown to the base of the plant. The buds appear on the edge of the crown, likewise as small red dots, without any growth of wool. The flowers are orange-reddish and appear throughout the summer, mostly in considerable numbers. It comes from the neighbourhood of Sucre and was found on the airfield there, near the Quebrada de Villa Maria, Hazienda Rellini.

#### **23) *Parodia otuyensis* Ritt.**

*Parodia otuyensis* Ritt. has very pronounced areole wool, but one can hardly speak of a "woolly crown" The flowers of this species are also much larger and stand above the wool and spines. They are salmon red, rather goblet shaped and tend towards the form of *P. tuberculata* flowers, except that the entire bud is enclosed in thick rust-brown wool. The flower stands on a tube of about 1.5 cm in length and is 4 cm long. Habitat according to Ritter, near Otuyo; according to Krahn also near Km. 16 on the road from Sucre to Tarabuco.

Comments on *Parodia* of the *schwebsiana* group

.... from P.H. Sherville

Among this group of *Parodia* I have three species which have flowered for me. *Parodia schwebsiana* is a seedling plant approximately 1" dia and 1½" high — it flowers every year but for only a very short season compared with say *P. mairanana*, *gracilis*, or *procera*, which seem to be in flower on and off for about ten months out of twelve. Last year *P. schwebsiana* flowered for only eight days comprising two sessions of three days and one two day display, between August 9th and September 5th. Significantly *P. multicostata* flowered in the same months (as did *P. otuyensis*), but for much longer periods; from August 11th to 28th, from September 1st to 13th, then in the following year from September 6th to the 29th and again from October 6th to 11th. This particular plant was a seedling from Sargent. The only other representative which I have from this group is *P. taratensis* which is again seedling raised but quite a distinct plant, being a much paler green than those mentioned above. It is also significant that it has produced offsets freely and naturally without provocation and is yet still only in its fourth year.

Reverting to *P. schwebsiana*, this indeed has flowers with numerous thin petals of a lovely deep red colour, almost approaching the mauve that one finds in say *Pelecyphora valdeziana*, (again *P. otuyensis* is similar). My *Parodia multicostata* however has clear orange flowers — very similar to those on *P. sotomayorensis* in a friend's collection and could well be one of the cultivar hybrids that Brandt mentions. The body of my *P. multicostata* is also paler than either *schwebsiana* or *sotomayorensis* (or *otuyensis*) all of which have a really deep bottle green stem — and whilst it hasn't got definite ribs as Brandt suggests, the tubercles are much elongated. The illustration of *P. multicostata* would fit perfectly the body of *otuyensis* or *sotomayorensis*. The ribs on my *P. schwebsiana* however are hardly tuberculate and very shallow.

.... from D. Sargent

It does seem that the denser and thicker spination on imported plants is due to the fierce sun and purer air that they are subject to in their habitat, likewise their more intense colouring. Imported plants always lose some of this, however treated. I have found that the larger a plant is, and therefore presumably older, the fiercer the spines are. Incidentally, I have the impression that the older a plant, the larger the flowers are, but I have not confirmed this by measuring them.

.... from I. le Page

My plant of *P. multicostata* was obtained some five years ago from Uhlig as a seedling. The flowers can last for up to 10 days depending on the weather and the time of year. They do expand more as they get older, changing from quite a bright orange to a very pale orange as time passes.

.... from Mrs. L.E. MacIntosh

I have never had much luck with *Parodias* until this year, when I shifted here. I planted out the oldest and best plants (about a dozen) in an old metal wheelbarrow that had developed perforations, to give them a free root run. They have done wonderfully well and flowered most profusely; amongst them is *P. schwebsiana*, a columnar plant 6" tall, *P. multicostata*, barrel shaped, and *P. otuyensis* — flat and circular. Other than the hooked central of varying lengths and the fine radials, I cannot reconcile these plants at all, for their mode of growth and rib formation is quite different. I am now building up my collection of these plants once again.

.... from J.R. Gooch

I must admit to not having a very large number of *Parodias* but I do have a *P. schwebsiana* from Uhlig, a *P. multicostata* Lau 376 from Sargent, and a cultivated *P. multicostata* from a nursery in Holland whose standard of plants is such that I would not now consider doing business with them. The Lau 376, which has three flowers open at the time of writing (November 25th) matches very closely Brandt's description for *P. salmonea*; my specimen is only half the size he quotes for mature plants. The flowers are salmon pink, open wide, but with the tips of the petals curved up; perhaps because of this, mine are barely 2 cm in diameter whereas the description states 3-4 cm. The style is pink, stigma lobes cream.

My cultivated *P. multicostata* has a bright green body, less shiny than the imported plant. There are clearly 4 central spines, the lowest strongly hooked. Flowers, also out at this time, are 4 cm in diameter and pale orange. The plant does resemble *P. salmonea* superficially, the flower buds in both instances having much ginger brown wool in the crown; the plant makes a show of flowers in the summer and again in the autumn. These two plants, and perhaps even more so with *P. schwebsiana*, produce much white wool in the crown which, with careful cultivation under glass, persists on the plant body. However, one puff on the plant or an overhead spray completely removes it except for that in the crown, and we must assume that in habitat the plants appear relatively free of wool. I can definitely confirm that the flowers become larger each day for 3 or 4 days after the first opening, on these plants. The blooms are open night and day at this time of year but in the summer, *P. schwebsiana* half-closes at night. Flowers actually die with the petals spread wide open.

.... from A. Johnston

You ask if my plant of *P. sotomayorensis* is at all like *P. schwebsiana*, *multicostata* or *yamparaezii*; it is a collected plant which came from S.P.I. and whilst the body colour and tubercle shape are similar, the spines differ. On the old areoles there is one strong long spine hooked like *P. maasii*, but the new ones are not so strong.

I have just been down to the greenhouse with the sketch of the *P. multicostata* which I think compares favourably with my own plant. This had one flower at the end of November and there is another just starting to open (December 14th) — it is orange in colour. It is still only a small plant in a 2" pot and this is the first time it has flowered. It looks as though it may be one that has one flower after another. I will see how long it stays open. I find that the spines on *P. multicostata* differ most in comparison with *P. yamparaezi* particularly the radials, as they do not spread. My plant has spines that project outwards and seem to be bundled together, rather than radiating and spreading. The nearest plant I can find that has spines like this is *P. ocampoi* v. *compressa* which also has abundant wool in the crown.

... from R. Martin

I would agree that *P. sotomayorensis* does somewhat resemble the *P. schwebsiana* & *multicostata* types, having short hooked centrals which are rather stout, and radials few in number and less stout. The flowers stay open day and night; they are small to begin with but increase in size as they mature over the next few days. In addition, the colour of the flower becomes paler, compared with its much deeper colour on first opening.

... from J. Klavins

I have only a couple of plants from the *P. schwebsiana* group, *P. schwebsiana* itself and *P. otuyensis*. The *P. otuyensis* had only four flowers in June, the first one stayed open for five days. It did not really close at night, the petals just became less reflexed. It had three more flowers in October and these did not close up at all at night and they lasted for eight days.

... further from P.H. Sherville

Regarding the comparison made between the central spines on *P. sotomayorensis* and *P. maasii*, by A. Johnston, the hooked centrals on my *P. sotomayorensis* are certainly not as stout as those on *P. maasii* and are also only about half the length. The spination on *P. sotomayorensis* is very neat and uniform compared with the rather straggly centrals on *P. otuyensis*, which may have the effect of making the *P. sotomayorensis* appear to be better spined than either *P. maasii* or *P. otuyensis*. This latter species, especially, has centrals which twist about and are not so erect or outstanding as those on *P. sotomayorensis*. Again on spination I would agree completely with A. Johnston when he says that "the radial spines on *P. multicostata* don't radiate, they project outward and seem to be bundled together as in *Parodia ocampoi* v. *compressa*". There can be no better analogy than this as cited; it fits the *P. multicostata* spination perfectly, excepting of course the central spines which are virtually absent on *P. ocampoi* & var.

Considering the group around *P. multicostata* and the question of naked buds raised by Weskamp, I have not flowered *P. taratensis* yet, but certainly *P. yamparaezi*, *otuyensis*, *multicostata* & *schwebsiana* have a naked bud rising from the dense wool in the crown. I would also include *P. tarabucina* in this comment. There are plenty of other *Parodias* with naked buds, such as *P. suprema*, *culpinensis*, *comarapana*, *gracilis*, *elegans*, & *schutziana*, of course.

... from R. Moreton

I have a plant of sp. 990 de Tarabuco (possibly a Lau plant) which John Donald reckoned to be *Parodia tarabucina*. This plant is about 3½" in diameter and some 4" high and has straight or slightly curved spines. It has never flowered for me. From the description in the *Kakteenlexikon* it seems unusual as the flower of *P. tarabucina* is said to be purple-salmon — the rest of the description matches my plant. On checking against the original description in the U.S. C. & S. Journal I find my sp. 990 would appear to fit O.K. There is a rather poor photograph which seems to show considerably longer spines than on my plant, however.

Regarding *P. sotomayorensis*, I have some small seedlings raised from Knize seed, but the name seems to be very suspect; I think that they are actually *P. commutans* or perhaps *P. obtusa* (sensu Ritter). The Knize seedlings have a long, curved, hooked central and a second shorter one directed upwards, with seven short, chalk-white radials. The *Parodia sotomayorensis* from Ritter's original seed flowers as a 3-year old seedling, which I am sure the Knize ones will not. The spine count of the two sorts is completely different. The Ritter plant has 4 hooked centrals and  $\pm$  15 radials, but the centrals are relatively much weaker and the radials stronger than the Knize plant. The seedlings raised from New Mexico Cactus Research seed look more like *otuyensis*/*yamparaezi*, but have the thickened spines as per Werdermann's *P. schwebsiana*, but 15/16 radials, not closely adpressed to the body.

*Parodia taratensis* seems to me to be not unlike *P. punae* when it is a small seedling, but it becomes columnar and offsets madly from the areoles. This applies both to my collected plant and to my seedlings, none of which are grafted.

Regarding the illustration of *P. bilbaoensis* in Ku.a.S which shows a plant with hooked centrals, I have looked up the reference to this species in the American Journal and I see that it is compared with *P. taratensis*, but it specifically mentions the straight spines. The only plants I have ever seen of this species came from Uebelmann, and as far as I can remember they were the same as the illustration in Ku.u.a.S.

Of a batch of *P. multicostata* which I grew from seed, I have retained four plants. Although Brandt suggests that plants appearing under this name are mostly hybrids, all my four plants are virtually identical. They do flower but my efforts over several seasons to obtain seeds by cross-pollination have been unsuccessful. However, after telling you recently that they would not set seed, I was tidying up my plants in the greenhouse when I found a seed pod had set on one of these plants. I have another seedling of *P. multicostata* which I grew from Dr. Herdt's seed, but it is

somewhat different to my other four plants: it has not reached flowering size yet. Like A. Johnston, I have also had *P. multicostata* in flower in December — a somewhat unseasonal time for flowering, I would have thought.

.... from H. Ewald

About eight years ago I obtained a very small imported plant of *P. tuberculata* from Keith Mortimer; this produced some offsets and one of these now flowers well. If the dead flowers are removed then any subsequent flowers tend to remain rather small.

.... from H. Middleditch

Both Paul Sherville and Roger Moreton refer to the fairly prolific offsetting which is a feature of *P. taratensis*; Horst Ewald records a *P. tuberculata* offsetting — but I would be so bold as to enquire whether this latter plant may perhaps be incorrectly named. The attachment of an incorrect name to an imported plant is by no means uncommon. It would appear that all species in the *schwebsiana* group are solitary.

.... from T. Lavender

But we have a *P. yamparaezi*, a fair sized plant with 16 ribs, which we obtained from Jim Bolton, which is now putting out five offsets.

.... from A.W. Craig

My plant of *P. yamparaezi* is three headed; the body appears to have produced these multiple heads quite naturally — there is no sign of an original body which one can distinguish on plants where the crown has been chewed off by grazing animals, and offsets then grow away. This plant was purchased from Hallett at Anglesey and on his staging there were quite a few multi-headed *P. yamparaezi* — some of them with 5 and six heads. Of the three heads on my plant, one has 15 ribs, one 16 and one has 18 ribs. The flowers definitely stay open all night.

.... further from H. Middleditch

Whilst on a visit to Roger Moreton, I had an opportunity to discuss with him the plants in his collection which belong to this group. Now I can see more readily the variation between the plants from various sources which pass under the name of *P. sotomayorensis*. On the plant from Winter's seed, the central spines are about 2 cm long (perhaps at the longer end of the range within the *schwebsiana* group), some of them are straight, some of them are curved, and some are definitely hooked; pretty well every areole has a mixture of the three forms. The ribs on this plant are fairly deeply divided into tubercles. These features were apparently typical of all the seedlings in the batch. The seedlings grown from New Mexico Cactus Research seed have much shorter spines altogether, more or less only half as long as the plant grown from Winter's seed. The ribs on the NMCR plants are clearly, but not deeply, divided into tubercles; here the ribs are notched into tubercles, whereas the Winter plant could perhaps be better described as a series of tubercles forming a rib.

The small seedlings being raised from Knize seed are already exhibiting a lengthy, twisting, solitary central spine and certainly suggest an affinity with the *maasii* group. Quite recently I received an imported specimen of KK 688 *P. sotomayorensis* from Knize; when I was unpacking it, I thought a *P. maasii* had come by mistake. This plant is just over 4" in diameter (across the body) and the single, strong, stout, central spine is about 2" long (5.5 cm). There are ten slender radial spines and situated above the long central are four spines 2 cm long like the radials and of similar slenderness, but pointing outwards and upwards. One might perhaps have one's choice of calling them radials or centrals. All spines are what I am tempted to describe as straw-coloured.

Because of the dense areole wool in the apex of the plant one cannot see the bases of the spines at that point, but elsewhere the base of each spine can be seen to be swollen. The swelling is small in proportion to the breadth of the central spine, but on the radials and on the four short straight "centrals" the base is at least twice as thick as the rest of the spine, looking similar to a glass rod being drawn out of a molten blob of glass. On the shoulder of the plant the bases of all the spines are dark brown in comparison to the straw colour of the rest of the spine length, so at that point the swelling at the base is much more conspicuous to the eye. However, the swelling is no less on the older spines where the overall dun grey-brown colour makes the swelling at the base of the spines more difficult to discern. An examination of each of the sketches of spine-clusters from F.H. Brandt which have reached the Chileans, does not reveal any indication of base-swelling on spines in either the *schwebsiana* group or the *maasii* group.

I must admit to some surprise that a *maasii* type of *Parodia* should be found as far north as Sotomayor; until very recently the most northerly location for a *maasii* type *Parodia* was at Camargo and Ciniti. These two places lie within the basin of the rivers Camblaya and Challamarca which, together with their immediate tributaries, appear to form the quite compact distribution area for the *maasii* type of *Parodia*. Quite recently a *Parodia lecoriensis* n.n. has been offered in the catalogues and if this does indeed emanate from the neighbourhood of Lecori, then we have a *maasii* type of *Parodia* occurring at a point about forty miles further north of Camargo. There are two hamlets named Lecori, less than ten miles apart, on the trail from Camargo to Potosi, almost on the watershed between the Camblaya and Pilcomayo basins; they are less than thirty miles from Otavi, the home of *P. otaviana*. But Sotomayor is even further north, on the north bank of the Rio Pilcomayo. Perhaps a comparison of the flowers and seed of the knize KK 688 with those of other *maasii* type plants and of *schwebsiana* group plants might be illuminating?

.... from F. Brandt

About the *Parodia* you have received from Knize under the name of *Parodia sotomayorensis* KK 688 — I

also have this plant. It is indeed similar to *P. maasii*; from your description it appears that your plant does exhibit a strong spination. I am not really sure what it is. I do not know enough about the habitat — have you any ideas?

I have grown plants from Ritter's seed of *P. sotomayorensis* which are now in bloom; both the blooms and the spiralled ribs point to the plant which I described in 1972 as *P. ignorita* Brandt. (Stachlpost 8 No. 40 pp 86-87, 1972). I am also enclosing a colour print of *P. ignorita*. It is a pity that Ritter only sold seed under the name of *P. sotomayorensis*. When I described *P. ignorita*, I didn't have the slightest idea of what the plants of *P. sotomayorensis* looked like, or the colour of the flowers which were until now unknown. When I described *P. ignorita* I did not know that my seedlings of *P. sotomayorensis* were going to turn out to be the same as *P. ignorita*.

Whilst *P. ignorita* Brandt is the same as Ritter's *sotomayorensis*, it in no way resembles the species collected by Lau & Knize, which were sold as *P. sotomayorensis*. To ascertain whether the Knize *P. sotomayorensis* is the same as *P. maasii*, one must first investigate and also establish accurately the habitat of the species. I am still perplexed: *P. ignorita* (*sotomayorensis*) has only one hooked spine. And this *P. ignorita* is no relation to the *P. sotomayorensis* of Lau & Knize. The *P. sotomayorensis* of Lau & Knize appears to have an affinity with *P. maasii*; the Ritter's *P. sotomayorensis* does not, which is to be seen in the picture of *P. ignorita*.

I cannot tell you what *P. yamparaezi* Cardenas really is, or the many plants with this name collected by Lau and passed through the Trade, but they do not tally with the Cardenas description. As Cardenas writes, the centrals are white to grey, but the spines on the collected plants from Lau are black to brown. I have personally asked Lau about this and he told me that he also found plants with white spines. Where are they? I have not seen any! On this basis the *P. yamparaezi* Card. must still remain questionable and unknown until new specimens of this species arrive in our collections.

For over ten years one could buy and sell *P. tarabucina* anywhere, but the Cardenas description does not tally with the collected plants. In 1973 Knize collected plants from there and sold them under the name of "*Par. otuyensis*" — and these were identical with the description of Cardenas (for *tarabucina*? — H.M.). This year the plant will flower for me and also I have seedlings of *P. tarabucina* exchanged ten years ago with Blank of Lausanne, Switzerland — these seedlings are now so large that they should flower and they seem to be similar to those collected by Knize as "*otuyensis*". So one can only regard these plants as the "true" *P. tarabucina*. Everything else which has been collected and sold during the last ten years under the names *P. tarabucina* and *P. sp. Tarabuco 990* and "*No. 990*", have been incorrectly identified.

.... from J. Hopkins

I have *Parodia otuyensis*, *multicostata*, and *tarabucina*; the description of the bud as "rising naked from the woolly crown" would seem to be appropriate to me! The flowers are small and the naked parts seen are in fact the petals. I cannot recall however having examined in detail the receptacles of the flowers.

.... from Mrs. A. Lavender

We have *P. yamparaezi* just starting to come into bud. This first appears as a spot of dark brown wool in the white of the usual cushion of areole wool which covers the crown of the plant.

.... further from A. Johnston

I have just been to look at my plants to see what the buds appear like. *Parodia tuberculata* has naked buds, a full ring of them, *Parodia otuyensis* is almost naked and *P. schwebsiana* is hairy; I have not flowered *P. sotomayorensis* yet and *P. yamparaezi* should flower later in the season.

.... from G.J. Swales

From the author's discussion of these species, I see that he regards *P. schwebsiana* and *P. schwebsiana* v. *salmonea* Bkbg = *P. salmonea* Brandt as having seeds which are "completely different". I have had no opportunity to examine the seeds of these two particular species, but I have looked at quite a large number of cactus seeds under the microscope. A degree of minor variation does indeed occur in the individual features on seeds of the same species, or even between seeds from the same fruit, but generally the major features will be consistent. When I look at the excellent sketches by Brandt of the seeds of these two species, I cannot help but wonder if their seeds really are completely different. Under the same heading, the author refers to the "micropyle and micropyle pore", whereas these two terms refer to one and the same item. Did the author intend to refer to the micropyle and the funicular opening?

.... reflection from H. Middleditch

In his text, Brandt notes that in *P. salmonea* the micropyle and the "micropyle pore" (presumably the funicular opening) are found adjacent to each other close to the centre of the hilum. There is no specific comparison given for *P. schwebsiana* in the text, but from the sketch of this seed it appears that the micropyle is separated from the funicular opening by a fair distance, one being near the centre of the hilum and the other not far from one end. Is this what the author means when he says that the seeds are "completely different"?

.... from W. Weskamp (K.u.a.S. 24.7:73)

*Parodia backebergiana* Brandt, published in K.u.a.S. 6.1969. Brandt stated that this species, together with *P. otuyensis* Ritter (incorrectly offered by Uhlig as *P. tarabucina* Cardenas) occurs near Oropeza. (According to Krahn, the whole population is contained in a space of only a few meters circumference!). Since we can assume that probably all



the species in the sub-genus at least are capable of successfully pollinating each other, the question should be asked next, whether they are able — on the whole — to colonize a common area. They can do this (they are then said to be sympatric — in contrast to being separated spatially, when they are then said to be allopatric), if they are isolated in their sexual propagation (reproduction). Such reproductive isolation mechanisms are found in sympatric species. At its simplest it is different flowering times, through which a natural hybridisation is excluded; or a different pollinator, which is for example very characteristically the case for sympatric *aquilegia* species. Since this is not true of *Parodias* — and in fact the species of the sub-genus *Protoparodia* are in practice rather long-blooming — an intermingling of species is excluded.

If however one does not exclude the possibility that two species live together in a confined space, it must result in the formation of hybrids. For example, according to Ritter there are hybrids between *P. fulvispina* and *ritteri* (H. Kessler "The FR *Parodias*" Stachelpost 28;1970). I should not of course exclude transition forms. What Krahn found near Oropeza is *P. yamparaezi*, in which the bud arises blood red and naked from the thick wool of the crown. In ignorance of the bud and flower of *P. yamparaezi*, *P. backebergiana* was described, which in every respect is similar to the former.

*Parodia yamparaezi* Cardenas, Cactus (France) 1966 synonym: *Parodia backebergiana* Brandt K.u.a.S. 6.1969.

... from E.W. Bentley

Although I am fairly happy that I have correctly translated the wording of the foregoing comments by W. Weskamp, I cannot altogether follow his meaning. He refers to two methods found in nature for ensuring reproductive isolation of sympatric species and then he goes on to say "Since this is not true of *Parodias* . . . .". Does he mean that *Parodias* do not have different flowering times? Or different pollinators? Or that reproductive isolation in all its many aspects is not found in *Parodias*? He then goes on to say that because species in the subgenus *Protoparodia* are long-blooming, this excludes a "Vergesellschaftung", which I would normally translate as "association". I cannot follow this particular argument at all.

... from H. Middleditch

As a meaning for the word "Vergesellschaftung" my own dictionary gives 'socialization'. Will this word be used here in the sense of being closely associated as opposed to widely separated? That is, closely associated geographically, or growing on pretty much the same patch of ground i.e. intermingling. Does this mean that Weskamp is arguing that, because the *Parodia* in the group *Protoparodia* have a long flowering time, this excludes different species growing in close proximity to each other? If so, I would have thought that this was not a strong argument, in the absence of supporting evidence concerning the times of day during which the flower is open or during which the stigma is receptive. Nevertheless, one cannot avoid being somewhat sceptical of the proposal that two very similar-looking plants growing in more or less the same patch of ground, are two different species.

... from Dr. H.J. Hilgert

As to this problem of translation, I think that the word "Vergesellschaftung" probably cannot be translated literally. Therefore I'll try to repeat the contents of the comment by W. Weskamp in my own words. Weskamp presumes that at least within the sub-genus all species are capable of reciprocal fertile pollination. Since, however, the species of the sub-genus *Protoparodia* are permanently blooming it would be impossible that two species of this sub-genus would grow side by side at a limited place without forming hybrids. Therefore, if no hybrids are found, it cannot be assumed that these two species are growing "vergesellschaftet" i.e. side by side at the same spot.

I hope you can see from the above what Weskamp means by the term "Vergesellschaftung", i.e. that different species are growing side by side at the same spot without forming hybrids. A "Pflanzengesellschaft" is the ecologic unit of a certain type of landscape. In Weskamp's opinion a "Vergesellschaftung" is only possible if the forming of hybrids is excluded either by different times of blooming or by different ways of pollination i.e. by isolation mechanisms in sympatric species.

... footnote from H. Middleditch

After that clarification from Dr. Hilgert, I feel even more assured of the desirability of discussing pollination agents and pollination ecology within the pages of the *Chileans*, so that we may each make our own assessment of how this may influence the status of a plant as a species, variety, intermediate, or hybrid, as an alternative to a discussion on pure taxonomic grounds.

... from "The Pollination of Flowers" by Proctor and Yeo

We have taken for granted the idea of adaptations, or of adaptive characters, and their origin by natural selection. It is common experience that when we examine an organism we see that many of its structural and behavioural characteristics are related to its mode of life, and many instances of adaptations have been described among the animals and plants we have considered. There will always be some features the adaptive significance of which we cannot readily see. Some such features may possess undiscovered adaptive significance, while others, particularly small differences between species, are often held to be probably non-adaptive. Biologists have perhaps been too ready to make this second assumption. Those who describe, classify and identify organisms — the taxonomists — often tend to ignore the question of adaptive significance, being pre-occupied with finding and listing characters purely for the purpose of classification and

identification. In fact, adaptive characters relating to some constant feature of the organism's mode of life are particularly valuable in taxonomy, for they have to be constantly present if the organism is to function properly; only those adaptive features which show a variable response to the environment are unsuitable for classificatory purposes. Moreover, differences between related organisms in such characters are indicative of differences in mode of life and are therefore particularly significant indicators of species differences. The advantage to taxonomists of understanding the floral biology of the plants they work with has been emphasised elsewhere; unfortunately, a great deal of descriptive work has been published in which the investigation of structure is totally divorced from the consideration of function. This occurs not only in the description of species, but also in morphological studies aimed at investigating evolutionary relationships.

**ECHINOCACTUS SCHWEBSIANUS** Werd. sp. nov. By E. Werdermann

(Translated by H. Middleditch from M.f.K. 2:9. 1930) Synonym *Parodia schwebsiana*

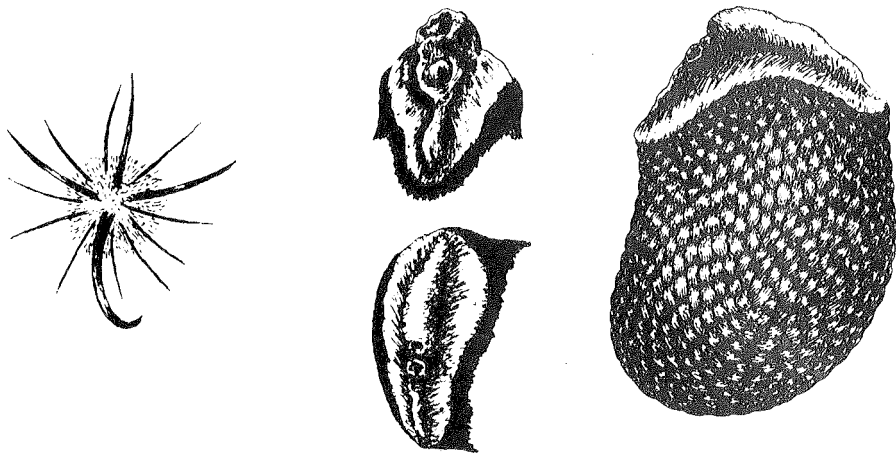
Simplex, rarius proliferans, depresso-globosus, vertice impressus, lanuginosus, aculeis non superatus; costae 13-20, pumilae, basim versus complanatae, vix vel haud tuberculatae; areolae orbiculares, lanuginosae, mox glabrescentes; aculei radiales 10,  $\pm$  horizontaliter divaricati, tenues, subfusci, mox canescentes, basi subincrassati, aciculares,  $\pm$  recti; centralis 1, crassior, ad 2 cm longus, basim corporis versus incurvatus, apice hamatus, juvenilis pallide ferrugineus, demum canus, basi incrassatus, flores solitarii ex lana verticis; ovarium squamis lanaque praeditum; tubus squamiferus, lanuginosus, setigerus; petala ferrugineorubra; stylus stigmatibus 6, albis stamina superans; semina  $\pm$  ovoidea vel subnephroidea, nigra, nitida, tuberculata.

(From the Latin) Simple, occasionally branching, flattened spherical, apex sunken, woolly, not covered over by spines, ribs 13-20, dwarf, becoming flattened towards the base, scarcely or not at all tuberculate, areoles circular, woolly, soon becoming bare, radial spines 10, more or less spreading horizontally, slender, somewhat brownish, soon becoming greyish, somewhat thickened at the base, needle-like, more or less straight; centrals 1, stouter, up to 2 cm long, curved downwards towards the base of the plant, hooked at the tip, at first pale reddish brown, finally greyish-white, thickened at the base. Flowers solitary, from the apical wool, the ovary bearing scales and wool, the tube scaly, woolly and bristly. Petals rusty reddish brown, style with six stigma lobes, overtopping the white stamens. Seed more or less ovoid or somewhat kidney shaped, black, lustrous, tuberculate.

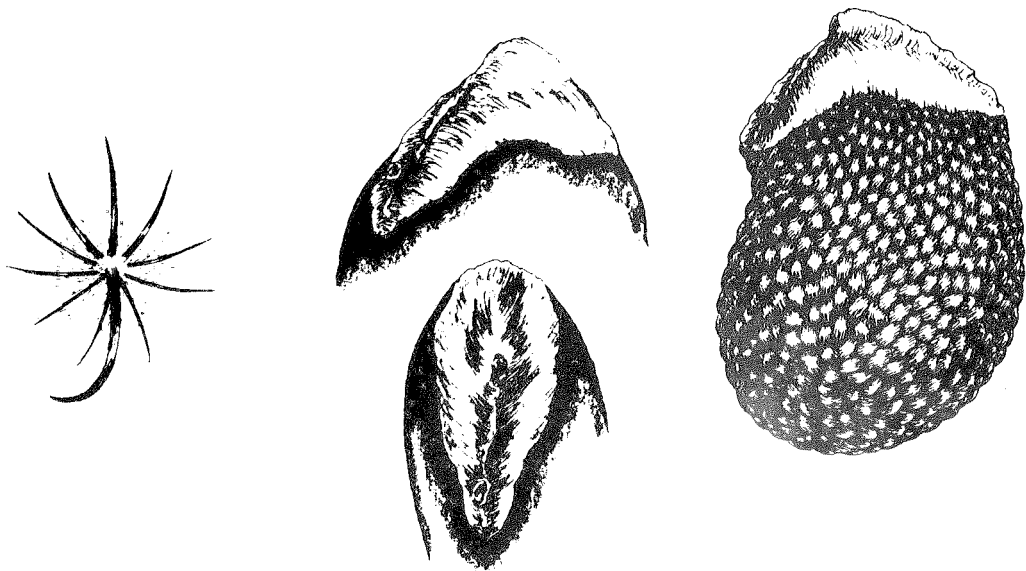
(From the German) Body solitary, occasionally offsetting from the base, usually somewhat depressed-globular, 5-6 cm high and about as broad. Crown somewhat sunken, usually covered with thick white wool, penetrated by some short spines, but none of these close over or even extend above the tuft-like cushion. Colour in proximity to the crown fresh green and glossy, further down paler and dull, delicately spotted. Towards the neck of the root somewhat thickened and becoming markedly brown and corky. Ribs 13-20, separated in the crown by acute — and below by shallower — furrows into rounded ridges about 4 mm high which are more flattened out towards the ground, at the areoles slightly humped tubercle-like and broadened, only occasionally somewhat prolonged into chins, running vertically or only slightly spiralled. Areoles 5-7 mm apart, when young — especially in the crown — with thick and long white wool; later quite naked, more or less round, of about 2 mm diameter. Areoles which have carried a flower retain in their upper part a pit-like depression.

Radial spines almost regularly 10, of which the three uppermost, inclined and spreading upwards, the longest like a central spine, quite straight or only slightly curved, slender awl-like, up to 12 mm long, at first pale horn-colour to brownish, later going whitish-grey, at the base darker and slightly thickened onion-like, roundish in cross-section or somewhat flattened, sharp, more or less darker tipped; the remaining spreading horizontal, whitish grey, 5-7 mm long, strongly needle-like, straight or more or less curved, darker at the base, and slightly thickened nodular-like; one directed straight downwards, 2 inclined, the remaining 4 usually more or less pectinately directed sideways. Central spine 1, much the strongest, up to 2 cm long, inclined downwards and curved, at the tip curved into a hook, in the cross-section quite roundish; in the crown pale brown, later grey to pale horn-coloured, frosted, darker at the tip, brownish at the base and markedly thickened onion-like.

Flower (2—) 3 cm long altogether, one after the other out of the woolly crown. Ovary small, ca. 3-4 mm long, 3 mm diam., pinky-reddish, furnished with transparent fleshy honeycoloured or pale yellow-brown, pointed lanceolate, 1-2 mm long scales, from the axils of which spring numerous white woolly hairs up to 7 mm long. Ovules numerous, almost adherent, not bundled together, but standing side by side in clusters lining the complete interior of the ovary. Flower tube funneliform, ca. 10-11 mm long, exterior red, likewise with scales, from whose axils similarly springs long woolly hair, but of a brownish colour, additionally 1-2 (—3) dark brown, 5-7 mm long, quite straight bristles. Inner perianth leaves (petals — H.M.) burgundy- to rust-red, up to 16 mm long, 1.5-2 mm broad, linear-lanceolate, pointed tip, slender midstripe, entire, only at the tip occasionally somewhat toothed, median vein very narrow and only weakly defined and darker. Outer perianth leaves in form and colour scarcely different, but somewhat shorter. Numerous stamens lining the tube, rising close together above the stigma lobes at first, without a clear zone up to the margin of the tube, much shorter than the petals, bent in the middle. Filaments white, anther pale yellow. Flower throat paler than the petals. Style ca. 12 mm long, pretty well projecting above the stamens, but considerably shorter than the petals; style



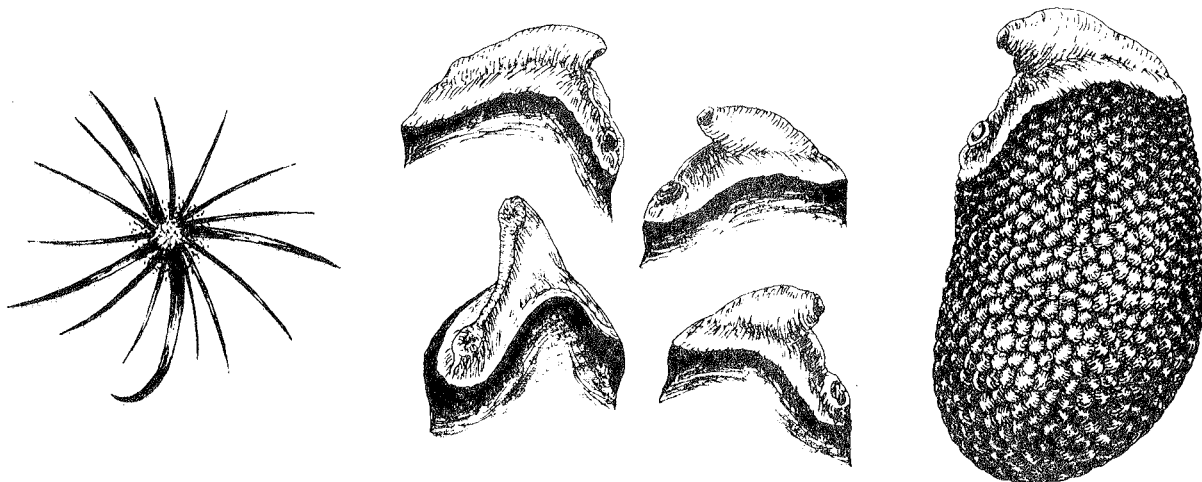
*Parodia schwebsiana*



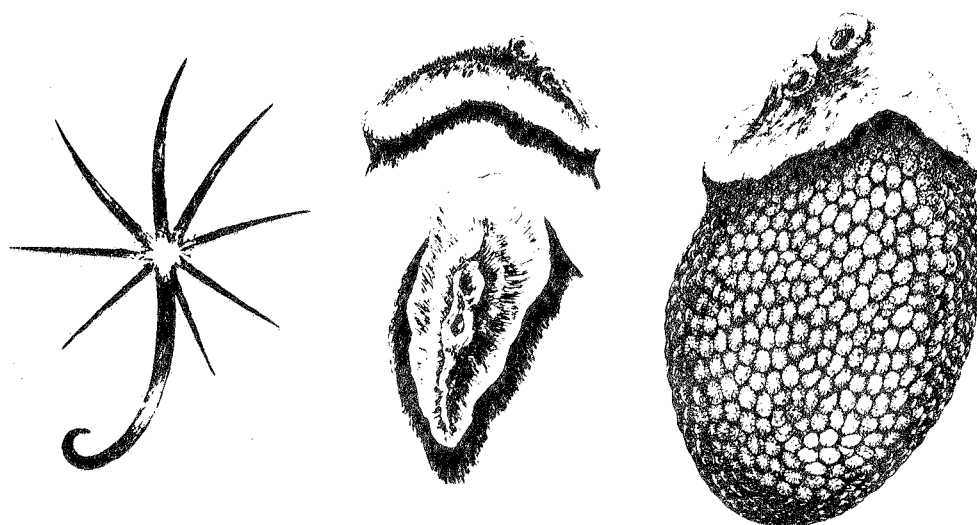
*Parodia salmonea = multcostata*



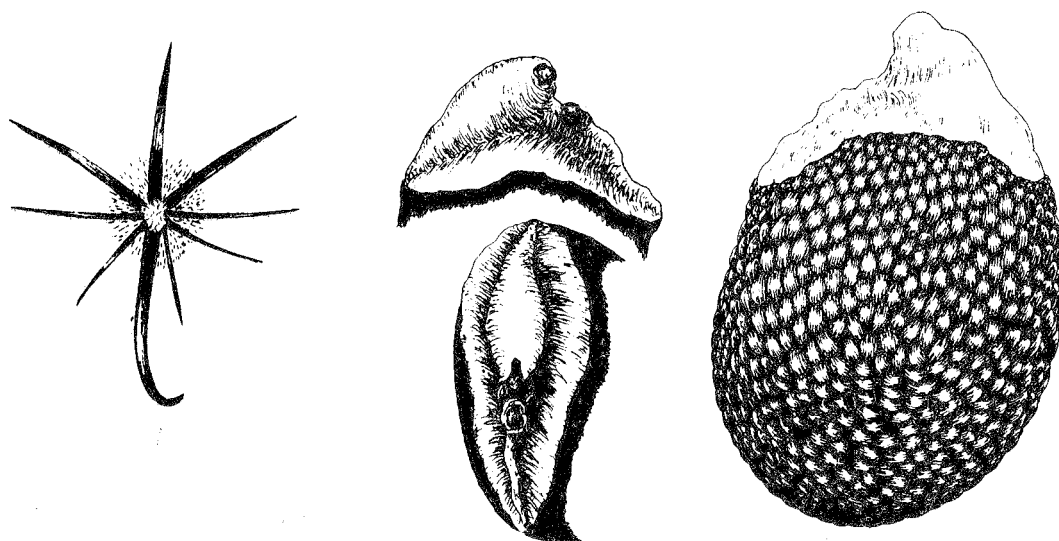
*Parodia yamparaezi*



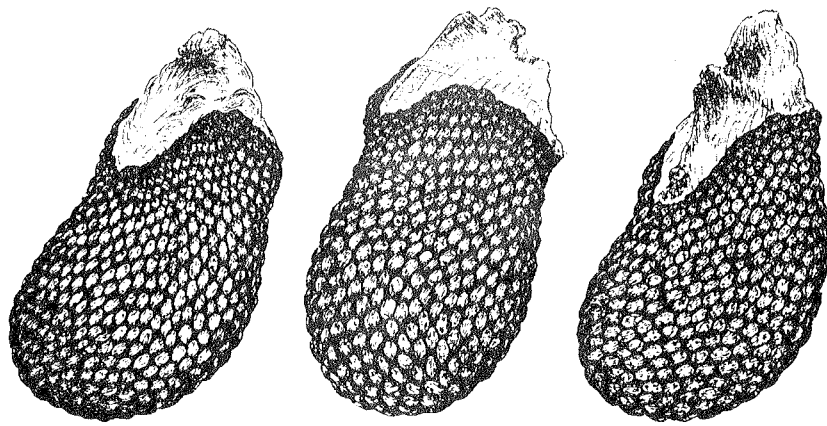
*Parodia tuberculata*



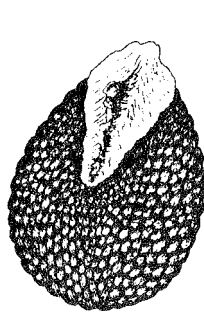
*Parodia backebergiana*



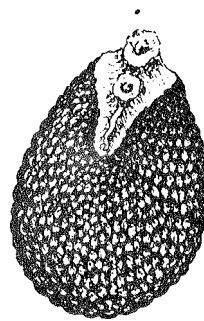
*Parodia otuyensis*



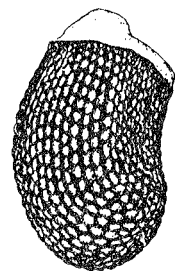
*Parodia sotomayorensis*



*Parodia  
salmonea*



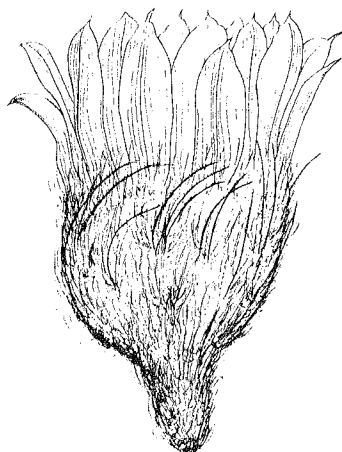
*Parodia  
schwebsiana*



*Parodia tuberculata*

Krainz Die Kakteen C. VI c

F. BRANDT



*Parodia schwebsiana*

KRAINZ Die Kakteen C VI c

slender, white, stigma lobes 6, closed together like a club, cream coloured, about 1 mm long. Seeds small, scarcely 1 mm long, irregular egg- to slightly kidney-shaped, black, shiny, tubercled with elongated places. (The altitude is not given by the regular bands; at the hilum provided with a little whitish cork cover.

Habitat: Bolivia, near Cochabamba.

The discoverer of this new species, Herr Jose Steinbach, writes about it as follows: "Grows on an isolated mountain of schist near to Cochabamba, in fissures in the rock at exposed places. (The altitude is not given by the collector. It is, however, estimated that this certainly amounts to 3,000 m altitude, since the city of Cochabamba itself lies at over 2,500 m altitude.) Spines always drawn in (viz: probably appressed), in the rainy season somewhat less than during the whole of the dry season. Flowers only in the apex. The white wool, in which they are embedded, is more abundant at the flowering time than before. Ovary insignificantly small, fruit not seen. Flowering period end of December — January."

The collector sent me in the preceeding year a number of specimens of which the first flowered in July of this year. Apparently to start with this *Echinocactus schwebsianus* was taken to have a close affinity with *Echinocactus maassii* (*Parodia maassii* — H.M.) also originating from Bolivia. The new species diverges however from the latter in a number of characteristics. The body remains much smaller and stockily globular, the crown does not become overtopped by crest-like spines, but on the contrary is only covered up by woolly felt, out of which some spine tips peep out. The number of spines is less, also they grow shorter than with *Echs. maassii*. The flower is smaller and deeper red, whilst displaying a brick- to orange- colour in the *Echs. maassii*, of which a huge number of imports have quite recently arrived in Germany, no doubt collected by Herr Stumer on the Argentine-Bolivian border.

The new species has been named after Herr Willy Schwebs, of Dresden, in recognition of his proficiency as a master of cactus cultivation.

#### Comments on *Parodia schwebsiana*

... from H. Middleditch

The habitat flowering time for this species is quoted by its collector as December — January, which places it right in the middle of the rainy season. This might suggest that this particular *Parodia* would appreciate a fairly generous supply of water during its flowering period in cultivation.

Accompanying this original description of *Parodia schwebsiana* is a photograph of a most interesting plant — it appears to be almost twice as high as it is broad, in contradistinction to the official description which states that the body is about as tall as it is broad. Can one assume that for his illustration Werdermann picked a plant that was reasonably typical out of the "numerous specimens" which he had received, and that the somewhat elongated specimen illustrated was not an atypical specimen? Perhaps this plant emulates *Chileorebutias* and *Sulcorebutias*, which grow low and compact in habitat but become more elongated in cultivation? Has anyone ever received an imported plant of *Parodia schwebsiana*, I wonder, which is markedly taller than it is broad when received? Or should we really be making *Parodia schwebsiana* var. *applanata* Hoffm. & Backbg. synonymous with the globular *Echinocactus schwebsianus* Werd., and have a new variety for the elongated sort of *P. schwebsiana* instead?

The description of the testa cells on the seed as elongated and arranged in bands seems to be rather more reminiscent of *Parodia comarapana* than the appearance of the testa on the usual *Brachyspermae* seed. In addition to the sketch of *P. schwebsiana* seed from F.H. Brandt which appears in this issue, there is a photograph of some seed of both *P. schwebsiana* and of *P. comarapana* in Chileans No. 17 p. 93 — the latter clearly exhibiting the elongated testa cells arranged in rows.

Although I was already aware that Backeberg, Marsoner, and Blossfeld were collecting in the Andes around 1930, this is the first indication which I have met with that Stumer was also collecting in these same parts at about the same time. Presumably *Parodia stumeri* was named after him.

... from R. Moreton

My own collected plant of *P. schwebsiana* is now 14 cm high and 6 cm in diameter. Going by the growth marks it was received at 7-8 cm high by 6 cm diameter. In my opinion I would have described the spines as 6-8 radials and 4 centrals, one of the centrals being much stronger and hooked. I can see no sign of the onion-like swelling of the three sub-central spines. Also the spine layout is nowhere near as consistent as Werdermann says. Nevertheless I think the overall description agrees satisfactorily.

... from J.D. Donald

If Werdermann had never mentioned the swollen base of the spines on *P. schwebsiana*, no one else would ever have been bothered. I have several of these plants from different sources including Ritter seedlings — these latter do not have swollen bases to the spines, but Fechsler collected plants ex Uhlig do, as do those from Lau as well.

... from P.H. Sherville

Now as regard to bulbous-based spines on *Parodia schwebsiana*, I have one plant with these and one without! My own original plant, seed raised from F.R. seed, has a swollen base to the central spine which is also dark brown whilst most of the spine is grey. It is more shallot-like than onion-like as the spine in cross-section is D-shaped to start with.

On the other hand the plant I bought from Phil Allcock as *Parodia schwebsiana* var. *applanata* has no swollen base to the spines but they are still dark brown which gives the illusion of being bigger at the base; but micrometer measurements confirm only a fairly uniform taper. Other *Parodias* in my own collection with bulbous based spines include *Parodia maxima*, *culpinensis*, *suprema* and *subterranea*. The *P. maassii*'s appear not to be bulbous but merely thicken progressively from tip to base, again being darker around the base.

**PARODIA TUBERCULATA** Cardenas sp. nov. From U.S. Cactus & Succ. Journal XXIII 1951 No. 3

Caulis late globosus non prolifer, 5-7 cm latus, 4-5 cm altus, griseo viridis, vertex paulo impressus pauci lana oblecta. Costae c. 13, spirales in sphaeroidatae 1 cm diam., mamillas solutae. Areolae cinereo tomentosa, 12 mm remontae, circulares, 3 mm diam. Aculei radiales 10-11, aciculares, 7-10 mm long, quoquoersus fere adpressus. Aculei centrales 4, 13-18 mm long, unus deorsum deflectus, uncinatus. Omni aculei cinereis, albo pruinati a basim incrassati. Flores brevi campanulati, 18 mm long, aurei rubris. Ovarium albo-lanatum, 4 mm diam. Tubus parvus, superne dilatus, minutulus squamis pilosus praeditis. Phylla perigonii exteriora interioraeque lanceolata. Stamina fere incrassata. Stylus 1 cm long., flavus stamina superantis. Stigmata 7, flavida. Fructus globosi, 5-7 mm diam., paulo umbilicati, superne atropurpureus, infere temperatus, pauci pilosus. Semina 0.8 mm diam., nigra opaca.

Bolivia: Province Oropeza, Department Chuquisaca, near Quebrada de Villa Maria on Hacienda Rellini, about 5 Km beyond the Sucre airport, 2,700 m., February 1949, Martin Cardenas 4397 (Type in Cardenas Herbarium, cotype in U.S. National Herbarium).

Simple, globose, 4-5 cm high, 5-7 cm broad, greyish green. Ribs about 13, spirally arranged, hardly visible on account of the spheroidal 1 cm diam. tubercles. Areoles 12 mm apart, circular, 3 mm diam., grey-felted. Top of stem depressed, about 2 cm diameter, with white wool and tight areoles bearing little brownish tangled spines curved outwards. Radial spines 10-11, acicular, spreading outwards, somewhat appressed, 7-10 mm long. Central spines 4, 13-18 mm long, one of them turned downwards and slightly hooked. All spines greyish, finely pruinose, slightly swollen at base. Flowers several from top of stem, red-orange, shortly campanulate or urceolate, 18 mm long. Ovary light yellow, 4 mm diameter, covered by dense white hairs. Tube short, widening above, bearing short scales with hairs. Outer perianth segments orange red, lanceolate; inner ones lanceolate with roundish apex. Stamens rather thick, filaments light orange, anthers lemon yellow. Style yellow, 1 cm long, exceeding the stamens in length. Stigma rays 7, orange-yellow. Fruits about 6 mm in diam., globose, naked or provided with minute tubercles bearing white hairs. Fruit dark purple above, lighter below. Seeds about 0.8 mm diameter, black, not glossy, very finely granulate.

This species resembles *P. carminata* Backbg. from Salta, northern Argentina, but differs in having larger tubercles, appressed radial spines and smaller flowers.

Comments on *P. tuberculata*

.... from Mrs. M.B. Levitsky

My plant of this species comes from the University of California Botanical Garden, and their tag says "64.637-S-1" whatever that may mean. It is 9 cm in diameter and 9 cm high, and has about 35 offsets around the neck; 18 ribs, which spiral; stem is a bright grass-green; areoles are oval, with white wool; radial spines 8, cream colour with tan tip; central spines 4, the lower being hooked, and the centrals are tan with brown tip. Last summer it bloomed, for the first time, with a small tomato-red flower, about 2 cm wide. It did not set fruit in 1972, but further down the stem I found some very small round dry fruits which may have a few seeds in them; these would be from 1970, when I bought the plant . . my card says "bloomed recently". But the seeds could be crossed with . . whatever, can't tell. If it sets seed this year, I'll save it.

.... from G. Watts

*Parodia tuberculata* has always been a favourite of mine; this was originally a small tatty imported plant from Roanoke, Ipswich about 7-8 years ago. Although slow growing it produces its orange coloured flowers readily and also readily drops the dead flower heads. Its fat tubercles are attractive; I certainly have not seen many of this species about.

**PARODIA OTUYENSIS** sp. nov. Ritter. By F. Ritter

Translated by H. Middleditch from Cactus (France) 17.76:1962

Simplex, hemisphaerica, 4-11 cm diam., apice depressa, leviter lanuginosa, griseo — viridis; radicibus brevibus, carnosus; costis 13-20, juventute tuberculis distinctis, deinde obtusis parum tuberculatis, 7-10 mm altis, areolis 7-10 mm remontis, rotundatis, 2-3 mm diam., parum lanuginosis; aculeis brunneo-nigris, exterioribus 7-9, patulis, 10-25 mm longis, rectis vel arcuatis, sat gracilibus, centrali 1, 15-25 mm longo, hamato, exterioribus validiore. Flores infundibuliformes, 20-28 mm longae; ovario sphaerico, 4 mm diam., squamis aliquis oblongis et lana alba minute glomerata munito, aliquando

nudo; cella nectarifera cylindrica, 1.5 mm longa, aperta, angusta; tubo infundibuliformi 8-11 mm longo, apice 6-8 mm diam., miniato basi squamis aliquis et lana brunnea glomerata et aliquando setis aliquis nigrescentibus munito; perianthii phyllis lineare acuminatis, 11-13 mm longis, 1.5–2.0 mm latis, miniatis, marginibus violaceis vel brunneis; staminum filamentis albi cantibus, 5-8 mm longis, tota tubi longitudine insertis, antheris ochroleucis; stylo ochroleuco, 15-19 mm longo, stigmatibus 5-8, ochroleucis, 1.5 mm longis. Fructus sphaericus, 5-6 mm diam., basi ruber deinde viridis, squamis aliquis et lana glomerata ornatus; semina ovata, basi incrassata, 1.25 mm longo, 0.5 mm lata et crassa, testa fusco nigra, minutissime tuberculata, hilo basilari, prominente, albo, elongato.

Body solitary, very occasionally offsetting, flattened to hemispherical, 4-11 cm diameter, crown depressed, with scanty wool; epidermis grey-green; roots short, more or less fleshy.

Ribs divided up in young specimens into rounded tubercles of about 7 mm in diameter, later becoming flattened, hardly humped, often spiralling, 7-10 mm in height, 13-20 in number.

Areoles 7-10 mm apart, round, 2-3 mm in diameter, weakly felted with white wool.

Spines brown to blackish, becoming grey, radials 7-9, spreading, all the same length on the young specimens, short and slender, straight to slightly curved, then on the older plants the lowermost stronger reaching 1 cm, the uppermost longer, reaching about 15-25 mm, central spine solitary, more robust, hooked, 15-25 mm long.

Flowers from the crown, scentless, 20-27 mm long, 25-30 mm diameter (Description based upon 6 flowers observed on different specimens at the type locality).

Ovary spherical, 4 mm in diameter, greenish tinged with red, furnished with very small scales green to yellow or reddish, few in number, and with minute tufts of white wool, sometimes quite bare.

Nectar chamber 1.0-1.5 mm long, cylindrical, closely surrounding the style, containing very little nectar.

Tube 8-11 mm long, conical, reaching 6-8 mm in diameter at the upper part, pale red in the interior, the external surface carmine, furnished with green or reddish scales, adpressed, 1-2 mm long, surrounded with brown wool, the upper ones frequently accompanied by some flexible blackish bristles.

Stamens. White filaments, reddish towards the end, 5-8 mm long, bent inwards, inserted throughout the length of the tube. Anthers small, rounded, cream white; pollen pale yellow.

Style 15-19 mm long, yellowish white, 5-8 stigma lobes, 1.5 mm long, pale yellow, exserted beyond the stamens.

Petals spreading, 10-13 mm long, 1.5 to 2.0 mm broad, linear acuminate, carmine with violet margin or yellowish-brown.

Fruit globular, 5-6 mm in diameter, red at the base, green at the top, furnished with scales and wool like the ovary.

Seeds oval, 1.25 mm long, 0.5 mm broad and thick, swollen out at the base; testa matt black, furnished with very fine tubercles. Hilum basal, white, elongated, projecting.

Type locality: Otuyo, Saavedra Province, Department of Potosí, Bolivia.

Systematic relationships: Species close to *P. sotomayorensis* sp. nov. (not yet published).

Species discovered by F. Ritter in December 1958, catalogued under the number FR 913.

Holotype deposited in the Herbarium of the Utrecht Museum.

... from H. Middelditch

In Chileans No. 17 we reproduced a review of *Parodia* seed from the Belgian Cactus Journal "Dodonaeus" by De Cocker. Of the various seed groups within this genus which are put forward there by De Cocker, the plants which we are discussing here were all included in the Group *schwebsiana*. This group of plants was identified by De Cocker as the Group *Oblongisperma* Buxb., but this was one of several major errors made by that author in his review, as this *Oblongisperma* group concerns *P. comarapana* & *hausteiniana*, whereas the *schwebsiana* complex is actually in Buxbaum's *Parodia* seed group *Brachyspermae*. This seed group is defined in Chileans No. 23 p. 110. The various illustrations of seeds in this present issue which are (with but one exception) from the pen of F.H. Brandt, quite evidently fall into the Buxbaum group *Brachyspermae*. On closer examination, it will appear that the seeds from plants which grow near Cochabamba are more or less oval but certainly not distinctively elongated i.e. *P. salmonea*, & *P. schwebsiana*. On the other hand, those seeds which are from plants growing much further to the south, in the neighbourhood of Sucre or on the hills above the south bank of the Rio Pilcomayo, have a small but positive elongated oval appearance. This can be seen on Brandt's sketches of the seed of *P. yamparaezi*, *tuberculata*, *sotomayorensis* and *backebergiana* and also on Buxbaum's sketch of the seed of *P. tuberculata*. It is not evident on Brandt's sketch of the seed of *P. otuyensis*. Reference to David Lewis's original sketches of *Parodia* seed which appear in Chileans No. 16 p. 31 will reveal that the seed then described as *P. otuyensis* was quite distinctly elongated. Although a number of the seed packets received at that time for David Lewis's *Parodia* seed study, from New Mexico Cactus Research, were wrongly named (the *Eriocactus leninghausii* seed shown by David Lewis as *Parodia multicostata*, for example), an elongated form of seed for *P. otuyensis* as shown by David Lewis would seem to be more consistent with those of species growing in adjacent areas in the wild than the oval seed shown by Brandt. I would therefore venture to suggest that the seed shown in this issue by Brandt as *P. otuyensis* is either atypical or else it is not true seed of this particular species.



**PARODIA YAMPARAEZI** Card. sp. nov. By Prof. Martin Cardenas

Translated by H. Middleditch from Cactus (France) 19,82:1964

Simplex globosa parce complanata 2-10 cm alta 7-14 cm crassa cinereo viridis. Costis 14-20 parce spiraliter dispositis 7-10 mm altis, 8-12 mm latis. Areolis 1 cm remontis, circularibus 2 mm diam. cinereo tomentosis. Aculeis radialibus 7-8 radiantibus vel adpressis 4-12 mm long. tenui acicularibus. Aculeo centrali uno, 1.5 – 2.5 cm long. deorsum directo, adpresso, parce complanato, sanguineo nitentibus. Ovario 6 mm long. albido glabro. Tubo sursum patenti fragariae rubo, squamis 2 mm long. acutis, pilis albis vel diluto bruneis instructo. Phyllis perigoni 1 cm long. late lanceolatis. Staminiibus ex fundo tubi usque ad basim petalorum 6 mm long. Filamentibus tenuissimus diluto flavis vel albis. Antheris diluto. Stylo 15 mm long. albis, 9 lobis stimaticis 2 mm long. albidis, coronato.

Globular plant with depressed crown, 2-10 cm high, 7-14 cm broad, grey-green. Ribs 14-20, on a slow spiral, rather rounded shoulders, 7-10 mm tall, 8-12 mm broad. Areoles 10 mm apart, round, 2 mm in diameter, grey felted. Radial spines 7-8, spreading or appressed, 4-12 mm long, weakly acicular, light grey to white; central spine 15-25 mm long, pointing downwards and appressed, somewhat flattened, subulate (awl-shaped), slightly crooked at the tip.

Flowers from a cushion of white wool at the crowing point, urn-shaped, 25 mm long, bright crimson. Ovary 6 mm long, whitish, entirely bare. Tube expanding in the upper part, raspberry red, furnished with scales 2 mm long bearing hairs of a white to pale brown colour. Perianth segments (petals) 10 mm long, broadly lanceolate. Stamens inserted from the base of the tube to the base of the petals, 6 mm long. Filaments very slender, pale yellow to white. Anthers pale yellow. Style 15 mm long, white. Stigma with nine white lobes, 2 mm long.

Originating from Bolivia, Province of Oropeza, Department of Chuquisaca, near to Yamparaez. March 1963. Cardenas No. 6127 (Type plant in Cardenas Harbarium, co-type in U.S. National Herbarium).

Comments on *P. yamparaezi*

... from W. Weskamp, K.u.a.S, 24:5:73

In K.u.a.S. 11, 1971 I put forward the view that this species and *P. otuyensis* Ritter are identical, for the flattened-globular body, the greater part of which remains in the ground, the much longer and stronger upper radial spines compared with the lateral and lower ones, in both species similar in number, and the red flowers admit of this conclusion. In a letter to Kessler, Lau has rejected this assertion of mine as erroneous. In the correspondence, which Kessler has kindly put at my disposal, it says: "I can not share the opinion that it is a case of duplicate descriptions. First of all the two locations are far apart and the environmental conditions differ. Also *P. otuyensis* is difficult to find while *P. yamparaezi* occurs in large numbers at its site of occurrence. There are also differences in, for example, spine colour, in the flowers, and in the style and stigma".

Whether there are now many or few specimens, whether they are easily discoverable or colonise places difficult of access is, on its own, beside the point.

Isolation, different environmental conditions, lack of genetical interchange, bring with them always certain changes, which however, if you compare the descriptions of Cardenas and Ritter, are scarcely there reflected. The difference solely lies in that *P. yamparaezi* forms a distinctly stronger woollen crown (which in imports first becomes apparent in cultivation) while on the other hand the areoles on the calyx (outer tepals? – E.W.B.) are extremely sparsely woolly. The bud then arises practically naked from the crown, while in *P. otuyensis* it is clothed in thick brown wool. Differences in style and stigma were not established.

... from E.W. Bentley

In translating the above text I did not find it to be clear whether Weskamp means that he has not noticed any differences in the style and stigma between the two species, or that Lau had failed to make any specific statement on this point.

... from R. Moreton

I am personally inclined to think that *P. otuyensis* and *P. yamparaezi* are indeed one and the same. I do not have a collected plant of either which I can believe in. I have a *P. otuyensis* from Knize which I feel sure is of the *maassii* complex. But I do remember the *P. yamparaezi* we had at one time at Hollygate – which came from Uebelmann – as being very much depressed globular and having bright red flowers. Seedlings of each appear to have very similar spine counts and appearance.

(Brandt suggests that the Knize "otuyensis" is *P. tarabucina* – H.M.)

**NEOPORTERIA FLOWERS** By E.W. Bentley

Several of my *Neoporteria*s come into bloom in the winter months and the flowers that open at this time of year are fairly small – I suppose that they will be about 1" high. But I have at least three plants that are not usually in flower during the winter but which, when they do flower, have much longer tubes.

In the late summer of 1966 I obtained a grafted plant from Roanoke nursery near Ipswich, under the name of *Neoporteria coimasensis*. I potted this up in my usual compost of John Innes No. 2 and silver sand in the ratio of 2:1. Two years later I took the plant off its grafting stock, around mid summer time, and it soon became established on its own roots. Early in April of the following year there were buds to be seen on the crown of the plant for the first time, and four weeks later the first flower was almost open. It has continued to bloom in subsequent years, the buds sometimes appearing as early as the first week of March and sometimes as late as mid-April. The flower has a fairly slender cylindrical tube, the uppermost part — perhaps 5 mm in length — becoming funneliform. It also widens out a little where it joins the ovary, which is about 2-3 mm greater in diameter than the tube. One flower which I measured was 7 cm high and 5.3 cm wide.

Two other plants were obtained as seedlings from Gilbert in 1966 (under the name of *Thelocactus bicolor*) but from their appearance and their flower I believe that they are both *Neoporteria nidus*. One of them has fairly dark spines and the other one has light-coloured spines. One of these plants put out its first bud in 1968, the other plant budded for the first time in 1969. The flower buds became very long and when the flower was fully out it was about 3" long — it was taller than the plant itself! This flower has a thicker tube than on *N. coimasensis*, slowly tapering outwards from the base then becoming cylindrical towards the top. The scales on the tube all had a darkish pink tip, even those at the base of the tube where the scales were otherwise yellow-green in colour. From behind each scale came two transparent bristly hairs. The perianth leaves were pink, with a darker pink outer margin, yellow-green at the base. The stamens were not visible, the six stigma lobes were palisaded in by the inner perianth leaves. These two plants usually flower from May onwards and I have measured flowers of between 6.5 cm and 8 cm in height.

I have sliced flowers off one or two of the winter-flowering *Neoporterias* and the main fact is that there is a definite nectar chamber with a capacity of 5-10 cubic mm, but whether this amount of nectar would attract a humming bird, I would not know. I was interested to find that *Neoporteria laniceps*, *subgibbosa* and *wagenknechtii* have nectar chambers of quite different shapes. In *N. laniceps* the nectar chamber was almost conical in shape, some 3.5 mm in diameter at the base and 2 mm high, giving an estimated volume of 9 cubic mm. In one flower of *N. subgibbosa* the nectar chamber tapered more slowly towards the top — it was 2.9 mm diameter at the base and 2.3 mm high, giving an estimated volume of 9.4 cubic mm. On the second flower of this species the walls of the nectar chamber bulged inwards so it would have very much less capacity. In *N. wagenknechtii* the base of the nectar chamber sloped upwards from the base of the style, unlike the aforementioned examples, and above this it was pretty well cylindrical, being some 2.8 mm in diameter and 2.4 mm high, having an estimated volume of 6.2 cu. mm.

These estimated volumes refer to the space below the origin of the lowermost filaments, and this is not easy to distinguish. I did not make any useful observations on the quantity of nectar present since I cut vertical sections, but my impression was that there was very little. Another time I will slice from the top down and it will be interesting to slice some of the larger flowers, for comparison, later in the year. I have pickled the sliced flowers that I sectioned.  
... from H. Middleditch

Pickling flowers to preserve them is something that I have not come across before. What sort of fluid is used for this purpose, I wonder? I also wonder if the *Neoporteria* flowers have a nectar chamber with the top 'roofed over' by a diaphragm formed by the swollen bases of the lowermost stamens, perhaps fused together, as in some *Cleistocactus* and *Matucana* flowers. Or is it simply the ring of lowermost stamens which form the top of the nectar chamber?

It is noted above by E.W. Bentley that there appeared to be very little nectar present in the nectar chamber of the flowers which were sliced. Could it be that the flowers would produce less nectar because it was the winter season? One of our members in New Zealand has already suggested that *Seticereus* flowers contain less nectar at the commencement of the flowering season than in full summer. Could the same apply to *Neoporteria* flowers which bloom late in winter?

Several of my own *Neoporterias* have flowered over the course of the winter and these have all been fairly short flowers — seldom exceeding about an inch in height. However, it does appear that there may be several species of *Neoporteria* which consistently produce flowers of an appreciably larger size than one inch high. On the presumption that, in Nature, there is a purpose for everything, I wonder what is the ecological cause of the varying heights of flower amongst the different species of *Neoporteria*? There appear to be only four different species of humming bird to be found in those parts of Chile where *Neoporterias* grow — are the different flower heights associated with different bill lengths found in this small group of humming bird species? Or is it a question of the flower being able to attract the attention of the humming bird? In locations where there is a fair amount of other vegetation — bushes, shrubs, grasses, etc., the *Neoporteria* may have to produce a fairly large flower to ensure that it is not lost amongst the various other blooms which are carried farther above ground level where they can receive preferential visits from pollinating agents. But this assumes that all the flora at a given location has a common flowering season — is this the case?

At the opposite extreme, one might imagine that out in the semi-desert districts, a small *Neoporteria* flower would be adequate to attract the attention of a humming bird when there is very little (if any) competition from other flora for the attention of passing pollinating agents. However, when plants grow mainly in occasional patches, in slightly sheltered declivities, or on rocky slopes, it may be necessary to produce a flower large enough to be seen by

passing humming birds. This could mean that the largest flowers occur on *Neoporteria*s where there is either maximum or zero competition from other flora for the attention of pollinating agents. The smallest flowers may occur, in that case, where there is just sufficient accompanying vegetation to support a resident population of humming birds but the flora is sufficiently dispersed either by distance or difference in flowering times to reduce the need for any competitive floral display. (Floral display is at its most colourful, varied and vivid in the tropics where there is a wealth of pollinating agents and innumerable varieties of flora in constant bloom, to compete for attention).

Unfortunately very few travellers and collectors seem to include in their accounts of their travels, a description of the nature of the vegetation associated with a cactus-growing locality; nor are the relative flowering times of the cacti and the rest of the flora given more than an occasional passing mention.

... response from E.W. Bentley

I cannot share your opinion that the ecological unawareness of your 'travellers' was blameworthy. I have done only a very moderate amount of collecting in difficult terrain — bits of Malay jungle, etc. — but it is clear to me that many of the authors I have translated for the Chileans, or read about, did well enough to get from one place to another intact and with their specimens. The sort of data that you would like to have involves stopping in each spot for several hours — or days — or even months, with adequate apparatus and often assistance from others. You can't expect a traveller to be an ecological research worker as well! As a matter of fact, plant ecology was almost non-existent even at University level until about the mid-twenties. The 'father' of animal ecology is regarded by most biologists to be Charles Elton, who only retired from the Bureau of Animal Population at Oxford in about 1970 — I did six months there myself in 1950! The first text-book of plant ecology in England was written (I think) by W.B. Leach (who lectured to me in 1932–34!) in about 1928. Before the 1914–18 war, field botany was concerned almost 100% with collecting and classifying.

As to why some flowers are taller than others — I'm afraid that I do not subscribe to your stated belief that everything in Nature has a purpose! As I see it, if a plant happens to produce a gene for tall flowers and this gives it an advantage, it may rapidly be selected for. But this does not necessarily mean that another short-flowered strain or similar species in the same habitat will die out. This other strain may have some other advantage such as a different ripening period for its seeds, that somehow enables it to keep its end up. And so I would be surprised if different *Neoporteria* species did all have the same floral characteristics.

On the question of nectar volume, I certainly do think that factors such as the amount of incident sunlight would be important and this could be a seasonal matter in habitat. I think however that under favourable conditions a given-sized nectar chamber will become reasonably full. I imagine that 5 cubic mm may be too small a quantity to be of interest to a humming bird; something like 5 c.c. may be a better morning's haul!

I am not clear when you speak of a 'roof' over the nectar chamber whether you mean that the filaments are tightly joined round the style so that a nectar drinker would have to pierce a way through. Otherwise — if it is just a matter of the narrowness of the tube at the base and the bunching of the filaments round the style restricting access somewhat — all the flowers I looked at had a roofed-in chamber. What I meant about the origin of the filaments — which normally originate in alternating whorls — is that it is often difficult to decide at what level they can be said to be free from the tube without flattening this out and spoiling the cross-section. Hence the 'bottom of the filaments' is not therefore an accurate measuring point for comparing one nectar chamber with another.

The pickling fluid that I use is a mixture of industrial alcohol, formalin, glycerine, and water. Flowers pickled in it tend to lose their colours, but will travel in a tin with damp cotton-wool, I think, and can be examined in water at the other end.

(Three *Neoporteria* flower sections are illustrated on page 26, together with three flowers from Krainz "Die Kakteen", quoted there as: *Neoporteria multicolor* 60–80 mm high, *Neoporteria coimasensis* 65 mm high, *Neoporteria nidus* 40 mm high. It is perhaps unfortunate that a common scale was not used for these sketches as this would have made comparison easier and more positive. The flower sections of *N. clarata* v *grandiflora* & of *N. nigrihorrida* are approx. full size — H.M.).

... from Mrs. L.E. McIntosh

Some of my *Neoporteria*s are in flower as I write and I have grouped these into two classes, firstly the smaller flowered ones like *N. rapifera*, *wagenknechtii*, *castanea*, *subgibbosa*, *nidus*, *litoralis*, *villosa*, etc. These seem to flower at odd times right through the year with the exception of the two mid-winter months. The flowers are never more than 1½" tall (*nidus*) down to ¾" tall (*villosa*). These are the ones that repeatedly have several flowers from the same areole. On the other hand, *senilis*, *nigrihorrida*, *multicolor*, *clavata* etc. are the large flowered, long tubed ones up to 3" tall. They flower at the end of August and in September, which is very early Spring. I have not sectioned any *Neoporteria* flowers, but will do so if you can let me know what to look for.

(Later) I have managed to slice two of the smaller flowering *Neoporteria*s, *rapifera* and *wagenknechtii* — these two seem to be always in flower — with flowers about 1" tall. The tube itself was about quarter of an inch high and about half of this was a nectar chamber which was a pyramid shape and full of nectar. The very small stigma projected above the tightly packed petals. The style was like a piece of pliable fine wire — I actually tied a knot in it without breaking it — something I have never noticed before. The stamens were very thin, and so many of them, tightly packed inside the

petals and they were loaded with pollen. Now I see why not very much effort is needed to pollinate these plants. I will see what I can find when the larger flowered ones come into bloom.

... from G.E.H. Bailey

Certainly I find quite a range of sizes among the flowers of various *Neoporteria* species which have bloomed for me. I have taken the following measurements: *N. nidus* — 3.5 to 4 cm long; *N. villosa* 2.5 cm (FR 250); *N. multicolor* — 7.5 cm (FR 243); *N. coimasensis* — 7 cm; *N. nigrihorrida coquimbana* — 5 cm; *N. castanea* — 4 cm. Incidentally, Backeberg says that *N. mamillarioides* probably has the largest flower of the genus; mine have not bloomed yet!

... from R. Ferryman

In regard to the comments from Mrs. MacIntosh on flower sizes, my own experience is in general agreement although why *N. nidus* should be considered small flowering and *N. senilis* large, when they are one and the same, is confusing. I have a fair assortment of *N. nidus/senilis/gerocephala* which range from small flowered to large flowered. Those in flower during late autumn and up to spring are generally small flowered and *N. nidus/senilis/gerocephala* fall into that group. However, I have recorded 4 cm on *N. senilis*: Backeberg quotes 3–5 cm. Also in the same category is *N. subgibbosa*, quoted small to 4 cm, but generally it seems to me to be around 2.5 cm high. *Neoporteria nigrihorrida* is another around 4 cm but my champion is *N. mamillarioides* which usually makes 4/5 cm, although a local grower recorded 6 cm last year. I find that a great deal depends on the weather for those extra mm's.

... further from Mrs. L.E. MacIntosh

I harvested seed from some smaller-flowered *Neoporterias* in early spring (late August) just as the large *Neoporterias* were beginning to flower — they would have been brushed in June at which time nectar was present. I cut open some large flowered ones in September and found the nectar chambers full, but at Xmas time, a late flower on *N. senilis* proved to be empty. This seems to fit in with the suggestion that the humming birds would have moved to other more fruitful quarters at this time. I have also cut up flowers of *Neoporteria rapifera*, *wagenknechtii*, and *microsperma* just after Xmas but cannot find any trace of nectar at all. While these plants seem to be for ever in flower, do you suppose they only develop nectar when the pollinating agent is around? I doubt this would be humming birds, the flowers being so small.

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

*Neoporteria* flowered with typical small flowers. Its nectar chamber is very small, about 3 mm diam. by 1½ mm high and appeared to be dry. Maybe not a humming bird flower?

(Later) I have now (Spring) sliced a couple of *Neoporteria* flowers — one large and one small. The flower from *N. villosa* is about 3 cm high but that from *N. coimasensis* is very tall indeed — nearly 7 cm high. The nectary arrangements are basically very similar in both flowers apart from size — in the *N. coimasensis* the nectary chamber is about 6 mm wide and high. The style is not joined to the innermost stamens although they do stand very close together. There must be access to the nectary although the style is closely surrounded by stamens. Nectar is certainly present in relatively large quantity; if you hold the flower horizontally when slicing you can see that the nectary must be about full and it tastes sweet even before the bees have dealt with it.

... reflection from H. Middleditch

The humming birds rely on many other types of flora besides cacti for their source of nourishment. One family of plants known to have flowers pollinated almost exclusively by humming birds is the Bromeliaceae. The Tillandsias, Bromeliads, Puya, etc have a flower raceme which carries a large number of fairly small flowers. Each individual flower on one of these stalks will contain a relatively small amount of nectar, but the flower stalk as a whole will be a fairly prolific source of nectar to the visiting humming bird. Perhaps any of our members growing Bromeliads or Tillandsias who may care to section the odd flower or two could tell us how much nectar each floret contains? And do the *Neoporterias* behave in a somewhat similar manner, with the small-flowering *Neoporteria* having perhaps a dozen or more flowers, the larger flowering *Neoporteria* having two or three flowers, so that the total nectar production of the plants is more or less comparable?

... from D.W. Whiteley

I have recently done sections on flowers of 9 *Neoporteria* (sensu stricta) and found copious nectar present — but I have done some in the past and found little. What have I done different this year? I happened to plunge pots in a bucket of water about a week before flowering and really soaked them, almost submerging the plants (but not the buds, though). I usually just water with a can. I am now of the opinion therefore that nectar quantity is related to water stress in the plant — if it is dry, little nectar is present; if it is wet, plenty of nectar is formed. What a good way of ensuring pollination and viable seed when conditions are right for sowing — if it is too dry don't bother to attract insects, but if it is wet then the system goes into gear.

... from H. Middleditch

But *Neoporterianae* have turgid seed pods which stay on the plant for several months in the greenhouse — but does this happen in habitat as well? If the plant flowers in habitat and then retains the seed pod on the plant for some months, the fruit could dehisce around about the start of the next growing season. In this way the seeds would not be exposed to predators all through the dry season and flowering would be unrelated to water prevalence at pollination.

I am a little surprised by the suggestion that attention was only given to the ecological aspects of plant life as late as the 1930's. To quote from the 1912 edition of "Structural Botany" by D.H. Scott, "A rather new branch of Botany, or at least one which is being pursued very actively at the present time, is called Ecology (from the greek word for a house) and is concerned with the study of the plant at home, that is, in relation to its surroundings. Ecology aims, for example, at finding out why some plants grow in woods, others in marshes, others on sand dunes; how plants are affected by one another or by animal neighbours; the causes of their succession according to the seasons, and so on. Ecology has a great deal to do with geographical Botany, because it helps to explain the distribution of plants, and with Physiology, because one must know how a plant lives in order to understand its relation to its surroundings".

Again in Warming's "Oecology of Plants" for 1909 he makes reference to modern biological investigations by various leading botanical authors, which have "elucidated the manifold and complex relations subsisting between the plants and animals that form one community, and have demonstrated the adaptations of plants to animals and the converse".

## HAIR RINGS AND NECTAR CHAMBERS

.... from R. Mottram

We have just had an example of *Matucana fruticosa* produce flowers and fruit. Both features are typical *Matucana*. Some aspects of John Donald's comments on this species in Chileans No. 31 leave me mystified. I have never known any *Borziactinae* produce sterile fruits, and I strongly suspect he may be mistakenly interpreting the immature stage of the fruit development. Also since when has a diaphragm been a "type of staminoidal hair ring"? These are two entirely different structures. At maturity, the fruit on *Mat. fruticosa* swells, becoming pale green, and the seeds are released through basal pores — exactly like the other *Matucanas*.

.... from H. Middleditch

I am under the impression that a staminoidal hair ring is made up of a number of hair-like growths which appear on the inner wall of the flower tube, above the nectar chamber or nectar glands but below the base of the lowermost filaments. I could even imagine that they may be vestigial stamens, no longer required by the flower but which have not yet been entirely eliminated by evolution, something like the human appendix. Would this be revealed by the presence of a single vascular strand leading to each vestigial stamen, like the single vascular strand which leads to the base of each living filament in the flower? Or will the vestigial stamens have lost this vascular thread by evolution?

Now as to the question of a diaphragm being a "type of staminoidal hair ring", would John Donald have been regarding the vestigial stamens as greatly shrunk in length but broadened and fused together at their bases, so forming a diaphragm? But if the vestigial stamens had become fatter, rather than thin and hair-like, how can they be described as "hair", in which case how can the diaphragm be a "hair-ring"? Has John Donald ever taken the trouble to examine the roof of the nectar chamber on humming-bird pollinated flowers as other Chileans members have done, by taking close-up slides of sliced flowers for examination and discussion? In none of the many slides shown at Brooksby has any evidence appeared of the enclosed nectar chamber having a roof formed of hair-like growths.

.... from G.J. Swales

The presence of numerous stamens is a feature of a more primitive flower and a more advanced flower could be expected to have fewer numbers of stamens. A flower which has evolved from a more primitive form will possibly show a reduced number of stamens and the redundant stamens may persist as vestigial structures. I do find some difficulty in envisaging how a diaphragm, which is a solid membrane, can be formed from a number of individual hairs, however many there may be. On the other hand, I do wonder if any diaphragms exist which are not formed from fused filament bases. If a diaphragm is not made up of fused filament bases, then from what does it arise?

.... further from H. Middleditch

If we are to accept Geoff Swales' contention that a primitive flower has numerous stamens and a more advanced flower has fewer stamens, so that in the process of "advancing" some stamens are made redundant, then presumably after the passage of geological time the redundant vestigial stamens will eventually disappear, leaving us merely with a flower having a lesser number of stamens. Where vestigial stamens do appear in a flower as a hair-ring at the base of the filaments, does this mean that it has evolved from a more primitive flower in fairly recent geological time and has not yet evolved sufficiently to divest itself of these superfluous elements? Can we conclude from this that a flower exhibiting a staminoidal hair ring has recently (geologically speaking) started to evolve into a more advanced form?

Now it is argued by Grant & Grant in "Humming Birds and their flowers", 1968, that humming bird pollinated flowers are an advanced evolution from original insect-pollinated flowers and indeed they quote several examples of floral mechanisms which are still in the transitional stage to specialised humming bird flowers. It would appear to me that the flower of *Neoporteria* (sensu stricta) typifies this situation in the cactus family, for it has a relatively short tube and makes up for this by retaining the inner petals in a tube-like form for most of the life of the flower. But it does not appear to have been evolving into a humming bird flower for long, because there is no evidence of redundant stamens in the form of a vestigial hair ring. In the *Denmoza*, however, we appear to have a flower which has evolved past the stage now reached by *Neoporteria*, for *Denmoza* flowers have evolved a lengthened tube; presumably this will have evolved in the

fairly recent past as the redundant stamens are still to be seen in the form of a hair ring at the base of the filaments. The incurved tips of the petal on the Denmoza flower may be a carry-over from an earlier shorter-tube form, which adopted this device to present the appearance of a tube-flower. The tube on the Cleistocactus flower has a similar appearance to that on Denmoza, but the mouth of the corolla is open and the petals on most Cleistocacti flowers do reflex to some extent; I am not aware of any Cleistocacti flowers which exhibit a hair ring of vestigial stamens. If we are to accept this as the sequence of the evolution of flower form to humming bird flowers, does this mean that those Borzicactinae flowers which do exhibit a staminoidal hair ring have evolved to humming bird flowers more recently than those Borzicactinae with flowers which lack a staminoidal hair ring? Or, like the tadpole's tail, are those Borzicactinae which exhibit a staminoidal hair ring merely the residual pointers to the path which the remainder of the Borzicactinae flowers have already followed in evolving into humming bird pollinated flowers?

For some time I have been puzzled by the apparent deviation in the nectar chamber sizes quoted by some of our members when studying sliced humming-bird flowers. In addition, I found some difficulty in actually establishing the presence of a nectar chamber on some Matucana flowers which I had sliced myself. I am now beginning to suspect that we may have some Matucana flowers with capacious nectar chambers roofed by a distinct membrane or diaphragm; other species with a nectar chamber whose entry is barricaded by the lowermost filaments lying closely against the style, with the very base of the filaments more or less fused together; and some species with but a more or less thickened tube wall which partially constricts entry to the nectar chamber and the lowermost filaments lie but loosely against the style: finally coming to Matucana (Incaica) aureiflora which possesses a virtually open nectar chamber. But if this represents a progression from moth-pollinated to humming-bird pollinated flowers, would we have expected to see a vestigial hair ring on those flowers still at the partially-evolved stage? There appears to be none to be seen; but if the Matucana as moth-pollinated flowers had already advanced to a reduced number of stamens, there would hardly be a further reduction in stamen count in the evolutionary development to humming bird flowers. But do Neoporteria flowers have more stamens than Denmoza? and do Cleistocacti and Matucana have less still?

... from J. Forrest

I have little experience regarding internal organs of flowers but would agree with G. Swales when he says that more advanced flowers (in an evolutionary sense) would be expected to have fewer stamens than more primitive flowers, as evolution tends towards simplicity. Thus, for example, some Frailea flowers do not form petals, but set seed without opening and usually produce far more seed per fruit than does a fruit formed from an open flower with petals. I would therefore consider cleistogamous flowers more advanced than normal flowers.

... from D.W. Whiteley

I am a little uneasy about the talk of advanced and primitive features. We do not really know for certain what constitutes an "advanced" flower, we can only speculate. If we consider what constitutes an advanced flower, it is one that obtains fertilisation with the least possible effort coupled with the maximum possible chances. Therefore the ideal advanced flower would be self fertile, relying on no other source. Therefore the top rung of the ladder of excellence would be occupied by a plant that set seed without ever needing to flower. Failing this, the second rung down would not be occupied by a flower with one stigma and one anther but a flower that enabled almost everything that lived, breathed, walked or crawled as well as wind, rain, etc, to pollinate it, to obtain the maximum possible chances of fertilisation. This flower would have umpteen stigmas and millions of anthers.

This is rather akin to Gordon Rowley and Len Newton's comments on "succulence" (NCSS Journals), that many plants can occupy different life form categories at different stages of development. Therefore terms like succulent or non-succulent, and advanced or primitive, are measures of degree not measures of evolutionary time. Two closely related plants can fit into different categories under these systems and as such they do not represent the evolution of the line concerned. The gaining or loss of anthers does not mean advancement or regression in terms of evolution; either situation can be an advantage if it favours conditions then prevailing. Neither does one necessarily progress one way, when it is a matter of survival of the fittest. Therefore I cannot go along with botanists who have as their most advanced genus the plants with the least number of anthers — they just do not know this to be true.

Shall we therefore stop using these misleading terms and say what we really know to be true, that flowers exhibit "greater or lesser specialisation"? The plants with fewer anthers seem to be restricting themselves to a more specialised group of pollinators and so are showing greater specialisation. In the long term this may be either an advantage or a disadvantage; it may, eventually, even result in the demise of a line. In such a case can it be an "advance" and can the plants with fewer anthers be described as more "advanced"? Bearing in mind that greater specialisation is not always an advance; keeping one's options open is often a more advanced path to tread.

Whilst the most efficient method of pollination and the restriction of cross pollination to a few selected individuals may seem to be an advance, is this really so? Is specialised pollination more advanced if it leads to degeneration and ultimate destruction of the strain? How many more "advanced" lines of plants have died out in the past to leave us with "primitive" plants that have survived to our times? Wide cross pollination is the best means of survival, not specialisation.

As one cannot prove that flowers only evolve by losing stamens and that a change for the better to a greater number of anthers cannot be ruled out, speculation based on anther number cannot be proved.

... reflection from H. Middleditch

Dave Whiteley suggests that we really do not know for certain what constitutes an "advanced" flower, and hence (by inference) that we equally do not know what constitutes a "primitive" flower. He also suggests that evolution does not necessarily advance by a reduction in the number of parts of the flower. We may find a logical appreciation of floral evolution in modern literature, such as "Plants without Flowers" by H. Bastin, where the author observes: "The first living things made their appearance in the sea and these have attained through age-long evolution to a considerable diversity of organisation. When a considerable number of marine invertebrates made their appearance about 500 million years ago, the plant life of the sea was already varied and luxuriant. It is questionable whether animals could have survived at all if their advent had not been preceded by organisms able to provide them with oxygen and food. Hence the primitive plants probably resembled some of the simplest forms in existence today."

Here the word primitive is applied to plants which existed very early in the evolutionary time scale. My Oxford English Dictionary gives for primitive = early, ancient, simple, original, from which another is derived, appearing in the earliest stages of growth. It would seem that Bastin is making quite proper use of an English word in describing plants as primitive when they have appeared in the earliest stages of evolution. The author then goes on to say: "Green plants are able to synthesize their own food given sunlight and moisture: animals, lacking this aptitude, must need consume plants, or other living animals, to go on living. Since the fundamental distinction seems to have existed from the earliest times, we may assume that plants were the pioneers among living things to leave the water. Rocks of the Devonian age have yielded, besides remains of early land plants of a simple type, numerous fragments of a more highly organised vegetation." Back to my dictionary for "pioneer" = beginner of enterprise, one of a body in advance; then from here I look up "advance" = make progress.

Bastin continues:— "No plants quite like the seed ferns exist today but a few species still linger as living links with the past. Cycads differ strikingly from the more familiar Gymnosperms, in that they hark back in their method of reproduction to that of the seedless type. The maidenhair tree is an archaic survival, the sole relic of an important race which achieved almost worldwide distribution and very considerable diversity of habit during the Mesozoic era. Towards the end of that era (about 100 million years ago) the Angiosperms or higher flowering plants spread until they monopolised the best of the earth's land surfaces. Thus the cryptogams were outmanoeuvred in the perennial struggle for existence". Once more to my English Dictionary which tells me that the maidenhair tree being archaic = primitive. Here the term seems to be used not in the context of the plant kingdom as a whole but in the context of the evolutionary position of the maidenhair tree relative to angiosperms. The evolutionary development of the angiosperms (flowering plants) is further discussed by Proctor & Yeo in "The Pollination of Flowers" as follows:—

"The idea that the evolution of flowers and insects proceeded hand-in-hand is born out by comparison of the fossil record of the angiosperms with that of the insects that pollinate them. Many lines of evidence lead to the conclusion that the most primitive living angiosperms are to be found among the trees and shrubs of the Magnolia family. The development of angiosperm flowers probably followed a pattern from the primitive Magnolia type flowers, to actinomorphic flowers (with radial symmetry), these in turn giving rise to flowers with parts definite and usually fewer in number; subsequent development to flowers with significant three-dimensional form, (for example, corolla tube), and zygomorphic flowers (similar but with bi-lateral symmetry) was linked with the structural and behavioural adaptations of the more specialised flower-visiting insects. The emergence of a major type has often been followed by adaptive radiation to different ecological niches and different pollinators. Superimposed on the pattern of adaptation to animal pollinators are the tendencies towards development of wind-pollination and self-pollination. Certain insect pollinated flowers are much more specifically adapted in form and structure to particular pollinators — in most cases to long-tongued insects which themselves have become specialised flower visitors. One's first impression on surveying the more specialised flowers is of exuberant variety, Many of these flowers regulate the behaviour of particular visitors with considerable precision and exclude other insects with a fair degree of effectiveness."

Here again the word "primitive" is used by Proctor & Yeo to describe "the original from which another is derived" in the context of the angiosperms. As with Bastin's use of this word, it would appear that 'primitive' is used within a context of development over an evolutionary time-scale; but I have not been able to find the word "advanced" in Proctor & Yeo's "Pollination of Flowers" to describe more (geologically) recent floral developments. However, in Strasburger's "Textbook of Botany" (new English edition) the opening paragraphs on Angiosperms refer to flower parts e.g. petals, which may be arranged either in a spiral or in whorls and it is then noted that "In many cases the whorled arrangement can be regarded as advanced, and its derivation from the primitive spiral may often be indicated by the sequence of development of the whorled members. On the other hand, when only two opposite members form a whorl, the whorled arrangement may be primitive, as, for example, in the seedlings of all dicotyledons". In describing the form of an anther, Strasburger notes that "as a rule" these consist of four pollen sacs joined longitudinally to the filament; but, "This structure is not universal; in various Magnoliales the stamens are flattened like leaves with the pollen sacs on the upper surface — doubtless a primitive condition." When considering the Order Centrospermae, which includes the

Cactaceae and the Aizoaceae, it is noted that "Families with a simple perianth may be regarded as primitive, those with a calyx and corolla as advanced; or the opposite view may be taken". From this brief appreciation it would appear that the word "primitive" is generally used to mean an earlier stage of evolution, or a characteristic from an earlier stage of evolution; the word "advanced" is used by some authors, but not by others, to mean a later stage of evolution.

Elsewhere Proctor and Yeo observe "The conifers are among the few groups of plants which are consistently wind-pollinated and they are perhaps the only group in which wind pollination is certainly primitive". Here a particular group of plants is being compared with regard to a particular function and within this context they are defined as "primitive". I can find no suggestion that wind-pollination as such is primitive. Indeed, Proctor and Yeo also observe that "the common Ash is an obvious example of a plant of entomophilous (insect-pollinated—H.M.) ancestry which has quite recently (in evolutionary terms) become adapted to wind pollination. The Mediterranean Ash still possesses a white corolla and the fragrant flowers are pollinated by insects!" In comparison, the English Ash has no corolla to the flower and each flower has only two anthers. This reduction in the number of stamens is in line with Proctor & Yeo's observation that evolution of angiosperms led to flowers having fewer parts; numerous pages of Strasburger are occupied by examples of this evolutionary process as represented in the present Flora.

One example of this reduction in flower parts may be instanced from Proctor and Yeo's work: "When the orchid flower is examined in detail, it appears that it is an exceedingly specialised version of the kind of flower seen in the Lillies and their relatives. It is in the stamens that the greatest modifications of the orchid flower are found. Most of the stamens have either been completely lost or reduced to sterile vestiges. Of the four remaining stamens, never more than two are fertile and in most orchids there is only one fertile stamen." Other forms of flowers which have been specially adapted for a particular pollination process, are also quoted: "The flowers of grasses and sedges are so specialised for wind pollination that they bear little resemblance to insect pollinated flowers". "The lesser periwinkle has stamens and style which are very specialised in structure". In these passages the word "specialised" appears and my Dictionary gives "special" = of a particular kind, peculiar, not general; specialised = adapted for a particular purpose. The more specialised flowers would appear to be those which are advanced on the evolutionary time scale i.e. one which has progressed from a more primitive fore-runner. It would appear that David Whiteley's supposition that an advanced flower is "one that obtains fertilisation with the least possible effort coupled with the maximum possible chances", is not really correct. If available literature is used as a criterion, then an advanced flower is simply one which has evolved from a more primitive flower, usually in geologically recent time, and often has a very limited choice of pollinating agents.

The angiosperms as a major group of the plant kingdom are more specialised than the gymnosperms, in that the general majority require a visit from some animal for reproduction, whereas gymnosperms do not. But this particular specialisation has evidently paid off in enabling this type of plant to occupy the greater part of the earth's land surface. In no other regard does the literature suggest that this or that specialisation places any flower in advance of some other specialised flower.

In regard to stamen count, most plants considered by Proctor and Yeo to have a more specialised pollination ecology, do not have numerous anthers. In those plants which Proctor and Yeo class as more specialised insect pollinated flowers, there is a preponderance of flowers with few stamens, i.e. less than 10. If more specialised flowers have fewer stamens, do less specialised flowers have more stamens? Do cactus flowers tend to have a larger number of stamens than the general run of specialised (or advanced) flowers? Have cacti been able to colonise areas which can barely support vegetation by reverting to the primitive feature of very numerous stamens which could have been required at the earliest stages of evolution of the flowering plants when there would be a much less variety of pollinating agents than exist today? Have cacti flowers specialised on a primitive feature in order to advance into new growing areas? Do the cactus flowers which have advanced to more specialised pollinating agents, e.g. to humming birds, possess less anthers than those cacti less specialised in their pollinators? Do the more advanced *Matucana* and *Borziacactus* bird-flowers (such as *Borziacactus tessellatus*) have less stamens than *Neoporteria* (sensu stricto) which have a capacious nectar chamber but have not yet developed the long-tubed flower?

... from P.H. Sherville

In regard to the comments from Roy Mottram, I also would find it hard to relate a ring of hairs to a diaphragm which is usually formed from the fused bases of filaments before their insertion into the tube wall. The comment from Harry Middleditch that the hair ring location is below the lowermost filaments is born out on my *Bolivicereus samaipatanus*; but in that, the filaments, although not fused, are still inclined towards the style and form a "roof" to the nectary. It would appear in this case that the hairs fill in the gaps between the filament bases. One could postulate that this constitutes an intermediate evolutionary stage between the filament bases fusing to form a complete roof and the presumably earlier stage where they are simply inclined towards the style in first attempts at protecting the nectary.

I would be wary of the theory put forward by Harry Middleditch that the hairs could be formed, or derived from, vestigial stamens. Usually the number of stamens is directly and consistently related to the numbers of petals and/or sepals, and to sacrifice stamens in this manner would imply a drastic alteration in the basic ratios of flower parts. Would not the sheer numbers of hairs preclude their being formed from vestigial stamens; could a flower —



especially a tubular flower — contain all the stamens represented by the number of hairs? I cannot think of any plant where hairs have been specifically derived from any other organ, they usually just occur where and when required.

Now in regard to the question about stamen count in *Neoporteria*s (sensu stricto) in comparison with *Matucana*, I find the reverse of the situation suggested for there are in excess of 30 stamens in *Bolivicereus* and an even greater number in *Submatucana madisoniorum*, whereas my *Neoporteria wagenknechtii* v. *napina* and *N. laniceps* only managed a count of 23. As odd numbers of stamens do not tend to occur frequently, I would accept that my 23 might be taken as 24 or even 26. But in any case, even if they reach 30 they are only just equal to the *Submatucanas* and certainly not in excess of them.

... further from R. Mottram

There are intermediate stages between covered and open nectar chambers, such as that found in flowers of *Matucana weberbaueri*, where the filament bases curve inwards towards the style, but don't completely close the gap. Therefore it is not too difficult to understand how a diaphragm forms. The lower filament bases curve inwards to the style and then fuse together to form a solid "roof". Hair rings appear roughly in the same position as the diaphragm and presumably serve a similar purpose i.e. to prevent loss of nectar. However, they comprise tiny delicate hairs, which are most probably unicellular extensions of the adjacent cell wall rather than reduced stamens (cf. root hairs). One possible exception is *Stetsonia coryne*, where the hairs are produced randomly along the length of the nectar chamber, and are shown to be multicellular. In this case they probably are indeed reduced stamens.

The concept that a large number of stamens is a primitive feature surely can't apply in the cactus family. One is tempted to ask how the stamens became numerous in the first instance if it is not a useful feature! In general there appears to be a correlation between the size and number of flowers carried by a species and the number of stamens. Or possibly it is the nocturnal habit which is responsible for the large numerous-stamened flowers. Compare, for instance, the large number of stamens of *Epiphyllum* with the few of the allied *Rhipsalis*. One cannot say that one is in a more primitive state than the other — each is simply adapted to ensure effective pollination.

In *Denmoza*, the hairs plugging the nectar chamber actually arise from the enlarged nectar glands themselves rather than the wall of the tube. Therefore it seems very unlikely that the hairs could be formed from vestigial stamens, in this case.

#### **BORZICACTUS FIELDIANUS FLOWERS** By Mrs. J. Hobart

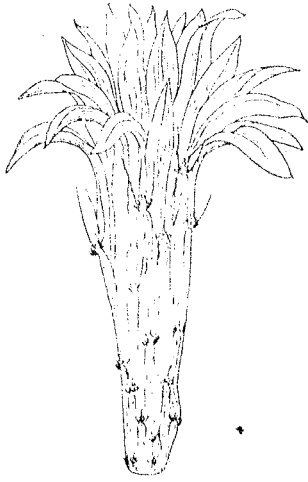
This particular plant was purchased at a Branch meeting at Edinburgh from a Mr. Forrester who had grown it from seed. When I bought it in 1964 it was reputed to be 3 years old from seed and it was then about 1½" tall (35 mm). By June 1973 when it first flowered, it was about 350 mm (14") tall. It has now grown up to 450 mm (18") high and has produced a side branch arising from about one-third the way up the main stem. The plant body is bright green and smooth with hexagonal tubercles, each areole carrying a few short spines and also one heavier spine pointing downwards. I certainly think that it looks similar to the plant in one of the slides taken by Phil and Mel Collins in Peru. My plant seems to flower from the beginning of June through to August, usually with only one flower out at a time although there will be two or three buds on the plant, all fairly close to the top of the stem. The flower usually opens between 2.30 and 5.00 p.m. in the afternoon and stays open all the time, day and night. The flower can last up to three days, but if the weather is particularly hot it will die in just over 30 hours. It does not seem to need the sun to be shining before the flower will open.

The bud develops very slowly, starting as a hemispherical hairy bud entirely covered with black and grey hairs. The bud elongates slowly and quite soon parts of the red petals can be seen. The last two days before opening, the tube elongates rapidly, putting on as much as 14 mm of growth in the last 48 hours. The style is exerted before the petals open. Pollen can be found deposited on the lower petals virtually as soon as the flower opens. The total length of the flower to the end of the style can be up to 85 mm; the diameter of the opened flower 40 mm. The tube is long with the petals opening into an actinomorphic flower, both tube and petals being bright red. The tube has spirally arranged scales with black hairs from the axils. The style is yellow, the stigma lobes green, remaining closed together. The anthers are yellow and the filaments red. When the flower first opens the base of the stigma lobes starts at least 2 mm proud of the stamens, but by the second night the stigma lobes are nearly buried in the stamens. When the flower was sliced for a longitudinal section, there was a copious supply of nectar running out of the nectar chamber. None of the flowers have ever set fruit and the flower remains fall of the plant within about a week of flowering. (See Front Cover & p. 26 for illustrations).

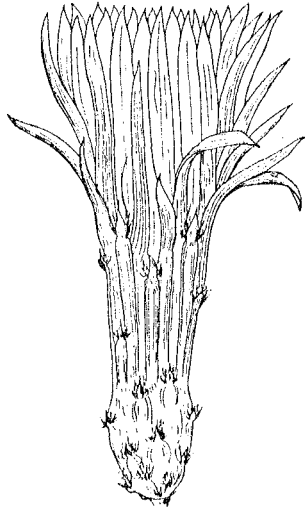
#### **Comments**

... from Mr. & Mrs. Collins

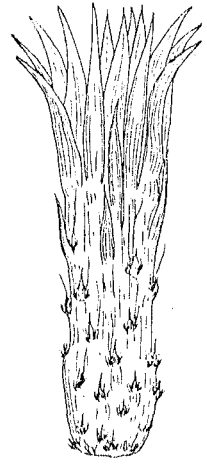
We saw a seedling *Borzicactus* in Harry Middleditch's collection which was, in one particular respect, strikingly similar to some plants which we saw in Peru — the almost flat tubercles were shaped like elongated hexagons with flat sides and where each pair of sides came together there was an obtuse, but very distinct, ridge. We came across



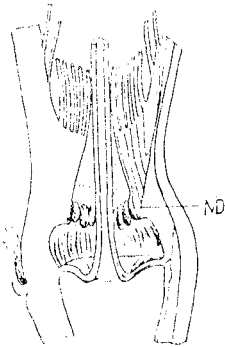
NEOPORTERIA MULTICOLOR



NEOPORTERIA COIMASENSIS

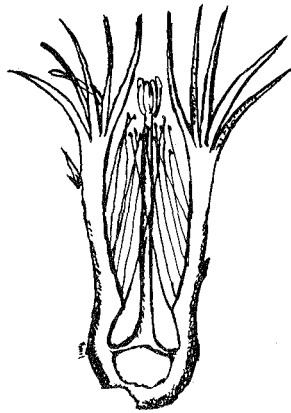


NEOPORTERIA NIDUS

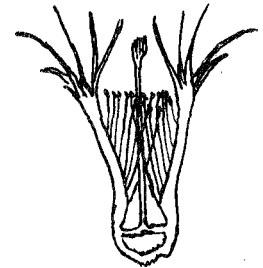


NEOPORTERIA COIMASENSIS

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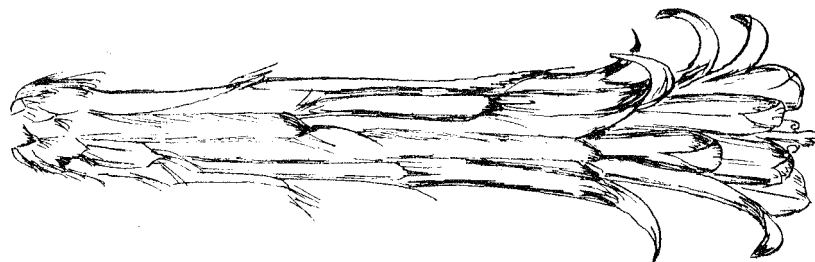
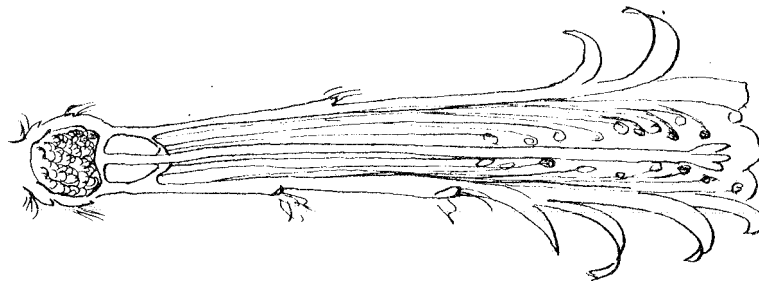


NEOPORTERIA CLAVATA  
var. GRANDIFLORA



NEOPORTERIA NIGRIHORRIDA

Collection - H. Middleditch



BORZICACTUS FIELDIANUS

Collection - Mrs. J. HOBART

this plant in the wild in the Santa valley: firstly at Monterey, about 7 km north of Huaraz, growing on the west side of the river i.e. on the eastern flank of the Cordillera Negra, here and there all the way from the actual bank of the river at 9,300 ft up to 10,000 ft., which was as high as we went. Later we found a plant which appeared to be the same, growing near Caraz, some 60 km to the north, at about 7,200 ft. on the east side of the Rio Santa this time. We have seedlings from this latter plant.

#### GENUS CLISTANTHOCEREUS BACKEBERG    Translated from Die Cactaceae Vol. II by E.W. Bentley

At the time of Britton and Rose our knowledge of the more or less oblique-opening and day-flowering cerei of the Andes ranges was rather incomplete. Equally the "collective" genus *Borzicactus* Br. & R. needed sorting out. In it were still included, besides two Ecuadorian species that alone agreed with the characters of the Type plant, one *Haageocereus* (*H. decumbens*), two *Seticereus* species (*S. icosagonus* and *S. humboldtii*) and in addition, as separate species, two synonyms of the two last-named species, and furthermore a *Loxanthocereus* (*L. acanthurus*). The Type plant was *Borzicactus ventimigliae* Ricc.; for this and for *B. morleyanus* Br. & R. the flower rim was given only as "somewhat zygomorphic" and "slightly oblique"; in none of them was the wool ring in the tube mentioned. The description of the flower rim is wrong and (to conclude from Fig. 230 in *The Cactaceae*, II, 161.1920) is only to be explained in that a flower was observed which was already closing up again. In fact, the Ecuadorian *Borzicactus* species possess a more or less strongly oblique-rimmed, fairly narrow-throated flowers, not having a waisted tube (which was not specified, however).

In connection with the foregoing one may be reminded that Akers and Buining regarded *Clistanthocereus* as not justified and put *Cl. tessellatus* in *Borzicactus*; apparently they knew no fully-opened *Borzicactus* flowers. All of which to prove how necessary was my reorganisation of the *Loxanthocerei*, and how necessary is a genus arrangement that brings together under each genus those species with uniformly characterised flowers; only thus can genera be natural. Each lumping together must — as has been the case before — make more difficult the exact cognisance of the species groups actually available. Therefore, *Clistanthocereus* was necessary as a distinct genus; that is, at the beginning of the series of genera would stand those plants that have almost radial flowers, with at the most, the rim slightly oblique. The newer finds have shown that more than one species is like this and thereby proved that this genus, too, is not monotypic. *Clistanthocereus* also has very robust-tubed flowers, quite stout, cylindrical, with the tube not opening like a funnel (as is the case in the almost radial *Loxanthocereus* species but which again, through transitions, allows recognition of the underlying relationship).

In J. SKG. "Skde" IV:44,1951, Buining says "The species of the genus *Clistanthocereus* belong to *Borzicactus*, since the flower tubes exhibit wool-rings, which for certain represent the most important distinguishing characteristic between *Borzicactus* and *Loxanthocereus* . . . the genus *Clistanthocereus* is scientifically without basis". That a "scientific basis" was lacking, that is, it derived from an inadequate knowledge of the genus *Borzicactus*, especially of the so-called wool-ring, was a hasty assertion. "*Borzicactus fieldianus*" Br. & R. (described as the third *Borzicactus* species in the Appendix to *The Cactaceae* IV:278.1923) was described without a "wool-ring" — but this signifies little, as emerges from what follows. The flower portrayal (loc. cit.) with the thick tube, the fairly narrow opening to the flower which is itself not funnel-shaped and the markedly laterally-disposed rim shows that this flower cannot be identified with that of a *Borzicactus* unless one forsakes all logic in classification.

This species *fieldianus* was given monotypic genus status at first and the foregoing species is therefore the Type of the genus. Akers then found a further species, very similar in the flower, presenting only a quite weakly oblique rim: "*Borzicactus tessellatus*" Akers & Buin. In it an obvious wool-ring was distinguished. Ritter later declared that the "wool-ring" was due to damage by a humming-bird visit (Winter catalogue No.8.1957) and that the species belonged to *Loxanthocereus*. That also was a hasty assertion. Quite apart from the fact that a humming bird can scarcely produce so fine and regular a wool-ring from the destruction of the bases of the filaments, a careful investigation by Rauh (prompted by an enquiry of mine) of the extensive flower material brought back from habitat by him, revealed the fact that such hair or wool formations occur more frequently than had previously been realised, and that this staminoidal hair phenomenon exhibits an evolutionary trend leading towards reduction. "Wool-rings" by themselves are not characteristic of a particular genus, except in combination with other regular characters of a given species group, as exemplified in *Borzicactus*, *Clistanthocereus*, *Bolivocereus*, *Submatucana*, *Acanthocalycium* and *Denmoza*. Rauh's investigation of an apparent specimen of *Clistanthocereus fieldianus* revealed that this exhibited only traces of hair formation, which explains the absence of the corresponding observation in Britton and Rose. Such a strongly reduced hair formation is found however also in some *Loxanthocereus* and *Haageocereus* species. As a result, "*Borzicactus tessellatus*" was put in *Clistanthocereus*, the distinguishing generic characters of which are as follows: Flowers almost radial, stout-cylindrical, without funnel-like outline, rim almost straight or only very weakly oblique; at the tube-base and at the base of the lowermost filaments a wool ring may be formed, or this structure is reduced to traces only. The fruit is not completely dry.

The growth is variable; it is bush- to tree - like, that is partly thicket-forming and then becoming taller (Britton & Rose note for *Cl. fieldianus* even "up to 6 m high") or low tree-like, up to ca. 1.80 m tall (Akers). The nectar chamber is, according to Rauh, short and wide (longish in *Loxanthocereus*).

In his Beitrag, z. Kennt. d. Peruan. Kaktveg. 287.1958, Rauh placed *Clistanthocereus* in *Borzicactus* while in the same place he gives as generic characteristic "almost straight tube, ring of staminoidal wool hair". The latter character is not a useful generic distinguishing character, as is pointed out here. This suggests that Rauh could not have meticulously researched *Borzicactus* flowers and that Britton and Rose pictured them incorrectly. Characteristics for *Borzicactus* — leaving out the wool-ring — are "the stronger zygomorphy of the flower (witness flower photos) and the narrow throat". From this *Clistanthocereus fieldianus*, *C. tessellatus* and also "*Borzicactus*" *piscoensis* (referred to *Borzicactus* by Rauh) do not belong to *Borzicactus* (Rauh states nothing about the zygomorphy of the latter). Also against it, according to my experience, is the wide separation of the latter. Rauh even says himself "*B. fieldianus* and *B. tessellatus* differ as much in habit as also in flower structure from the Ecuadorian species". According to the flower form they should not be combined. Rauh thinks that I — like Akers — separate *Borzicactus*/*Loxanthocereus* only on account of the staminoidal hair-ring. That was my earlier (!) view. Today only the very distinctive flower structure is decisive for me. Without correspondingly sharp division it seems to me to be impossible, however, to bring clarity to the genera of the *Loxanthocerei*. Much of the confusion goes back to Britton and Rose's incorrect representation of *Borzicactus*.

*Clistanthocereus fieldianus*. Syn. *Borzicactus fieldianus* Br. & R.

Bush-to thicket-forming, more or less low and tree-like, according to Britton & Rose up to 3 — 6 m long, according to Rauh generally up to 1.50 m high, either climbing, decumbent, or procumbent; stems up to 8 cm diameter, ribs 6 separated into almost wart-like, elongated humps, these up to 2 cm long and 1.5 cm wide, fairly well-defined 6-angled, about 1-2 cm high; areoles large, almost circular to elongated oval, with short wool, above which a groove-like depression up to a cross-furrow; spine count varies, originally only ca. 5, grey with brownish tip, ca. 1 cm long, later 2-3 strong central spines, up to 4 cm long; according to Britton & Rose up to 10 whitish, awl-like, very unequal and up to 5 cm long spines, in places even longer; flower (according to Rauh 5 cm long) almost rotate, inclined; Petals vermillion; tube constant thickness, 1.8 cm diameter; ovary crimson, scarcely differentiated; hairs brown; scales distinctive and long-tipped; fruit globular, 4 cm diameter. North-central Peru; first found by McBride and Featherstone in 1922 east of Huara at 2,600 m..

The description was partly completed according to living material from Rauh. According to that, the spines are, on a lively blue-green plant, at first brown, the outermost 5-8 mm long, the more central distinctly awl-like, at first up to 1.5 cm long, sometimes more or less appressed and furnished with faint edges, the surface not entirely smooth. One central spine markedly thickened towards the base; on young growth in the crown I have counted occasionally up to 14 spines; the areoles can be 9 mm long and 7 mm wide.

*Clistanthocereus tessellatus* (Akers & Buining) Bkbg.

Tree-like, up to 1.80 m high, ribs 5-6, with six-sided humps, grooved above; radial spines ca. 10, fairly short, 7-15 mm long, tinged reddish-brown; central spine generally 1, fairly robust awl-like; flower cylindrical, red, almost straight-rimmed or slightly slanted; scales long, fleshy, with extended tip, fairly slim; numerous strong brown to black hairs; white tipped, in the axils; at the base of the tube, a wool-ring. Fruit yellow, with shield-like, flat scales; fruit flesh dried out. North-central Peru, on the Rio Huara, between Churin and Oyon.

The wool-ring is robust in this species; in *Cl. fieldianus*, as I convinced myself with the microscope, only traces of hair structure are to be seen. In this respect the species clearly differ. Because of the seemingly variable growth, especially of *Cl. fieldianus*, and in view of the light green colour of the epidermis in both species, the only other possible difference seems to be the fairly elongated humps of *Cl. tessellatus*. This hump formation again resembles *Loxanthocereus granditesselatus* in the rib divisions (but that *Loxanthocereus* flower has a bent tube and the growth is prostrate). "Tessellate" rib-structure occurs in various genera, *Loxanthocereus*, *Borzicactus*, *Rauhocereus*, while sometimes it is quite irregular as in *Trichocereus thelegonus*. In *Loxanthocereus* it has only been observed in a few species. The large group of Peruvian cerei are particularly rich in forms and there is clearly a great need for well-defined genera and a key to the classification.

#### Comments

... from H. Middleditch

For the record, the original description for *Clistanthocereus* gen. nov. Bkbg in Jahr. DKG 1937. I, ran as follows: *Plantae erectae (partim dein decurvatae) costis tuberculatis, flore actinomorphae sed clistogamo, petalis minutis rotato-extensis*. Species typicalis: *Clistanthocereus fieldianus* (Br. & R.) Bkbg cmb. nov. Again for the record, the original description of *Borzicactus fieldianus* in Britton & Rose ran as follows: Forming thickets 3 to 6 meters high, the branches elongated, at first erect or ascending but sometimes becoming pendent or even prostrate; ribs few, perhaps only 6 or 7, stout, broad, 1 to 2 cm high, depressed between the areoles and on young shoots appearing as tubercled; areoles large, circular, short lanate and spiny, with a depression extending upward from its upper side to constriction of rib; spines 6 to 10, white, subulate, very unequal, the longest ones 5 cm long or longer; flowers several, from near tip of branches, but with only one from an areole, with a cylindric tube 6 to 7 cm long and a very narrow limb; ovary and flower-tube bearing ovate, acute scales, 1 to 3 mm long, these with long brown hairs in their axils; flower-tube within glabrous below its throat, bearing many stamens 4 cm long; perianth-segments red, 1 cm long; stamens exerted only beyond the perianth-segments,

if at all; ovary globular, perhaps somewhat tuberculate, with scattered, long-hairy areoles; fruit probably fleshy, globular, to ovoid, 2 cm in diameter.

In Strasburger's "Botany" (p.621) it is indicated that zygomorphic ("dorsiventral") flowers are regarded as advanced compared with radial ones. Is this the real basis upon which Backeberg separates the almost rotate flowering *Clistanthocereus* from the other more or less zygomorphic flowered *Borziactinae*? Does the existence of both different flower forms i.e. rotate (actinomorphic) and zygomorphic, together with wool-rings in the tube suggesting an incomplete reduction in the number of flower parts, point to the plants within the *Borziactinae* being still in a state of active evolution? If they are not yet clearly differentiated into sections, how can a sharp genus division be adopted, as Backeberg suggests? If plants outside the Cactaceae are sharply divided upon the bases of dorsiventral features, why should *Borzicactus Kimnach* be the only genus to encompass plants with flowers at different evolutionary stages? Is it the only genus to encompass plants with flowers at different evolutionary stages? How thoroughly did Kimnach study the plant Kingdom outside the Cactaceae in order to find out whether any existing genus did include flowers in different evolutionary stages before he published *Borzicactus Kimnach*? Has Kimnach's training and research encompassed a detailed study of floral evolution? How qualified was he to compare the relative evolutionary span represented by the *Borziactinae* with groups having other similar floral diversity? Has Kimnach merely inflicted further taxonomic confusion on the long-suffering cactophiles when an explanation of the real nature of the problem might have been more informative?

At our Brooksby 1978 Autumn Gathering we hope to hear from Geoff Swales with a basic botanical appreciation of floral evolution by reduction in flower parts, which is intended to provide members with a foundation from which the questions posed above may be studied. We would also look forward to any evidence of reduction in floral parts in the *Borziactinae*, from stamen counts etc. which members may be able to undertake in the intervening season.

**GYMNOCALYCIUM RAGONESEI** Castell. sp. nov. By A. Castellanos

Translated by H. Middleditch from Lilloa, XXIII, 1950

Planta parva, hemisphaerica, tabularis vel echinoidea, leviter umbilicata,  $\pm 3 - 5$  cm diam.  $\times 1.5 - 2.5$  cm alta, colore testaceo usque viridescenti-fumoso, instructa costis 10 depresissimis  $\pm 1.5$  mm altis, radiatis  $\pm 3$  mm latis in vertice, usque 12 mm in peripheria, levibus sulcis transversalibus munitis. Areola invenitur in gibbo parvo in parte superiore spatii inclusi; spatium interareolare  $\pm 3$  mm; areola circularis  $\pm 1$  mm diam., pilis tomentosa spinulisque 6 arachnoideis, setaceis, albidis, lateralibus, 3 mm longis instructa; spinula centralis deest.

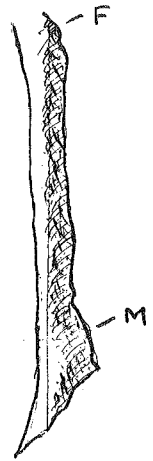
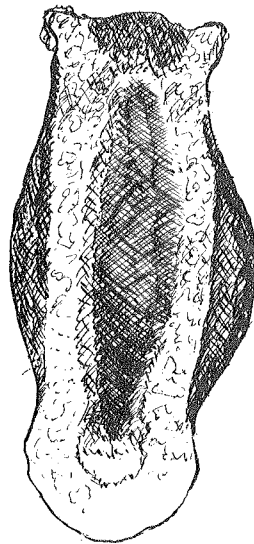
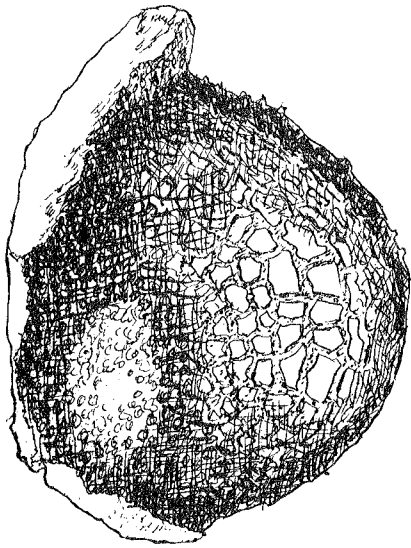
Flores 2-3 in vertice 3.5 — 4.0 cm longi, extus parum fumosi; ovarium subobconicum  $\pm 21$  mm longum  $\times 6$  mm diam. in parte superiore, extus bracteis semilunaribus margine clarioribus instructum: intus est cavitas ovarica,  $\pm 11$  mm longa  $\times 3$  mm diam.; tubus perianthii parum infundibuliformis  $\pm 12$  mm longus  $\times 7$  mm diam., fundo leviter colore rubescenti tincto; Pk 2 seriebus foliorum compositum, quorum exteriora sunt crassiora, dorsaliter parti exteriori floris concoloria et claria solum in margine: interiora maiora et tenuiora; Pc album, seriebus 2 foliorum linguaeformiter elongatorum, acuminatorum compositum, quorum exteriora  $\pm 16$  mm longa  $\times 4$  mm lata et interiora minora sunt. Stamina  $\infty$  filamentis viridescensibus anterisque pallidis, biseriata; series altera paucinumerosa, in fundo tubi perianthii circum stylum inserta eique semiaequilonga, altera numerosior in altitudinibus variis tubi usque faucem floralem inserta. Stylus columniformis ( $\pm 10$  mm longus  $\times 1.5$  mm diam.), viridescens-pallidus radiisque 8 stigmaticis 4 mm longis coronatus. Fructus et semina ignota.

Plant small, hemispherical, tabular to echinoid with a slight small central depression,  $\pm 3 - 5$  cm diam.  $\times 1.5 - 2.5$  cm high of brick red to greenish grey colour with 10 extremely flattened ribs  $\pm 1.5$  mm high, radiating ( $\pm 3$  mm broad in the apex and 12 mm at the periphery) which carry slight transverse grooves, in the upper part of the gap between which, on a very slight prominence, is the areole; areoles  $\pm 3$  mm apart, areoles circular  $\pm 1$  mm diameter, with felted wool and 6 cobwebby spines, bristle-like, whitish, lateral, 3 mm long, entirely without a central.

Flowers 2 to 3 in the crown  $\pm 3.5 - 4$  cm tall, inclined to be somewhat grey: ovary incomplete inverted cone shape  $\pm 21$  mm tall  $\times 6$  mm diam. in the upper part, having half-moon shaped bracts with paler margins and the ovary cell  $\pm 11$  mm tall and 3 mm diam. internally: perianth tube slightly funneliform  $\pm 12$  mm tall  $\times 7$  mm diam. internally and a slight tint of wine colour at the base; perianth calyx with two rows of petals, the outer thicker with the back of the same colour as the outside of the flower and only the margin translucent, the internal ones larger and more delicate; perianth corolla white, with two rows of petals, elongated tongue-shaped, tapering to a long point, the outer row  $\pm 16$  mm long by 4 mm broad, and the innermost smaller. Stamens numerous with greenish filaments and yellow anthers in 2 series, one series few in number at the base of the perianth tube around the style and level with the middle of its height, the other series more numerous inserted at a different height on the wall of the tube up to the throat of the flower. Style a column,  $\pm 10$  mm high  $\times 1.5$  mm diameter, greenish turning yellow and crowned with 8 radiating stigma lobes of 4 mm length.

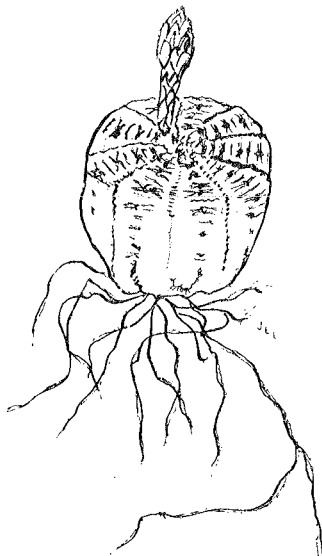
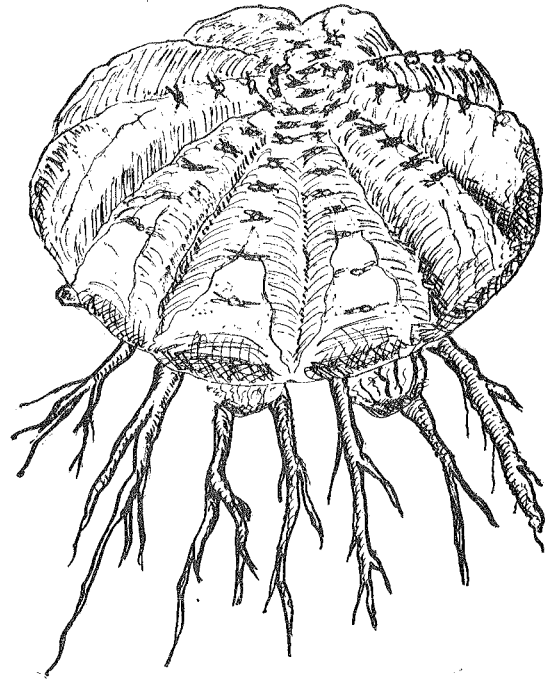
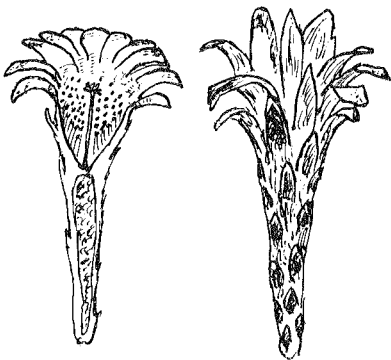
Fruit and seed unknown.

Specimens examined. — Catamarca: Salinas Grandes, between Km 969 and Totoralejos, collected Ragonese 13 — XII — 1949, no. 16,120 (Herbarium cited according to *Chronica Botanica* V, 1939, 143-150).

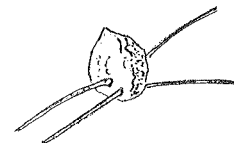


SECTION THROUGH  
HILUM

Succulenta 50.4.1971



Lilloa XXIII 1950



GYMNOCALYCIUM RAGONESEI

## Comments

... from H. Middleditch

In order to try and ascertain whereabouts van Vliet found *G. ragonesei*, I have consulted my 1:1,000,000 map which covers the surroundings of the Salinas Grandes. Along the railway line from Cordoba to Tucuman there are a number of halts which are identified only by a kilometer number (presumably the number of Kilometers from Buenos Aires) and although there is no Km 969 marked on the map as such, the straightness of the railway line and the existing Km points make it quite easy to plot the location of Km 969. This proves to be right on the northwest shoreline of the Salinas Grandes, whilst Totoralejos lies on the same railway line right on the opposite shoreline. Hence this particular *Gymnocalcium* must have been found actually in the Salinas Grandes itself. If the dried up lake bed consists of a continuous coat of mineral salts from which all the water has been evaporated, the mind boggles at the conditions under which these plants must be growing. But is the bed of the Salinas just a continuous sheet of mineral salts? Perchance it is not, for in describing the crossing of the fairly narrow southernmost arm of the Salinas Grandes, (Chileans No. 20 p.6), Nelida A. Serrano observes "In the middle of the crossing of the Salinas the vegetation became very sparse indeed, only some bushes of about 30 cm in height and discernible between them a halophytic succulent, with the ground in places covered with white patches owing to the great amount of salt present". Is such a patchwork of vegetation and salt-covered ground likely to occur equally over the broader parts of the Salinas?

... from F. Merrett

I have four plants of this species, grown in 1974 from seed obtained from De Herdt, but to my dismay I cannot get them to any size. They are as yet (1977) only about 1" across but they must be mature for they have all flowered regularly this year and were some of the last plants to remain flowering as winter closed in. One still has to flower (November) but I feel that the frost will shrivel it.

... from G.J. Swales

I am not so sure that I have ever seen any *G. ragonesei* larger than about 2" across. Some time ago I had a batch of imported specimens through my hands when I put in a joint order on behalf of a number of Cactophiles, and my recollection is that none of those were any larger than a couple of inches in diameter. My own imported plant of this species is not as large as this, yet. I would suspect that they remain dwarf, whatever their age, but on the other hand I think that growing them up to about one inch across in some three years is jolly good growing.

## **GYMNOCALYCIUM RAGONESEI** Castellanos By D.J. van Vliet

Translated from *Succulenta* 50.4:1971 by H. Middleditch

In the past, it has happened on more than one occasion that *G. ragonesei* has been mistaken for another species of the genus *Gymnocalcium*. For my own part confusion is not surprising in view of the close relationship which undoubtedly exists between *G. ragonesei* and the group of plants around *G. quehlianum*. I think that it is sensible, therefore, to supplement the description of these plants in such a way that mistakes should be a thing of the past. Before proceeding with this objective I shall first relate below in what circumstances the plants grow and the difficulties we had in finding them.

On our journey through central Argentina we reached Chumbicha, a picturesque little spot, after a sorely tiring day. It is splendidly situated at the foot of the Ambato mountains and yet scarcely discovered by the tourist trade. In order to get from Cordoba to Chumbicha, we had to traverse the Salinas Grandes. This is an enormous salt pan, certainly twice as large as Holland. It is entirely surrounded by mountains, and on account of this, the water which flows from the hills down to this level can flow away no further. Because of the great heat, it evaporates and the transported salts remain behind. This has continued until there is now a continually enlarging salt lake. The surface glitters blindingly in the sun and strongly resembles the mudflats at low tide in our own country.

It was January 25th in high summer. The weather was entirely in character. A scorching heat had accompanied us for several days. The many dead bodies of cattle perished from thirst spread a horrible stench. On approaching one, dense swarms of flies flew up at us, in order to feast themselves on living flesh just for a change. In this country the struggle for existence is merciless. This was confirmed by our finding ourselves in a region that took on the curious appearance of a semi-desert. Heavy rains never come with the start of the summer season. Everything was withered and burnt. Even the cacti, which nature has after all, well adapted to such circumstances, were also seen to be in need of water. Many young plants were dried up and larger ones close by shrivelled up to mummies.

As quickly as possible under the prevailing ovenlike temperature, we walked further towards the northern shores of the Salinas Grandes. According to the literature, *G. ragonesei* ought to be growing there. I doubt whether we should ever have found the plants, had we not received unexpected help. The burning sun, which had provided some two to three hours of unbearable heat, went into shelter behind clouds, which piled up around it in the distant heights of the mountain chain. Now they came floating threateningly in the direction of the Salinas and just afterwards violence broke loose. Deafening thunderclaps and heavy rainfall made it clear to us that after all cacti do occasionally get well watered in nature.

The free shower, which we managed to cope with, brought scarcely any cooling, but much help. Flowing water had washed away a layer of earth and *G. ragonesei* had become visible here and there, where we had just searched in vain. Normally the flat growing plants stand with their apex nearly level with the loamy soil. As soon as a period of drought occurs there, they shrink down a little. There then appears a depression on top of the plant, that fills with dust and it disappears from view. In spite of the fatigue and the wet clothing, this event stimulated us to such an extent that we dug up a fair number of plants and allowed them to disappear into the rucksack.

They seemed very soft to the touch, just like old potatoes, amongst which many had also gone bad. Later it turned out that of nearly thirty plants which I collected, there were scarcely sufficient to produce a total of five plants for my collection. The plants, which are provided with a wide-spreading root system, make it difficult for themselves to be dug out without damage. This provides an immediate cause of rotting in damp plants. Added to this the long journey from central Argentina to Holland and it might nearly have become a tragedy. Happily *G. ragonesei* is an industrious bloomer and so countless seeds have been brought into circulation via Clichéfonds, by which the further existence of this little plant is assured.

Plant disc-shaped, up to 70 mm in diameter, and 25 mm high, on average smaller in dimensions, now and then offsetting on the oldest areoles on the underside of the plant, lilac-to greenish-brown; apex a little sunken and only sparsely furnished with woolly felt on the new areoles; roots branched.

Ribs 7-9 rounded, broader below than above, separated by shallow vertical grooves and divided by small transverse grooves above the areole; below the areole an inconspicuous little hump (chin).

Areoles up to 6 mm apart, round, up to 1½ mm in diameter, furnished with dirty white woolly felt and rapidly becoming bare.

Spines 2 to 4, seldom 3, straight to weakly curved, not sharp, pectinate, upper ones up to 5 mm, lower ones shorter. All sand coloured, no central spines.

Flowers elongated funnel-shaped, up to 45 mm high and up to 30 mm across, situated round about the apex; outermost floral leaves (petals) spatulate, somewhat serrated, off-white with brown-to olive-green mid-stripe; receptacle exterior furnished with naked brown-to olive-green scales with pale margins, interior funnel-shaped, occupied as far as the pistil with stamens, which are white in colour above, tending to rose pink towards the base of the pistil; ovary (pericarpellum) elongated up to 2/3rds of the total length of the flower, furnished with naked green scales with pale margins, the seed mass suspended aloft in the cavity on a dense tuft of seed-stalks (funiculi), with some empty space left below; innermost stamens up to 3 mm, outermost up to 5 mm long, pale green; anthers pale yellow; style up to 9 mm long and up to 0.2 mm in thickness; stigma lobes 9, pale yellow, exserted above the outermost anthers.

Fruit berry-like, oblong and greenish, up to 25 mm long, drying out and bursting open vertically in several places.

Seed helmet shaped, with broad brim, which is pale ochre-yellow in colour, sponge-like seed-skirt around the hilum and on both sides a thickening of the testa; testa glossy chestnut-brown with darker brown reticulate design, now and then covered with some remains of the arillus layer; hilum almost invisible on account of the residue of the funiculus, grown out around the micropyle up to a wart (caruncle), resulting in abrupt heightening at the hardly distinguishable funicular opening, in various shades of brown.

The colour of imported plants is sand-coloured due to the continual etching of the epidermis by the salt- and sand-crystals, which become carried along by the wind. Often the small spines get dragged off in the process, as well. In cultivation one finds this etching does not take place any more. Then there arises out of the apex the original greenish-brown colour, merging into lilac-brown in the vertical grooves between the ribs. This causes a conspicuous dividing line on the plants. Also the spines then grow up to their normal length.

At areoles having 4 spines, one pair above and the other pair below, the upper are the longest. At areoles having one pair of spines missing — always the upper pair — the lower pair can then reach the length normally attained by the upper pair. Grafted plants grow in contrasting shape with respect to the naturally grown shape.

The flower buds arise from the new areoles around the apex. Their typical form, occurring in all species of the genus *Gymnocalycium*, is comparable to snake-heads. The pastel shade of the self-sterile flowers may vary from one plant to another. Sometimes offsets borne on the underside of the plant also carry flowers. The flowering period is spread over the summer until late in the autumn.

Classification: To begin with I have observed that *G. ragonesei* is associated with the group around *Gymno. quehlianum*, but distinguished therefrom by the lesser number of ribs, the elongated flower and the thickening of the seed testa — which I perceived with no other species around *G. quehlianum*. Moreover the testa in *G. quehlianum* is highly glossy on account of a clean transparent coating that looks just like cellulose varnish. The net-like design, so particularly handsome in *G. ragonesei*, is not so obvious here. Schutz classified *G. ragonesei* in his subgenus *Trichosemineum*, which translates as “with hairlike projections”. This is not correct. Here it is a matter of the remnants of the arillus layer resembling hairs. Buxbaum mentions about his type 7, *quehlianum*, that there is no arillus present. The question arises then, what is the material that entirely surrounds the hilum in the form of a sponge-like border? In addition, the seed of *G. ragonesei* is not the same as the indistinct illustration given for Buxbaum’s type 7.



Finally, a few words about cultivation. In loamy, gritty, mineral-rich, permeable soil. Winter and spring dry, spraying excepted. Plants on their own roots summer and autumn sparse water. Warm in the summer, cool in the winter, yet without frost. Flowering season is after the dry winter, therefore after the resting period. Growing season summer. Tolerates full sun.

In the Schutz Journal "Rod Gymnocalycium Pfeiff.", *G. ragonesei* gets written with two i's. This is erroneous. The plant is named by Castellanos after its discoverer Herr Ragonese (1949) and written *G. ragonesei* — see Castellanos in Lilloa 33.5 — 13:1950.

Comments on *G. ragonesei*

... from H. Middleditch

I found this article by van Vliet very interesting, not only because it is a pretty thorough and wide-ranging coverage of the characteristics and habitat ecology of this species, but also on account of certain queries, problems, and inconsistencies which it throws up. The difference in the spelling for the name of this plant was new to me; *G. ragonesei* was the form to which I had become accustomed and I find this spelling also in Backeberg's *Kakteenlexikon*. It would be nice to be able to refer back to the original diagnosis by Castellanos, for whatever mode of spelling is actually used therein is the one which really should be followed.

As van Vliet refers in this article (and on other occasions) to the Schutz classification for *Gymnocalycium*, one assumes that he is probably fairly familiar with Schutz's writings on this subject. From the comments near the end of his article it would appear that van Vliet has not yet discovered that Schutz and Buxbaum use the word 'arillus' to mean two quite different things. An explanation of this botanical term was put forward in the *Chileans* No. 16 pp 33-34. As explained there, the aril or arillus layer on the testa is a growth in the form of an extra outer coat over the testa of the seed; this growth emanates from the junction between the funiculus and the testa i.e. at the rim of the hilum.

If the aril developed solely as a thickening or band at the margin of the hilum, rather than as a partial or full coating over the testa, then one might consider that the use of the term 'aril' by Schutz and by Weskamp to describe this growth, was valid — if it were not for the fact that it would leave us without a suitable botanical term to describe the thin remnants of the arillus layer on the testa which was observed by van Vliet, who described them as a 'placenta'; in making the above translation this particular word has been rendered as 'arillus'.

The description of how this plant reacts to the dry season by shrinking and forming a depressed apex would seem to be admirably matched by the observations and sketches by D.J. Lewis in *The Chileans* No. 18 p. 133. As the flower on this species is rather unusually tall and thin for a *Gymnocalycium*, one wonders if this form is designed to enable it to push up through a thin covering layer of earth — after all, the earth washed away from those plants for van Vliet's benefit must have been deposited somewhere else, perhaps over some other *G. ragonesei*!

My own little seedling of *G. ragonesei*, obtained from Till on our 1969 Cactus Tour, is a magnificent clay-like dark brown colour, but it has five adpressed spines at each areole, (not four as van Vliet describes) each spine being nearly black at the base, passing through a short length of red, whilst most of the length of the spine is pale horn coloured. I suspect its parentage is not solely *G. ragonesei*. My recollection of seeing a plant of this species in flower in the Linz Botanic Gardens, is that the flower tube was a distinct greyish colour; from the above article it appears that van Vliet makes no specific observation on this characteristic. On both these counts, reference to the original description would be very useful to indicate whether this apparent variation was within that to be expected for the species.

... from G.J. Swales

It now seems to be fairly obvious that there are two kinds of plants in circulation under the name of *G. ragonesei*. Only the flattened, very weakly spined one checks with the original description. The other, tending more to the globular shape and having characteristically sunken areoles, may well be a new species, variety, or form, but it is certainly not *G. ragonesei*. Perhaps this plant is the one seen in some recent lists as "*G. pseudoragonesei*", although as far as I know it has not been officially described as yet.

In his description of the flower of this species, van Vliet says that the stamens are "up to 3 mm long". If one allows for the length of the anther then this would leave a very short filament indeed, much shorter than I have seen in any other species of *Gymnocalycium*. Perhaps it would be worthwhile checking on this feature when my own plant flowers again.

The sketch of the seed of this species displays a reticulate pattern over the testa and when I look at my own seed samples of this species I find that the reticulate pattern is very obvious. Indeed, it serves to distinguish *G. ragonesei* from the other *Trichosemiaeae* seed. This reticulate pattern merges into the more familiar tuberculated surface at the flared "seed skirt" which seems to me to be a very suitable term for this feature. Parts of the pale coloured spongy tissue which wraps round the seed skirt will break off very easily when the seed is being handled. This material is not likely to be just the remnant of the funiculus, which should detach from the hilum like a perforation at an abscission layer. The seed has a central ridge which runs almost the full length of the hilum taking in both the funicular opening and the micropyle. It is probably this ridge which van Vliet shows to the right of his sketch of the seed, but it is not quite clear to me just what this sketch is actually portraying. In his description of the seed, van Vliet notes "the residue of the

funiculus grown out around the micropyle up to a wart (caruncle)". I find it quite incredible that the writer apparently confuses the residue of the funiculus with a caruncular growth, which are quite different parts of almost any seed.

In his discussion of this species, van Vliet says of the term Trichomosemineae, meaning "with hairlike projections", that "this is not correct". But in fact these hairlike projections have been drawn in on his own sketch of the seed of *G. ragonesei* and they can also be seen under a microscope without any difficulty. So I thoroughly disagree with his observation on this particular point and find Schutz's term Trichomosemineae quite appropriate.

... from E.W. Bentley

I see that van Vliet says that there is "an abrupt heightening at the hardly distinguishable funicular opening", but this comment does not seem to agree with his own figure!

## A MONTH IN SOUTH AMERICA By J.M. Chalet

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

At last the time has come when I shall be travelling to the South American continent. My craze for that part of the world arose a long time ago, only to be strengthened by my interest in cacti. Briefly, there I was one stormy evening and in a sweltering temperature (27° C at 23.00 hours) in the hands of the Brazilian customs at the international airport of Galeao. Their cordial reception augured well for my trip through South America. After having reached successively Sao Paulo, Curitiba, Porto Alegre and then Punta del Este on Uruguayan territory, I made for Montevideo and Buenos Aires. After a sojourn of a few days with some friends, I took the train in the direction of La Paz (Bolivia), a distance of 2,460 Km.

The first stop was at Tucuman, at 1,100 Km. This section cost 87 pesos (27 Swiss Francs) by special first class. The carriages are fitted with enormous ventilators attached to the ceiling. In the dawn of the 24th January 1973, the train arrives at the outskirts of Cordoba, an industrial town of 700,000 inhabitants. The houses coated with whitewash are topped by water tanks. The stationmaster raises his baton at 10.40 hr in brilliant weather. The fields of maize alternate with the thorn woods. Thousands of white butterflies whirled past like flakes of snow.

At Km 760 the railroad reaches the last outliers of the Sierra Cordoba. The countryside becomes more varied. As the train leaves the urban centres further and further behind and travels deeper into the country, the stations take on less and less an air of importance. They become almost the sole place for trade and for contacts between tourists and the natives. The children sell hunks of warm chicken, cooked maize, and *Opuntia* fruits. The houses are for the most part built in abode — a mixture of earth, water and grass cut and dried in the sun. The frame is made from dead trunks of *Trichocereus* or *Stetsonia*. These cacti are sometimes just used to reinforce the walls of the habitations. The windows are fewer and smaller.

After a halt at Dean Fumes, a real western station where five or six locomotives shunt around puffing at full blast, the aspect of the countryside changes. It is only an expanse of spiny thickets and dry grasses, from which emerge the first *Stetsonia coryne*, at first thinly scattered, then in groups steadily more dense — Km 860 to 885. Then, just as suddenly as they had appeared, they disappear to reappear yet twice again between Km 906 — 945 and 950 — 976, being before and after the crossing of the Salinas Grandes. At Km 922, the train stops at Veco y Mansilla. I take a photograph of children who sell *Opuntia* fruits at one peso (0.30 Swiss Francs) per Kg. However, whilst I am trying to film them, the children slide away.

At Km 970 a further stop in order to pass the train coming from Tucuman. Indeed, this section affords a unique vista with an occasional by-pass siding. I disembark and for the first time I can touch and photograph a cactus in its natural habitat. It is a magnificent *Stetsonia coryne* with fine black spines with shiny tips. What happiness and what fleeting emotions for a cactophile. The train set off once more towards Tucuman, occasionally at a reduced speed (30-40 km/hr) which enabled me to study the borders of the railroad in the hope of discovering other species of cacti. Chance smiled on me, for I saw *Cleistocacti* with red flowers, then some crowns of *Echinopsis* in the shade of a spiny bush. It is 17.00 hr and the heat is just as suffocating as always. The wind is warm and the sky a limpid blue. On the left arise the Sierra de Ancasti.

After having made the acquaintance of two students, I turn my back on the countryside for a short while. It is 22.30 hrs before the train pulls into the station of Tucuman. This town, situated at an altitude of 500 m., possesses one of the finest public parks in Argentina. It was in this town that the Argentine proclamation of independence was signed on July 9th 1816. In an idyllic setting, the Casa de Tucuman recalls this epoch.

## Comments

... from H. Middleditch

This article contains a very valuable clue to the relationship between the finding place of *G. ragonesei* and the actual point at which the Salinas Grandes occurs. Castellanos tells us that this *Gymnocalycium* is found between Km 969 and Totoralejos, this latter place lying about Km 952 position on the railway line. We are told by J.-M Chalet that the *Stetsonia* occur between Km 950 — 976, which is "after the crossing of the Salinas Grandes". But on my

American Geographical Society 1:1,000,000 map, the railway line crosses the Salinas Grandes between about Km 952–965. Both can hardly be correct. As a result of comparing maps from one or two other sources with these A.G.S. one million Hispanic America maps, I am beginning to suspect that the latter can leave much to be desired in the way of accuracy; further that there are sources of information available from which these maps could be updated but the publishers seem to be less than concerned about maintaining a good professional standard of mapping accuracy.

A map received from F.H. Brandt and presumably of German origin shows a completely different outline for the northern end of the Salinas Grandes but even this puts the railway crossing of the Salinas Grandes from Km 960 to Totoralejos at Km 938. However, it does mark Km 969 as a halt, beyond the "shoreline" of the Salinas Grandes. This appears to be the most likely patch in which *G. ragonesei* was found, perhaps in more open spaces between clumps of *Stetsonia*. Although van Vliet is less than explicit about the surrounding vegetation at the spot where he found *G. ragonesei*, he says that he was "walking towards the north shore of the Salinas Grandes", probably southwards from the Km 969 halt. This would also match his comment about clouds from the heights – presumably of Sierra Ancasti – floating "in the direction of the Salinas".

When crossing the narrow southern arm of this same Salinas, Nelida Serrano describes the surroundings thus: "In the middle of the Salinas, which has a breadth of only some 10 or 20 Km in this part, the vegetation became very sparse indeed, only some bushes of about 30 cm in height and between them *Salicornia* sp. "quite evidently, no *Stetsonia*. Equally, no vast expanse of bare salt pan, just "the ground covered in places with white patches owing to the great amount of salt present". Is this typical of most parts of the Salinas Grandes?

... from G.J. Swales

If you care to look at the legend accompanying each sheet of the A.G.S. Hispanic America 1:1 million maps, you will see a guide to the reliability of the geography of the area covered by each map. This varies from trigonometrical surveys to "adjusted from compiled maps". It would appear that the publishers accept that their maps could be inaccurate in parts. There are other maps which provide many more names of both places and geographical features than are to be found on the American Geographical Society maps.

#### WHAT IS THE "ARILLUS"? From Succulenta 52.11:73 By H. Middleditch

In his very interesting article on *Gymnocalycium ragonesei* in Succulenta 50.4:1971, D.J. van Vliet refers to the Buxbaum classification of *Gymnocalycium* and observes that "Buxbaum mentions with his type 7, the quehlium group, that there is no arillus-shell present. The question arises then, what is the material that entirely surrounds the hilum in the form of a sponge-like border?" The answer to this question is fairly simple, but the explanation is rather complicated since it involves the interpretation of a botanical term. We have all to get used to the botanical terms which constantly appear in our cactus journals, for authors must use the proper words to describe various parts of a plant, flower, or seed, if we are all to understand and benefit from their writings.

In every language, each word has a clearly defined meaning which can be ascertained simply by consulting a dictionary. It is by no means as easy to be certain of the meaning of a word in a foreign language, and even more difficult when it is a scientific term rather than a word in everyday use. In order to avoid any confusion as to meaning between one language and another, most scientific terms relating to flowers, fruits, and seeds, are in Latin. This means that exactly the same word can be used for any given botanical term, irrespective of the native tongue of the author. Unfortunately, just because the same Latin term is intended to be used for the same part of a seed, it does not necessarily mean that all writers do in fact use the same botanical term for the same physical part of the seed. There is a reason for this.

Most of us will regard Latin as a classical language used by the Romans many centuries ago; nowadays we have need for Latin words to describe scientific data which were quite unknown to the Romans. It has, therefore, been necessary to manufacture Latin words in recent years in order that they can be used by scholars for their studies. This has gone on to such an extent that a very great number of the words which now make up 'Botanical Latin' have no counterpart in Classical Latin. We can almost say that there are two languages, Classical Latin and Botanical Latin. One may obtain and refer to a "Dictionary of Botanical Latin" which is quite different, except for a few common words, from a "Dictionary of Classical Latin", just as one would obtain a Dictionary for the English language and another for the Dutch language. In addition to the Botanical Latin and Classical Latin, one may find that a certain number of Latin terms are used in the legal profession to refer to specific legal technicalities, so that one may almost regard "Lawyer's Latin" as yet a third sort of Latin language. The well-known Czech cactophile and *Gymnocalycium* enthusiast, Dr. Schutz, will very likely be quite familiar with this form of Latin in his professional capacity. It will therefore be evident that we do not have just one Latin language nowadays and consequently the likelihood of a misunderstanding in regard to the precise meaning of a word in Botanical Latin becomes more than just a remote possibility.

We ourselves may find it easier to understand some of the Latin terms used for parts of the cactus seed if we consider how the various parts of a cactus seed come to be formed. The cactus fruit which contains the seeds is formed from the ovary, which is at the base of the flower. The ovary is hollow and before fertilisation the ovary contains a number of minute ovules, each of which is connected to the inner wall of the ovary by means of a seed-stalk or funiculus. After

fertilisation the ovary expands as the seeds grow and ripen. The funiculus also expands during this process and serves to feed the growing seeds with nourishment. As it ripens, the growing seed expands and when it reaches its final size it develops a hard outer shell. We call this hard outer shell the testa. This covers the whole of the outside of the seed with the exception of that part of the seed which is still connected to the funiculus. When the seed is ripe and the funiculus has completed its task, it dries up and withers away, eventually breaking away from the seed.

If the funiculus breaks away cleanly from the seed, it leaves a scar on the surface of the seed over that patch where it had previously been connected to the seed. We call this scar the hilum. If the funiculus breaks off a short distance away from the junction between the funiculus and the seed, so leaving a short length of dried-up funiculus solidly attached to the seed, this short remnant of funiculus on the seed is described as a strophiole. This can be seen on numerous cactus seeds, *Parodia chrysacanthion* being a particularly good example. There are some excellent illustrations in Buxbaum's "Morphology of Cacti" Part III of the form of strophiole which may be found on seeds of *Blossfeldia*, *Parodia*, *Aztekium*, *Krainzia*, and *Phellosperma*.

In the Trichomosemineae group of *Gymnocalycium*, the margin of the hilum extends past the testa like the brim of a hat; it is also thickened, so that it projects down below the testa. On this account it tends to have some similarity in appearance with a strophiole. By careful examination under a microscope, it is possible to distinguish between a strophiole and a thickened, extended hilum, for the strophiole can be forcibly removed from the seed to leave the hilum exposed. In his "Morphology of Cacti", Buxbaum carefully refers to the thickened, extended hilum as a strophiole-like structure. However, he does not suggest that there is any distinct junction to be found to indicate that this is part of the funiculus rather than part of the seed proper. We are left to infer that the 'strophiole like structure' is still hilum and therefore part of the seed proper. It will be evident that the location of the junction between the funiculus and the hilum determines the correct term to be applied to any extension of the hilum; if this junction is within the "strophiole-like structure" then this feature is indeed a strophiole.

When the seed is in the process of ripening, the nourishment from the funiculus passes into the seed via a small aperture which is visible on the ripe seed. This feature is referred to as the funicular opening. It would appear that van Vliet in his article describes this opening as the funiculus, but this is not correct; the funiculus is the stalk connecting the seed to the inner wall of the ovary, sometimes described as a "seed-string". Here we have an example of the incorrect use of a botanical Latin term, in a fairly simple situation. It is not the first time this has happened and it is unlikely to be the last, but it does help to show how readily confusion may arise. Understandably, confusion may arise even more readily when we arrive at a more complex term, such as "arillus".

One may find a definition of this word "arillus" in the Royal Horticultural Society's Dictionary of Gardening, which states:— "Aril, Arillus. An extra covering of the seed outside the testa, developed in a cup like fashion usually from the tope of the stalk of the seed, rarely from the micropyle. An aril for instance is seen in the seed of the *Taxus* (Yew) and *Euonymus*, where it forms a scarlet coating and in the nutmeg where it forms a branched red growth around the seed — and in a large number of other seeds. In seeds of many *Euphorbiaceae* e.g. the castor oil bean, and in some *Leguminosae*, the aril is small and hard, instead of fleshy as it usually is, and is then called a caruncle. In some instances, e.g. in willows and in *Asclepiads*, the aril takes the form of a tuft of hairs, developed in the willow from the funicle and in *Asclepias* from the micropyle. An arillus developed from the micropyle is sometimes called an arillode."

Perhaps the classical example of an arillus almost surrounding the testa of the seed can be observed on the yew (*Taxus*). A similar sort of extra fleshy coat covers the testa in some cactus seeds. When this extra fleshy outer coat finally dries up, there will remain over the surface of the testa a film of tissue in the form of a thin and rather fragile coating. Because this layer is very brittle it fractures, and pieces may break off the seed as the fruit dehisces. On other seeds, remnants of the arillus layer are retained to a greater or lesser degree on the seed. This may in effect be observed fairly clearly on seeds of *Parodia ayopayana*, for example.

Buxbaum, in part III of his "Morphology of Cacti" provides a dissertation upon the arillus coat and illustrates several examples of an arillus coating on seeds of both cacti and other sorts of plants. His usage of the term "arillus" is in line with the R.H.S. description quoted above. Understandably, he continues to apply this term in the same manner in his study of the *Gymnocalycium* seeds, to which reference is made by van Vliet. Since there is no arillus covering over the outer testa of the seed of *G. quehlianum*, this fact is noted by Buxbaum. But of course, this particular seed does have a very thick and extended hilum margin, which van Vliet has evidently become used to describing as an "arillus". Hence the reason for his question, which starts this article.

It appears from his own article that D. van Vliet is familiar with the writings of Dr. Schutz, who applies the term arillus to the thickened margin of the hilum. Apparently following this usage, van Vliet applies the term in the same manner, the first time it has been so used in Western Europe. It appears that he has done so unconsciously and quite unaware of the fact that it is in contradiction to the use of the term by Buxbaum.

This, then is the cause of the confusion and the reason for van Vliet's question. The answer to his question must be that the arillus layer is the dry, fragile, thin outer covering around the testa which is present only on some cactus seeds; the sponge-like border of the hilum is an integral part of the hilum and therefore it cannot be given a different name — it is and must be described as part of the hilum. One may describe it as the hilum margin, or even as a "collar" —

as Buxbaum does. However it may be described, it is certainly not an arillus.

#### Comments

.... from A.F.H. Buining

There is not only the special Latin language of Botanical Latin, etc., but also that of Medical Latin.

.... from Dr. P.A. Florschütz (Succulenta 52.11.73)

There exist various definitions of the term 'arillus'. To stick with the English language one finds another definition in H.J. Featherly, 'Taxonomic Terminology of the higher plants' 1959 (there was a facsimile reprint in 1965). "Arillus, an appendage or outer cover of a seed which grows out of the hilum or from the funiculus". In the light of this definition, the use of the term arillus in the case in question is not incorrect. In practice it is often exceedingly difficult, without painstaking examination of the various stages between ovule and seed, to decide where the appendage comes from.

The term funicular opening is unknown to me. I would suppose that this is more or less the same as hilum. There is never a real opening. Nutrient is carried to the ovule by vascular tissue. The quoted definition from the Dictionary of Gardening is in fact broader than that of Featherly. An outgrowth from the micropyle is also called arillus here, but this is definitely not correct; it should be called arillodium, as is more or less optionally stated at the end of the definition.

It should be stated at this point, that if the micropyle and hilum are closely linked, as is the case in many plants including cacti, it is very difficult to establish where the appendage originates.

.... response from H. Middleditch

The term "funicular opening" is apparently unknown to Dr. Florschütz. If he would care to consult the Buxbaum-Krainz "Die Kakteen", in particular the descriptions of the seed which are included in the sections dealing with *Oroya* (C. Vb), *Buiningia* (C. IV), *Denmoza* (C. Vb.3) and *Notocactus* (C. IVa), he will find therein the term "Abrissloch der funiculus" applied to this feature. Again in the article about *Corryocactus* (C. IVa) he will find the term "Abrissoffnung des funiculus" used for this self-same feature. My Dictionary tells me that "loch" is a hole, so "Abrissloch der funiculus" apparently means outline of the funiculus hole; whilst "offnung" means opening, so "Abrissoffnung des funiculus" would appear to mean outline of the funicular opening.

There does appear to be a fair amount of choice when it comes to describing this particular feature, for elsewhere in the Buxbaum-Krainz "Die Kakteen" we may find the following further alternative descriptions for this self-same feature:—

In C. Vc, *Rebutia* — "Funiculus rest" = funiculus remnant

In C. VIc, *Parodia* — "Gefassbündelrest der Funiculus" = remnant of the vascular bundle of the funiculus.  
— "Funiculusanteil" = funiculus remnant

In C. VIc, *Notocactus* — "Trockener rest der samenstrangs" = dried up remnant of the seed-strings

— "Ausgebrochener funiculus ansatz" = attachment point of broken-off funiculus

— "Vertrockneter rest des Funiculus" = dried up remnant of the funiculus.

— "Abrissstelle des funiculus" = outline position of the funiculus

In his *Morphology of Cacti*, Buxbaum describes a remnant of the funiculus which is attached to the hilum as a strophiole, so it would appear hardly appropriate to use virtually the same term — here "funiculus rest" — to describe the funicular opening. The same comment must surely apply to the descriptions "Trockener rest der samenstrangs" and "Vertrockneter rest des funiculus". Both these terms refer to the remnant of the funiculus, or strophiole. Then we have the "Abrissstelle des funiculus", or the outline position of the funiculus — but the patch of surface over which the seed and funiculus were connected, appears in the ripe seed as the hilum: the same term can hardly be applied to the funicular opening, surely? Finally we have the "Ausgebrochener funiculus ansatz" — but the attachment point of the broken-off funiculus is the hilum, not the funicular opening. Would Alice have suggested that "He only doth it to mislead"?

Perhaps it would not be out of place to consider what is the precise nature of the feature commonly described as the "funicular opening". As already indicated, the purpose of the funiculus is to supply the growing seed with nourishment. It does this via the single vascular bundle which runs down the middle of the funiculus. This vascular bundle, like those in any other living plant, consists of two sorts of cell structures — xylem and phloem. The phloem is formed by cells each having an enclosing wall, similar to most other cells in a living plant. The xylem, on the other hand, is made up of cells which are connected end to end but without a separating wall between adjacent cells, so that they form a long hollow tube. Any break across the funiculus will expose this opening. When the seed is ripe and the funiculus withers and breaks away, it will expose this opening, albeit a minute aperture. Hence Dr. Florschütz is hardly correct when he says that "there is never a real opening". If there never was a real opening there would never be a route for water and nutrient to enter and ripen the seed. If we wish to be strictly accurate, this opening is not the funicular opening, nor yet the vascular bundle opening, but the xylem opening. However, the feature on the hilum commonly termed the funicular opening is actually the dried up remnant of the vascular bundle at the point of detachment — the "Abrissstelle des vertrockneter rest der ausgebrochener gefassbündelrest" perhaps?

It is to be noted that in his description of *Rebutia* seed in *Succulenta* 48.5:69, Brederoo observes in connection with the hilum: "Under the magnifying glass we can see in the tissue two more or less clearly perceptible openings to be found . . . .". Apart from the micropyle, presumably the other opening is that which, according to Dr. Florschütz, does not exist. Yet a further variation on the theme may be found in Cardenas' description of *Parodia ayopayana* (Chileans No. 27 p. 175) wherein it states that the "hilum is covered by a large aerenchymatic cushion". Presumably this will be the strophiole?

. . . . from G.D. Rowley

Outgrowths on seeds can be of adaptive value in many ways. They may be protective, or associated with mechanisms for dispersal. The section in A. Kerner & F.W. Oliver "The Natural History of Plants" II: 423-425 & 442, 1895, is still as good an introductory account as any I have seen. The hair crown on a *Stapelia* seed is a familiar example of an obvious adaption for wind dispersal. The "Spring Snowflake" (*Leucojum vernum*), which favours damp shady woods, relies on the attentions of ants which are attracted by the shiny coloured knob on the end of each seed, and carry seeds around for some distance. The selective value of such appendages, therefore, has favoured their development in many different and unrelated Orders of plants, and often by modification of different parts of the seed (or whole fruit). Parallel evolution has been at work, and botanists, who love to rationalise and classify, find it difficult to devise terms which can apply to all cases, especially where the origin of an appendage may not be clear.

Regrettably we have no international body that standardises the application of botanical terms in the same way as botanical nomenclature, so a term used in a precise and narrow sense by one worker may be used in a broader, more general sense by another. Of course, all terms are liable to misuse, and when concerned with unfamiliar or microscopic organs the misuse may pass uncorrected. For instance, in *Cacti. & Succ. J. Amer. XLV: 225, 1973* you will see in Fig B1 the hilum labelled "funiculus" — a slip of the pen no doubt. Where terms are used ambiguously, we can only exhort botanists to avoid using them, or to define (preferably with the aid of a diagram) the sense in which they intend them to apply.

If you wish to go into the niceties of embryology, I recommend: P. Maheshwari — *An introduction to the Embryology of the Angiosperms*, 1950. The readers of the *Chileans* will soon be needing a crash course in embryology to keep up with this sort of interest!

. . . . from E.W. Bentley

With reference to the article about the "arillus", it is rather unsuitable to use *Taxus* as a guide to the seed of flowering plants, since it is a Gymnosperm with a rather different organisation. However, as a matter of fact, arillus-wise, it is fairly in line with the Angiosperms.

No doubt the article is right about the present terminology in use to describe seeds. But if this is generally accepted by botanists then the meaning of some words have changed. If for example you consult an established text book such as Strasburger, the arillus is described as a (sometimes present) succulent outer covering of the seed, derived from the chalaza. This in turn is described as the basal portion of the nucellus — the tissue including the ovule.

Seeds do not suddenly develop a complete testa from one end to the other round the embryo sac. I believe that the integument — which later becomes the testa of the seed — grows upwards from the chalaza and round the rest of the nucellus, in some instances at least, if not in all. The integument is often formed of an inner and outer layer and for a long time is much more prominent at the end away from the funiculus, as shown in the first sketch herewith. There is no impediment to the chalaza pushing up a further layer of tissue below and outside the integument — in other words, an arillus. And in a cross section of *Taxus* at a certain stage of seed development you can see this happening, as shown in the second sketch herewith. (Both sketches are after Strasburger — a very old edition).

Lastly, I think the response from H. Middleditch to the comments from Dr. Florschütz are taking it out of the Doctor rather un-necessarily. In the first place I would bet that the vascular bundle in the funiculus is composed of several phloem and xylem columns — so that if there is indeed an aperture, there are more than one! Furthermore, I expect that by the time the funiculus breaks away these cells will have dried out and collapsed — so that there is nothing to justify the name 'aperture' and so I agree with Dr. Florschütz on this point.

. . . . from R. Moreton

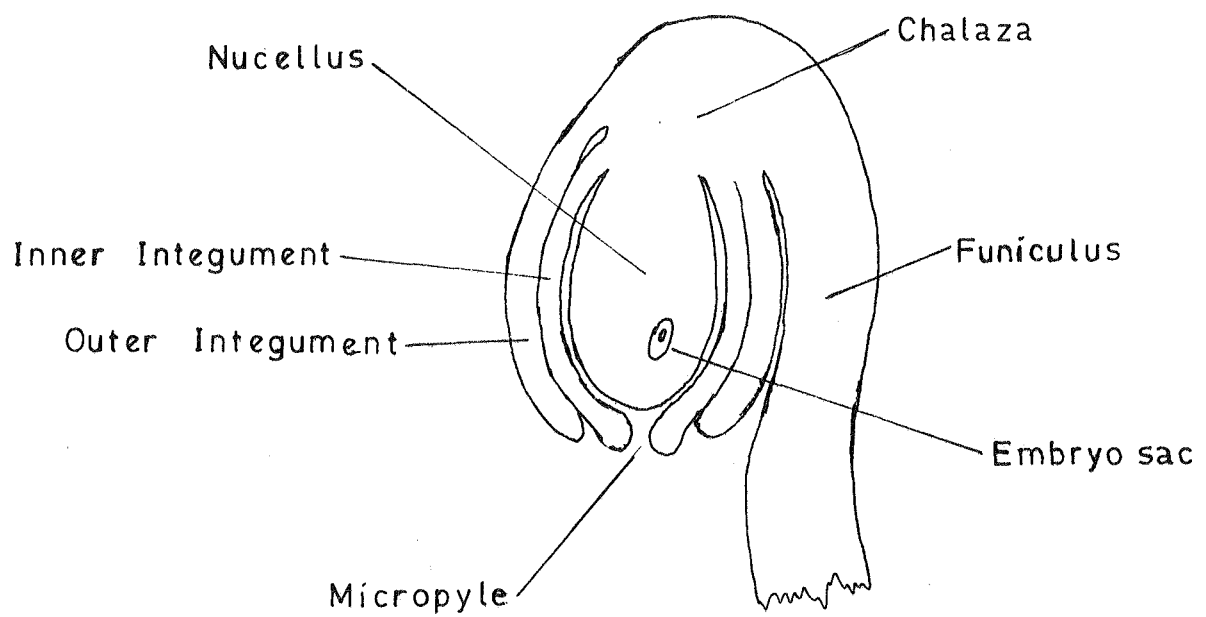
You have picked some fine examples of various German words for translation, I must say. Those which have the particle "Abris—" : this appears to be the imperfect of *abreisen* — to break away, tear off, rupture. Thus *abrisloch* must mean the hole caused by the tearing off of the funiculus. *Abrissoffnung* has the same meaning. *Abrisstelle des funiculus* = place of breaking away of funiculus.

. . . . further from H. Middleditch

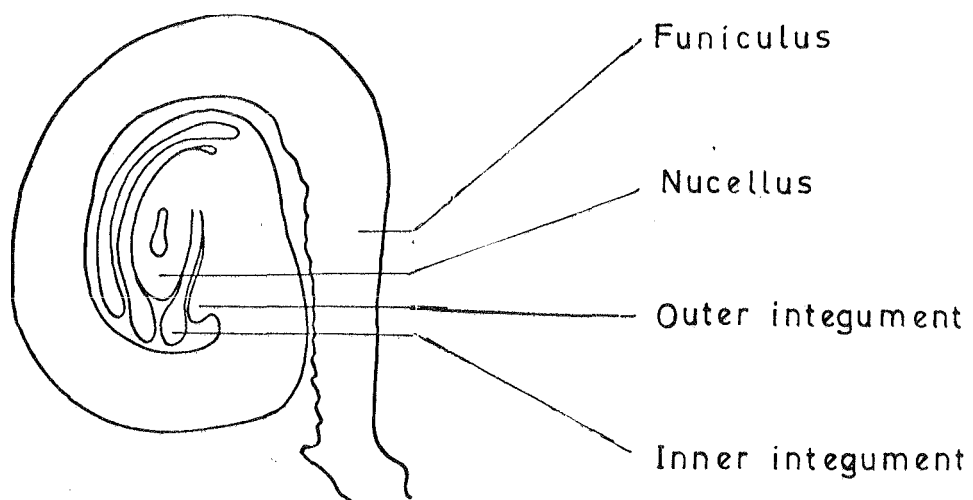
But if these words are derived from 'abreisen', would not they then be spelt *abrisloch* and *abrisstelle*, rather than *abrisloch* and *abrisstelle*? Does not the "abris" come from outline?

. . . . further from R. Moreton

Regarding "abris—" ; I am not too keen on your alternative, as the meaning is "outline" in the sense of synopsis or summary. Outline in the sense of periphery is "umriss". Perhaps a proper technical translation is *abscission scar*.



Early growth of ovule into a seed - E.W. Bentley (after Strasburger)



Development of ovule of *Opuntia aurantiaca* (after Archibald)

Arillus layer  
- start of growth  
around ripening ovule  
(after Strasburger)

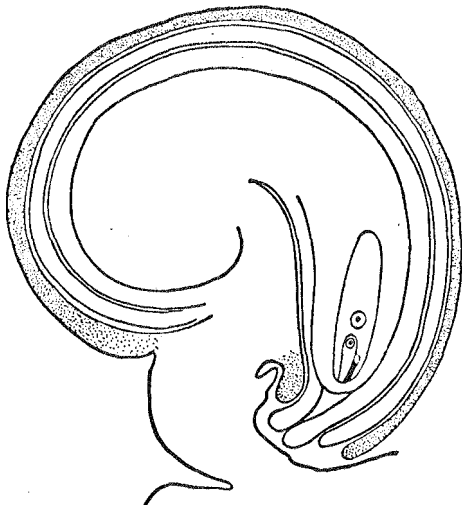
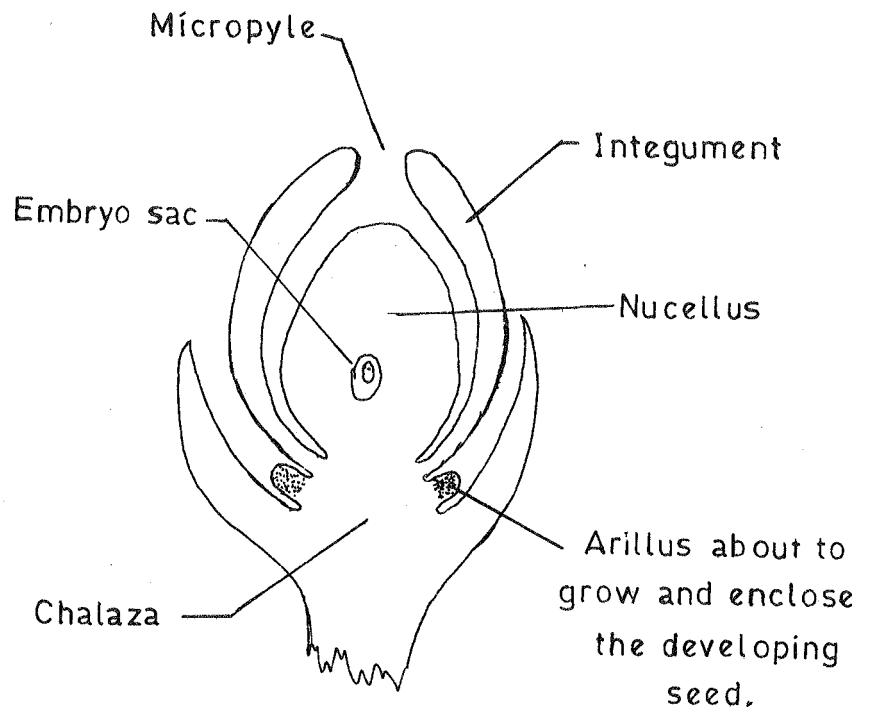
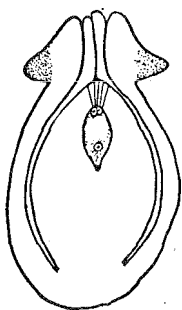
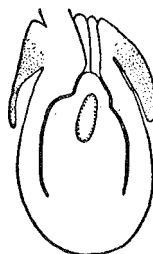


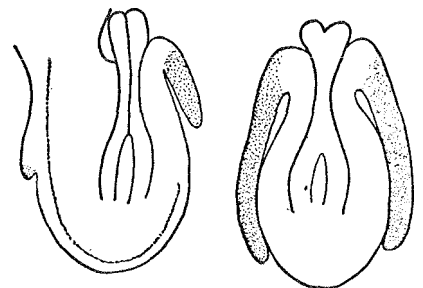
Diagram of ovule showing origin of  
aril or third integument  
*Trianthema monogyna* (after Bhargava)



*Brachytilum horsfieldii*  
(after Mauritzon)



*Burbidgea schizoeila*  
(after Mauritzon)



*Careya arborea*  
(after Mauritzon)

Diagram of ovules showing origin of Caruncle



.... from R. Rolfe

The abrisssloch and abrisssstelle are pretty obviously compound words and are somewhat difficult to translate. Can I start by observing that I have come across yet another version of this term, "Funiculusabbruchstelle" meaning the hilum (of seed). This came from my German-English Science Dictionary, Louis de Vries, which also gives me:— Riss = fissure, crack, tear, laceration; Rissstelle = location of crack, suture of dehiscence; and ab (when used as a prefix) = off, away, from: hence abrisssstelle = abscission layer.

.... from G.J. Swales

The argument over the use of the term "funicular opening" would seem to me to hinge round the question of the cellular passages in the funiculus along which food and water pass to the fertilised ovule. This funicular conducting strand is formed by xylem and phloem cells which are elongated cells placed end to end like sections of piping. The aperture resulting from a fracture of a xylem or phloem cell is so minute as to be insignificant, particularly in comparison with the size of the micropylar opening. Hence I don't think that I could go along with the argument that fractured xylem and phloem cells form an opening and so I would suggest that there is indeed no specific opening. In this, I would agree with Dr. Florschütz.

In regard to the terms such as "dried up remnant of funiculus", I have seen a slight projection which could be described in this manner on some *Gymnocalycium* seeds which I have examined under the microscope. I suspect that this is the remnant of the dried up vascular strand of the funiculus. Hence I would favour this latter form of description for a feature which possesses this appearance. It would, perhaps, be possible that when Prof. Buxbaum has been examining seeds of various genera and species that he finds there is some variation in the appearance of this particular feature and hence he has described it in various different terms. He could possibly be doing this quite deliberately, to keep us informed, rather than to mislead us.

However, there is another possible explanation for the varying manner in which the remnant of the funicular connection is described. If this remnant is examined under a magnifying glass it may appear to be an opening due to the frayed ends of the remnant splaying out somewhat. This tends to produce a dark centre to the remnant which would look as if it was an aperture. Knowing the difficulty of locating the micropylar opening, even with the aid of a microscope, I am concerned at the practicability of drawing conclusions from examining and drawing a seed with only the aid of a magnifying glass. Brederoo specifically refers to the use of a magnifying glass for this purpose in the extract quoted by Harry Middleditch. It rather worries me that Brederoo may have used a magnifying glass for all his seed sketches, because the features illustrated in his sketches may be seen differently if viewed under a microscope. I wonder what equipment is used by Prof. Buxbaum for the purpose of preparing his seed sketches?

The accompanying sketches show the origin of a caruncle from the backward growth of the outer integument from the vicinity of the micropyle, compared with the origin of the aril which is a different growth in the form of a third integument. However, when one examines a seed it is very difficult indeed to decide the origin of the growth. Davis and Heywood, in their "Principles of Angiosperm Taxonomy" refer to arils, caruncles and elaiosomes on the seed and note that "there is a wide diversity in the application of these terms which are often applied conventionally to certain groups". If the membrane formed as a third integument is to be regarded as the aril, then one could use the term caruncle to describe the distended hilum such as that found on seeds of the *Trichomosemineae* group of *Gymnocalycium*.

However, if the aril is formed as a continuous membrane, it does not explain how the aril is found on ripe seed in discreet patches, apparently quite separated one from the other. In the U.S. C. & S. Jnl XLVI.4.1974 the report covering an examination of some cactus seed by means of an electron microscope, includes the comment "However we have never observed the 'peeling off in shreds' of the aril suggested by conventional examination". Although the aril is indeed frequently found in patches, I have never found loose, friable, or detached portions of aril on any of the hundreds of *Gymnocalycium* seeds that I have examined.

I see that Cardenas refers to the seed of *Parodia ayopayana* with a hilum covered by an "aerenchymatic cushion". Aerenchyma is a technical term for plant tissue containing air spaces. I personally would not have used it in this context, but obviously it refers to the dead spongy tissue associated with the hilum of so many cactus seeds. When I first examined seeds which displayed this feature I found some difficulty in arranging the seed so that I could see the testa, for the enlarged hilum usually faced upwards. I came to the conclusion that the centre of gravity of these seeds would cause them to land hilum upwards when carried away from the parent plant by wind or water. The porous nature of the enlarged hilum would tend to take up water readily from a morning dew, and so trigger germination of the seed.

.... from J. Hopkins

On *Lobivia* seeds the arillus layer is characteristic of a pulpy fruit where the filling is almost a solid jelly. I do not recall having seen an arillus layer on a fruit which contains fleshy funicles, at all. I may perhaps have come across one or two cases where the arillus layer gives the impression that it is flaking off, or about to do so, but this is certainly not common. This may possibly be where a patch of pulp has dried off on the seed and gives the impression of being a remnant of an arillus layer — this sort of patch comes away from the seed quite easily. I would agree with Geoff Swales that a true arillus layer is very firmly adhering indeed. In *Lobivia* seeds I find that an arillus layer is usually a complete cover; it appears in patches only on a minority of *Lobivia* seeds, usually on those of the *Incaica* group. I would regard

it as open to question whether these patches are a true arillus layer.

## **A SPRINGTIME CHILEANS' MEETING**    Reported by P.H. Sherville

Brooksby, by now familiar to those Chilean members who regularly attend the Autumn Gatherings, had a somewhat different appearance in early April. An overall fresh green replaced the more familiar tints associated with September, with some fine newly-formed red pine cones, daffodils, and other signs of Spring were evident. Hard overnight frost persisted until the sun had risen well into the sky, a reminder for early risers from more southerly latitudes of one of the benefits of living in the south of England; naturally those from the north were all saying how warm it was and how well advanced the plants were this far south!

After the evening meal on the Friday, discussion commenced with one of the main topics of the weekend, the proposed trip to the cactus lands of South America. Each member who had considered participating in this trip presented their own views on objectives, a suitable itinerary, and potential problems, as each saw the situation. Paul Sherville explained that his own thoughts for an itinerary had been considerably amended from the proposal outlined in Chileans No. 32, and now centred around north-west Argentina and southern and central Bolivia. He had investigated some basic costs of reaching the habitat from the U.K., and of various modes of travel around the cactus habitats. It would seem from the available literature that roads as we know them are virtually non-existent in large areas of Bolivia. Here a vehicle may be a hindrance rather than an asset. It was observed that many of the explorers who had visited that area had relied on the existing public transport and then either by foot or mule to the habitats; we may be no worse for following this example. In regard to any plant material procured, two major nurseries in the U.K. and some private individuals had offered to receive plants from Paul Sherville and to keep them isolated and used for seed and vegetative propagation. For this they were prepared either to pay for plants on receipt, or to make an initial financial contribution. It would first be necessary to secure a licence to collect plants and it was quite possible that the only proceeds from the trip would be data and, if we were lucky, seed. Discussion then turned to the possible collection of data concerning the plants in habitat and of relevant meteorological data. However, enquiries into this latter aspect showed clearly that it was impracticable to obtain worthwhile data.

Stephen Davies, a final year student at Kew, then explained how he hoped to participate in the expedition provided he was successful in his application for a travelling scholarship. He had also investigated some of the problems which had arisen to date. Firstly, he foresaw no problems in securing licences to clamber over the Andes and collect plants, but said that applications could take up to 6 months to obtain. Similarly, he did not envisage any problems in taking more than £300 overseas, provided that the necessary formalities were complied with, a facility which was readily available to him at Kew. He went on to explain that Kew were interested in the field selected and that, apart from his own interest in cacti, he could be undertaking some research on the Commelinaceae, which includes members of the popular house plant genus of Tradescantia.

John Hopkins then put his views to the meeting, explaining that he was especially interested in an itinerary which included known habitats of the plants he was studying i.e. Lobivias. He felt that some aspect of conservation should be a major objective of the trip and stated that he intended to bring back only three or four samples of each clone, for propagation purposes. Since there was so little known of the real extent of distribution of any cactus species in habitat, he felt that this would be a suitable subject for field study since it would ascertain where the real need for conservation lay. Such data must surely be of use to conservationists as a whole, so he had made an approach to the World Wildlife Fund with a view to seeking their interest and support for this study.

Finally, Roger Ferryman indicated that he now felt that he would no longer be able to cover the ground of prime interest to him within the time available, and it might not be the right season for finding plants. It was, therefore, unlikely that he would be participating in the trip. The other Chileans member who was interested in this trip was Bryan Adams who was at present out in the West Indies in Montserrat. His prime interest was reported to be the Echinopsis-Pseudolobivia habitat.

In the course of correspondence since our previous autumn meeting, advice has been sought from our members in Montevideo and in Buenos Aires, especially in regard to daily costs of food and accommodation and also for transportation, to enable participants to prepare a financial budget. Unfortunately no reply had been received from Buenos Aires to date, but the contents of the reply from Montevideo were conveyed to the meeting. It was the general feeling that the cactus Flora of the Andes may well pose even more tempting problems than that of Uruguay, where travel and travail may be less onerous. The early hours of Saturday morning being already upon us, further discussion was adjourned for informal exchanges during the rest of the weekend.

Later on Saturday morning (after breakfast), Dave Whiteley chaired a discussion on members of the genus Neochilenia, which Donald & Rowley now included in the all-embracing Neoporteria. The speaker explained that he could find no clear dividing line between the various genera established by Ritter and Backeberg viz: Neochilenia, Chileorebutia, Pyrrhocactus, and Horridocactus. These plants are of Chilean origin. Those from the more northerly habitats were predominantly yellow flowered, pink flowered species appearing in the more southerly habitats. The most

northerly and yellow flowering *N. aricensis* is almost indistinguishable from a yellow flowering *Islaya*. There are great problems with some names, thus *N. jussuei* appeared to embrace plants of widely differing appearance and with dissimilar flowers and had been applied throughout its history to a variety of quite different plants. Likewise *N. setosiflora* seemed to have meant different things to different authors. The plant known as *Delaetia woutersiana* was only a male-sterile form and thus had no real status. It was suggested that many of today's problems stem from the publication of a number of taxa whose descriptions were based on characteristics like hairiness of the flower tube or colour of the spines and could without much difficulty be applied to plants of differing appearances. Chief culprits, it was suggested, were Backeberg and Ritter, but many earlier descriptions were rather vague, which when coupled with a habitat location quoted as "Chile" compounded the clarification problems facing contemporary workers with these plants. A slide was shown at the close of the discussion of a *N. occulta* which was seen in Austria in 1964 when visiting a collection which included a superb selection of Chilean plants, most of which were then virtually unknown in the U.K. It was the lack of information regarding these plants at that time, which led directly to the formation of The Chileans.

It was suggested by Harry Middleditch that the problems outlined by the previous speaker were basically similar to those encountered by Roger Moreton when the identification of various *Parodia* was under discussion, and that was in "knowing where to start". Even the determination of old established species can sometimes be difficult, and hence we lack a basis with which to compare a wealth of new introductions and it becomes difficult to offer guidance on problems of identification. It was explained that it was for this reason that a particular effort was now being made to define clearly various supposedly wellknown species in the Chileans, so that we would know "where to start" in a study of a genus.

A topic originally opened at our previous autumn meeting was the genus *Austrocactus*; a number of slides were then shown of some species of *Austrocactus* in flower. It was noticeable on one slide that flowers bore stamens inserted in two series, one set closely applied to the style and the other seemingly arising from a ring of hymen near the base of the inner petals. This feature was not evident on the other species of *Austrocactus*. It was also noted that the outer petals bore spiny tips very similar to those found in the genus *Acanthocalycium*, but again this did not appear to be in evidence on the other species. The habitat of these plants is in Patagonia, the southerly part of Argentina.

After lunch a discussion on conservation was opened by Harry Middleditch who reviewed recent legislation dealing with the international trade in cacti, and suggested that there was every likelihood of plant importation not just being markedly reduced but possibly terminating altogether in the foreseeable future. It was asked whether The Chileans should ask for special dispensation to acquire imported plant material, since members study their plants rather than "just collect" them. The point was made that much useful data not available elsewhere in the literature had already been compiled and published under the auspices of The Chileans, something which many — if not most — of the established Botanic Gardens had failed to do.

The floor was then taken by John Hopkins who reviewed the means by which The Chileans could further the cause of conservation. He began by trying to define the word "conservation", which the dictionary tells us is: to keep unchanged or in a sound state or to safeguard a situation. In this sense he indicated that conservation was for nature's benefit as well as for that of mankind; he felt that we had no real understanding of just which species were endangered in habitat and thus required protection. The last U.K. plant survey, in which the country was split into 10 Km squares, occupied 2500 botanists for nearly ten years. By comparison the area required to be tackled in South America is many times greater and the nature of the terrain makes any such survey even more difficult. It is also doubtful if the local resources are adequate for such a meticulous survey. As this task was virtually impossible to undertake, it was suggested that the immediate need was to identify those species which required protection now. The prime causes of ecological disasters were then reviewed: Development, by expanding agriculture, mining, industry, tourism, or urbanisation; Geographical, which may be local in effect such as landslides, or more widespread such as climatic changes — some of which can be attributed to human actions; and lastly, Collectors. It was suggested that collectors who pay local natives so much per plant and are unable or unwilling to take a large harvest, leaving the excess to rot, were perhaps the greatest threat. Collectors tend to specialize in the rarer species and this very selectiveness was a hazard to uncommon plants. Even conservation measures were not always effective — the cause of the African elephant was cited, which was in danger of becoming extinct due to poaching even though it was on "protected" reserves. The analogy lay in the recent report in the *New Scientist* of "cactus rustling". A protected habitat attracts poachers since it is a known source of supply, avoiding time-wasting searches elsewhere and insufficient finances are available for really effective supervision of a large area. The only real answer lies in controlling the outlet i.e. the market, or even removing the outlet completely.

The speaker now turned towards the conservation of existing material in cultivation, expressing his agreement with the view that it would be a sad day for those interested in studying a special group of plants if all original material was to be denied to them. However, we should be able to show our fitness for receiving fresh habitat material by how well we looked after that which we already possessed, and it was suggested that much more could be done to propagate and thereby conserve existing imported material than had previously been the case. Propagation could be undertaken in a variety of ways, by vegetative means, by grafting techniques, and by seed production. It was stressed that any material in cultivation was vulnerable to the vagaries of life, such as power cuts, and so the more widespread the distribution of any

species, or even of individual clones, the safer the material would be. The speaker had already organised an extra greenhouse specially for purposes of propagation and invited members to let him have any spare offsets from habitat plants, or any imported plants which were no longer required due to their battered appearance or damaged parts. These would be grown for propagation and distributed to members. Information on origin, field numbers, etc, would be welcome where available with such plants. It was suggested that widespread distribution of vegetative offsets from one plant or clone could give a misleading idea of a species, but it was agreed that we could only work with the material available. The more exchanges that were made, the less would be the likelihood of such misapprehension arising.

The possibility of producing authentic seed from imported habitat plants now in cultivation was then discussed. There were problems in bringing together plants from different members' collections for cross pollination. A list of members willing to loan plants for cross-pollination was agreed to be of little practical use when its real value was analysed. In any case it would be necessary to ensure that no inadvertent pollination took place because if that did occur then the resultant seed would probably be hybrid even though it would be distributed as guaranteed genuine. Such random pollination could be avoided by isolating the plant for the duration of the flowering, either by removing it from the greenhouse or by keeping the whole plant in a polythene tent until the fruit has started to form. It would also be necessary to ensure that the habitat plants really were the same species and it was agreed that this was a rather more difficult problem. To send pollen by post was courting disaster since the confusion in labelling plants from field collectors and nurseries could easily result in crosses which would not occur in nature although both plants may have the same name on the label. Nor could we know whether two plants having somewhat dissimilar appearance would grow in habitat within normal cross-pollination distance of each other. Conversely two plants of comparable appearance could well grow beyond cross-pollination distance apart in the wild and the seed from such a cross would produce a new strain unknown in nature. It was eventually agreed that if Chileans members judged two plants before them to be closely akin before cross pollinating them, then this was the nearest that we could expect to reach in practice to attaining genuine named seed from plants in cultivation. It was suggested that the appropriate study group leaders could assist in bringing plants together for seed production by putting those collectors in touch with each other who wished to obtain seed from imported plants.

It was abundantly clear that many problems still remain to be resolved in relation to the whole issue of conservation in cultivation. The least that the Chileans could do in this respect was to try and disseminate ideas of vegetative propagation and to encourage good practice in seed production from imported plants. Members present were asked to contribute towards this by word or deed as they each felt able or inclined.

After a short break, the meeting continued with an explanation by Roger Ferryman on the techniques of grafting very young seedlings onto *Peireskiopsis* stock. The system consisted simply of taking a young seedling, ideally about ten days old, but anywhere between 3 days old and — in some cases — up to 2 months old, cutting it in half, and placing each half on the freshly cut succulent young stem of a piece of *Peireskiopsis*. It was important to use only the most succulent portion of the stem of the *Peireskiopsis*, near to the top; when it was growing very quickly this useful zone would extend about  $\frac{1}{2}$  —  $\frac{3}{4}$  of an inch below the growing tip. The only other ingredients for success were warmth, 80/85°F and high humidity — 90 to 100%, and of course a steady hand. The lower half of the seedling was grafted inverted, leaving the roots intact, and this rapidly produces offsets which can be removed and either rooted down, or regrafted onto fresh stock. Some samples of this process were on display, including a ten month old *Rodentophilla* over one inch in diameter, plus a slightly smaller *Discocactus horstii*, already offsetting.

In response to questions, the speaker stated that he used a surgical eye knife, but thought that a razor-blade would do, the important thing being not to squash, tear, bruise or damage the region around the cut surfaces in any way; a clean cut was one of the prime essentials to success. He added that no weight was required to hold the grafted seedling in position, and he just allowed it to float in the sap of the stock. The *Peireskiopsis* stock was quite durable and would stand low temperatures of around 55°F over winter. Loss of leaves, while being undesirable was not in his experience deleterious, but it was important to keep the stock growing over winter, hence the 55°F temperature. With some species, it had been found that they tended to offset profusely in the early stages after the graft had taken, the offsets being removed shortly after they formed, and it was found that the main plant then grew away cleanly. With regard to using offsets from the same parent stock for his supplies of grafting stock, no problems had been experienced to date; however, it was suggested that problems could occur, which may require starting off a second source of stock. In this connection, offsets from *Echinopsis* plants which had often been used for subsequent grafting had been found to deteriorate after some time. The best results were obtained by raising seedlings of the Paramount Hybrids to use as stock.

After tea, the discussion turned to some problems encountered in trying to obtain close-up pictures of flower-parts, seeds, areole structure, etc. Pip Smart set this discussion away by observing that commercially available macro-photographic equipment was not entirely suitable for our purpose, and proceeded to demonstrate some of his own home-made equipment. This consisted of a rigid wooden board on to which he had fixed a set of interchangeable plastic tubes of different lengths which had been adapted to accept the camera at one end and the standard lens (reversed) at the other. Special care had been taken to keep the camera body perpendicular to the lens/tube assembly, for the speaker felt that it was essential to align the film plane exactly perpendicular to that of the lens axis. The tubes themselves consisted of lengths of plastic drainpipe coated on their insides with a matt-black paper. This system of up to 800 mm extension

tubing gives a series of fixed magnifications of x5, x7.5, x10, and x12.5, which facilitates the calculation of exposure time, which is important even for those with cameras equipped with through-the-lens metering. The fixed magnification ratios are again of advantage when slides are later projected, as the magnification concerned can be quoted without the need to incorporate scales on the slide.

The complete assembly was secured to a heavy wooden table in order to eliminate any movement of the camera. For taking close up views of seeds, these were secured to the vertical face of a block also rigidly attached to the table. For flower sections, a simple device was used for orientating the subject in front of the camera. It consists of a piece of black material glued to a square of wood which has a tripod bush fitted at the rear. This was then fixed to a standard ball and socket joint on a tripod and the sliced flower was pinned to the black material and could then be angled at will before the camera. We then saw some slides of seeds which had been taken with this equipment, three *Aylostera* seeds almost filling the screen.

Returning to the indication of size on close-up photographs, John Hopkins briefly demonstrated the system he uses, which consists of a black card with a grid marked with white ink of two axes graduated in centimetres. Geoff Bagnall then showed his system which consisted of a plastic coffee-jar lid, with just one scale applied with Letraset figures, again graduated in cms. Francis Fuschillo showed some slides of *Gymnocalycium* flowers, also separate petals and finally some seed, taken against a graticule background. These were all taken with a standard set-up using a 100 mm lens together with a 50 mm lens reversed on the end, lighting by two electronic flash units, in established positions on a table-top. After initial calibration, no further adjustment or calculations were required for exposures. For modelling seeds, a sheet of clear plastic was mounted on four dwarf legs and the surface was scribed off in a grid of 2mm squares. A hole 0.012" diameter was drilled in the centre of each grid square. With the normal set-up, about six squares of this grid nearly filled the field of view, so a slide can compare six species of seeds or six views of the same sort of seed. Slides were shown with some seeds having their hilum facing the camera, an attitude which normally involved much painstaking fiddling with double sided sellotape or the like.

The discussion then turned to the problems and snags of taking close up shots of sliced flowers. Using a slide of a sliced flower from *Gymnocalycium sigelianum*, Harry Middleditch demonstrated that when the slice was made at about 2 mm in front of the style, one could see a ring of short stamens arranged spirally round the base of the style, while the flower tube exhibited a broad U-shape in section. When the same flower was resectioned a mm or two closer to the style, the spiral arrangement of the lowermost stamens was no longer apparent, but now the lowest part of the style and its surrounding nectar chamber could be seen, giving to the internal profile of the tube an urn shape, which was quite different to the preceeding section taken in the same flower. This would suggest that more than one section could be needed to portray some flowers adequately. Extending this idea, a thin section was then shown from the same flower, similar to the sketch of a flower section as it is normally portrayed in the literature i.e. without any back to the flower. It had proved difficult to take a thin slice down the centre of a flower. However, Pip Smart then showed a similar type of slice of an *Echinocereus* flower, although he confessed that it was the end product of a number of abortive attempts to make a thin slice. He had not yet found a simple method of doing this. These were the very first slides shown to the Chileans of this mode of flower section, which had previously been entirely the province of a botanical artist.

Continuing in the photographic vein, Geoff Bagnall took up a topic introduced at the previous autumn meeting, concerning optimum combinations of telephoto and other lenses. By using a graticule as the subject, the magnification had been established for various alternative lens arrangements and the results had been plotted on logarithmic graph paper. Initially using extension tubes only, the shorter the focal length of the lens, the better became the magnification. Then using a reversed 50 mm lens, this was mounted on a primary lens; as the focal length of the primary lens increased, so did the magnification. Without a primary lens, magnifications of up to 8 to 1 were attainable with long extension tubes. With an additional primary lens, light transmission was greatly improved giving less problems in focussing at small apertures, and magnifications of up to 20 to 1 were attainable. This magnification could be achieved either with 850 mm of extension tube on a 200 mm primary lens and a 50 mm reversed lens, or with 85 mm of extension tube on a 600 mm primary lens and a 50 mm reversed lens. It was anticipated that even these figures could be improved by using a shorter focal length lens than the 50 mm e.g. one of 12.5 mm. It had been suggested immediately prior to the meeting that a lens from a cine-camera may prove suitable for this purpose, as they are a standard product in the cine field but could be very expensive when built specifically for a 35 mm format. It was suggested that a cine lens lacked an iris and so would be unsuitable; it was hoped to have the answer to this question by the time our Autumn Gathering came round.

With several good macro slides of seeds now available, these were used by Harry Middleditch to indicate points of interest and identification when comparing seeds, several members having enquired what to look for in this context. Points worthy of note were the seed coat or testa, whether it was black or brown, glossy or matt, smooth or tuberculate, and if the latter whether the tubercles were of a particular shape or disposition. Some seeds are nearly round in shape while others are thin and nearly flat. In outline, most seeds possess a flatter profile at the hilum; some have nearly a round outline, others have a flare at the margin of the testa where it joins the hilum. The hilum can be perpendicular to the major axis of the seed or at an oblique angle. The hilum can be as broad and as wide as the seed, or narrower. In profile the hilum may be flat, or vee-shaped, or peaked. It may even be depressed. In outline it may be round, or long and thin, or

even waisted. Its colour is usually white or cream. The body of the seed sometimes has a keel running all or part way round the testa and this is worth noting for both degree and extent. Finally, a somewhat controversial feature to look out for is the presence or absence of an aril — a thin membrane laid over the testa, but care should be taken not to confuse this with the dried remains of any pulp which remained on the surface of the seed.

To finish the evening, we were treated to some slides by one of our members who had visited some fellow Chileans out in Australia. There were slides of *Opuntia vestita* in flower, and among various other species there was a plant called *Notocactus rubriflorus* in flower. The relationships of this particular plant gave rise to some discussion. As Saturday gave way to Sunday morning, the meeting was temporarily adjourned until after breakfast!

The first discussion on Sunday was chaired by Pip Smart, on the subject of fruit produced by *Weingartia* and on the closely related genus *Sulcorebutia*. In earlier issues of *The Chileans*, members had expressed some difficulty in getting fruit and seed to set on these plants. Some seed had been produced by the speaker by means of cross pollinating flowers on *Weingartia* with others on *Sulcorebutia*. The two parents used for each cross had been identified and recorded. Most success had been attained in setting fruits on the more northerly members of the *Weingartia*. On measuring the resulting capsules, a gradation in size was found, increasing from north to south. The speaker stressed that only one series of such measurements had been made and these would need verification from other collections and also from his own plants in subsequent years to establish the consistency of the observations. Starting with the smallest seed capsule, the sequence took the following order of increasing size: *Weingartia multispina/pulquinensis/hediniana/neumanniana*/FR50 to *Sulcorebutia breviflora/haseltoniana/tunariensis/hoffmanniana* (Lau 977). A seed count revealed an increase in numbers with increasing fruit size as far as *W. hediniana* and then a decrease again to *W. neumanniana*. The fruits dry very quickly, from a fleshy berry to a dry capsule with a fibrous wall through which the seeds can be seen. In fact the wall bulges to accommodate the seeds, and looks as if the seeds could come through the wall but this has never been seen to happen. All the seeds escape through the lid of the capsule when it opens. Scales were seen to be present on the fruit of both genera, and especially an arrangement of four near the top of the capsule where the flower remains were attached. *Sulcorebutia tunariensis* exhibited spiny areoles on the fruit, which none of the other fruits displayed. *Sulcorebutia hoffmanniana* was successfully pollinated by *Lobivia backebergii*. It was noted that the long-tubed *Sulcorebutias* were much more difficult to fertilize and a count of the unfertilized ova revealed a low conversion to seeds.

A short discussion then took place on the subject of "advanced" features of flowers. At the previous Autumn meeting it was suggested that the flowers of the genus *Neoporteria sensu stricto* were in the process of advancing from insect pollinated to humming bird pollinated flowers. In the light of subsequent correspondence, it had been further suggested that advancement of flowers is usually denoted by a reduction in the number of flower parts i.e. apetalous is an advanced feature. It was now suggested that the term "advanced" was only relative to a previous stage and not necessarily relative to flowers on a different line of development. It was further proposed that the term "more specialised" could be a more suitable one for use in certain applications. In view of the various comments relating to the reduction in the number of flower parts associated with more advanced flowers, those present were asked to examine flowers during the summer months and where possible to take note of the numbers of flower parts, and particularly of the number of stamens. Any sort of flower would be worthy of study, whether obviously insect pollinated flowers such as the *Neochilenias*, to humming bird type flowers as found in some members of the *Borziactinae* i.e. *Matucanas*, *Cleistocacti*, *Arequipas*, and others.

To conclude the weekend's activities, we were treated to two series of habitat slides of Peru; firstly some more of those taken by Phillip and Melanie Collins, and secondly some taken by John Medway, who had just joined us after some arduous travelling. We began in the valley of the Eulalia, a tributary of the Rimac. It was at once noticeable that the terrain was generally of a rocky nature, and also that at lower altitudes very little other live vegetation was to be seen to accompany the cacti, but many dead and broken twig-like stems were in evidence. These appeared to be herbaceous and other annual growth, some of which may have been carried down the slopes either by flash floods, or small avalanches of scree, or wind and gravity, and left trapped around the cacti. With increasing altitude, more "other" plants began to appear in company with the cacti, some of which looked like *Umbelliferae*. The other plants included some legumes, vines (*Ipomea*?) and *Oxalis*. The region seems to be characterised by short afternoon showers in some seasons, notably at the time of this visit in the months of February and March. Specimens of *Melocactus peruvianus* were seen in very good condition, even though their roots only penetrate the surface to a depth of from half to two-and-a-half inches. A blue flowered *Tradescantia*(?) was seen to accompany some of the *Melocacti*. It was also noted that some cephalia were heavily laden with wind blown dust and detritus which formed almost a concretionary skin among the bristles of the cephalia. At this juncture a slide dispelled the earlier idea that the twiggy detritus was annual growth; it was plain that fresh green growth was arising for the new season from the short leafless stems of shrubby growths. Deeper into the valley and at higher elevations, the greenery became less sparse, the shrubbery became larger and finally even some trees appeared. Stone walls were evidence of earlier cultivation now abandoned. The speakers had seen little evidence of comparable vegetation on the southern wall of the valley and had spent most of their time on the northern wall. The angle of slope had made it very difficult to stand upright.

Moving now into the valley of the Rimac, we saw *Espostoa* growing among large rocks on less steep ground, some *Loxanthocereus acanthurus* growing in the shelter of rocks, *Jatropha* and lichens. Higher up the valley was

*Matucana haynei*, growing not far from Matucana in association with bindweed and grass, the type locality for the species.

After lunch we continued our journey through Peru, this time under the guidance of John Medway, who had visited Peru on three occasions and enjoyed the company of Karel Knize on a few outings. To begin with we saw some views of the desert region near the coast not far from Lima, where nothing grows except straggly heaps of *Tillandsia paleacea* on the dunes. We were then treated to some views of Karel Knize's nursery, and then on to the Lurin valley. This river runs almost parallel to the Rimac, and is located a few miles further south. Again *Melocactus peruvianus* was prominent, growing in association with a spiny shrub. The whole valley is more rocky, sandy and dusty than that of the Rimac or Eulalia valleys, and the *Neoraimondia* grow on more level areas in the Lurin valley than in the other two locations. No plant here attained a height much above 6 feet, whereas other slides showed *Neoraimondia* growing near Atico, much further south, where specimens of around 15 ft. were common. The fruits of these *Neoraimondias* contain enormous numbers of seeds and in addition to the rather specialised flowering organs developed by these plants, we were shown some slides of the much more spiny juvenile form.

We were then treated to slides of the Eulalia valley with specimens of *Neobinghamia climaxantha*, *Haageocereus seticeps* and other members of this same genus, some of which bore smaller green fruits, whilst others carried larger pink fruits, all containing ripe seed. Specimens of *Espostoa melanostele* were also to be seen and on the opposite side of the valley to that which Philip and Melanie Collins had visited, there were *Tephrocactus kuehnrichianus* in the vicinity of large rocky outcrops. Here also the *Matucana haynei* were much more numerous but also much smaller than on the opposite flank of the valley. At this juncture the distinct difference in the nature and content of the vegetation on the opposing valley walls were remarked upon by both Philip and Melanie Collins and by John Medway. It was suggested that there was considerably more humus present on the southern valley wall. In a railway cutting we saw *Loxanthocereus acanthurus* together with *Trichocereus peruvianus*, also a "Jacaranda"; it was explained that this name was applied by the Peruvians to a considerable number of different shrubs.

In the Huara valley, near the town of Oyon, at 2300 m, we saw specimens of *Haageocereus pachystele* and with no obvious signs of moisture, abundant stands of *Espostoa*, *Neobinghamia villigera*, *Mila*, *Melocacti*, *Matucana variabilis* and various *Tillandsias*. *Trichocereus peruvians* always seemed to be growing in association with a yellow shrub. Near the spa town of Churin lower down the valley, we saw *Borzicactus* (*Clistanthocereus*) *tesselatus* at its type locality about 1 Km east of the town. Here it was moist, with lichens and humus now present. Continuing eastwards towards the mouth of the valley, we were shown the last cactus to occur before the barren coastal desert zone, an *Armatocereus procerus*.

Much further south, we were shown some slides taken in the vicinity of Atico, right on the coast, where it was quite cool and damp. Here we could see *Neoraimondia* growing right down to the foreshore near Kilometre post 720. Just south of Atico there grew *Haageocereus littoralis* and *Islaya grandiflora*. The *Islaya* appear very near to the coast, and occur along a stretch of several miles; further northwards they occur in association with the lowly *Pygmaeocereus bylesianus*, which grows almost flush with the surface, virtually buried, and with only a small root below the stems. Also found here is *Pygmaeocereus akersii* in the ratio of between 1 in 50 to 1 in 100 to the *P. bylesianus*. Some eight miles south of Chala the surface is compacted into a gravel pan, or desert pavement, below which lies friable sandy soil. Here is to be found *Islaya paucispina* and *Haageocereus repens*. Often the only clue to the presence of an *Islaya* is a small leeward sand slick behind the plant, produced by the prevailing wind.

North of Chala, at about 500 ft altitude, towards the plains of Nazca, there occurs *Islaya paucispinosa*, in a landscape of mixed sand with rocky outcrops. Between Chala and Atico, a slide depicted a vista of wave-like sand dunes stretching as far as the eye could see in all directions, with not a bird or bush, stone or twig, or any sign of life spoiling the total uniformity of the rippled surface of the sand, except for three or four wee specks like grit on the screen. In actual fact, these were plants of *Islaya bicolor*.

As we had overshot our official 4 p.m. closing time, all those who had contributed to the weekend's events in various ways were thanked for their support. All present were encouraged to support propagation for conservation of imported material and were asked to encourage other members in this philosophy. Requests were made for further close-up slides of seeds for discussion at the autumn meeting and for observations on stamen counts and other flower features which would support discussion at the Autumn Gathering.

#### Comments

... from H. Middleditch

In addition to the discussions reported above, two members had brought along both microscopes and seed samples which provided facilities for seed comparison. During the course of the weekend there was much informal discussion around this table. One or two members had expressed an interest in black and white photography and a selection of b & w prints were on display. These also attracted discussion during the course of the weekend. In support of the discussion concerning the proposed trip to South America, another member brought along some portable instrument which could have been suitable for taking measurements in the field, including a thermometer in a suitable protective casing and a soil pH meter. It was noteworthy that among those members present who expressed an interest in trekking up and down



the Andes in search of cacti, one followed this spring meeting with a week's practice by trekking around the Cairngorms.

## CHILEANS ANNUAL GATHERING 1978

Our Annual Gathering will be held from Friday September 1st (7.30 p.m.) to Sunday September 3rd (4.00 p.m.) 1978 at Brooksby Agricultural College, Leicestershire. We shall be looking forward to hearing from our member who visited Peru, and our two members who visited Uruguay this year, about their experiences in the search for cacti. We also anticipate hearing from G.J. Swales on evolutionary reduction in flower parts, from D. Rushworth on Melocacti and Discocacti, from A.W. Craig on Sulcorebutia, from J. Hopkins on the Lobivia cincta/impurana group, from R. Mottram about Acanthocalycium, from Roger Ferryman on Brazilian cephaloids and Argentinian Pyrrhocactus. In the absence of a firm Tariff from the Local Authority, it is anticipated that the weekend will cost £18.50 per head, including accommodation in single rooms, evening meal on arrival, three meals per day (buffet tea on departure) and morning coffee. Members wishing to participate should write for booking to Mrs. M. Collins, 11 Tudor Gardens, Upminster, Essex RM14 3DE. Full fee is due one calendar month prior to event.

## REPORTS AND ACCOUNTS FOR NUMBERS 31 TO 33 INCLUSIVE

Income — £'s		Expenditure — £'s	
Subscriptions	1,294.41	Printing of Journals, etc.	1,615.11
Sales of back numbers	264.40	Postage, stationery & sundries	252.29
Sales of Indices & Year Books	82.20		
Sales of Plants and seeds	49.02		
Bank Interest	91.29		
Miscellaneous income	193.81		
	<hr/>		<hr/>
	1,975.13		1,867.40
Balance brought forward from previous period	650.90	Balance carried forward	758.63
	<hr/>		<hr/>
	2,626.03		2,626.03

From the above accounts it will be seen that the cost of Publishing the Chileans exceeds subscription income by about 50% so members have received almost £7 worth of value for a £4.50 subscription. The cost of publishing the Ten-Year Index has not yet been covered by sales of this item. In the period under review, our printing costs have risen by about 15% and postage by even more. This rise has been contained by reducing margins and paragraph gaps in order to maintain 37,000 words (or so) per issue in fewer pages. Over the next twelve months an appreciable rise in printing costs may well have to be faced and either total content per issue will have to be reduced or the subscription will have to rise above £7 for three issues. We now have no room for further economies excepting that a reduction from current issue size by 0.3 ozs. would save 3p per copy in postage. Financial resources could be improved and subscription increases controlled by a modest increase in new members.

In the past, the content of the Chileans has been devoted largely to reproduction of data from the journals of Continental Societies who have long enjoyed a ready supply of both imported plants and homecoming field collectors. More recent issues have included thorough studies of supposedly well-known species in order to provide a base for the study of a genus. Our contents are now extending to critical reviews based largely on a study of plants grown by members in this country, but even more time and correspondence is involved collating information here. The greater depth of the discussion also involves more space per species complex and hence a reduced spread of generic coverage per issue. In order to pass on to a wider membership the content of the discussions at our Annual Gathering, more comprehensive reporting of these events is now included. As we are without the services of a cartographer, touch-up, or entitler, longer preparation time is incurred per issue and has added to the time lapse between issues.

Due to deterioration of plates and other causes there has been an extended delay in reprinting back numbers, involving supply delays of up to twelve months in odd cases. The Slide Library continues to extend due to the welcome donation of slides; the Slide Librarian now appeals for any slide cases you no longer require. Commentaries on further groups of plants such as cereiform, cephaloids, Cleistocacti, etc., or supplements to existing commentaries, would be welcome. Supplies and sales of plants and seedlings have shown an increase and promise to add a valuable contribution to our funds; seedlings donated for this purpose have naturally been especially welcome.

Following the discussion on conservation of collected material, a number of members have taken positive steps to propagate offsets for exchange and distribution.



## Comments

.... from J. Hopkins

Is it really necessary to waste so much space in the Chileans with the reports of the Meetings at Brooksby? Give it a page or so by all means if it has to be included but why go to the lengths of reporting virtually all the talks and discussions? Does anyone really read it all; is it of any real interest? Surely it would be much better to get articles from our members about the plants they grow and particularly from members with more specialised collections who can write about newer sorts? Recently I paid a visit to an ex-Chileans member who complained that he wanted to read about plants that were being found now, not about visits to South America that took place ages ago. Can we not get more pages filled with up-to-date information?

.... from L. Sheath

Cannot say that I am particularly thrilled at the present format of issues 31 to 33 — they seem to be lacking entirely in variety. Reminds me of the boring sermons one had to listen to in Church in ones youth. Of course different points of view are interesting but page after page in the same vein is a bit much.

.... from D.W. Whiteley

If members are to be retained (never mind increased membership) then I do not think that the Chileans will be able to put up the subscription to much above the present level for three journals — and certainly there must be no more supplementary subscriptions requested. I think that “jacking up” a subscription half way through a subscription year loses members quicker than anything else. By all means revise the subscription rates upward for a coming year but let members know what they are in for in advance. The only satisfactory way to work a system that requires an additional payment before one receives the following journal is to pay per journal; that is, your payment for the next journal is due every time you receive one — that way people can remember. Paying every second or third issue is confusing and people cannot remember whether they have paid or not. I think people are confused as to where they are now, and to how many journals are to be published a year, and at what cost.

.... from Mrs. H. McDonald

I do wish that the Chileans was published more regularly -- one never knows when the next issue is going to appear.

.... from P. Smart

I find the Ten Year Index superb and when I have had to use it, it has proved most effective. I think the optimum balance between brevity and complexity has been achieved and that the author deserves congratulating on a most arduous task well done.

## COMMENTS & QUERIES FROM MEMBERS

.... from The Librarian, Royal Botanic Gardens, Kew

I am particularly interested in the exact date of publication of the Chileans No. 30 owing to the new combination *Gymnocalycium buenekerii* (Buin) Swales having to be taken up for the Index Kewensis. I am assuming that the above name is new from The Chileans 8(30):150 197?, and that he has not published the name elsewhere. Unfortunately this name is invalid on two counts. The first, and least obvious, reason is because the basionym was invalidly published in Buining in 1970 when he omitted to cite the exact type collection upon which the varietal name was based. The second reason is that Mr. Swales omitted to supply a full and direct reference to the basionym of his new combination, i.e. *Kakt. u. And. Sukk.* 21(9):162 (1970), as required by the code mentioned by Gordon Rowley in the Chileans.

.... from G. Charles

I have just obtained a *Cleistocactus vulpis-caudae* which is a remarkably free-flowering plant, although not often seen offered. This plant was in a friend's collection for many years and has always interested me. He bought it as *Akersia roseiflora*! I would be extremely interested to find someone who has another plant for seed production purposes. Could you help? also I would very much like to get something going among the Chileans membership on *Notocacti*; could I ask those who would be interested in joining a Robin devoted principally to discussing and propagating *Notocacti* from material of known origin. I am sure that new species, flowers, fruit, and seed will also enter into the correspondence.

.... from P. Smart

A problem which must affect all of us who correspond on our own subject; how does everyone get round the problem of describing flower colours? For years I have had problems caused by people describing colour under misleading names — particularly pink as violet, violet as lavender, orange as red and (chrome) yellow as orange. For a while I have been trying to get hold of suitable pages of colour charts with the idea of photographing several ranges and cutting prints into strips and circulating them round some of the groups I correspond with. As long as all the prints for one group are produced (commercially) at the same time, there should be no problem about variation of colour. As long as people didn't leave the charts in the greenhouse they should last a reasonable time. Do you know if anyone has tried this idea or what do you think of it? Any comment on the idea would be appreciated. Perhaps it would be worth while thinking of such a set of prints as a Chileans “Year Book”?

## STUDY GROUPS/REFERENCE COLLECTIONS

Cleistocacti	T. Lavender, 62 Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
Copiapoa	E.W. Bentley, Northside, Crosspark Hill, Oakford, Tiverton, Devon.
Frailea	J. Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
Gymnocalycium	G.J. Swales, 5 Hillcrest, Middle Herrington, Sunderland, Tyne & Wear.
Lobivia	J. Hopkins, Primrose Cottage, Monks Lane, Audlem, Cheshire, CW3 0HP.
Matucana/Borziactinae	P.H. Sherville, 51 Park Road, Enfield, Middlesex, EN3 6SR.
Melocactus/Discocactus	Mrs. L. Teare, 27a Maher Street, Kensington Gardens, Adelaide, South Australia, 5068 Australia.
Neoporteriae	R. Ferryman, Nichelia, The Street, Stonham Aspal, Suffolk.
Notocactinae	G.J. Charles, 23 Burnham Road, Great Barr, Birmingham, B44 8HU.
Opuntia/Tephrocacti	J.W. Bagnall, 22 Perlethorpe Avenue, Mansfield, Notts.
Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A.W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm, Yorks.
Rebutia	P. Smart, 5 Tomlinson Avenue, Gotham, Nottingham, NG11 0JU.
Sulcorebutia & Weingartia	J.R. Gooch, 51 Bourn Avenue, Hillingdon, UB8 3AR.
Trichocereus	N.T. Hann, 5 Lake Road, Shriley, Croydon, Surrey, CR0 8DS.

## THE CHILEANS

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Membership Secretary and Back Numbers	Mrs. A. Lavender, 62 Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
Seed Exchange	J. Hopkins, Primrose Cottage, Monks Lane, Audlem, Cheshire, CW3 0HP.
Slide Librarian	A.W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm, Yorks.

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