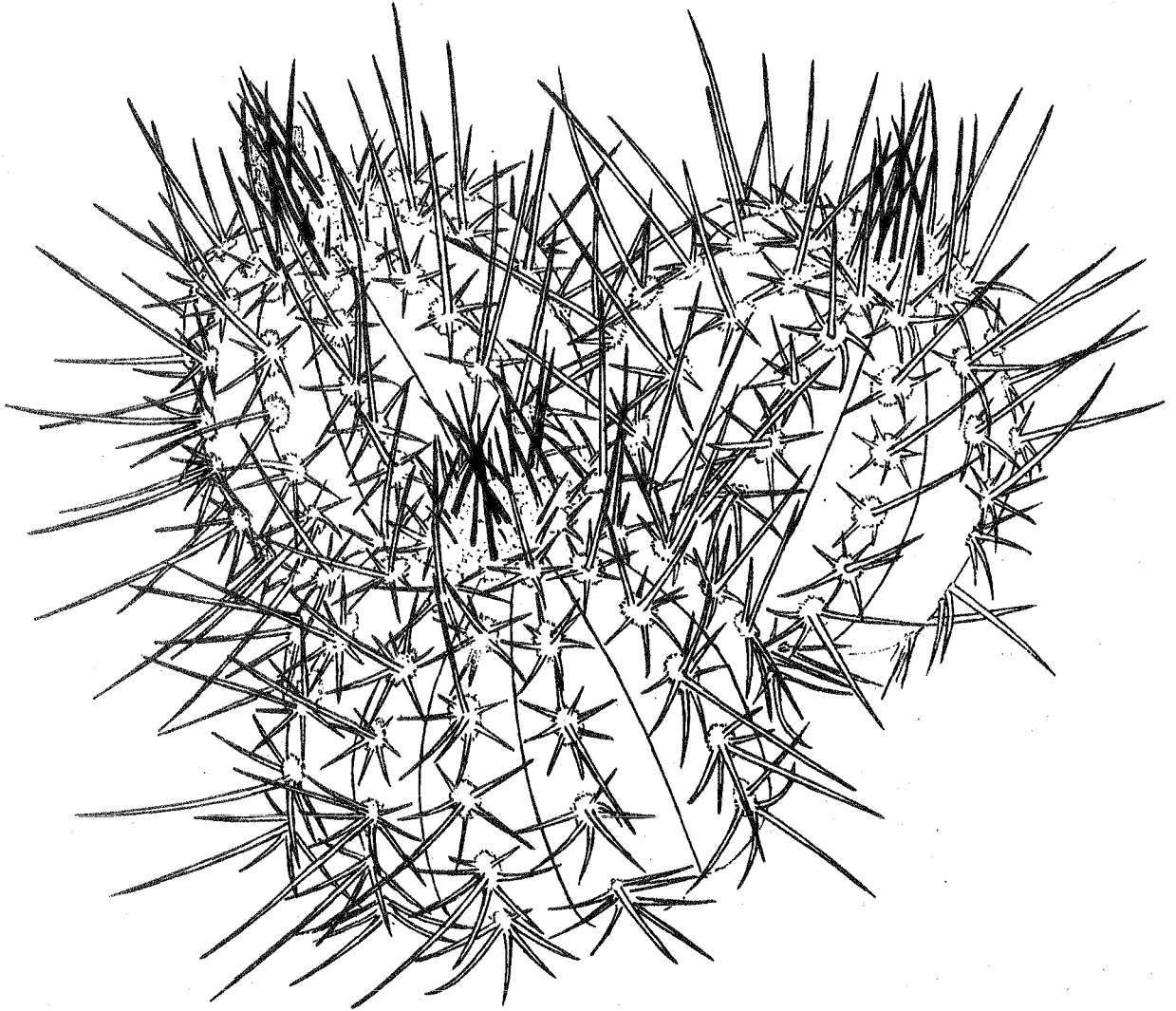


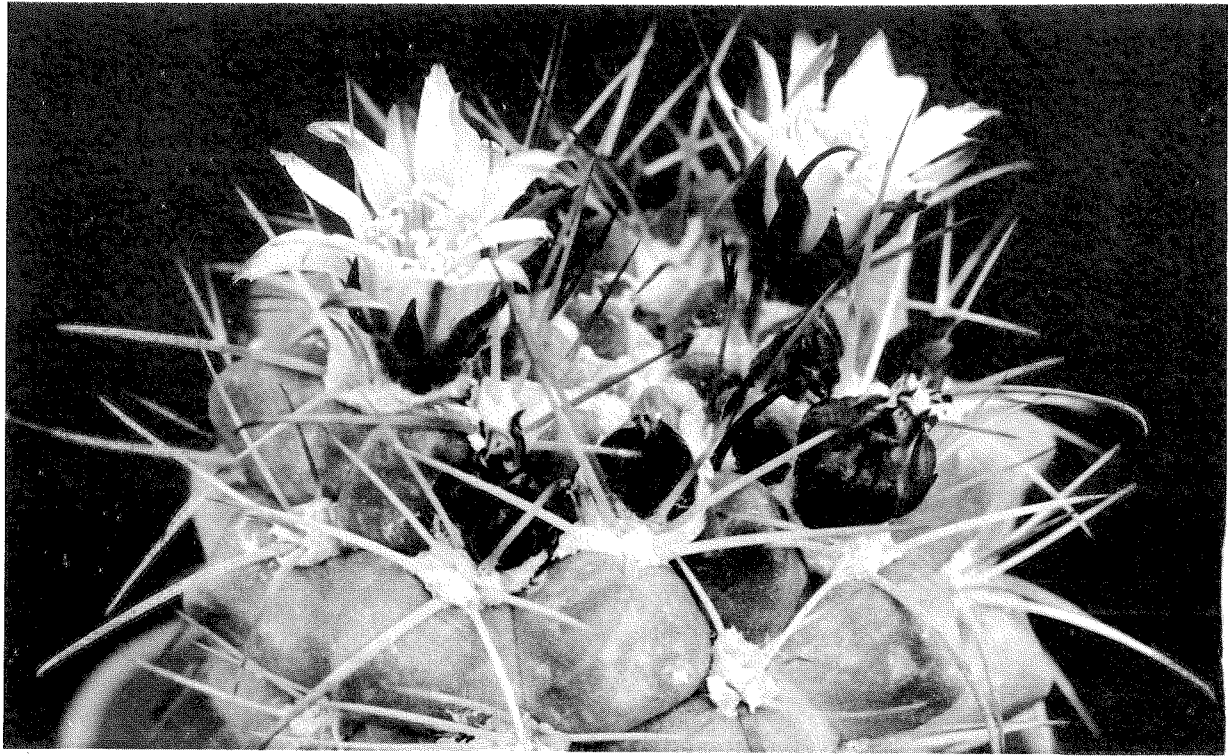
# THE CHILEANS '79

VOLUME 11 NUMBER 37



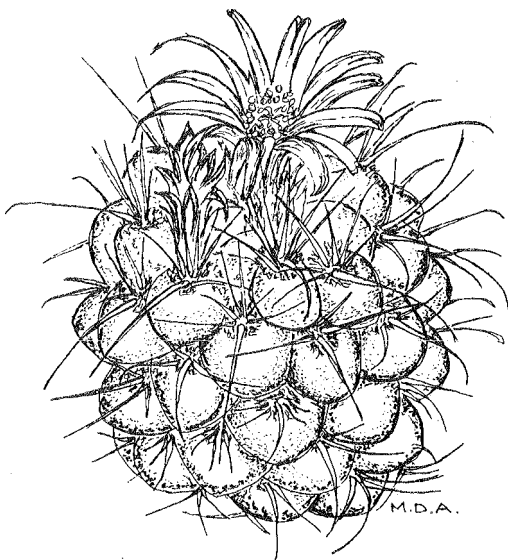
COPIAPOA BRIDGESII

Collection-A. W. CRAIG



*Neowerdermannia vorwerkii*

Photo & Collection: R.E. HOLLINGSBEE

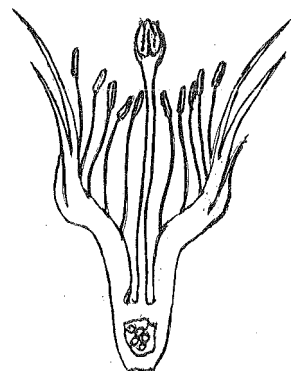
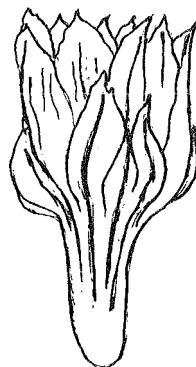


NEOWERDERMANNIA CHILENSIS

KK 625



NEOWERDERMANNIA  
VORWERKII  
Castellanos & Lelong  
Die Cactaceae 1943



NEOWERDERMANNIA VORWERKII

Flower and section

Krainz - Die Kakteen 1. III. 1969

## NEOWERDERMANNIA FLOWERS by R. E. Hollingsbee

My plant of *Neowerdermannia vorwerkii* came to me from Donkelaar as a grafted specimen, in the September of 1967. It did take quite a while to really get going and although it flowered for the first time in 1971, I was unable to see it in flower. This year I did catch the flower open and took the photograph alongside.

The flowers are small and of a very pale lilac-white colour. The petals were short and few in number. On examination of the plant after flowering it appears that several flowers were produced from more than one of the areoles. In fact there were two or three dried flower remains in several areoles. In one areole I found not only three dead flower remains but, much to my surprise, two seed pods as well. I am sure that they were not the result of last year's flowers, but I believe they were produced this year. The plant carried 14 flowers during the season.

When I examined one dry seed pod it was found to be oval and in size between three sixteenths and  $\frac{1}{4}$ ins. in diameter. There were four seed pods all told on the plant. Pod one contained 7 seeds and 2 undeveloped seeds; pod two contained no less than 22 seeds and 1 undeveloped seed; pods three and four, which came from the same areole, had 3 seeds and 8 large seeds respectively. The pods were deeply embedded in the wool and stem of the plant, producing quite a depression where the pod or pods had developed. I was careful to remove all pod and flower remains to prevent the possibility of rot being set up.

### Comments

..... from P. H. Sherville

Although I have never had one of these plants, I have seen one in flower in another local collection. The description of the fruit as "sunken" has in fact a very clear meaning to me! I have seen a variety of forms of this plant, some completely spineless, but I think that the most common form consists of lozenge shaped tubercles with an ancillary areole bearing a few short reddish spines and a central somewhat hooked spine. Now whether the particular import I have in mind was still rather shriveled or not, I don't recall, but one had to search hard for the flower! All that was readily discernable was the top 4 or 5mm of the petals which were dark wine red to purplish in colour and few in number (only about 7 or 8). The stigma was just exerted through the throat of the flower which itself was just flush with the areole — there was no trace of any ovary so it is quite possible that the fruits are akin to those of *Mammillaria theresae* i.e. inside the plant body! Although I do not recall seeing a fruit, "sunken" could be an apposite description.

I rather have the feeling that on some plants of *Neowerdermannia* which I have seen there have been a few loose seeds around the tubercles without any sign of fruits at all, rather as one finds in *Ariocarpus* and *Pelecypora*. In conclusion I must add that a great deal of the degree of "sunkeness" depends on the degree of dessication which the plant has endured in importation and the extent to which the plant has recovered at the time of observation.

..... from A. Morris

My *Neowerdermannia* came to me from Lambs at Worthing about five years ago. Its age would be hard to estimate — it could have been ten years old when I received it; I believe that it was a collected plant. I'm glad to say that it has flowered every year since acquisition. There were approximately six flowers this year; when the buds first appear they are very dark — almost black; they become a little lighter in colour as they develop and then finally one sees the cream edges to the petals. Every flower set a fruit, which appeared within a few weeks of the flowers. The fruit wall was certainly thicker than that of *Rebutia* but not as thick as say that of *Gymnocalycium*. The position of the fruit is a bit difficult to ascertain. When I removed the fruit it left a depression of an eighth of an inch or perhaps a little more, in the areole. Next year I will try and keep an eye on the fruits as they develop.

..... from P. G. Waterman

In May 1970, I obtained a plant of *Neowerdermannia vorwerkii* from Uhlig. It was carrot shaped, about 3ins. in diameter at the top and some 6ins. long. Only the top and shoulders of the plant were green, but there were remains of areole on the uppermost 1" to 1½" of the sides; to judge by the colour of this upper part, which was just about the same dirty brown as the rest of the thick tapering root, only the very uppermost green part had been above ground level and the sides (on which there were the remains of some areoles) had been below the ground.

The plant established itself very quickly indeed. It had to be kept indoors whilst the greenhouse was being erected and it produced one flower whilst in the house, very soon after receipt. It flowered again in about March-April time, the following year. There was a *Gymnocalycium* out in flower at the same time and I crossed the flowers of *Neowerdermannia* with the *Gymno*; two pods were set on the *Neowerdermannia*. The fruit was a green fat berry, set well down in the areole, right in the axil of the tubercle. Indeed one of the features of this plant is the position of the areoles, which are close to the axil between tubercles and not on the tip of the tubercles.

..... from R. Moreton

*Neowerdermannia vorwerkii* certainly flowers quite well, though not I think every year. I have never set fruit on it, although I do not normally cross pollinate plants just to see the fruits. Perhaps I shall have to start. The flowers are certainly not very spectacular — dark brown pointed buds, followed by whitish flowers with dark midstripe, only about 7mm tall and wide. *Neowerdermannia chilensis* flowered for the first time last year — it was an import from Frau Winter in 1963. Its flower is somewhat larger and more yellow in colour.

Does anyone manage to grow these from seed, successfully? They must need very intense light as they always look etiolated with me and eventually peter out.

..... from J. Medway

When I was over in Peru in late 1975 I picked out a couple of plants of *Neowerdermannia* from Karel Knize's nursery; one was *N. peruviana* and the other was *N. gielsdorfiana*. Unfortunately I have no idea whereabouts they were collected. The *N. gielsdorfiana* was the slower of the two to settle down and even in two years there was very little new growth from the centre. The body was about 60mm. across, excluding spines, in the form of an inverted top from the body through to the root. The illustration in the Argentinian Society's "Cactaceas" by A. Castellanos of *N. vorwerkii* is about it, although my plant is not quite so regular in taper. There are few spines, the lower one on each areole is strongly hooked, the remainder straight to slightly curved.

The *Neowerdermannia gielsdorfiana* produced a number of flowers in 1977; I have taken a slide which is fairly accurate on flower colour — pinky mauve would you call it? The margins of the petals were a very pale pink. With the approach of Autumn I felt it was time to remove the flower remains and was surprised to find that there was some 27 seeds in a cavity above the areole; I have taken a slide of the seeds in situ on the plant. I certainly did not expect to find any seeds on the plant as I did not notice any seed pod before removing the dead flower remains. As the seeds and the fruit body are buried in a cavity above the areole I would probably not have been able to see whether there was a fruit there before removing the flower remains. I would certainly have taken more care had I known. As it was I merely pulled the dead flower gently away dispersing some of the seed as I did so. After taking the slide some days later, I removed the seed very carefully from the cavity and also a thin dry skin, which was the fruit wall. Next year, if I get a repeat performance, I will proceed with more caution.

Having returned home with both plants in the November of 1975, I cautiously began to water both plants in the Spring of 1976. The plant of *N. peruviana* plumped up nicely. Great cavities opened up in about six places behind the areoles around the top of the plant, which exposed round about 100 seeds which had not previously been discernible. I sowed about 40 of these myself but only one germinated and that lasted only a month before rotting off at the root. This was my only attempt at germinating this genus. However, I have the seed collected from the *N. gielsdorfiana*; I have also ordered *N. peruviana*, *chilensis* and sp. nov. from K.K. (which are offered as *Weingartia*). To judge by Roger Moreton's comments it doesn't look very hopeful, but I intend having a serious go and raising seeds of this genus. Roger Moreton's experience with *Neowerdermannia* parallels mine with *Eriocyce* and *Rodentiophylla* — good germination, but the majority do not stay around very long. I think that perhaps I have been too generous with water previously; I have also ordered fair quantities of both these latter genera from K.K., with a view to overcoming the difficulties.

..... from P. A. Smart

I've checked my seed sowing records and to my surprise find that I have only sown four batches of *Neowerdermannia* seed since starting to keep records: No germination resulted from sowing *N. peruviana* in 1969 using J. I. type compost and a temperature of 60-70°F.

The 1973 sowing of *N. peruviana* from Sargent was in Levingtons, but this batch was sown at the end of November and only 70°F used. It took about eighty days before there was any sign of germination and after some three months from the date of sowing, ten out of 15 seeds had germinated.

In 1975 I used my normal seed-raising pattern and made two sowings of *N. vorwerkii*. They were sown in Levingtons between late January and early March and were kept at 100°F-110°F for five to ten days. After that a further 14-21 days in the propagator at 70°F, they were then put on a soil warming cable at 65°F-70°F and gradually given air. They were then left in the seed pans under the staging until October or November when they were dried off for the winter. At that stage, germination was about 40%. During the winter they get no special protection and go down to 38°F at times; my "first winter" losses are negligible in most other genera, but with *Neowerdermannia* it ranges from 50% to 75%. It would seem, therefore, that *Neowerdermannia* seed may well like the high temperature treatment even if no germination takes place at that time; and also likes the excessive moisture conditions given by Levingtons compost. But the sample is too small for statistical significance.

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

One of the imports which I obtained from Knize last autumn was a *Neowerdermannia*; it has produced some seed and the fruit really is sunken. There was no obvious indication of any fruit being present, just a brown patch above the areole, rather like one sees in these fungoidal attacks that seem to be increasingly prevalent today. After I had watered the plant the other day, I found that the brown patch had disappeared and was replaced by a number of seeds — so the fruit really is sunken, as the top is flush or only slightly proud of the surface around the areole. Having excavated the seeds, a pit remained some 5 or 6mm. deep, which is now slowly rising back to the normal surface.

..... from P. Alcock

I did have an imported *Neowerdermanniana* which put on a grand show of flowers — a whole ring of flowers opened within a few hours of each other. After this, individual buds appeared and flowered in ones and twos for the next three months. Flowering activity seemed to have ceased by mid-August. The flowers were small — about 15mm. in diameter. I would not say that the flowers had abnormally few petals — they merely give the appearance of this because the petals are very narrow — 2 to 3mm. only. Although I did not take particular note of the length of time that the flowers lasted, I would say that they remained open for about a week. The flowers were the very palest pink with a brownish-pink midstripe. This particular plant settled down very quickly indeed — it was showing signs of growth within two weeks of purchase from Jumanery.

..... from J. R. Gooch

It is quite some years ago now that I purchased an imported plant of *Neowerdermannia*, from Hallet, I believe. It must have been a fair size as I remember it could not be accommodated in anything less than a 5" pot. In the same season that I

acquired it, the plant put out three rather insignificant straw coloured flowers from very near to the growing point, and unfortunately, expired very shortly afterwards. In the spring of 1976 I decided to try again and invested in a *Neowerdermannia peruviana* from Uhlig. This plant has the typical tap root which is 10cm. long before branching; the body is globular, being 6cm. in height and diameter and of a dull grey-green colour. There are only ten spiral rows of tubercles but it is probably only a relatively young plant. Each areole starts in the crown with a generous quantity of white wool, but by about midway down the plant body this wool is all lost. There are seven thin curved spines, at first all black, but soon fading to pinkish grey except for the lowest which is curved down and hooked at the tip and remains darker with a black tip. The lowest spine is the longest and strongest at 2cm. long. The remainder tend to curve around the plant and are only 10-15mm. long. It has not flowered yet. (Later) I have today collected seed from one of my *Neowerdermannia peruviana*. The small pink flowers were carefully cross pollinated, and although the fruits remained very small, the top one or two mm. with the dried flower remains just protruded above the wool in the tubercle fold. The fruits remained dark green in colour throughout, and on ripening split around the top which then opened up widely as if on a hinge and allowed the quite large seeds to be released. This "hinge" is always towards the centre of the plant, which I assume ensures that the seeds will be blown or washed by rain from the side of the plants in habitat. I have slides of the plants in bud and flower and have taken a shot today of the opened seed capsules. So far, the ripened fruits have contained between 46 and 56 seeds.

..... from H. Middleditch

The slides of his *Neowerdermannia* in bud, flower, and fruit were shown by J. R. Gooch to the 1978 Chileans' Autumn Gathering. The flowers appeared to be a fairly deep pink colour with a paler margin to the petals. The fruit had split whilst still green and turgid, the roof of the fruit hinging into a vertical position and so exposing the large black seeds which were lying fairly loosely inside the fruit capsule; there were some signs of the dried-up funicles on and among the seeds. The hinged "lid" was composed not only of the dried-up flower remains, but also of the uppermost part of the fruit; the fruit was probably carrot-or-top-shaped, the split taking place at about the maximum diameter, near the top of the fruit. The seed was collected for sowing with a view to contributing towards the conservation of these plants.

#### **THE FIRST NEOWERDERMANNIA? By D. W. Whiteley**

I had intended to introduce a further mystery plant for discussion in *The Chileans* as to its possible identity, but after a little searching through literature I believe that I may have solved the problem and unearthed an overlooked "first". We have all taken *Neowerdermannia vorwerkii* of Fric to be not only the first species to be described but the first plant of this genus to be found. I was browsing through Britton & Rose's "The Cactaceae" looking for Chilean plants described as *Mammillaria*, *Frailea*, *Echinocactus*, etc., etc., when I came across the following entry on paged 205 vol. 3 under *Malacocarpus*: *Malacocarpus* sp. Simple, or in clusters, short cylindrical, 1 dm high: ribs about 15, low, broad, somewhat tubercled; radial spines 10 to 12, acicular, ascending, 2 to 3 cm long, brownish, darker towards the tip; central spines usually solitary and hooked, a little stouter than the radials; flowers dull red, small, extending only a short distance beyond the spines. Collected by Juan Soehrens in Tacna, Chile, altitude 3,000 m, in 1911.

I was puzzled by this as I knew of and could find on the map no Tacna in Chile, only Tacna in southern Peru not too far away from the Chilean border. What had hooked spines and grew near the Chile/Peru border? I could only think of *Neowerdermannia chilensis* as I once had one that was given to me as grafted plant by John Gjeltma. From John Donald's remarks in *The Chileans* Vol. 3 No. 15 pp. 52-55 it appears that this plant was Ritter's *N. chilensis* with the cream or yellow flowers and not the true Backeberg plant of that name. This same *Chileans* article contains an illustration from Ron Ginns of *Neowerdermannia chilensis* which appears similar to the plant which I had, but the spines on mine were even more strongly hooked than those shown, a real "fish hook" cactus.

Was this Soehrens' plant then a *Neowerdermannia*? It well could be but it had red flowers. I remembered the 1969 *Chileans* article by Donald and so I looked it up. I was struck at once by the remark "the forms of *N. vorwerkii* such as var. *erectispina* of Hoffman & Backeberg, collected near Viacha by La Paz in Bolivia, are very similar to plants collected by Albert Buining recently above Torata in Moquegua, Peru. Similar plants from the same area were also collected and distributed by Alfred Lau. Friedrich Ritter's *peruviana* FR 191 seems to be rather shorter spined than the Torata plant and was found near the Chilean/Peruvian border". Torata, on my map marked at Tarata, is above Tacna, in fact much closer to Tacna than Moquegua. It would seem then that both Buining and Lau have recollected Soehrens' lost *Neowerdermannia*. It is also obvious that as this plant was first discovered by Soehrens in 1911 it predates the stated discovery by Fric of *Neowerdermannia vorwerkii* in "the early nineteen twenties".

Until I re-read the article on *Neowerdermannia* by Donald I had thought it rather strange that this plant from Tacna had never been recollected as the area has received quite a bit of attention from Rauh, Ritter, Knize and Lau. Neither had I ever seen any mention of this description by any later authors (I do not know if Backeberg mentions it in his *Die Cactaceae*?) but I can find no trace of it in the *Lexikon*. Should this plant prove distinct from the now known species it would be rather fitting if it were named after Juan Soehrens thus giving him his due recognition for discovering the first species of the very interesting genus *Neowerdermannia*.

## Comments

..... from D. Sargent

I had a letter dated 1968 from Alfred Lau who was on a collecting trip in the extreme south of Peru, saying he had found quite a few plants he cannot identify (though this does not mean that they are new discoveries of course). Among them he says he had found various *Islaya* near Tacna and near Ilo, a *Melocactus* not in any book, in the Nazca valley; 9,000 feet above Moquequa a new *Neowerdermannia*; at least five different unknown *Arequipa*, and a new *Mila* found 600 miles south of any reported *Mila*. Examples of these and others were due to arrive about March. He says he had been staying with a tribe of Indians who still practice head-shrinking so I hope he doesn't sent me off a crate of those!

..... from H. Middleditch

After the Chile-Peru war of 1879/1883 the allocation of the Tacna/Arica territory between the combatants remained unsettled right up until 1929. Hence in 1912 the province of Tacna would be claimed by both countries, but was still under the control of Chile. It appears that Soehrens was on a trip to Tacna from March 15 to April 28 in the year 1911 and it does seem likely that he came across the first *Neowerdermannia* on that occasion.

### **NEOWERDERMANNIA** Fric gen. nov. **VORWERKII** Fric sp. nov.

by A. V. Fric

Translated by P. Collins from *Kaktusar* 1.11: 1930

An underground plant consisting of a turnip-like root, an under-ground stem and a flat body. It branches only if it has been damaged. In the dry season the body is concave funnel-form, filled with dust and drifting pebbles, in the rainy season it rises above the surface in the form of a hemisphere, being freed from its covering of soil by the wind. The body is composed of three-angled protuberances, flat on top, pointed underneath, which shelter the areole pressed deeply into the body. Only on the underground part of the stem can we observe that these protuberances form 16 spiral rows. The areole when very new is protected by whitish wool, which fills the hollows between the tubercles, but soon falls off. The areole bears six spines. The topmost and shortest is about 1.5 cm, the two on either side about three centimetres and the lowest ends in a little hook. Except for the lowest, which is glossy black, the rest are curved like a bow, glassily transparent and colourless.

The flower is not known as yet. So far as can be deduced from the dried remains of the flowers, the calyx is covered with wool and small hairs. The flowers grow out in a ring as in *Mammillaria*. They grow out from the hollow between the tubercles, from a special vegetative point above the areole, and they have their own separate nerve. The fruit is a thin membrane enclosing 4-6 seeds and it ripens inside the body. It is squeezed out onto the surface only by the further growth of the plant. Habitat: South America. The highest peaks of the Cordilleras on the snowline at an altitude of 5,000 m above sea level.

The justification for a new genus: despite the fact that I do not know the flower, and have found only the remains of flowers, I hold this plant to be a new genus which cannot be fitted into the systems of Britton and Rose, still less into Schumann's system. Certainly it awakens many doubts, but this was already the case with *Obregonia* and other discoveries of mine, and in the end it will surely be acknowledged even though I do not write descriptions in Latin. It is not my fault if German scientists do not have as much respect for their own language as I or the Americans, and regard only Latin descriptions as valid.

In view of the fact that the calyx is covered with hairs, it is possible, following Berger, to put this genus in the *Trichocereus* branch, which in my classification will be called *Trichocalycium*. (I intend to do away with all names that suggest the habit of a plant, such as "torch, hedgehog" and similar ridiculous notions corresponding to the German *Kerzencactus*, *Igelkaktus*, etc.) The habit of a plant changes according to climatic conditions. It is only necessary to point out the similarity of *Euphorbias* and cacti, which strongly resemble each other, and then again the difference of our "snake's milk" for instance from *Euphorbia obesa*, plants which are closely related. On the other hand many *Trichocerei* are not columnar, but as tiny as many *Echinopsis*, and the flower tubes are scarcely hairy, so that the name is just as absurd as "whiplash torch".

Apart from the well-developed tubercles under the areole, which give the plant the appearance of *Mammillaria*, this new plant is distinguished from all South American cacti by the double vegetative point and the development of the fruits inside the plant.

The form of the plant must have adapted to the climatic conditions. In the high places where it grows, continual gales and occasional avalanches of ice and stone make it impossible for any vegetation to get higher than the rock under which the plant nestles. Everything taller than the projecting rock is swept down, so the little plant had to shrink in order to be protected, and had to develop the large hump-like protuberances to protect the delicate organs of reproduction, whether sexual or asexual. We can observe similar protuberances on the high-growing *Lobivias*, the related *cinnabarina* and *pentlandii*, and especially *Lobivia graulichii* Fric sp. nov., but also in many *Gymnocalyciums* (*gibbosum*) and many *Notocacti*, which grow in the lowlands. But in these, ribs can still be observed, whereas in *Neowerdermannia* they completely vanish in the three-angled tubercles.

However, the appearance of a plant is irrelevant to the characterisation of the plants. The main thing is simply the method of propagation, whether sexual (a system of flowers) or asexual (vegetative points). Whereas in *Mammillaria* we have two vegetative points: the axil and the areole, both of which serve for asexual reproduction, while only the axil serves for sexual reproduction, we have in *Coryphantha* three such points: the areole, the axil, and the groove. (I use this term for the German "Furche". It is the best translation and the one most suited to the present circumstances). Asexual propagation takes

place from all these but flowers arise only from the groove. As far as I know, all South American cacti have just a single vegetative point: the areole, from which they flower and from which in addition offsets sprout. *Neowerdermannia* is the first exception. It has two vegetative points, to which leads separate nerves, both subcutaneous. At the end of the auxiliary nerve forms the flower. After the flower has dropped, the nerve contracts and the fruit is withdrawn into the body. If the plant has been damaged, than at the end of the areolar nerve, within the body, offshoots form, which split the skin below the areole and push to the outside. It would be unjustified to look for a relationship between this plant and the genus *Mammillaria*, but it can be approximately explained by the way in which, in the forerunners of the *Mammillarias*, the sexual vegetative points were able to separate from the asexual. In any event, we are faced with one of the most ancient cacti, a relic of primeval times, one of the remnants of the early ancestors of North American cacti which have been preserved.

Faced with erecting a new genus, I am not deterred even by the fact that so far only one species is known, and that perhaps much time will pass before additional species are found. In high locations, in the thin air, where every movement is an effort, exploration is associated with great difficulty, great expense and on occasion with great danger also, so that hardly anyone will venture up there after me, but I am sure that those icy regions will yet provide many surprises for the botanists.

The native name for this plant means in translation; "the cactus you can eat". When there is a bad famine the natives painstakingly collect the turnip-like roots from the tops of the mountains and cook them. I am not publishing the native name or a fuller description of the discovery-place, partly to protect the plant from depredation, partly so that insatiable "collectors" will not rob the kind and hospitable natives of their one salvation in their times of greatest need. I have the experience of what happens to some of my newly-discovered plants, like *asterias*, *senilis*, or more recently *Oreocerus irigoyenii*: where such a greedy collector gets to, there no cactus grows.

#### Comments

..... from P. Collins

This article by Fric seems to be remarkably uninformative about *Neowerdermannia*, although quite revealing where the author himself was concerned. Not having previously read of any of the writings of Fric, we were struck by the bitterness of his references to German botanists.

Fric's language is somewhat colourful at times, he talks about a plant "crouching" under a rock, and it has been toned down a little where necessary in translation for naturalness in the English. Although I have been helped with a reasonable-sized Czech dictionary, one or two queries remain. The "snake's milt" (not milk) is presumably a Czech vernacular name for a local species of *Euphorbia*; and the name "whiplash torch" is also presumably a Czech vernacular name. In several places Fric uses a word which can only be translated from the dictionary by "nerve", but in the context Fric must surely be referring to a vascular bundle?

..... from H. Middleditch

If we care to bear in mind that Fric was trained as a gardener, it is unlikely that his formal training extended to an appreciation of plant structure, but he has nevertheless evidently been able to grasp the significance of the vascular bundle leading both to the axil and to the areole. I do not indulge frequently in cutting up cacti to scrutinise the track of the vascular bundle, but I would have thought that the thin thread of vascular tissue leading off to the axil would not be very easily seen. Was Fric the first to point out this feature of *Mammillaria*, *Coryphantha*, and *Neowerdermannia*? I can understand that if he did not know the right way to describe this vascular thread, he might well have called it a nerve.

Having examined one or two articles by Fric I am tempted to suspect that he extended the altitude of certain mountains he climbed and of places where he found various plants, perhaps to enhance the glamour of his exploits in subsequent writing. Be that as it may, I would question whether *Neowerdermannia* is indeed found at an altitude of over 15,000 feet.

..... from D. W. Whiteley

In their paper "The Distribution of the Genera of Chilean Cactaceae", Weisser & Lembcke say that "*Neowerdermannia* has not been found by us in Chile, but has been reported by Backeberg in the area of Ticnamar, at 3,500 m and by F. Ritter at 4,000 m, per Buxbaum-Krainz, *Die Kakteen*, CVI, 1969."

### **A JOURNEY to the PROVINCE of TACNA from 15th March to 28th April, 1911**

by Juan Sohrens

Translated by E. W. Bentley from Bol. Mus. Nac. 4 (1). 13. 1912

I left Santiago for Valparaiso on 15th March in order to take on the same day the steamship "Loa" in which I proceeded to the north. Arriving at Arica on the 22nd of the same month, I learned with regret that I would have difficulty in getting to the interior. The violent rains on the altiplano of the interior had transformed the dry river beds into raging torrents which had destroyed all the bridges. In this way, complete lack of communication with the interior had been brought about.

I was destined by this involuntary prison to collect the few plants, seeds, and insects which were to be met in the margins of the plantations. In this way I was able to obtain a collection, especially of insects, more complete than has hitherto been in existence. I allotted a whole day to surveying the outskirts of Tacna where the scanty rains that fall in this region from time to time are wont to produce in these deserts a sparse vegetation, of which I have been able to collect plants and seeds.

I observed with satisfaction that during the ten years that have passed since my first visit to this region, cultivation of the land in Arica has increased considerably. They have constructed reservoirs, provided with windmills to water vegetables and other crops. The incomparable climate permits harvesting of crops throughout the year, the products of which meet a grateful welcome in the saltpetre areas which lie more to the south. Unhappily I did not observe the same in Tacna; in this locality the cultivation of cotton has decreased owing to the aridity of recent years; whole plantations have become dried up and abandoned by their owners. What rich and abundant harvests could be obtained in this province if it were possible to provide it with water by means of artesian wells or tapping the lakes and rivers of the interior! The cotton plant of this region does not require special care for it to reproduce well, since it gives a good yield even on poor land, provided that it can be supplied regularly with a certain amount of water. In the vicinity of Tacna, I found in various localities clumps of cotton plants that had grown from seeds that had been scattered singly, being plants that had scarcely reached 25 cm in height and that nevertheless bore capsules inside which cotton had been produced. It would be commendable to collect the seeds of these plants that had adapted themselves to dry conditions to obtain a variety more resistant to the inclemency of the dry years.

On 28th March, I was able to leave the limits of Arica and proceed by auto to the central encampment which was about 70 kilometers away; the bridges were evidently holding enough for foot passengers to cross them. The railway follows the road from the first few kilometers in a northerly direction only to turn then to the east and plunge into the valley of the river Lluta. The whole region that we crossed is completely devoid of vegetation; in the lower part of the valley where as a result of filtration the water has formed a few swamps, there grows the gigantic *Equisetum xylochaetum*, which reaches a height of 5 meters, giving short stretches of this region an antediluvian aspect.

After a curve formed by the railway and after attaining an altitude of 1,000 meters above sea level, we suddenly caught a glimpse of the farms at the bottom of the valley of the Lluta, like a chess board. The sudden change produced by leaving a desert and entering a stroke a region provided with a rich and abundant vegetation is surprising and it is difficult to accustom one's eyes to this sudden change.

The river Azufre, flowing into the river Lluta, carries into it in its waters a quantity of toxic substances, which do not allow the cultivation of cotton, fruit-trees or flowers; but certainly alfalfa, potatoes and maize with which this water gives good yields. It would not be difficult to divert the river Azufre to free the river Lluta from the undesirable conditions introduced by the waters of the former; this would permit the production of a quantity of very valuable crops which would well compensate for this sacrifice.

About midday we arrived at the central encampment and getting myself put up in the house of the director of the railway under construction between Arica and La Paz, Mr. Whyne Edwards, where I encountered a fine welcome and a perfect understanding of the object of my journey. I used the afternoon of the same day to go on an excursion to the Quebrada Quiroz, where I was able to collect five species of plants. It was my intention to collect all the plants from their first appearance in Tacna to the greatest altitude that I managed to ascend in the interior. The next day, I left the central encampment, which was at 1500 meters above sea level, to travel by mule into the interior.

The encampment at Kilometer 96, at 2,600 meters above sea level served me during the next few days as a point of departure for my excursions. The vegetation of these heights is still very sparse, only at 2,200 meters did I meet the first feeble plants of a *Gnaphalium*, and at a slightly lower altitude the first quiscos. On 4th April I transferred my operations to the encampment at Kilometer 110 which was at 3,600 meters above sea level. In the rainy season in this region, between the months of December and March, there exists here a very interesting and varied vegetation. I was able to make a large and interesting collection of plants which will serve as a basis for a future botanical investigation in the Province of Tacna.

Among the plants collected in these altitudes was encountered the interesting parasite *Ombrophytum peruvianum* in the family *Balanoforaceae* of which until now no representative has been recognised in the Chilean flora. Also I found a new species of the genus *Solanum* which produces potatoes and of those which are cultivated there are actually more than 200 specimens in the Botanic Garden. This last plant has, over and above its scientific value, without doubt great importance for Europe and the United States of the North with the object of improving by crossing the ordinary potato of cultivation, and in this way producing new and better species. I have been able to collect the seeds of a wide variety of plants which are now being cultivated in the Botanic Garden, the observation and study of which will provide new biological data to science.

After a short stay in the encampment at Kilometer 123, which itself is some 150 meters higher than the previous one, I climbed by the wild Huailas Gorge to the altiplano which is met with at more than 4,000 meters above sea level. In this region almost all the plants that we have seen until now had disappeared, presenting in exchange others that formed compact clumps just like cushions or humps, called generally "Llaretas" and which give to these desert regions a unique appearance. These "Llaretas" are of great importance for the inhabitant because they furnish an excellent fuel and I shall permit myself later to make a few special observations on the matter.

After a short stay in Titiri, which is situated at 4,100 meters above sea level, and where I was able to collect a large quantity of interesting plants of the flora of the high cordillera for my herbarium, I moved my camp to Chillusmo, at the foot of the Volcano Tacora at 4,250 metres above sea level. In this locality, the vegetation is very sparse; many species of the lower regions fail to ascend to these altitudes. Instead there are a number of forms which grow exclusively in these elevated regions. My presence being indispensable in Santiago I was unable to progress higher by ascending Tacora, and after a short excursion



to the White Lake, which is situated almost on the boundary with Bolivia, I returned on 14th April to Titiri. The exhaustion of the mules and wild tempests of rain obliged me for the second time to accept the hospitality of the encampment at Kilometer 123 in order to assign a rest day for the animals. On 17th April I arrived at Kilometer 110 encampment where I had left the greater part of my equipment, along with my collections. After having sorted my collections and collected a number of living plants, I had to return with three pack mules from the encampment at Kilometer 96 to the station at Kilometer 90. Here I took leave of my guide who had served faithfully during all the excursions, returning myself in a goods train to Arica. It happened that the same boat that brought me before from the south to Arica, carried me to Valparaiso where I arrived on 28th April, returning a few hours afterwards by rail to Santiago.

Taking into consideration that the season in which I had to stay in these regions was not propitious for botany, since the flowering of the plants occurs in the months of rain, from November to February, I have obtained very satisfactory results. Once the collected plants are all sorted and classified, I shall be able to present a complete collection to the National Museum, which is lacking in specimens from these regions. The special climatological conditions of these provinces, where the winter comes after the rainy season in the interior, whilst on the coast the summer follows the season of the garuas, produces for science important and interesting reciprocal exchanges between insects and plants, inviting biological study of the phenomena that occur. Also I was able to take a quantity of photographs of the countryside and of typical plants.

With much pleasure I acceded to the wishes of the Governor of Arica, Sr. Arteaga, to advise him how to provide the town with plantations of trees in order to embellish it. Unfortunately it was impossible to make an adequate selection between the plants available; moreover insufficient experiments exist on the cultivation of this type of plantation in the sand region to be able to hope for a satisfactory result. According to the Governor, all the plantations of trees that up to now have been tried have failed. Notwithstanding, it appears to me that it would be possible to obtain a practical and satisfactory result, if, when planting the trees they are treated with sufficient care and the climatological conditions are taken into consideration.

I have cultivated in the Botanic Gardens a number of plants of jacaranda, eucalyptus, conifers and other trees for the plantations of the town of Arica, as also forage plants, that are able to withstand much aridity and which I am making available for trials in the Arica region. It would be advisable if the same cultivator of the plants mentioned, when they are transported to the north, were to be transferred in person to this region with the object of giving advice to the Governor, with respect to the manner in which they should be planted and maintained. Similarly there should be appointed to those provinces an agronomic expert, who with sufficient knowledge and the studies which he would make in the locality, would be able to help the farmers and peasants of the land with his advice.

#### Comments

. . . . from Isaiah Bowman, "Desert Trails of Atacama" 1924

The coast of northern Chile is quite the driest of which there is any record in the world. For a 21 year period Iquique has an average rainfall of 1.5 mm and Arica has still less, 0.6 mm for a 19 year period. But an average in the desert is as nearly useless a computation as even the desert affords. There is no such thing as a normal desert rainfall. Years of absolute drought pass, and a foreigner who comes out and stays his time could then depart without having known a drop of rain to fall. He may even assert that it never falls and speak as one who knows because he "has lived there." The British Consul at Iquique advised some of his friends who were coming out from England not to bring umbrellas, for in the fourteen years that he had known the coast no rain had fallen. Yet on the night on which they disembarked from the steamer it was raining hard. In 1906 there was a three days' rain, a succession of light showers with intervals of heavy mist, which penetrated the houses and ran off walls and ceilings and soaked carpets and beds. It is only a rare downpour that gives Iquique anything at all to average through the year. It is as nearly like a rainless land as any that we know on the earth today.

Yet it must be impressed that rains do actually occur at intervals in the Desert of Atacama and that some of them are of extraordinary character. The reason for their occurrence is not quite clear. In the Cordillera of the Andes and the western foothills periodic summer rains fall as far down as 8000 or 10,000 feet, lower still in some places, higher up in others. At long intervals the usual rains may be supplemented by an extraordinary heavy snowfall or an equally heavy rainfall. The sudden precipitation of rain in unusual quantities is a feature of practically all the deserts in the world. In northern Chile the rains and snows produce heavy floods that extend far out over the nitrate pampa and freshen the innumerable gullies that feed the main streams and spread vast sheets of mud and gravel over the outer piedmont. They are said to occur once or twice in a lifetime. Billingham notes nineteenth century floods in the Pampa de Tamarugal in 1819, 1823, 1852, 1859, 1878 and 1884. Bollaert comments on those of 1819 and 1852. Floods also occurred here in 1903 and 1911. Probably some of the storms are quite local in character, but others appear to be associated with widespread periods of rain, as those of 1819 and 1911. The latter was a season of extraordinary character.

On February 15 and 16, 1911, the towns of Pozo Almonte, Huara, Pisagua and others of the province of Tarapaca suffered a great inundation following days of furious snowstorms in the Cordillera. Increase in the river at Tacna interrupted communications between that town and Arica; an enormous lake that formed between Huara and Pozo Almonte suspended railroad service there; the work of the salitreras was paralyzed, numerous workman's encampments were destroyed, and likewise a large quantity of nitrate. In some parts of the pampa it rained copiously on the night of the 13th February, although elsewhere not a drop fell. On June 24th of the same year rain fell at Antofagasta in the early morning; it was accompanied with a violent thunderstorm that caused great alarm among the people, so rare is such a phenomenon on the coast. In Calama (altitude

7400 feet, latitude 23°S) the streets and houses were covered with a thick layer of snow. Telegraphic communication between Tacna and Arica was interrupted, and many trees were blown down in the plantations and gardens.

..... from H. Middleditch

A large number of the plants which Ritter grew in his garden when he was resident in Chile are now in the hands of the herbarium of the Natural History Museum in Santiago. These include FR 199 *Neowerdermannia chilensis* with collecting localities of Ticnamar, Chapiquina and Puquios. This last-named place lies on the railway line from Arica and is quite probably near the location where Soehrens first found this plant in 1911. Ticnamar lies further to the south and here Backeberg also collected this plant, whilst Chapiquina lies at approximately the same altitude, between the two foregoing locations. This altitude would be compatible with Reiche and Pohlmann's "hen's-egg to fist-sized cactus" which they found in the next pair of valleys to the south.

In his account of his journey inland from Arica, Soehrens refers to the river Azufre carrying in its waters a quantity of toxic substances. In his paper read to the Royal Geographical Society in London in 1835, J. B. Pentland reported some observations made whilst he was in the Bolivian Andes, including the following: "The Nevado of Chipicani (at the south-western basis of which the hamlet of Tacora is situated) consists of a broken-down volcanic crater with an active solfatara in its interior, emitting quantities of aqueous and acid vapours, which by their condensation give rise to the Rio Azufrado, a considerable torrent that derives its name from the large quantity of sulphates of iron and alumina which its waters contain in solution."

#### **EXTRACT FROM REPORT OF THE 1933 EXPEDITION By Curt Backeberg**

From the Cactus Succulent Society of Great Britain Journal 2.1:1933

At first I often heartily cursed the film-making; for when I returned home in the evening (if one can call it a "home"), naturally the seeds had first to be cleaned; this generally takes a long time and when one longs to sleep one must still charge the film holders. But I got fonder and fonder of the film work, till finally I found it really attractive. The skeleton of an idea of having to take films became more shadowy and I came to realise that the celluloid strips would be for me the best reminder, and for cactus lovers a unique and living insight into the home of the cacti. I have, therefore, spared no pains to make the pictures as complete as possible. Thus, I hired a flotilla of Indian fishermen on Lake Titicaca, with whom I set out on the water. What an unforgettable experience that was! The yellow straw sails, the wash of the reed boat, the blue sky, the colour of the mountains, and the indescribable beauty of the towering cloud masses around the jagged towering rocks in the distance . . .!

To be sure the work began with a slight mishap to my deputy "cameraman". He fell from the Balza, as the reed boat is called, into the lake, for the seating accommodation is especially restricted owing to the sharpness of the stern. Thank goodness, I was holding the camera at the time.

Then I took pictures in Tiahuanaco, the old pre-Inca settlement went up into the mountains, found yet more *Lobivias* up at the boundary regions of the tropical Yungas, and confirmed that the genera *Rebutia* and *Neowerdermannia* extend almost to Lake Titicaca (reckoned from northern Salta in Argentina) and therefore have a very wide distribution. A propos *Neowerdermannia*. It is also called *Achacana*, which means an edible cactus, as *Pasacana* means an edible cactus fruit. Dr. Werdermann thought that *Neowerdermannia* were probably eaten at special ceremonies. Unfortunately there are no more to be found at that site today. The cactus is simply eaten as a food, as the potato is with us. Bolivia is at war and the Indian no longer earns anything and hardly knows what to live on. Can one wonder then that at one place they could only bring me small and unattractive *Neowerdermannia*, and excused themselves by saying that all the large plants had already been eaten on account of necessity! Nothing remained for me to do but to go myself into the remote Lomas of the plateau to collect really beautiful large plants.

I paid a visit to my colleague Marsoner. He is a bachelor, and at the time he was busy setting out his mid-day meal on the table in the kitchen. There was the customary beefsteak and peeled potatoes. Suddenly I noticed that one potato had a central axis and was cut smooth on one side, and the Marsoner told me that the confounded ants and woodlice had nibbled his *Neowerdermannia* (they do this with us too, as many people know from experience) and he had decided on the spot to eat them himself, so that the woodlice at least should have no more of them. He put pepper, salt, sugar and everything else possible in the "sliced cactus" but he maintained that in spite of all they tasted bitter.

Finally we agreed that there must be some trick in their preparation to overcome the bitter taste and decided to leave the further enjoyment of *Achacanas* to the Indians. Once, when the store is empty, perhaps, a good, straight forward potato tastes better really. However, Marsoner's *Achacanas* were quite welcome.

#### **NEOWERDERMANNIA IN FLOWER By C. Backeberg**

Translated by P. Collins from *Kaktusy* Number 5 1934

This very unusual picture (in the Czech Journal - H.M.) shows this strange plant which apparently, although it grows well for us in cultivation, nevertheless rarely flowers. The flower-tube is naked and scaly, the perianth lobes are whitish with purple central stripes. Two forms exist; one with pointed and the other with rounded perianth lobes. Some plants have strongly pointed, well developed tubercles. *Neowerdermannia* is called "Achacana" by the Indians and is an edible plant, once

the spiny covering is removed. Pieces are then cooked and taste similar to potatoes.

Neowerdermannia occurs from northern Salta across the whole of central Bolivia as far as Lake Titicaca and has even been found in the neighbourhood of Potosi. The appearance of the plant changes considerably, however. The less handsome ones come from northwestern Argentina, where they are very often bitten off by animals. The best specimens come from central Bolivia. These particular plants have magnificent long, black, central spines, and almost red radial spines.

The way the seeds are stored is peculiar. Neowerdermannia was once declared a chamelon among the cacti, and, it was said, made its way to Mexico (under the ground perhaps?) where it once again saw the light of day in a different form, as a Mammillaria. The story went round that "it squeezes out its seeds like a Mammillaria". I think that the man in question only studied the plant superficially. The seed (about 5-8 grains) remains above the areole in its quite imperceptible covering and in the dry season, with the drying-up of the plant, it is pulled into the body, so to speak. Then, when the rainy season comes, the ribs of the plant expand and the tubercles with the areoles also stand out; the seeds meanwhile having ripened are pushed out again by the areoles and the rain washes them away. The plant with its naked flower-tube occupies a unique position. I have found it in almost the whole of Bolivia; in some localities, however, only in a few spots, since the Indians, because of the hard time they had during the Gran Chaco war, have quite literally eaten up the best part of them.

Neowerdermannia must rather be placed with the Echinocacti and not as Dr. Werdermann originally thought, with the Lobivias; on the other hand, with regard to the completely naked flower-tube and large tubercles, the plants do not match up with many South American Echinocacti either.

#### **NEOWERDERMANNIA Fric By A. Castellanos & H. V. Lelong**

Translated from *Opuntiales vel Cactales in Genera et Species Plantarum Argentinarum* Vol. 1 1943.

Fric A.V. & Schelle E., *Kaktusar* No. 11 1930; Werdermann, *Kakteen* 1930; Boedeker *Kakteenkunde* 1934; Backeberg, *Kakteenfreunde* 1934; Backeberg, *Blatter f. Kakteenforschung* 1935; Backeberg & Knuth A.B.C. 1935.

(Description in German repeated from Werdermann, *Kakteen*, 1930.)

Flowers small + 2.5 cm long), the tube funnel shaped, glabrous, with fleshy, greenish scales lacking either wool or hairs in the axil. Perianth white or pink, with the reproductive organs enclosed; stamens very numerous, shorter than the style and in one series; they begin about 4 mm from the ovary and continue at different heights along the whole tube, attached to its inner wall up to the base of the perianth lobes. Ovary spherical, 3 mm in diameter, with relatively few ovules, glabrous and hidden in the tuft of the wool on the areole; the latter in its turn is located in the axil of the tubercles; style robust, ending in a funnel shape and with few stigma lobes (about 4).

Fruits spherical,  $\pm$  5 mm in diameter, the withered perianth persisting, somewhat dry at maturity and reddish in colour. Seeds not very numerous, 5-10, some 2 mm long, angular, slightly kidney shaped and greyish-brown.

Stems obconical, umbilicate, solitary ( $\pm$  12 cm long x 8 cm diameter) or branched, but in the latter case smaller in size, with spirally-arranged tubercles bearing in their axils the areoles, which are furnished with a tuft of white wool, deciduous with age, and numerous spines curved at the tip like a hook. Mountain plants.

Geographical distribution: Jujuy.

Specimen described: *N. vorwerkii* Fric; Jujuy, Maimara, collected by Marsoner November 1940 (BA. 34663).

#### **INLAND FROM ARICA By C. Backeberg**

Translated from *Stachlige Wildnis* by P. H. Sherville

Since one cannot hire mules and horses in Arica, Bock had arranged for animals at Quebrada Honda. A muleteer undertook the mission to Ticnamar, from where the people should meet us half-way to the gorge. The cool night wind roared around our ears, when we set off in a small lorry. We had to hold on firmly in order not to fall under the seats, since they are only made out of a board without side arms. Towards morning it became even more cold. We huddled up close to each other, and pulled our ponchos tight round us up to our noses. Unfortunately we could not close our eyes, which burnt from the fine dust and severe strain.

Mile after mile the machine ate its way through the desert, and at last it drew up a rather steep slope. We stopped in front of a low ruin, a solitary corral. A figure raised himself and came over to us. It was our guide, who had arranged to be here. We will wait until dawn for the departure, and we sat behind the corral, which acted as a windbreak, and into which the animals are brought overnight in order that they do not escape. As the morning dawned, a mule troop arrived from Azapatal, who would go to Belen. One of the drivers fetched a letter out of his pocket, for a wool dealer who lives up in the mountains, and handed it to us. Not only freight, but money and post would be confided to the honest muleteer, who in this region fulfills a valuable duty. In the loneliest regions of the cordillera he even arranges the barter trade.

In the meantime, our mules had been saddled and loaded. They let their tired heads hang; their rest between the outward and return journeys was much too short. We mounted, a departure call rang out over the caravan, which simultaneously advanced towards Belen, taking us up the canyon. The traversing of one of the most desolate regions of the west coast had begun.

For hour after hour we had now already trotted through the hot pampa, one behind the other. We have donned long wind-jackets, pullovers and vests, and mustered all our strength against increasing tiredness. After a while we could scarcely stay upright in the saddle. Ever farther it goes, up and down through the completely barren moon-like landscape, but it seems to us as if we cannot escape from the situation. The copper-brown mountain chain of the Cuesta remains unaltered far in the distance, and to its feet stretched the smooth treacherous plain which has no end.

When one rides over this, one thinks that it is very comfortable to ride sidesaddle, until one finds the first of many peculiar fissures, which interweave from east to west and impede progress. They are the last witnesses of the former fertility of this earth; for sometime or other in the grey antiquity, rivers flowed here from the mountains to the coast below, which gradually ate deep canyons into the established land as it grew into desert, where today all life is lost. Formerly it might have been covered in friendly green. Now the earth shows no sign of flora any more; at least I could not discover one plant over the whole day.

Again one of the steep-walled incisions opened before us, to whose base a precipitous zig-zag route made its way down. The afternoon shadows almost reached to the opposite canyon rim already. Bock, who rode at the head of the troupe, disappeared immediately behind a prominence, then I heard a loud call from him — "Cardon." I was almost terrified. Cardons are what one calls all large cerei out here. "Should there be columnar cacti here?" "How can that be"? I asked myself. My guide had seen correctly. In the base of the canyon stood three moderately strong and still unbranched, approximately four meters high, *Browningias*, bolt upright like telegraph poles.

But only one of them is alive, the other two are mummified; the rigid spines felt crackly, papery skin fell from the porous central stem when I touched the plants with a pick-axe. Our muleteers had told me previously that rather more Cardons grow on the slopes; it was understood, however, solely from their descriptions that they had found *Neoraimondias* there. These, the Peruvian could regard as his natural plant, not only because they crop up from the Ecuatorian to the present Chilean region, but also above all because they are distributed to the southern edge of the regions in Chile which were abandoned after the saltpetre war. I had truly suspected moreover that *Browningias* exist up there, for a fellow countryman of mine brought along some years ago, photos of these from northern Tarapaca. That there are also these in this completely dead pampa, I could not have expected. The three plants had certainly grown from seed, which had once been washed down from the heights. At the base of the canyon one could still recognise the remains of the vanished rivers in smooth polished rocks and sandy waves, when the watercourses were recently stopped.

The *Browningias* grow very slowly. The first existing columns are inclined to be ignored for a long time in the juvenile stage, in which perhaps they obtain some rain from time to time; finally they must laboriously absorb every breath of moisture out of the depths of the existing further-dessicated earth, until their growth progressively slows down and the death of the vegetation, to which their brothers on the pampa had previously fallen victim, snatched away two of the three residual remains, which could have remained for some time in the shelter of the canyon. The scattered and often astonishing habitats of the *Browningias*, permits the conclusion that the dessication of the west coast and the range of its existence is of rather recent date, otherwise they would have already disappeared completely. The question on the other hand concerns the cacti, which only feel at home in the desert, for these cacti must formerly have existed in much larger numbers.

Shortly before the ascent to the Cuesta, we stumbled between the ruins of a disused mine, and a stinking water-hole. Our mules plunged down like wild beasts to the silted-up pot-hole, for the brave animals have not received a drop of moisture over two whole days. It is astonishing that they are able to endure it. Also they are still a long way from their goal, for a good watering place they must first get to Ticnamar. Gradually the route becomes evermore uphill, and it is beginning to get cool; we pull our waistcoats and pullovers close together round us again. In the last light of day we saw, over on our left, on a rocky point a Guanaco, which stood guard over its herd there. We are now in the small hollow in which we must spend the night. The muleteers tied their spirited animals together by their forelegs, the packs were laid in a heap and the fire kindled. We used the withered stems of the *Neoraimondias* for this, they occur relatively plentifully above here. The dry wood assumed a fragrance when burnt.

In between, we set up our camp for shelter against the wind. Bock piled up stones one above the other, whilst I spread over the earth a number of old newspapers, which we had brought as packaging material, upon which the saddlecloth would lay. The saddle itself served as a pillow, and we covered ourselves with our ponchos. The night passed rather uneasily. When once some of the animals escaped, the guide went in search of them rather noisily. Soon afterwards, Bock, who had suffered an asthma attack since the previous day, made himself an adrenalin injection, and towards morning the cold earth began to penetrate the paper underlay so strongly that I could no longer sleep.

I was happy when the day dawned and we could make our hot tea in the glowing ashes of the cereus stems. Then we rode further long hours through hollows, over low summits and small high plains thereon; the landscape began to become elevated, short bushes emerged. Here and there one would see already a bird or a vicuna or a vischacha, a small dog-like animal, and at last the valley of Ticnamar opened before us. It was, nevertheless, once again becoming dark before we attained the place. I had become somewhat lame from the extraordinary long ride. The bones did not want to operate correctly when we set out the next morning, but it must be, for there are, like I had discovered with the advent of the indians, interesting cacti in the surroundings. We occupied almost the whole day here, to scour the surrounding slopes. We first got out of the saddle around six in the afternoon.

If we were also dog-tired, we were more than pleased with the result, our success included three important

finds. First I had identified a new *Oreocereus* in the neighbourhood of the village, which by reason of its spine colour received the name *Oreocereus variicolor*. Being present on the Chilean side of the cordillera shows, as I had previously presumed with the discovery of the south Peruvian *Oreocereus hendriksenianus*, that these principally Bolivian-occurring cereoid genera from there must be reached from the west, and indeed evidence of a period when the Andean barrier was not so far advanced as now, since the present heights of the passes would allow no extension into the coastal zone. A confirmation of the correctness of my supposition shows itself as a result of a further find; the first and until now solitary *Neowerdermannia* to become known beyond those of Bolivia and northern Argentina, which is called *Achacana* by people in each country (*N. chilensis*). Its occurrence at this place, like that of *Oreocereus variicolor* also, certainly not resulting from a detour around southern Peru. Instead *Neowerdermannia* must have evolved there likewise; they can only descend from ancestors which advanced out of the Bolivian highlands, westwards through the incisions in the mountains towards northern Chile.

Our spiny booty will still be packed the same evening. We don't need to dry them, because the dampness of the associated earth will quickly evaporate in the desert climate. When we were ready with the work, we handed the burden (the name for such cargo-packs) to a muleteer, who would convey it over the shortest route to the coast below. Bock and I will ride back over the detour around the Cuesta Oscaya, a solitary pass of the cordillera, towards Arica, then I would like to become acquainted with the eroded landscape between Ticnamar and Belen.

### SOME NOTES ABOUT THE FINE CACTI SPECIES FROM THE WEST COAST OF SOUTH AMERICA By F. Meyen

Translated from *Allgemein Gartenzeitung* 1. 1833 by H. Middleditch

Among the plants from the new world which have enriched our gardens, the cactus family stands near to the top. Their splendid flowers along with the strange, tropical appearance of the plants, puts them in first place among the ornamental plants in our hothouses. Although a remarkable number of species are already known from this Family at the present time, yet the number of still unknown ones is surely even greater: and owing to the difficulty of transporting these plants from certain very distantly situated areas, the knowledge of these latter will be delayed for some time yet.

The southerly provinces of Peru, such as Arequipa and Tacna, over the Cordillera as far onward as Lake Titicaca, are particularly rich in these fine plants and, insofar as their shape is concerned, the finest species are to be found just there, which surpass all those which our hothouses hold up to now. This region is also the least accessible for us, so that we will be obliged to do without these ornaments of tropical vegetation for a long time yet. This plant life occurs at a distance of some 20 to 30 miles from the coast, from whence it must be brought on the backs of mules to boats, then conveyed to Panama and from there make the journey over the isthmus and to Europe. Should the plants be conveyed around Cape Horn, then there would be considerable concern because of the cold and the lengthy transportation over the open sea.

Here in southern Peru, just like on the whole of the west coast of South America, as far from north to south as the cactus extend, the cerei with upright stems occur, right to the edge of the seas, and they ascend the hills up to a height of 12,000 feet and more. The mountain on which lies Chiquito, right on the edge of Lake Titicaca, is littered with cerei and peireskias on its slopes. On the Chilean plateaux, which rise to a height of 1500 to 2000 feet, such as the Llano del Cachapual, a continuation of the Llano de Racagua, the cerei are one of the principal features; there they are often covered over their whole exterior with the handsome *Loranthus ebracteatus* Bertero, out of whose scarlet red sheath the large white-coloured flowers extend downwards; towards whose honey innumerable Diptera (flies — H.M.) fly. If one ascends the Cordillera from Tacna or along the road beyond Arequipa one traverses the first and second chains; the traveller is astonished by the barren nature of this tropical region. Everywhere precipitous ascents, on all sides nothing but bare rock, denuded of all vegetation except for the isolated, handsome, cacti, which tower up here like phantoms from the rocks, and which are blackened on account of the influence of the sun. The *Cereus candelaris* sp. nov. is confined here to the slopes of the mountain, but keeping very strictly to an altitude of between 6000 and 9000 feet; its straight, erect stout trunk becomes 6 to 8 feet high and even higher, it is almost unribbed and quite densely enveloped with black-brown spines. In old age the spines fall from the lower part of the trunk and the latter become bare. At the top of the stem there spreads out from one point 5, 8 or even 12 branches, which are pale green coloured, covered with delicate hairs and are two to three inches diameter. These branches of 2½ to 3½ feet in length, grow in different directions, some upwards, some downwards and others twist snakelike in all sorts of directions. Close besides this cactus, especially in Arequipa province, is to be found *Cereus arequipensis*, which surpasses the former in beauty. It is eight ribbed, and reaches the height of 20 to 25 feet. Upon its ribs are situated hairy protuberances at regular intervals, from which bunches of spines project, in the centre of which is to be found the large white flower. Considering this tall candelabra cactus, its ribs covered from top to bottom with the large, symmetrically situated humps, from which the large white flower extends, then one could properly describe it as the most handsome of this plant Family.

As one ascends higher up there into the Cordillera, so ever new sorts appear; the cereiform ones become shorter but appear in greater numbers; among the new ones are to be found *C. fascicularis* (*Cereus erectus*, 16 angularis, 4 ped. altus, subarticulatis, art 3-4, aculeis 8-9 e circulo radiantibus. Flores 9-10 albi 3½ poll. longi in apice ramorum positi), *Cereus aureus* (*C. erectorepens*, sexangularis subarticulatus, aculeis 6-7 longis rigidis uno centrali recto longissimo. Flores aurei formosissimi 1 poll. longi, calyce villos.) etc. At the altitude of 10,000 feet and above, the Echinocacti become predominant,

which alternate with the almost round very long haired cerei. Still higher, as far as the vicinity of the perpetual snowcovering at 14,000 feet upward, low growing Peireskia are to be found. Just as on the whole it is characteristic of the Alpine vegetation that the plants which brighten the more elevated regions grow more compactly, so it is here also in the great heights of the cordilleras, and possibly nowhere more so noticeably and so extremely characteristically. Just as on the Vulcan de Maipa the peculiar plant forms of the Boopidae make small hummocks, which are elevated from among the volcanic deposits, and just as *Selinium acaule* Cav. (*Larotia* Hook) in the Cordillera of Chile covers complete rocks with their impenetrable turf, so also does the *Peireskia* upon the high plateaux of southern Peru. Catching sight from an appreciable distance of what seems to be small piles of 1 to 1½ feet high which have a yellow-red colour, the traveller is misled at first into supposing that he sees perhaps a wood. Then with closer investigation it is a *Peireskia*, whose leaves are crowded close together and are furnished with yellow-red spines several inches long. The flowers of this plant are found between the leaves and do not project beyond the spines. At the altitude where this peculiar *Peireskia* appears, the long-haired cerei are already left well behind and they mark the end of the cactus vegetation, which consequently reaches up to the vicinity of the perpetual snowline, where then the Family of the Cruciferae become predominant.

Comments . . . . .

from H. Middleditch

It is rather puzzling to read of *Peireskia* growing "up to the snowline" until it is realised that Meyen is speaking of the low growing, woody, and sometimes spiny plants like dwarf shrubs which form a component of the Puna "mat." Weberbauer describes this formation as follows: "The Vegetation is very dwarf, and consists chiefly of herbs, which sometimes form tufts or cushions. Among them are certain prostrate shrubs." Some plants are caudiciform, another bears a remarkable resemblance to *Crassula lycopodioides*. The plants which Meyen took to be *Peireskias* are not alone among those from the Puna mat which exhibit a form of growth comparable to succulent plants.

When Meyen speaks of southern Peru, he is referring to a tract of country, which, at that time, stretched far to the south of the present boundary between Chile and Peru. At that time i.e. 1833, the southern boundary of Peru lay at about 21°S latitude, somewhat south of Iquique. Hence most of the territory which now forms Chile's northernmost province of Tarapaca was then part of Peru. Meyen landed at the port of Arica and then travelled inland via Tacna and Tacora to Lake Titicaca, returning to the coast via Arequipa. The account which he gives of *Cereus candelaris* (syn. *Browningia candelaris* Br. and R.) is the very first published description of this plant. His observation that "the stem loses its spines in old age and then becomes bare" has puzzled all subsequent authors, since no other traveller seems to have come across a plant of this species which exhibits this particular characteristic. In describing the branches of this plant as "2½ to 3½ feet in length and 2 to 3 inches in diameter" he markedly underestimates the true dimensions. Did he ride close up to a plant and actually take some measurements? If so, how did he come to be so wrong? Or did he just ride past at a dozen or more yards distance and estimate their size, without having anything else available in that stark landscape to afford a comparison for size?

And if he was unreliable on this particular point, might it go some way towards explaining why his account of the stems "shedding their spines in old age" might also be unreliable?

Not only do we find the first description of *Browningia* in this account, but also that of *Weberbauerocereus*, in the form of *Cereus fascicularis*, synonym *Weberbauerocereus fascicularis* Backbg. Yet another first is *Cereus arequipensis*, synonym *Neoraimondia arequipensis* Backbg. as well as *Cereus aureus*, renamed *Erdisia meyenii* by Britton and Rose. Current botanical taxonomy would require this to be named *Erdisia aurea*.

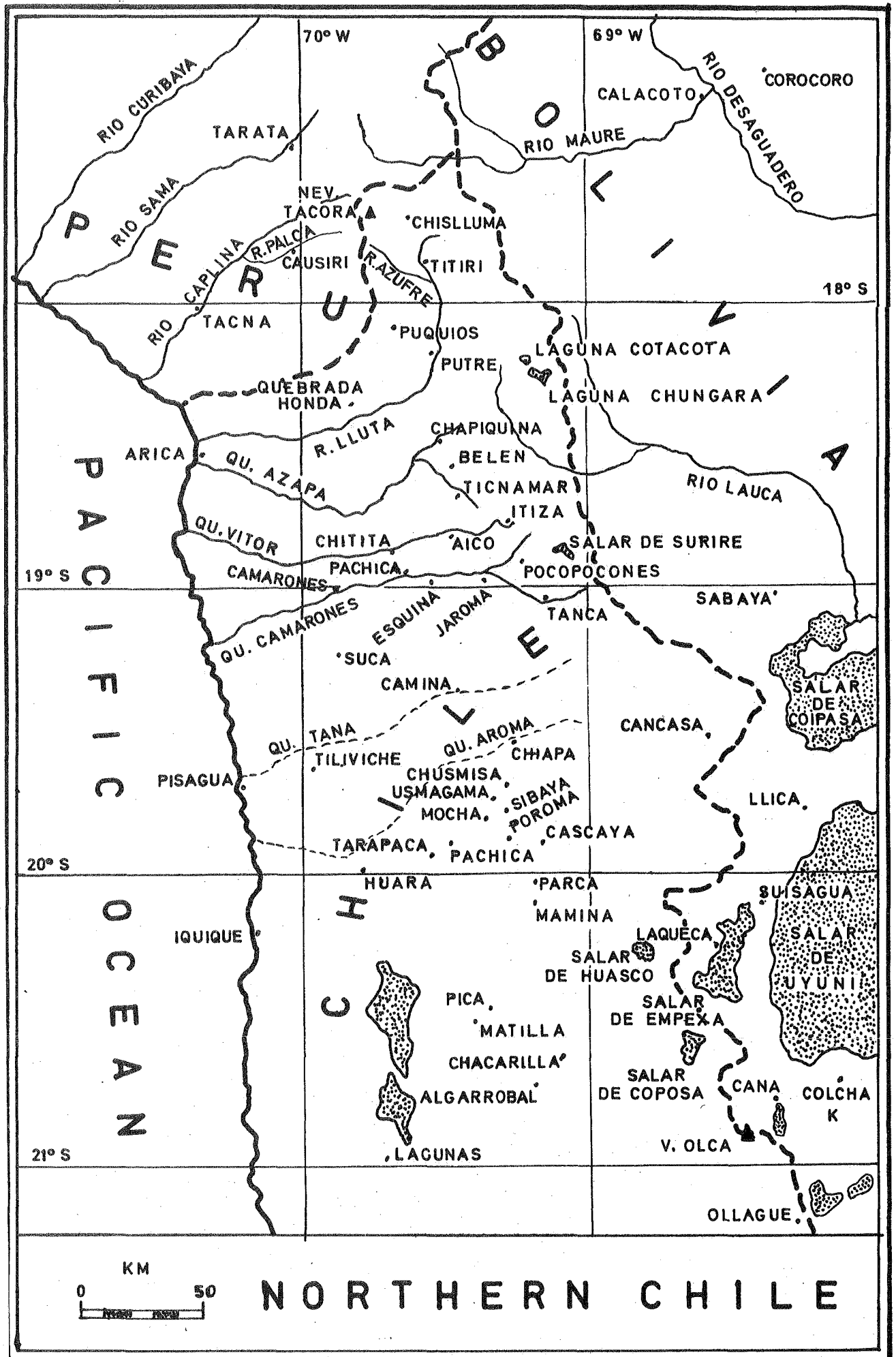
Meyen reports that the columnar cerei are often seen with a parasitic *Loranthus* growing on them. In his *Die Cactaceae*, Backeberg includes several illustrations of columnar cacti from southern Peru which are hosts to just such parasites. Similar parasite growth has been reported from central Chile, especially on *Trichocereus*. It is not entirely clear whether this parasitic growth is confined to cereiform cacti inhabiting the coastal zone, or whether it also occurs on the *Corryocactus*, *Browningia* and *Trichocereus pasacana* from higher altitudes. This feature of parasitic growth on coastal cereiform cacti can hardly be attributed in entirety to the prevalence of mist in the coast zone, since both Bowman and Phillipi comment upon the occurrence of mist at high altitudes — but a much colder mist than that at the coast, presumably.

. . . . . from R. Kiesling

*Trichocereus pasacana* occurs in large numbers in north-west Argentina where I have seen it growing up to some nine or ten meters high. Usually it reaches an appreciable age before branches appear and these are generally on the upper half of the trunk. In old age the spines on the lower part of the trunk are deciduous and I have found the base of the trunk almost bare of spines.

. . . . . reflection from H. Middleditch

So did Meyen see both a *Browningia candelaris* and a *Trichocereus pasacana* and — believing them to be one and the same sort — ascribe the deciduous spines on the lower trunk to his *Cereus candelaris*? Meyen does describe *Neoraimondia arequipensis* "with hairy protuberances from which bunches of spines project"; but all illustrations of *Neoraimondia* display spines only on non-flowering areoles, the more columnar areoles — "the hairy projections"? — which bear flowers are without spines. Perhaps there are parts of Meyen's account which are not exactly correct? Could they have been written from memory rather than from notes and measurements made at the time?



## A TRIP FROM ARICA THROUGH TACNA TO THE HIGHLAND OF TACORA By F.J.F. Meyen

Translated from "A journey around the world" 1834 by H. Middleditch

A short time after our arrival in Tacna, we learned that our ship would stay in Arica for about 14 days and go on from there to Islay. At once we resolved to undertake a journey over the western chain of the Cordillera towards the Lake of Puno (Titicaca - H.M.) and, from there, to travel back via Arequipa towards the harbour of Islay where we would hope to meet up again with the Princess Louise.

Tacna, with a population of some 10,000 persons, is a real commercial town; it carries on a transit trade with Bolivia which is very profitable. It belongs to those places in south America where the cost of living is very high; besides water, timber also incurs great expense. The small stream, called the Rio de Tacna, on which the town of Tacna lies, has only so little water that it cannot supply all the neighbourhood at the same time. At the time of our visit to Tacna, the town received the river water only twice a week; on the remaining days it was used by a pair of villages which lay 2 and 3 leagues above Tacna.

The climate of Tacna is quite pleasant and more salubrious than that of Arica. Quite early in the mornings it is very warm here, but the temperature only rises a little during the day, which is perhaps ascribable to the cooling inflow from the neighbouring Cordillera. Then, in the afternoon between 3 and 5 o'clock, a brisk wind arises which brings down the cold layers of air from the snowfields of the Cordilleras and even we were very affected by it. On account of it, mist and clouds build up, which cover the whole sky and then dissipate again at night. Long after sunset, when the wind has died down, the chill is no longer as sharp as it is in the afternoon. The sky remains clouded over throughout the night, so it is already very warm early the following morning. The altitude of Tacna is, according to Mr. Pentland's measurements, 1795 English feet above the level of the sea.

Shortly after noon, right at the time of the greatest heat of the day, we left Tacna; the sky was so clear and bright, that not even a trace of haze was to be perceived. The route took us along the valley of the Rio de Tacna, which is half a league in breadth and is enclosed to the left and right by mountain chains. The vegetation in the vicinity of the river bed was scanty; besides some syngenesistic bushes (= with anthers united in a tube or ring - H.M.), Baccharidae and Eupatoriae, there grows an Ambrosia — *A. orobanchifera* sp. n. — upon whose roots we found two different species of Orobanche (Orobanche are parasitic plants - H.M.). The walls of the surrounding mountainsides however were completely devoid of all vegetation, and gave the landscape the most desolate appearance. At a distance of two leagues lay the humble village of Caleo. This village is over a league in length, i.e. here and there stand some huts and then another Hacienda. Shortly after Caleo, the small hamlet of Patchi lies on the left side of the valley. The road goes past there another 1½ leagues towards the warm springs of Caliente. We climbed up to the solitary house there, whose owner gave us permission to make use of his house for sleeping overnight.

Bright and early on the following morning, we set out again on our journey, and climbed gradually towards the foot of the Cordillera. Some fine bushy plants of the Family of Leguminosae — *Mimosa pellocantha* sp. n. — and Bignoniaceae were all that we caught sight of on this trail; no plant, no grasses bedecked the stark and barren landscape, which was arid on all sides and covered with rock debris. At a distance of 4 leagues from our overnight stopping place, we came across a small house, but no water. Here everything was scorched up by the continuously blazing summer sun; the large fig trees stood leafless there, showing signs of life only by the buds at the tips of the branches. Only *Schinus molle* stood in full bloom and fruit.

Here we allowed our horses and pack animals only a short rest, whilst we prepared our breakfast of chocolate and roasted mutton. As we set out again the road ascended much more rapidly and already after a few hours we arrived in the region where flowing water was available in the depths of the mountain valleys, which gave a scanty sustenance to some plants. Soon the heat on this march became intolerable; well up in the open air the thermometer read 24°R already by about half past ten, and from the bare rocks the burning heat streamed out towards us. We had arrived in the region of the cacti, which gave the barren landscape an extraordinary appearance; nothing but bare blocks of stone, not even one little plant apart from this succulent vegetation was to be seen. A new cactus — *Cereus candelabris* — bedecked the slopes of the mountains round here. (Then follows a diagnosis identical to that published by Meyen in 1833 - H.M.). We did not see the flowers of this handsome cacti. Yet we did find some other Cactus — *Cactus aureus* and *Cactus fascicularis* — in flower; and have described them straight away since their preservation was not practicable.

Further upwards we reached a Quebrada in which, despite the very sparse water, there still occurred a generally prolific and fine vegetation; here grew *Isolopsis fuscata* sp. n., *Bowlesia diversiflora* sp. n., several Cruciferae and magnificent Solanaceae with large flowers. Very abundant here was a large spider, that had made a cone-shaped tent in the centre of its web, into which it crept away from the burning sun. Also a handsome *Loranthus* — *L. acuminatus* R. & P. — came into our harvest here and further onwards we found a handsome *Echeveria* — *E. peruvianus*.

About half past two we arrived at Palca, a small place where we would stay overnight. We came into this camp early so that we were able to devote a short time to the investigation of the neighbourhood. Palca lies on the slopes of the right bank of a narrow but very deep Quebrada, that is clothed all round with very prolific and fine vegetation. A number of humming birds and a black thrush enlivened the bushes. On the heights around Palca we saw in Peru for the first time cultivated potatoes — maize and alfalfa (lucerne) forming the other section of agriculture. We pitched our camp for the night in a natural cave in the closely packed boulders; pebbles fell almost constantly from the steep mountainsides and it seemed to us that now and then they became exceptionally frequent, perhaps on account of faint earth tremors. On the following morning, April 2, the temperature was very trying for us, since we had slept on the previous night in the hot vicinity of the coast. At half past seven we



measured the temperature of the air and of the running water here to be  $7\frac{1}{2}^{\circ}\text{R}$ . A few leagues further up from Palca, the trail proceeds steadily along the slopes of the fertile quebrada and looks quite pleasant.

At both sides the vegetation was most luxuriant, thickly decorated with the most magnificent flowers. Cactus peruvianus with its large white flowers is here quite at home, and the bushes are clothed with the gorgeous Mutisia hirsuta. Also a Lycopersicon grows most abundantly here; now and again it forms small mounds, which are quite ornamental with yellow flowers. On the rim of the quebrada the tall Cactus, even Cactus peruvianus, disappear and thenceforward lower forms appear, which are clothed with glossy white hair over their whole surface; also here are further species, for which one seeks in vain in the systematic handbooks.

Here the flanks of the hills become extraordinarily steep and their ascent was tremendously difficult for our animals. Here two small springs appeared in the slopes of a rocky cliff, whose dripping water had brought about the unusual vegetation all round. Already tall plants have disappeared at this altitude and even bushes which still occur here are stunted dwarf-like. Here the growth of a few small alpine plants, which even occur in the vicinity of the perpetual snowline, is most striking.

#### Comments

. . . . . from H. Middleditch.

A very similar route to that followed by Meyen in this article was taken by H. A. Weddell, who states that Palca lies at an altitude of about 2,900 m. From Meyen's account it would appear that Browningia candelaris first appears at a spot roughly half way between Patchi and Palca, about the same as half way from Tacna at 600 m. to the pass of Guaillos at 4,500 m. i.e. at approximately 2,000 m. altitude. This is reasonably comparable with the lowest altitude for the habitat of this plant which was given by Reiche & Pohlmann for the Vitor and Camarones valleys. Between those valleys and the site observed by Meyen, there now lies the Arica-to-La Paz railway line, along which Soehrens noted his first sight of "quiscos" at an altitude of "just below 2,200 m". In the valley of the Rio Tacna, Johnson observed Browningia at 2,200 m. downwards. Those writers who have provided an impression of the surroundings in which these plants are to be found, all agree in describing Browningia as inhabiting sloping rocky ground, completely or substantially bare of any accompanying vegetation. The photographs taken by Rauh on his collecting trip to Peru, which appear in his book describing his journey, and also the habitat slides shown by J. M. Chalet to the 1977 Chileans Annual Gathering, both confirm these impressions.

The "lower forms" of cactus which are "clothed with glossy white hair" may be Oreocereus or Tephrocactus.

(Further accounts of travels in northernmost Chile and articles about the cacti to be found in that area, will appear in subsequent issues of "The Chileans".)

### **ECHINOCACTUS MARGINATUS** Salm Dyck

Translated from Otto's Allgem. Gartenztg. No. 49, 1845 by  
G. J. Swales (Latin) and E. W. Bentley (German)

*Echinocactus caulo ellipsoideo cinerascente lurido-viridi vertice lanato 10 costato, costis parum convexis, pulvillis omnino confluentibus convexis nigro-tomentosis; aculeis exterioribus 5-7 radianter patulis rigidis rectis primo badiis dein cinerascentibus, infimo atque centrali solitario validioribus; floribus luteis, laciniis exterioribus lanceolato-acutis, interioribus erectis obtusis cum mucronulo.*

(From the Latin)

Echinocactus with ellipsoid stem drab greyish-green, woolly at the top, 10 ribbed, ribs slightly convex, areoles entirely confluent bearing convex tufts of black felted wool; outer spines 5-7 spreading straight outwards, rigid, straight, at first chocolate brown afterwards becoming greyish; the lowermost and the single central spine more strongly growing; flowers yellow with outer petals acute-lanceolate, inner petals upright, obtuse, with very short terminal point.

(From the German)

The stem is  $6\frac{1}{2}$ " high,  $3\frac{1}{2}$ " thick, narrowed towards the top and the base, with domed crown which is furnished with dense white wool. It has ten ribs, drab ashen-green, which are rounded off towards the top but flattened nearer the base, with very obtuse grooves between. The broad areoles are almost round, flowing together and covered with black felt. The 5-7 radial spines, of which the lowest is longer and stronger, are more or less standing out in a radiating manner. The single central spine is one inch long and standing straight out; all are stiff and straight, at first chestnut brown, later going ash-grey and under the magnifying glass are seen to be marked with faint lines. The outer flower petals are upright, lanceolate, pointed and of reddish colour, becoming gradually longer and broader above; the inner flower petals are yellow, broad, blunt with a barely noticeable pointed top. The crowded filaments as well as the anthers are yellowish; the style is thick and hollow, the eleven stigma lobes yellow.

Comments.

..... from H. Middleditch

In regard to the "black" areoles, no doubt the areoles would become much paler if the accumulated dirt and dust were removed by persistent energetic spraying, as commonly occurs in cultivation. The ellipsoid stem, drab grey-green epidermis, woolly crown and 5-7 radial spines appears to me to be a pretty good description for many plants which we now find labelled *Copiapoa lembckeii*. Backeberg established this species for plants found near Caldera since he was under the mistaken impression that *Echinocactus marginata* came from near Antofagasta.

When Pfeiffer and Otto published *Echinocactus bridgesii* they also described several other plants which had been introduced at the same time by Thomas Bridges, one of which was:

***Echinocactus columnaris* Pfr.** — *Crassus, columnaris, griseo-viridis, 11 angulatus, vertice convexo, fulvo-lanato; sinubus latis, acutis; costis verticalibus, subcompressis; areolis magnis, rotundis, contiguus, tomento denso nigricante munitis; aculeis intertextis, rigidis, rectis, nigricantibus, exterioribus sub 9 (½" long.), centrali 1 longiore, crassiore, subpollicari* — Diam. 4", alt. 1, which translates from the Latin as: Stout, columnar, greyish-green, 11 angled, convex at the top, with yellowish-brown wool; grooves (between ribs? — H.M.) broad, acute; ribs vertical, almost flattened; areoles large, almost circular, touching, furnished with dense matted blackish hair; spines interwoven, rigid, straight, blackish, outer ones up to 9, ½" long, central one longer, stouter, less than 1" long. Diameter 4", height 12".

Here again, we have the "blackish" areole wool which can be expected to clean up with suitable washing in cultivation. However on one and the same plant one would hardly expect to see both almost flattened (i.e. very obtuse) ribs and acute grooves between ribs. But here we have the tawny-brown wool in the crown, so common on plants found in cultivation today as *C. lembckeii*. Normally an ellipsoid or perhaps even egg-shaped body would be associated with *C. lembckeii*, but identical plants despatched from Knize either under the name of *Kz 72 streptocaulon* or as *C. lembckeii* display the height/breadth ratio of 3 to 1 which matches Pfeiffer's description of *E. columnaris*.

It would appear that Bridges brought quite a number of plants back to Europe, evidently disposing of them directly or indirectly to Kew, to the Berlin Royal Botanic Garden, to Prince Salm Dyck, to Cels in Paris and Schelhaus in Germany — and possibly elsewhere. It appears that species names based on these plants were published by a number of the recipients quite independently and quite without any joint consultation to avoid synonymy. Pfeiffer evidently came to the conclusion that his *E. columnaris* was synonymous with Salm Dyck's earlier *E. marginatus*, for in 1850, he published in his *Abbildung und Beschreibung Bluhender Cateen*, Vol. II, Plate 30:

***Echinocactus marginatus* S.D.**

Synonym: *Echinocactus marginatus* Walpers Repert V.

*Echinocactus columnaris* Pfeiffer *Abbild u. Beschr. Cact. Vol II Part 3. 1846.*

*Echinocactus caule crasso, columnaris, grieseo-viridi, 10-11 costato, vertice convexo, fulvo-lanato; sinubus latis, acutis; costis verticalibus, subcompressis; areolis magnis, rotundis, contiguus vel confluentibus, tomento denso negricante munitis; aculeis intertextis, rigidis, rectis, nigricantibus, exterioribus 5-9, centrali 1 longiore, crassiore, subpollicari.*

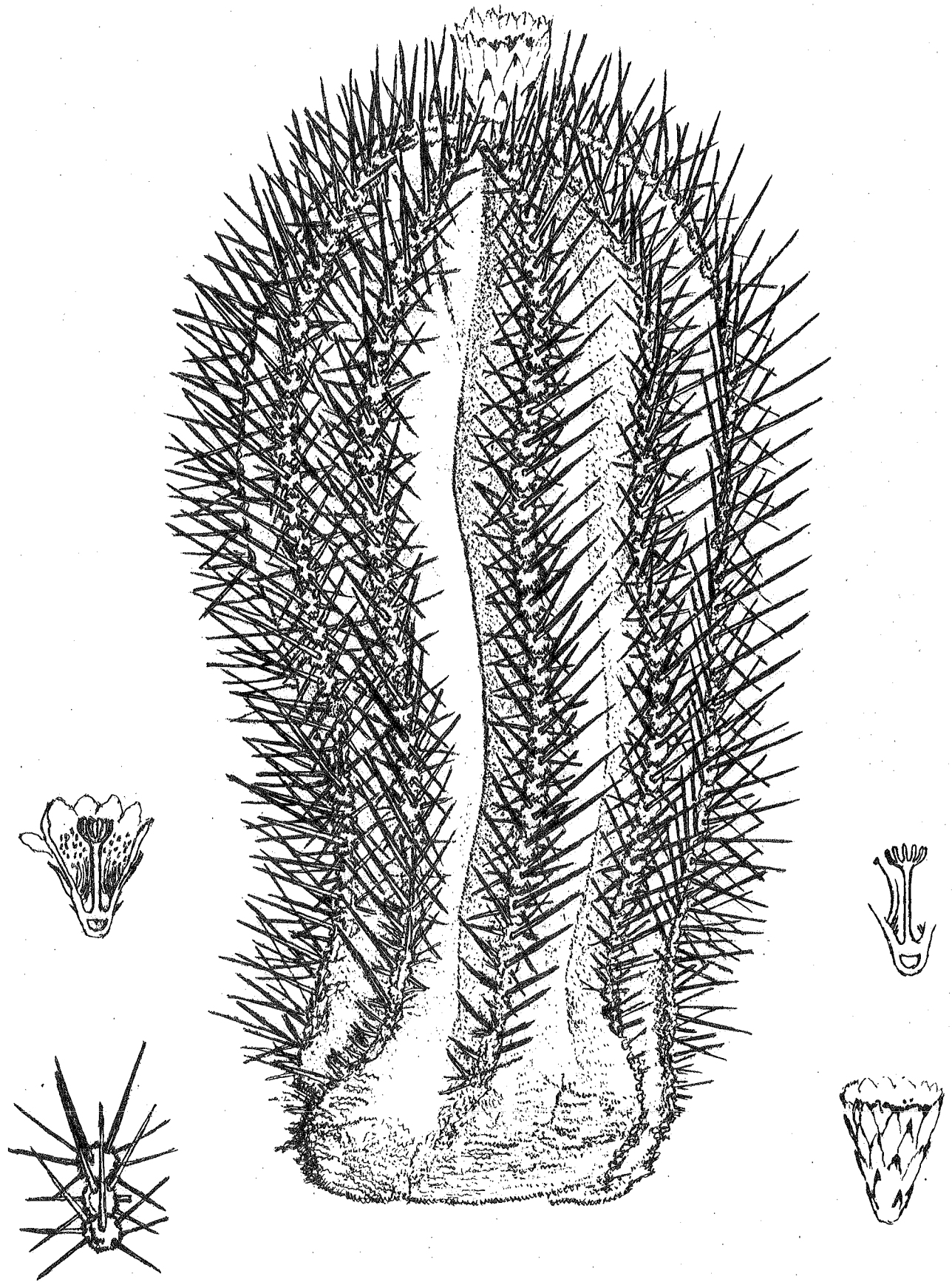
(From the Latin) *Echinocactus* with stout, columnar, grey-green stem, grey-green, 10-11 ribs, convex at the top, with tawny wool; grooves between ribs broad, acute; ribs perpendicular, almost flattened; areoles large, almost circular, touching or blended together, provided with dense black felted hairs; spines interwoven, rigid, straight, black, outer ones 5-9, single longer, stouter, central, less than one inch long.

(From the German)

"The same goes for this distinctive species as has been remarked about the previous one. I named it *E. columnaris* earlier but my description was published too late, since it had already been described as *E. marginatus* by Prince Salm-Dyck.

The stem has a great deal of similarity with many cereiform plants, on account of its ellipsoid-columnar appearance; its colour is a drab green and it has 10-11 fairly upright somewhat compressed ribs, separated by a broad sharp groove. The large, roundish areoles furnished with thick blackish felt stand close beside one another or blending into one another. From them stand out 6-10 straight, rigid, black-brown spines later becoming grey, of which always one in the centre is higher and stronger, like the foregoing, almost 1" long. The outer ones, which vary in number between 5 and 9, and almost ½" long, outstanding-spreading and when 9 outer spines is the principal number — as is the case in many instances — they cross over one another. The flowers rise up from the crown, are fairly small and yellow. The outer petals are lanceolate, pointed at the top, reddish, becoming longer and broader above, the inner ones yellow, broad with hardly noticeable terminal spiny tips. Filaments generally somewhat shorter than the style which divides into 11 yellow lobes."

In this description we can see how Pfeiffer combined the ellipsoid bodied *Echs. marginatus* S.D. having its crown covered with white wool, with the more elongated *Echs. columnaris* having the tawny wool in the crown, thereby producing a blend of the two descriptions which did not happily fit either sort. Moreover, the Plate accompanying this hybrid description shows a tall slim plant, not the tubby body of a Salm-Dyck's description. In this way, Pfeiffer established as early as 1850 the long-honoured practice of getting confused over *Echs. marginatus*. Some years later, Forster-Rumpler placed *Echs. marginatus* as a separate species from *Echs. streptocaulon*. But which *marginatus* did he mean — the tubby *Echs. marginatus*



COPIAPOA MARGINATA

Pfeiffer Abb. u. Besch. Bluhender Cacteen

2. Plate 30. 1850

S.D.? — or the slender Echs. *columnaris* in the plate titled Echs., *marginatus* Pfeiff.? — or Echs. *marginatus* Pfeiff., which is columnar in the Latin and ellipsoid in the German? — the Echs. *marginatus* S.D. with the white woolly crown or the Echs. *marginatus* Pfeiff. with the tawny wool in the crown? Here was established the practice of using for purposes of comparison an Echs. *marginatus* whose precise identity was not clearly defined, a practice followed with remarkable thoroughness by almost all subsequent authors, including Backeberg and Ritter.

In his *Gesamtbthg. der Kakteen*, Schumann rewrites the description of this species, as follows: *Simplex semiglobosus dein columnaris lana copiosa vertice clausus; costis usque ad 15 validis acutis plus minus spiraliter tortis acutis vix sinuatis vel crenatis; aculeis radialibus vulgo 7 subulatis rectis, centralibus solitariis validioribus porrectis; floribus infundibuliformibus minoribus flavidis, ovario squamoso et lanuginosos.* This translates from the Latin as: Body solitary hemispherical, later columnar, covered at the top with copious wool; ribs up to 15, robust, acute more or less sharply twisted spirally, barely indented to crenate; radial spines commonly 7, straight awl-shaped, solitary central spine stronger, porrect; small funneliform yellow flowers, ovary scaly and woolly.

From the German, Schumann's description reads: Body hemispherical, later more globular, finally columnar, up to 40cm high, rounded top, covered with a dense cap of yellow wool; in the new growth leaf-green or darker at first, later grey-coloured, up to 11cm in diameter and even more. Ribs 12-15, divided above by short grooves, up to 1cm high, flattened below, straight, pretty sharp, not very deeply grooved between ribs. Areoles more or less 8-12mm apart, circular, 6-7mm in diameter or occasionally broadly-elliptical, furnished with a pretty long dense woolly felt soon going grey, remaining a long time and in the crown flowing into that adjoining. Radial spines 7-9 of which the middle pair the longer, measuring up to 20mm. Central spines 1-2, both spreading, the upper one turning upwards, the lowermost the longest, measuring up to 25mm; these straight, awl-like, rigid, the former radiating, occasionally bent backwards. The spines are dark honey yellow when young, then become black at the tip, finally becoming grey.

This description by Schumann makes no mention whatsoever of areoles being close together, touching, or confluent. One could assume that Schumann had seen plants such as those we now call *Copiapoa lembckei*, where areoles frequently do not come close together, where spines are often dark honey-yellow, and where the crown wool can be tawny-brown and he appears to have adjusted the description of Echs. *marginatus*, which perhaps explains why his Latin description, Schumann puts Echs. *streptocaulon* synonymous with Echs. *marginatus*, which perhaps explains why his Latin description includes "ribs more or less acutely spiralled" but it does not explain why his description in German omits any reference to spiralling of the ribs. In this way, Schumann continues the practice established by Pfeiffer of producing a hybrid description under the title of Echs. *marginatus*.

When *Copiapoa marginata* was described by Britton and Rose in "The Cactaceae" it was stated that "Dr. Rose, when collecting in Chile in 1914, found these plants very common on the dry hills above Antofagasta." Their description included the feature "usually erect, but when old often 60cm long, spreading with ascending tips." There seems to be little doubt that no *Copiapoa* which exhibits this feature can now be found anywhere near Antofagasta, as Ritter himself observes (*Copiapoa streptocaulon*, ex K.u.a.S., this series). In regard to an entirely different plant, Dr. Rose paid a visit to the Rimac valley in Peru where he saw plants of *Espostoa* (which possessed a *Cephalium*) growing alongside shorter stemmed *Haageocereus*; he subsequently described these two sorts under the one name of *Binghamia*, even though he saw other *Espostoa* growing in northern Peru and described them as such. Since he was able to make one glorious misconception in Peru, it does seem quite possible, if not probable, that Rose made another mistake either at Antofagasta or when writing up his observations. No one else before or since. Rose's visit has described any such procumbent plant at this location. But, even since 1920, the habitat of *Copiapoa marginata* has been repeatedly stated by numerous authors as "Antofagasta". In this way, Rose made his contribution to the long-established practice of confusing the identity of *Echinocactus/Copiapoa marginata*. The article by Ritter (this series) also states that "*Copiapoa marginata* grows near Antofagasta" but from the evidence presented (in this series), this can also be seen to be an error. In his "Die Cactaceae" Backeberg attributed a tall *C. marginata* to Antofagasta, where it does not exist. When an author refers to *Copiapoa marginata* during a discussion, it is never clear whether he means *Echinocactus marginatus* Pfeiff., or *Echinocactus marginatus* S.D., of the Plate of *E. marginatus* Pfeiff., or the plant that actually grows near Antofagasta, or something else altogether.

In the *Dodoneus Journals* for 1968 there were illustrated some plants found by Knize near El Cobre which he described as Kz 90 "probably identical with *C. marginata* (S.D.) Br. and R." None of these Knize plants do in fact attain the columnar growth of *C. marginata* (*C. columnaris* Pfeiff). An illustration of a similar looking plant from near Antofagasta was published by Ritter to accompany his article in K.u.a.S. which dealt with *Copiapoa streptocaulon* Hooker emend Ritt. Quite a number of plants which match these illustrations have been brought into cultivation from the vicinity of Antofagasta. Because of the constant repetition of the erroneous location of "*C. marginata* from near Antofagasta", it appears to have escaped all post-Britton and Rose authors' attention that these plants from Antofagasta have never been described and named. So the whole position may well be clarified by describing these now as *Copiapoa atacamensis* sp. nov., the original type plant being Rose 19410 (Britton and Rose III p.87); synonyms — *Copiapoa marginata* (S.D.) Br. and R. pro parte; FR 205 *Copiapoa echinoides* (Winter catalogue 1955-1956); FR 205 *Copiapoa marginata* (Winter catalogue 1957 on), *Copiapoa marginata* sensu Ritter; Kz 72 *Copiapoa echinoides* (non Kz 72 *Copiapoa streptocaulon* Hort), Kz 90.

Having established what we are to call the plant from Antofagasta, we can now turn to the oval-ellipsoid grey-green bodied plant with grey-white crown wool and areoles touching or nearly so, which Backeberg described as *C. lembeckei*, but which would conform with the description of *Echinocactus marginatus* S.D. non Pfeiffer, the latter name having priority. Hence we now have *C. marginata* S.D. (non *C. marginata* Pfeiffer non *C. marginata* (S.D.) Br. and R.) synonym *C. lembeckei* Backeberg. Little wonder that Backeberg found it easier to dream up a new name rather than have to digest all the foregoing! It is understandable that E. W. Bentley thinks that Backeberg was a menace, but on this group of plants, Backeberg seems to have been in good company.

**COPIAPOA ATACAMENSIS** H. Middleditch Spec. Nov.

Caule globoso vel elongato-globoso, simplex ad subprolifera, usque 5-8 (-9) capitulis; corpore usque 12cm diametro, cinerascenti viridi; costis 12-16, obtusis ad acutis, leviter crenatis; areolis confluentibus ad 15mm inter se remotis, apici fulvis lanatis, deinde nigris et denique subnudis; aculeis badiis initio, deinde mox nigrescentibus, tandem cinerascens; exterioribus 5-7, radians, procurrens, leviter curvatis, 10-12 mm longis, centralibus 1, 33-38 mm longis, circularis, subulatis; flore adhuc ignoto.

Habitat in collibus littoralibus prope Antofagasta.

Typus — In Horto Botanico Noveboracum sub Nr. Rose 19410.

Globular to somewhat elongated-globular, solitary or clumping with 5 to 8 (-9) heads. Body up to 12cm in diameter, grey-green covered with grey-white coating. Ribs becoming 12-16, obtuse to acute, upright to slightly spiralling, with well-defined acute to obtuse groove between base of ribs. Top of ribs more or less rounded, barely divided into tubercles by slight depressions between areoles. Adjacent areoles usually touching but may be up to 15mm apart. Young areoles 6-8mm diameter, covered with soft orange-brown hairs which obscure the growing point, then becoming black and finally appearing to be almost bare. Outer spines 5-7, radiating, projecting markedly, curved backwards slightly, 10-22mm long, the lowest often the longest, together with an occasional one or two short, slender, almost bristle-like spines from the upper part of the areole; central spine one, straight, projecting outwards, 33-38mm long, round, tapering, some 1mm diam. at the base. All spines are chestnut brown in apex, rapidly becoming grey-black and then grey. Flowers and fruit not yet known. Type locality: coastal hills around Antofagasta, north Chile. Type plant: Rose 19410 in New York Botanical Garden Herbarium.

(Further articles in this series, dealing with *Copiapoa* originally collected by Thomas Bridges, will appear in forthcoming issues of the Chileans).

**FLOWER SCENT WITH SULCOREBUTIAS** by Rudolf Oeser

Translated from K.u.a.S. 29.8: 1978 by H. Middleditch

For many years I have collected and observed plants of the genus *Sulcorebutia* Backeberg. With some of the flowering *Sulcorebutia* I noticed quite soon a very intense, pronounced musty flower scent, which can best be compared with the smell of damp, rotting wood. As not all species exhibit the aroma, I began to note this feature in my plant card index along with the other flower characteristics such as size, shape and colour. So in the course of a few years I produced a survey which apparently suggested connections by groups based on the presence or absence of these specific flower scents. Within certain related groups of this genus, whose differentiation from the genus *Weingartia* is in any case controversial, it appears that in the same region there are related species to be found which are either scentless or scented. I am of the opinion that up till now too little attention — or even none at all — has been given to this significant distinguishing characteristic. I would like to stimulate further checks and observations through the publication of my observations and their conclusions.

From the *Sulcorebutia* which have flowered in my collection and the flower scent which I have observed, there may be deduced the following outline relationships:

1. The *steinbachii-tiraquensis* group — *S. polymorpha*, *S. glomerispina*, *S. totorensis*, *S. lepida*, *S. clizensis*, *S. hoffmanniana*, *S. seinoiana*, *S. tunariensis*. These species all originate from the Cochabamba basin or its surrounding mountains. They have no scent.

2. The group around *S. krugeri-candiae*, including *S. menesesii*, *S. muschii*, *S. glomeriseta*. This group come mainly from west and south of the foregoing group. All have a musty flower smell.

3. The group around *S. arenacea*, including *S. breviflora*, *S. caineana*. They come mainly from the area of the upper course of the Rio Caine. They all have a strong musty scent.

(The distribution of the three foregoing groups overlaps in many places).

4. Somewhat apart and isolated stands the locations for *S. krahni* with a musty flower scent, in the Province Caballero of the Dept. Santa Cruz; as well as *S. flavissima* between Aiquile and Mizque in Province Mizque of the Dept. Cochabamba. Here also belongs *S. mentosa*, which has no aroma, however.

5. Further south comes the large group of *S. verticillacantha*, whose members exhibit no scent. Here also belongs *S. markusii*, *S. vasquesiana*, *S. frankiana*, *S. losenickyana*, *S. alba*, *S. crispa*, *S. rauschii*, *S. zavaletae*, *S. mizquensis*,

*S. vizcarrae*, *S. pulchera*. All these species come from the basin drained by the Rio Grande, the basin around Sucre, Mizque, and Zudanez.

6. In the same area is also found a group of plants with a faint scent, namely the abundant forms of the plants around *S. caniguerallii*.

In addition to the summary I can propose some associations concerning plants whose relationship to a species appears to be open to question. In this way, I would consider a plant labelled *S. sucrensis* n.n which flowers yellow and has a strong musty smell. Since plants that are to be found in our collections labelled *S. sucrensis* n.n. flower pale red to pale magenta colour and have no musty aroma, so probably belong to the so-called *S. verticillacantha* group, this particular plant could be considered a mistake. It belongs to *S. krugeri*, whose typical spination it also exhibits. Another plant received as *S. verticillacantha*, v. *verticosior* likewise flowered yellow and smelled strongly. It certainly belongs on that account not with the species *verticillacantha*, but to *S. candiae* and indeed to that fine spined form FR 774a, since all *Sulcorebutias* of the *verticillacantha* group produce no perceptible flower scent.

On similar grounds, it seems to me also the recombination of *S. glomeriseta* (Card) Ritter into the genus *Weingartia* by Brandt is not tenable. That would result in this species being the only *Weingartia* with a distinctive musty flower scent, whereas as a rule those *Weingartia* which I have been able to observe either have no flower scent at all or else a sweetish fruit-like one. It consequently belongs to the grouping with *S. menesesii* and *S. muschii* and not to the true *Weingartias*. Also with me some specimens of *Sulcorebutia cylindrica* Don. = Lau 335 and Vasquez V 604 flower and I have noticed an intense flower scent like cloves, which I have also come across in other collections from plants of the same species. This flower scent does not appear elsewhere in the whole genus *Sulcorebutia* and suggests affinities to the genus *Weingartia*; on this basis the conjecture by Simon that this species is a *Weingartia* thereby becomes corroborated.

The recent combination of the genera *Sulcorebutia* and *Weingartia* by Brandt is very questionable on various grounds. On the basis of flower scent this likewise becomes unsupportable, since all observations on the scent of true *Weingartias* exhibit either a fruity aroma or no flower scent.

In the meantime, there has reached me via a personal contact from Dr. Hentzschel, Wedel/Holstein, corroboration of my extensive scent observations. Dr. Hentzschel, as a microbiologist, also recognises scent as the gas Geosmin, which among other things can be given off into the surroundings from certain ground fungi, the Actinomycetes. Relationships are probable of the scent with the flower colour pigment displayed, as well as relationships with the flower biology e.g. the potential pollinators of the corresponding flowers.

With these observations I must also make mention that in this way, by means of observations and comparisons, we obtain a better appreciation of the genus. I am quite aware that my deductions might immediately provoke contradiction. Nevertheless, is it not worth discussing once in awhile unconventional classifications of species and investigating other observations hitherto neglected?

Comments

..... from J. Theunissen, *Succulenta* 58.7:1979

A very subjective method of species determination is written about here by Rudolf Oeser. He talks of a distinctive smell in various *Sulcorebutias*. This suggestion is immediately followed up by Fred Brandt, who, in *Frankfurter Kakteenfreund*, doesn't hide his enthusiasm for this new method under chairs or tables. Not hindered by a knowledge of what scent is, I suggest that this criterion is unusable.

..... from J. R. Gooch

I have been busy sniffing my *Sulcorebutia* flowers as they open this season and it is certainly true that some of them have a quite pronounced scent. It is predominantly the yellow flowered sorts that have the most evident perfume. This is strongest on the first day of flower opening. The actual intensity of the scent also varies in different clones of the same sort. Thus, the strongest scent occurs with *S. candiae* ex Su-ka-flor whilst on FR 774 and KK 1031 the flower perfume is very faint and almost elusive. *S. breviflora* has a slight scent but *S. muschii* none. I am hard pressed to put a name to this rather elusive fragrance that occurs in the yellow-flowered group, but it is close to the fragrance of *Gymnocalycium bruchii* (pleasantly earthy?).

I believe that John Donald has observed that *S. vizcarrae* has a strong clove scent. This year my plant had a ring of flowers out and I can confirm that it indeed has a glorious and quite "heady" clove scent. Unfortunately I was unable to detect anything other than the very slightest trace of this in *S. vizcarrae*'s closest relatives, such as *S. flavissima* and *Weingartia purpurea*.

..... from H. Middleditch

The yellow-flowering *Sulcorebutias* which Oeser was growing under names of mauve or red flowering *Sulcorebutia*, would seem to be yet another example of misnaming of plants in commerce. This seems to be especially associated with Knize.

..... from J. Hopkins

I doubt if I can pin anything down which aroused my suspicions of Knize plants — in fact there weren't any suspicions really, plants simply had the wrong names. The first lot I had were from S.P.I. In desperation I started buying direct from Knize — often in quantities of half a dozen of a particular species — but the names were still wrong and the same numbers

were not always attached to the same plants from different sources (S.P.I., Uhlig). I thought at first that Knize simply didn't know one *Lobivia* from another — but the same mess occurs with his plants in most genera — *Parodia*, *Gymnocalycium*, *Weingartia*, *Sulcorebutia*, etc. It is curious that this state of affairs should have developed, as I was impressed with his careful documentation of Chilean plants as described in his articles in some of the earlier issues of the *Chileans*. I strongly suspect that he doesn't in fact collect personally many of the plants he distributes. On the whole, for study purposes, his plants are almost useless as I now no longer trust his names, numbers, or habitat data and until things improve in respect of reliability of information, I want no more of his plants. My *Lobivia* collection would be of far more value to myself (and to the cactus fraternity) if I had received correct data with my plants.

..... from H. Middleditch

I have participated in two or three joint orders on Knize and generally the plants themselves have been well worth having, but I am obliged to allow that one does become sceptical over the accuracy of the naming of some plants. A couple of years ago I received from him a "very spiny *Copiapoa grandiflora*" which turned out to be like no other *Copiapoa* I had seen before or since; a subsequent catalogue repeated the description although the location was a considerable distance away from the accepted habitat location of this species, so I sent for a specimen and at the same time I also included a request for a plain *Copiapoa grandiflora*. Two identical plants arrived, bearing not the slightest resemblance in body colour, rib count, areole spacing, spine character or colour to the previous "very spiny *C. grandiflora*". I am at a loss to know what they should all really be called. Three years ago I obtained a plant of *Copiapoa streptocaulon* identified by a field number which Knize had earlier catalogued as coming from Antofagasta. Later on I saw a number of identical plants in Tom Jenkin's nursery which had arrived from Knize under the name of *Copiapoa lembckeii* — which grows nowhere near Antofagasta. It is certainly most irritating to suffer this total unreliability of field identification.

..... from R. Ferryman

Some of the *Horridocactus* I received as a share from this last crate of plants from Knize showed beautiful rootstocks, although none could compare in size with the *H. vallenarensis* that Dave Whiteley received. Whilst one expects hard-grown specimens direct from Chile, some of the *Horridocactus* and *Neoporteria* were extremely bad; in fact two *huascensis*, a *confinis* and a *roseiflora* succumbed even before reaching the greenhouse. Those Knize names really are the limit; it would help if they were right! *Horridocactus kesselringianus*, normally regarded as dwarf (up to 7 cm), was 18cm across! Just what species it is I shall have to try and find out, along with checking most of those received.

Judging by what I have growing from Knize seed, the comments about the nomenclature of plants received from Knize can also be extended to his seed. This I find even more alarming since he supplies seed to several seedsmen, such as Doug Rowland, Kohres, D Herdt, New Mexico, etc. Here in Ipswich various colleagues loan plants to each other so that true seed may be harvested. The resulting seed is generally shared. Could this sort of thing be encouraged between other growers with validly named plants?

..... from R. Moreton

Now I did pass a remark a while back that *Parodia otuyensis* from Knize looked like *P. maassii*, but when I said this I was being a little cynical, for as far as I can see, every *Parodia* from Knize looks like *P. maassii*, they just have different labels! In addition I am beginning to think that many of the Rausch seeds distributed by Kohres are well and truly mixed as I am convinced that I have several species both of *Notocacti* and *Lobivia* in some sowings. In other cases all the plants of supposedly different species are like peas in a pod. I am not infallible, but I do use one pot to one species and I do not see how I could have caused the confusion in just the way it has happened.

..... from R. Zahra

I have never bought plants from Knize, but I buy seeds from him every year. He has certainly found many interesting things, and it is thanks to him that we are still getting the same amount of seeds from western South America. On the other hand he has a very funny way of doing things. In 1975 I bought 100 seeds of 3 different types of *Arequipas* — *hempeliana*, *weingartiana*, and another under a field number. In all three cases what came up is very interesting, because in all three cases I have the same selection of at least six different types of plants — (i) a *Matucana* species; (ii) a *Weingartia* type of plant; (iii) a *Trichocereus* type of plant; (iv) an *Arequipa* type of plant; (v) a *Lobivia* type of plant; and (vi) a *Haageocereus* type of plant. Of course, the variations were to be seen at first in the seeds and I had made a note of this before sowing. I also think that some of his names are not all that reliable, and when he cannot sell some of his ecotypes under a field number, very quickly invents a n.n. for it, or worse still he dumps it under one of the names already available and sells it fast to some name collector. I am not entirely free of the habit of name collecting myself, but I am fond of the plants themselves and not just the names.

..... from J. C. Hughes

I have grown some plants of KK 743 from seed which I obtained in 1974 from Doug Rowlands. This seed came under the name of *Matucana calvescens*. The plants are clearly more akin to the *Matucana haynei* complex. Have any other members raised plants from seed of this collection number and can anyone help with the identity of these particular seedlings?

..... reflection from H. Middleditch

And just how will any of these unidentified or doubtfully named plants be checked, or correctly identified? By comparing them with another plant? And how do we know for certain that the second plant is correctly named?

Although we all complain bitterly about the inconsistent naming of plants and seeds from habitat, it may be as

well to question the inherent tendency to assume that the names have been mixed up after they were collected in the field. We all tend to accept the supposition that the man who collected it in the field knew the correct name at that time. On reflection, I would now question this belief. It is not so long ago that I was able to supply a collector in Montevideo with a copy of a description of a *Notocactus* species from a Uruguayan Natural History Journal; the collector concerned has sent several batches of plants to Cactus nurseries in Europe. Taking another case, in an article in a Chilean Natural History Journal, Wagenknecht states categorically that he "does not know the works of Curt Backeberg". So when he sends Chilean cacti abroad he described them as . . . what? How, then, does a field collector identify a plant in the wild?

Karel Knize states in the forward to his own field number list that he uses the works of Curt Backeberg for naming, relying largely on geographical location. At our 1978 Chileans Autumn Gathering, Geoff Swales presented us at the start of the weekend with ten original species descriptions, for all present to identify. The extremely low success rate demonstrated effectively the almost impossible task of transforming a written description into a picture of a plant sufficiently clear for identification. The correlation of a written description and a growing plant can be almost as difficult — especially where descriptions are based on cultivated plants. And how many times can we be quite certain that an illustration is, with certainty, the plant we are comparing it with? And how many field collectors in South America possess any reference works to make any comparisons?

. . . . . from R. Moreton

I am amazed by what you say about lack of reference works by the collectors in South America, although I remember that when Prof. Cardenas was sending plants over he always asked for payment in books rather than cash. It would certainly explain the great variations in plants supposedly the same species from different collectors. But I still think that Knize just gets his seed mixed up in a good many cases. For example Knize's *Copiapoa fiedleriana* and *C. domeykoensis* from seed are indistinguishable and his *C. calderana* looks the same as Ritter's *C. longistaminea*. Also his *Islayas* seem to be a mixed bag and I have had to sort them out afterwards on the basis of appearance.

. . . . . from H. Middleditch

But since Knize has probably never met Ritter, how can he be expected to know what sort of plant is really supposed to carry a Ritter name? Not that Ritter appears to be terrifically forthcoming with information, even if they had met together.

. . . . . from D. W. Whiteley

I have written to Ritter myself for information and one gets the standard reply — wait for my book where all will be answered. In spite of the fact that Ritter's book has been so long delayed, the pressure is still on by collectors to get his material published. When someone does publish his stuff — and it has been done — it can make parts of his manuscript out of date before he ever gets it printed. You can understand therefore that he guards his information very carefully and particularly his habitats and is not keen that they appear before he has published.

I have a draft copy of Weisser and Lembcke's paper on "The distribution of the genera of Chilean Cactaceae" intended as a lecture to the Succulenta '78 Congress in South Africa. Indeed Weisser also admits ignorance of much of the "cactus literature" — it was just not available to them in Chile, much of it being European. Krainz and Buxbaum have been Weisser and Lembcke's main source of information on habitats. We therefore probably know more on paper on the type localities though they know more of the plants in certain localities in the field. Like most collectors, they have only collected up to just north of the Taltal or Cobre regions, and not all the way up to Peru as Ritter has.

#### **WHERE IS THE SOUTHERN LIMIT OF THE GENUS PARODIA? By F. Brandt**

The southern boundary of the occurrence of the genus *Parodia* was until quite recently located in the vicinity of La Rioja and Sanagasta. Now the collector Borth has, with his discovery of *Parodia mesembrina*, extended the distribution area much farther to the south. The theory of Prof. Buxbaum that *Parodia* is a highland branch of *Notocactus* cannot now be accepted as correct, since the many new *Parodia* found in the last few years place the genus as a representative of the Pampas region.

These new discoveries have been made not only on the eastern approaches to the Andes but also in the outlying ranges in the east of the Andes. Thus the habitat of *P. mesembrina* lies in one such range of hills, the Sierra Malanzan near Ambil, at about 500m altitude. The habitat of 500m may be seen there as the level of the Pampas and hence one can separate the genus *Parodia* into a highland branch and a lowland branch.

The Pampas branch of *Parodia* is not confined to the area of Malanzan but also occurs in the region of the Rio Pilcomayo in Bolivia, represented there by the formosa group of *Parodia*. Further south the pampas branch of *Parodia* crosses the border into the Argentine near Yacuba/Pocitos, where are found two further species at a height of 500m. Then Lau found a further *Parodia* in the province triangle of Salta/Tucuman/Santiago del Estero; this likewise appeared at a height of 500m in the outlying foothills of the Andes; this is *Parodia camprestis* Brandt. The recently discovered *Parodia* habitat near Ambil falls into line with this pattern and shows us that the pampas branch of *Parodia* stretches much further south to the San Juan/Cordoba road.

It must be taken into account that all the Pampas *Parodia* appear entirely in the lowermost and easternmost foothills of the Andes and also on the front ranges of the Andes. There are not as many in the hills in the area of Malanzan as in



the Sierra de Llanos, Sierra de Ulapes, Sierra de Chepes, Sierra de Guayguas, Sierra de Huerta, Sierra de Gigante, Sierra de Amabagasta, Sierra Bravo and (further north, slightly east of Santiago del Estero) the Sierra de Guasayan. Further to the north, towards the border of Bolivia, near Yacuiba/Pocitos, there are also a number of low hills which appear on the eastern slopes of the Andes and these could be seen as the further locations of the Pampas Parodia.

The characteristic feature of the pampas Parodia is the completely straight central spine. These straight spined species stretch in a straight line from the Rio Pilcomayo in Bolivia up to Ambil in the Sierra de Malanzan. In naming the different ranges of hills in the front of the Andes, I would like to point out that they could eventually be the habitat of the pampas Parodia. Naturally the genus Parodia could not be stopped from spreading its range of distribution to the south by the San Juan/Cordoba road, so one can count on finding new varieties to the south of this road.

At the present time, I have in my possession as part of my collection, a Parodia from the area of the San Juan/Cordoba road. It is from a place called Papaygayos, on the eastern slopes of the Sierra de Huerta at a height of 553m. I grew this species from seed which I collected in 1967, under the name Parodia sp. Papaygayos. Today this plant is fully grown and looks similar to *P. microsperma* but seems to be somewhat different. I have a similar Parodia from Lau who found it in the S.E. of the Province of Salta near Tala at the height of 700m. This habitat would also tally with Papaygayos, and behind this place is the Sierra de Huerta which ascends to 2,000m. This Parodia papaygayos shows that the species of Parodia spread out as far as San Juan and perhaps further south.

Scientifically it would be a very interesting exercise to search the eastern slopes and to obtain more knowledge of the distribution of the pampas Parodia in this area. I am sure that many new Parodia discoveries may still be announced from these locations. Even other species of cacti may yet be found there.

#### Comments

..... from H. Middleditch

The three Parodia from the Andean foothills on the borders of Bolivia and Argentina are identified by Brandt as *P. carapariana*, *pussila*, and *parvula*, all our contributor's own species names, as is the *P. mesembrina* from the Sierra Malazan.

*Parodia sanagasta* is a name established by Fric — but like many of Fric's plants it came into the cactus literature without an indication of the place of origin; subsequent collecting activity would suggest that the original plants may have been collected in the vicinity of Sanagasta, near La Rioja. For many years this has been the southernmost known location for any Parodia. The article by Borth which also appears in this series of the Chileans was the first record in cactus literature of a Parodia being found further south than Sanagasta. In his own account, Borth states that he found this Parodia in the Sierra de Ambil, lying immediately to the east of the Sierra Chepes. Between the Sierra Chepes and the village of Ambil, the Sierra Malazan is to be found marked on the Amercian Geographical Society 1:1,000,000 map. From this, it would appear that there is no real confusion between the location for *P. mesembrina* quoted by Borth and that given by Brandt.

Unlike our author, I would be most surprised if any Parodia were to be found any great distance further south than the San Juan/Cordoba road. This particular road conveniently forms a division across the barren lands to the west of the Sierra Cordoba, representing the boundary of a subtle climatic change which does not affect the other xerophytic vegetation but seems to be of some importance in regard to cacti. To the north of this route, we find *Gymocalycium* of the *Microsemineae* group and the southernmost *Muscosemineae*; to the south of this route we find *Gymocalucium* of the *Ovatisemineae* group. To the north of this line we find *Lobivia*, but none to the south of it; to the south of this line we find *Austrocactus*, but none to the north of it. Well to the north we find *Cleistocactus*, to the south we find *Denmoza*. Although the *Platyopuntia*, *Pterocactus*, and *Trichocereus* spread across this line, I feel that the influences controlling the foregoing divisions will also be likely to limit Parodia to the north of this route.

On the other hand, it would appear that Brandt's contention that more Parodia may be found in the Andean foothills may be borne out to some extent by the discovery of a Parodia in the Sierra Guasayan to the north of the Sierra Cordoba, which was reported by Borth in December 1974.

..... from Literaturschau (East Germany) Index 1977/78

<i>Parodia agasta</i> Brandt	<i>Parodia macednosa</i> Brandt
<i>Parodia aglaisma</i> Brandt	<i>Parodia mendezana</i> Brandt
<i>Parodia albo-fuscata</i> Brandt	<i>Parodia mesembrina</i> Brandt
<i>Parodia aureispina</i> v. <i>erythrostaminea</i> Brandt	<i>Parodia microsperma</i> v. <i>aurantiaca</i> Brandt
<i>Parodia buxbaumia</i> Brandt	<i>Parodia microsperma</i> v. <i>opulenta</i> Brandt
<i>Parodia campblayana</i> v. <i>rubra</i> Brandt	<i>Parodia microsperma</i> v. <i>rigidissima</i> Brandt
<i>Parodia capillitaensis</i> Brandt	<i>Parodia minima</i> Brandt
<i>Parodia carapariana</i> Brandt	<i>Parodia obtusa</i> v. <i>atochana</i> Brandt
<i>Parodia echinopsoides</i> Brandt	<i>Parodia papagayana</i> Brandt
<i>Parodia elata</i> Brandt	<i>Parodia pluricentralis</i> v. <i>erythroflora</i> Brandt
<i>Parodia haageana</i> Brandt	<i>Parodia pluricentralis</i> v. <i>H-2</i> Brandt
<i>Parodia idiosa</i> Brandt	<i>Parodia pluricentralis</i> v. <i>xanthoflora</i> Brandt
<i>Parodia lamprosina</i> Brandt	<i>Parodia prestoensis</i> Brandt

*Parodia pusilla* Brandt  
*Parodia quechua* Brandt  
*Parodia riograndensis* Brandt  
*Parodia salmonea* v. *lau-multicastata* Brandt  
*Parodia sanagasta* v. *saltensis* Brandt  
*Parodia separata* Brandt

*Parodia spanisa*  
*Parodia spegazziniana* v. *aurea* Brandt  
*Parodia stereospina* Brandt  
*Parodia talaensis* Brandt  
*Parodia thieleana* Brandt  
*Parodia tuberculosi-costata* v. *amblayana* Brandt

..... from J. Theunissen, *Succulenta* 58.7:1979 "Een Brand(t)end probleem" (A burning problem). Translated by W. W. Atkinson.

In the course of the study of the first year's Literaschau Kakteen I came again and again upon the name of Fred Brandt, who has built up a decided reputation in relation to the genus *Parodia*. Fred Brandt must assuredly be someone who has acquired no small knowledge upon this subject and who must have a splendid collection of Parodias. His earliest publication dates from 1967, when he published *Parodia dicrocacantha* together with Weskamp. After that he contributed to various journals a flood of new descriptions of *Parodia*, at first in periodicals with a large circulation such as *K.u.a.S.*, thereafter in smaller periodicals such as "Stachelpost", "Cactus", "Die Frankfurter Kakteenfreund", "Kakteen und Orchideen Rundschau", "Kaktus" and "Kaktus' Vilag". Strikingly, many periodicals no longer make use of his contributions after a period of time, whereafter he has recourse again to a new publication outlet.

Are his contributions not valid then? Always he provides a very extensive Latin diagnosis, whilst the sketches also bear witness to a great professional skill. What is the problem then? Well now, the right answer to that question is not so easy, but must probably be sought after in the fact that the work of Brandt is not sufficiently scientific. This needs further explanation, for is it not really to the credit of this man that he has described so many new species of *Parodia*? At first sight I should say "Yes, the more he has described and recorded in black and white, the more clarity we have. It is already obscure enough, surely?"

We have all from time to time chatted about species, varieties and forms and we all think that we know exactly what is meant by each. If we then go somewhat deeper into this question, it becomes quite evidently not so easy to be sure and we must moreover not lose sight of the fact that the number of cactophiles among us who are well-grounded botanically, and consequently can say something about our plants with some authority, is very small. Really I could be saying that almost the whole of "cactology" has been practised by laymen and this brings with it enormous problems. Since we are not inconvenienced by knowledge we can always say with as much right, that OUR opinion is the only correct one. It is obvious that this is a hopeless approach that only brings with it more unsatisfactory situations.

I do not know if Mr. Brandt is well-grounded in botany; just once I tried to make clear to him my objections against certain matters. He did not react directly, though he did alter certain names that he wanted to give to "new" species and which did not match linguistically. That is the only sign I have had that he had received my letters. In 1975 and 1976 there were published 29 *Parodia* species by Brandt in four different publications. I think it probable that very few of you caught a glimpse of these publications in the years in question. All these descriptions now lie open to inspection in *Literaturschau* and thus it becomes a great deal easier to judge what Mr. Brandt is actually doing.

From the explanations which often accompany descriptions I discover that Brandt has never been in South America on a field study. He receives his plants from various nurseries in the Federal Republic and from A. Lau. It should not be expected that commercial growers can import every plant in a faultless condition, and there are known instances where it is clear that plants are delivered under a wrong name. In such cases the seller is more interested in his bank balance than with science. It has also been shown that some new species are distributed under two different names, which increases the turnover. It is possible that Mr. Brandt has also been the victim of this practice.

In his accompanying notes Brandt often indicates details of habitat and of the finder. There are sometimes more detailed descriptions of the habitat. This is almost exclusively the case, in my opinion, when Brandt and Lau have corresponded. It is obvious from the fact that measurements are on the low side for both height and diameter that he has not seen himself seen the plants growing in habitat. It is logical that no full-grown specimens are transported to Europe. That would be too expensive and the plant has an increased risk of dying. Yet it is a good sign of an accurate description that how large the plant can grow in the wild, is in fact, stated.

It is more serious when Brandt splits up into different species a group of plants that the discoverer saw as a single species and sends them under one field number — and thus the possibility exists that forms are elevated to species. It is also noteworthy that Brandt still comes out with new specific names. Only infrequently does he content himself with the description of a variety. In my eyes there is something here other than strict science in the linking of as many species names as possible with his own name. This occurs more often when descriptions appear in a number of periodicals, differing in language such as German and Hungarian, that are not at the disposal of most amateurs nor scientists either. In order to obtain some clarity for myself in this complicated material I have examined these descriptions and will not deprive you of some of the more important findings, so that you can decide yourselves if my criticism is well-founded or not.

In the Argentine Province of Salta appear six species, four of which come from the immediate vicinity of Cafayate i.e. *P. aureispina* v. *erythrostaminea*, *P. sanagasta* v. *saltensis*, *P. albo-fuscata* and *P. pluricentralis* v. *xanthoflora*. There is a note with *P. sanagasta* v. *saltensis* that the plant was delivered by Uhlig under a B number, and is the same as *P.*

glischrocarpa n.n. of Ritter. Brandt announces elsewhere that he describes plants of Ritter; his motivation is that the name given by Ritter remains unpublished. Yet Brandt knows of Ritter's problems in publishing his work. Naturally it is not agreeable to have to wait for a long time for a definitive description. I thought, however, that the description of a plant belonged within certain limits, to the discoverer. In this respect Brandt does not treat Ritter too politely. Mr. Buining also found many plants which Ritter found before him, but in that case there existed an agreement between the two that they would not describe each other's plants. In regard to *P. albo-fuscata* it is added that this plant was brought into circulation by Uhlig and S.P.I. under the number B81, whilst *P. pluricentralis* v. *xanthoflora* is offered in the Uhlig list 1969/70 under the numbers B76-B79. If we compare these details with Ritters ideas on species and variety (Taxon 1966 pp295-306) then it seems unlikely that we are concerned here with four separate varieties.

In the Bolivian province of Campero, Ritter found three plants, which he provisionally named *P. tredecimcostata*, *P. tredecimcostata* v. *aurea* and *P. tredecimcostata* v. *minor*. Brandt thought it possible that these plants were identical with those described by himself as *P. echinopsoides*, *P. riograndensis* and *P. serarata*. We have here a clear example of how Brandt has no compunction in ignoring the judgement of an experienced field collector who see the plants as, at most, varieties.

Also interesting are his species *P. agasta*, of which it is stated that they also appear under the names of *P. maassii* v. *albescens*, *P. splendens*, *P. ritteri* and *P. maxima*, and also *P. lamprospina* which equally circulates under the name of *P. maassii* v. *albescens*. Both species are found in South Cinti. Amazing also is the *P. aglaisma* which is found in the Bolivian province of Mendez. This species was offered by Uhlig between 1967-1969 as "spec. nov. Cieneguillas". So far nothing strange. However, in Stachelpost No. 50 page 38 we find a description of the new *P. andreaeoides* Brandt wherein the writer tells us that "this species" was cultivated from seed of FR *P. subtilihamata* and that the same plant was later cultivated from Uhlig seed of "sp. nov. Cieneguillas". It is thus very difficult to believe seriously in this as a new description. And you must remember that for this article I have taken only the 29 species described in Literaturschau.

The clearest example, however, that Brandt doesn't have too much trouble with self-criticism, are three plants from the province of Sucre, which set me on the trail. Actually this only occurred because the second issue of Literaturschau for 1978 had a colour plate of these three plants; because they look very much alike, I went into the matter more deeply. The following are the plants concerned:

1. *Parodia idiosa*, published in Frankfurter Kakteenfreund 2, 1976. The plant grows in the hills around Tarabuco at 3,000m altitude. It was collected in 1971 by Alfred Lau under No. 990.
2. *Parodia quechua*, published in Kakteen und Orchideen Rundschau No. 1 of 1977. This plant grows in the hills around Tarabuco and was collected by Alfred Lau in 1971 and offered commercially by Uglig under the name *P. tarabucina* Card. and *Parodia Tarabuco-990*. Even the fact that the plant was already known to have been described by Cardenas (a Bolivian botanist) did not hinder Brandt from giving it another name.
3. *Parodia stereospina*, published in Kaktusz Vilag No. 1 1977. The plant grows in the hills around Tarabuco at 3,000m altitude and this species was sent to Europe in 1970-71 by A. Lau under the title of "sp. Tarabuco" and "sp. 990".

It is clear that very few amateurs will have had access to all three of these publications at the same time. It is also clear that Lau has no guilt in this matter. The habitat particulars agree precisely, and also particulars of the field collector agree exactly. Again, this is an instance where the man in the field suggests a single species and not varying forms, while Brandt makes three separate species from them, not even varieties. This sort of work is difficult to take seriously, and the only thing achieved is an enormous disorder in the genus *Parodia*. Therefore I will close with yet another call to members of the I.o.S. as well as Mr. Brandt to make an end to this unpleasant development.

..... from H. Middleditch

In Chileans No. 34 page 8, Brandt observes that plants distributed as *P. tarabucina*, *P. sp. Tarabuco 990* and as No. 990, "did not match Cardenas' description for this species". It may be felt that this alters the criticism from J. Theunissen that Brandt named these plants when "they already carried Cardenas's name".

However, in the same contribution to The Chileans, Brandt suggests that the plants circulating as *P. yam-paraezi* are really something different because the spines are black to brown — and not white to grey in accordance with Cardenas's description. If that is to be an accepted mode of species differentiation, what happens to a batch of *Neochilena* seedlings where every one is a slightly different spine colour? If this was used as a working proposition, then we would almost have one species name per plant. No wonder J. Theunissen suggests that Brandt is unscientific — he might even have said unsound and been justified in doing so. Hence the reason why The Chileans have not devoted space to any of Brandt's new "species". In Chileans No. 34 A. Yellin complains that the Chileans should "Give more descriptions of new plants". And compound Brandt's misdemeanours? Would we not do better to provide factual comparison data, otherwise not too readily available, on early descriptions of *Gymnocalycium*, *Discocactus*, *Notocactus*, etc., so that our readers are better able to judge for themselves whether or not some supposed new species is justified, and to decide what label might be appropriate for this or that plant in their collection?

..... from G. J. Swales

The Dutch contributor asks whether Brandt is a qualified botanist — he is actually an entomologist. He is clearly

well meaning and very thorough in his descriptions of new species, but he appears to be taking characters which an entomologist would make use of in his own field and applying a similar approach to Parodias. In entomology there is a tendency to count the whiskers on a rear hind leg and erect a new genus on that basis. Recently I was looking at a series of pictures of tropical butterflies which looked virtually all the same to me; however, there were not just varieties but represented members of a whole family. They had to be separated into species by fine details of colouring, form, or hairs — presumably this must work in the entomology but then Brandt should not transfer this technique from one set of organisms to another.

. . . . . from H. Middleditch

So is Brandt far from being “insufficiently scientific” as Theunissen avers, but really being much too scientific perhaps? I can confirm, after reading several comprehensive papers dealing with taxonomy of bees, that my own conclusions about entomologists “counting the whiskers” were rather similar to those of Geoff Swales. But are we discounting these differences just because a magnifying glass has to be used to see them clearly? Dare I suggest that, on that basis, the differences in *Gymnocalycium* seeds are equivalent to whisker-counting?

#### HAIR RINGS AND NECTAR CHAMBERS      A query from D. W. Whiteley

Apropos the comments from Paul Sherville which appeared under this heading in *Chileans* No. 34 (that it is hard to credit that hair could form a solid diaphragm), we would all find it hard to believe at first that a Rhino's horn could simply be matted hair. However, whether it is or not should be obvious under a microscope. It seems most likely, to me, that it will be formed from fused stamen bases. Are not staminodal hairs actually degenerate stamens? Does Buxbaum's morphology of *Cacti* tell us whether they have vascular strands? Perhaps John Donald was thinking of a structure developed from redundant stamens when he says “a type of staminodal hair ring”; most flower parts seem to be derived from the modification of some existing feature rather than the evolution of something completely new. Whether the diaphragm always has precisely the same origin in all plants, does not really matter to the pollinators. Plants with flowers having nectar chambers closed by stamens, diaphragms or staminodal hairs could all exist together, supplying the same need. However, we might call the variants distinct species or even genera.

As to the number of filaments indicating an advanced or primitive flower, I still have reservations about this. If the cacti are a family of plants still freely evolving, I cannot understand how *Carnegiea gigantea* has the greatest number of stamens in the *Cactaceae* and, (I believe) in the entire plant Kingdom.

. . . . . from P. H. Sherville

In *Chileans* No. 34, the more specialised insect pollinated flowers which are so described by Proctor and Yeo are quoted as commonly having 10 stamens or less. At an evening class session on taxonomy which I attended last year, we were told that numbers of stamens up to 12 were significant for classification, but for flowers with over twelve stamens these were all defined as “stamens numerous”. The significance of this number was not elaborated on, but apparently served to distinguish adequately, genera, species, and even plant families from those with less than twelve stamens.

A couple of years back, Geoff Swales made the point at Brooksby that just because a genus or family or whatever is considered to be advanced, this does not preclude it displaying some primitive features. Thus a tubular, zygomorphic (advanced) flower could bear quite a large number of stamens — a primitive feature. The possession of this sort of feature does not preclude the plant being considered as advanced; indeed, it might even be argued that by combining the best of advanced features with a (or some) primitive feature, it has also become a highly specialised flower.

. . . . . from H. Middleditch

David Whiteley says that he does not understand how the cacti can be a modern and still freely evolving family of plants and yet still include a primitive flower such as *Carnegiea gigantea*, which has a very large number of stamens. Now a large number of stamens taken as one feature in isolation does not necessarily define a primitive flower, it is a primitive feature. If a flower exhibits a fair number of primitive features then it might well be regarded as a primitive flower. A rotate flower like *Carnegiea* has a great many more stamens than a rotate flower like *Opuntia*, and the latter also has fewer petals, so that an *Opuntia* flower could well be described as less primitive than *Carnegiea*. On the other hand, a *Selenicereus* has a largish number of stamens, a primitive feature, but the long-tubed funneliform flower is anything but a primitive shape and so a *Selenicereus* flower would hardly warrant the appellation “primitive.”

It appears to be open to question whether stamen count is a useful guide when the numbers exceed single figures; however, there may be other readers who, like David Whiteley, might not be aware that a small number of stamens in a flower is just as important a feature for purposes of botanical classification as the progression from non-vascular plants, via vascular non-flowering plants, to flowering plants. Certainly this is something that I was quite unaware of myself until I acquired a copy of Strasburger's “*Textbook of Botany*”. This publication also amplifies the observations made elsewhere that flower form advances by a reduction in the total number of parts, not just a reduction in stamen count. Again this is a fairly important principle of Botany that was also quite unknown to me until fairly recently, so that I could never understand what Buxbaum kept talking about in his “*Morphology of Cacti*” when he wrote of flowers being on a “Reduction line” or exhibited a “reduction” in this, that, or the other feature.

Now to the question of freely-evolving plants like Cacti including in their numbers flowers which might be

described as 'primitive'. One could equally ask, bearing in mind that there are quite a number of flowering plants still in a freely evolving state, how does it come about that there still exist some plants with very primitive flowers like *Magnolia*. The answer to this question is exactly the same irrespective of whether it is asked of flowering plants as a whole, or of Cactaceae, or of any one of the other Tribes, Groups, or families which contain a wide spread of primitive and advanced flowers. In some ecological niches a primitive flower will continue to survive, whilst in others it must change if it is to survive; hence where the pressure for change in order to survive is minimal, primitive flowers will continue to exist; where the environmental pressures favour a changed flower, the primitive flower will not survive. On this basis we should be able to argue that where we find a primitive cactus flower — *Carnegiea gigantea* perhaps? — there has for many hundreds of years been little ecological pressure for change; we will probably find few plants and flowers competing for the pollinating agents associated with a primitive flower. Equally we should be able to argue that where we find an advanced cactus flower, that there has been a marked change in the environment, or that there is stiff competition from other Flora for the available pollinating agents, or both.

In this connection, it is perhaps relevant to note that the South America Andean mountain chain has been subjected to a quite marked geological uplift at a much more recent date than the last land movements of any magnitude occurred in the southern Rocky Mountains. The Rocky Mountains and the Andes were formed in the Cretaceous Period, some one hundred million years ago; the Andes underwent further uplift in Miocene times, about twenty million years ago, and very probably in Pliocene times as well, less than ten million years ago (See "The Geology of the Altiplano" H.P. Moon in the Report of the Percy Sladen Trust Expedition to Lake Titicaca, the Transactions of the Linnean Society of London, 1939). Plant and animal remains found on the Altiplano show that this was a moist climate at a fairly low altitude only a few million years before the ice age. The raised beaches and strandlines which are still traceable on the Altiplano show that the present lakes and salars — Titicaca, Poopo, Uyuni, etc., are mere remnants of a vast glacial lake. Since the ice age these have shrunk greatly and continue to shrink today by reason of evaporation exceeding inflow.

Thus in a time scale that is geologically short, very great changes have taken place in the humidity, vegetation cover and Flora of the Bolivian Andes. Evidence exists to show that the climate is very gradually becoming still more arid here and in the adjacent parts of S.W. Peru and N.W. Argentina. This sort of change inevitably leads to the demise of many plants which do not modify their floral morphology to suit the changed environment. Some fairly primitive flowers e.g. *Tephrocactus* have been able to survive. Others e.g. *Lobivia mistiensis* group have produced lengthy tubular flowers in comparison with shorter tubular or funnel form flowers on all other *Lobivia*; the tubular flowered *Borzicactinae*, *Denmoza*, and *Cleistocactus* also appear within or on the margin of the area affected by geographical changes. These geographical changes will have generated ecological pressure on the Flora; the cacti in the affected area have responded by changing their floral morphology; the *Carnegiea gigantea* has not been subjected to similar pressures from a changing environment, and is likely to have retained its original floral morphology with little or no change.

Apart from a changing geographical environment leading to changes in floral morphology, a change in the intensity of competition for pollinating agents could also lead to flowers developing more advanced or more specialised forms in order to be assured of the attention of certain pollinating agents. On either or both of these accounts, floral morphology could change. Where neither of these environmental pressures exist, flowers may well retain a comparatively primitive form. This will apply whether the plants are in the Cactaceae or in any other plant family. Where such diversity does indeed exist in a family of plants which are geologically fairly recent and are still "freely evolving", the really important question is — what has led to this situation? I would therefore suggest to David Whiteley that he gets out his intellectual spade and starts digging to find out what particular ecological niche each cactus form is suited to, since this could explain why the particular diversity of form has been brought about.

. . . . . from R. Mottram

When it comes to the number of stamens in a flower, I think we have the old problem of the confusion between "advanced" and "specialised". Increased specialisation is only advantageous if it enables a particular species to survive. In areas where there are plenty of birds but few insects, the survivors will have largely adapted to bird pollination and seed dispersal. In the case of the number of stamens, it will be of advantage to have many stamens if it increases the chances of pollination, and there will be ecological instances where the evolutionary pressure is in favour of more and more stamens. On the other hand, it is wasteful to produce stamens which are not going to be used, and so in some ecological conditions there must be a trend towards stamen reduction. Also I suppose increased pollen effectiveness may correlate with stamen reduction.

In the cactus family, we appear to have instances of both pressures. In the cerei which rely on bats to pollinate a high proportion of flowers, very large numbers of stamens appear to be advantageous, as in *Carnegiea gigantea* and *Cephalocereus senilis*. Perhaps the body of the bat is too smooth for pollen to adhere very well? Or perhaps most of the pollen is eaten by the pollinator or some other predator? Increased simplification seems to occur when a few large flowers are replaced by a very large number of tiny flowers. For instance, Borg reports that *Epithelantha* can have as few as 5 petals and 10 stamens, while *Blossfeldia* and *Rhipsalis* provide other similar examples. These seem to be all pollinated by small insects, which I guess over their history have never been more abundant than they are today, so that some degree of increased specialisation towards using these pollinating agents might be apparent among all flowering plants. Like the reduced parts in a cleistogamous flower, or the lack of ovules in some *Rhipsalis* ovaries until the flower is pollinated, a reduction in number of stamens is quite compatible with nature's desire to conserve energies for useful functions if there is an ecological push in that direction.

. . . . from H. Middleditch

But in nature there is no such thing as a surplus of anything in the design of a flower, leaf, or whatever. There is enough — and just enough — leaf, petal, stamen number, stigma length, ovules, pollen, and so on, to ensure survival of the species. All flora and fauna is designed on the principle of energy conservation, not just some of it. The excess of energy input over that required for reproduction, equals the annual growth. It is not a question of what sides of Nature are under ecological pressure — the pressure is there on every living thing, twenty four hours per day, 365 days per year. The pressure is simply more severe in some circumstances than it is in others.

. . . . from E. W. Bentley

It has long been proposed that the main line of evolution in the Angiosperms (flowering plants) has been from a radially symmetrical, wind pollinated flower with a dull-coloured and insignificant perianth through to a flower with separate sepals and petals (even if joined), the latter, at least, conspicuously coloured to attract animal pollinators — and from there on to zygomorphic flowers permitting special mechanisms of pollination, often selective of a chosen group of pollinators. However, the picture is complicated, first because such evolution may have taken a parallel course in more than one family or group of families — and, secondly, a reverse process may have occurred at any stage, entailing loss of structures once possessed. In spite of this, I can say without hesitation that no genus includes species with substantially different floral diagrams — although of course families do encompass species with distinctly different floral diagrams. But the real question is — what is meant by “substantial” differences. Loss of scent would not be regarded by most botanists as qualifying. Nor, in most cases, a reduction in size — or even complete loss of — petals: some chickweeds (*Stellaria*?) may or may not have petals within the same species.

When it comes to zygomorphism, a mere obliqueness of the rim of the tube in one species compared with a level rim in another species would not cause the average botanist, I think, to clamour for two genera instead of one. And of course when you come to families like the Compositae where the flowers in the middle of the disc have a tube that is radially symmetrical while the ones at the rim are often zygomorphic by reason of the ligula (the solitary petal which forms the margin of the composite flower) — thus tubular florets and ray florets — you have a problem if you attach too much importance to zygomorphism.

#### **THE ORIGINAL CHILEAN**      Reported by G. Streiter

Translated by E. W. Bentley from the G.O.K. Bulletin October 1970

The President of the Austrian Cactus Society, Herr Ing. Dr. Priessnitz, presented to the Vienna Branch of the Society, a review in slides through his collection, showing us his greatest love, the well-known “Chileans.”

Dr. Priessnitz is a Carinthian and lives in St. Veit a.d. Glan, a small town sited at about 500m with a continental climate. In a few words: cold winter, very hot summer, no air movement, no winter mist. When Klagenfurt basin, only 50m lower down, disappears in a thick mist and haze cover, St. Veit lies in full sunshine. The most unfavourable month is November; by Christmas the sun is already shining again; in January the effect of the Fohn wind is to cut down the heating cost in the greenhouse (on economic grounds a sunken house); in February growth is already beginning, and from spring to autumn a large part of the collection is kept out of doors. Such conditions are exactly right for cactus growing!

Dr. Priessnitz has grown 90% of his collection from imported seeds, which provides an interesting picture of the breadth of variation of different species. At first nearly everything was grafted, in order to obtain flowering plants rapidly (our lecturer is not very choosy what stocks he uses). Now that the need for large specimens is satisfied, he has set himself the task of getting those cacti with a reputation for being difficult on to their own roots. A fine, noteworthy saying runs “Own-root culture is the top school of cactus growing.”

Of the greatest importance Dr. Priessnitz considers the adequate nourishment of the plants. That Cacti grow in their homeland in arid and semi-arid soil; as a result of the ascending water movement, unusually high salt concentrations are found in the surface layers (so called Panzer-earth) and it would be absurd to measure fertiliser given to them in milligrammes. He uses 5 to 6 kg. of full fertiliser annually in about 12 square meters! First the compost is mixed with 5-6 kg. per cubic metre of low nitrogen fertiliser (e.g. Fertisal), while during the growing period Fertisal and superphosphate dispersed in the watering solution (about 10-15dkg per watering can) at intervals of 1 to 1½ months, and perhaps sprayed afterwards with pure water. The most important aspect as regards the substrate is its physical state; it must be coarse! Dr. Priessnitz mixes building rubble with the soil. (Anything called . . . sand is of little use).

In addition to the cultivation methods described, the St. Veit sun shines indefatigably, which produces a flower display that — in photographs — filled us with astonishment and wonder. There came in succession the Chilean genera *Neoporteria*, *Neochilenia*, *Chileorebutia*, and *Horridocactus*, whose generic rank on the grounds of similarity of flower structure and fruit, is in dispute. They all have hollow fruits in which the ripe seeds lie free and are dispersed through a basal circular hole.

In *Neoporteria*, as a result of a check, the flowers do not open completely. *N. wagenknechtii*, *litoralis*, *nigrihorrida*, and *villosa* are winter bloomers, but they are easy to bring into flower. If one provides sufficient light and warmth (over 10°C), they flower the whole winter through. The others are spring flowering. For these it is necessary as timely as possible (end of September), to let them enter their rest period, otherwise they set buds in the autumn that cannot be brought through the winter and then the spring flowering leaves something to be desired. Only *Neop. senilis* (= *gerocephala*) flowers in high summer, when no other *Neoporteria* is in bloom.

The individual species are often difficult to distinguish from each other; in many instances it is a case of

ecological forms of one and the same species, largely a case of varieties. For example, there are transitional forms from *N. nidus* to *N. villosa*. *Neoporteria nidus* is quite distinctive in its black-spined form, but also with its yellow spines its carmine red flowers make a beautiful strongly contrasting picture. With careful culture, *N. villosa* flowers through the winter into the spring. With cooler overwintering, the buds set in the autumn and eventually again in the spring. In flower and spination it is very variable (pale pink to dark carmine, the size of its flower varies also).

*Neoporteria heteracantha* was the first of his Chileans and comes from a time before World War II. The small flowers appear also at old areoles and are developed only on the sunny side. Very fine is *N. clavata* with ebony-black spines bent like claws. The species grows short-columnar, lying down in old age and must be propped up. In habitat it hangs down from rocks. It does well on its own roots and produces 7-8 large attractive flowers. *Neoporteria littoralis* is to be very much recommended. As the earliest of the autumn bloomers it produces flowers in late summer. *Neoporteria subgibbosa* produces several flowers from one areole; one must pass by it carefully because it easily loses its spines complete with areole. *N. nigrihorrida* is one of the most worthwhile plants to cultivate. It flowers with 100% certainty and profusely.

From *Neoporteria* there are transitional forms to *Neochilenia* the flower tube of which is more or less hairy and the flower opens like a funnel. In morphological structure, however, it shows the same basic form and is a summer flowerer. In old age the dark-red body of *Neochilenia nigriscoparia* produces a white protective coat like *Copiapoa*. *Neochilenia chilensis* is no thicker than 5cm but reaches up to ¾m in height and has to be supported. *Neochilenia ebenacantha* has been known for a long time in our collections and popped up in catalogues in the thirties. *Neochilenia puichella* (described by Ritter as *Pyrrhocactus*) has a dark red body and fantastic spination. The receptacle of its pink or white flowers is naked.

The genus *Chileorebutia* was set up by Ritter because of its wind-blown fruits. The hollow fruits are beset with long needle-like bristles, the wind drives them over the sand and the loose seeds are strewn from the circular basal hole. There are two forms. One keeps a spherical shape, (*C. napina*); the other, a tap-rooted plant from the extremely dry North Chile, attains a long snake-like body in cultivation. *Chileorebutia napina* v. *lanigera* differs considerably from *C. napina* and is perhaps even a separate species. It remains small and is much more difficult to grow. It responds badly to watering in summer and it is recommended to mix a fungicide with the watering solution. Also flower remains should be removed — water drops on them and favour fungus infection.

It is questionable whether *C. napina* v. *spinisior* really exists in habitat as a variety. Crossing *Chileorebutia napina* x *Neochilena jussieui* can definitely produce such a long-spined "variety". *Chileorebutia saxifraga*, *residua* and *iquiquensis* all come from the extremely dry north of Chile (the mist-zone), sit deep in the ground and can only be found during flowering time. Their short flowers have a remarkably woolly receptacle. *Chileorebutia residua* reaches the largest body size in this species group, *C. iquiquensis* offsets readily, its single bodies becoming no larger than a chicken's egg.

The flowers of *Horridocactus* are not hairy, only sparingly felt-flecked; in the inner structure of the flower and the fruit *Horridocacti* are again like *Neoporteria*, and are summer flowerers. *Horridocactus curvispinus* var. *combarbalensis* has a splendid flower of 5-6cm in diameter. *Horridocactus eriosyzioides* Ritt. (according to Backeberg a *Neochilenia*), a fine white-spined plant, in the non-flowering state is scarcely to be distinguished from a light-spined *Neoporteria nidus*.

In *Pyrrhocactus* the flowers are stronger, fleshier and urn-like. Morphologically, they resemble *Neoporteria* flowers. Very fine was *Pyrrhocactus* FR 9 with yellow urn-like flowers, an early discovery by Ritter; or a *Pyrrhocactus* with a delicate peach-coloured flower.

Comments  
..... from H. Middleditch

During our 1964 Cactus Tour to Austria we had the dual pleasure of paying a visit to the collection of Dr. Priessnitz and also of viewing a fine show of slides at a meeting held for the occasion of our visit by the local Branch of the Austrian Cactus Society (G.O.K.). Many of the slides which we saw on that occasion were of the same species as those mentioned in the article above — indeed, they may have been the very same slides. At that time, these plants were not too readily available in England, and I think it would not be an exaggeration to say that most members of the party were not only astonished, but almost dumbfounded by the magnificent display of plants in the collection and by the flowers shown on the slides. Our host was clearly well-versed in the nomenclature of his plants and I rather felt that when we left Klagenfurt we regarded Dr. Priessnitz as Mr. Chileans in person.

Despite the intervening passage of time and the acquisition into my collection of many *Neoporterianae* which were quite unknown to me prior to that year of our visit, I do not think that I have seen any collection of Chilean plants which yet matches that of Dr. Priessnitz. Regrettably, serious doubts regarding possible hybrids bedevils any detailed comparison based upon plants acquired in more recent years. The plants in Dr. Priessnitz's collection now enjoy almost vintage status and this might even be considered to enhance their value.

The reporter suggests that the flowers of *Neoporteria* do not open completely "as a result of a check"; this is not really correct, for *Neochilenia* carry typical cup-shaped bee-pollinated flowers whereas the *Neoporteria* would appear to be constructed as humming-bird pollinated flowers. I would also question the existence of "transitional forms from *Neochilenia* to *Neoporteria*"; certainly *Neochilenia woutersiana* has a mauve coloured flower somewhat similar to that of the *Neoporteria* but it is still an open, funneliform flower with a quite open nectar depression and no greater store of nectar than would satisfy a visiting bee.

The supposition that ascending water movements in the ground lead to remarkably high concentrations of mineral salts in the surface layers of soil, seems to me to be quite logical. This same process has led to the deposition of the world's largest beds of mineral salts in the Atacama desert and it seems reasonable to believe that adjacent territories with closely similar climatic conditions will differ only in degree in the concentration of mineral salts at the surface. In this belief, I have tended of late to add a decidedly generous dose of fertiliser to my initial spring watering based on the supposition that the first rains of the year in habitat will soak into the ground and dissolve the mineral salts present there, forming a pretty rich solution.

..... from R. Ferryman

I would like to raise the question of all these names in the Neoporteria/Neochilenia group — are they all Neoporterias, or should we use, or continue to use, the names Neochilenia, Pyrrhocactus, etc. I do feel that the Chileans should make some stand soon on this matter — or is the argument that we don't know!

..... from H. Middleditch

The discussion (in Chileans Ho. 34) about the flowers of Neoporteria sensu stricta which possess fairly voluminous nectar chambers, does seem to bear out the observations made by Dr. Porsche in the D.K.G. 1937 Yearbook that these flowers are to be included amongst the bird-pollinated flowers. The taller Neoporteria flowers appear to possess thicker tubes and fairly large nectar chambers, whilst the shorter flowered Neoporteria have narrower tubes and proportionately smaller nectar chambers. The volume of the nectar chamber in the smallest Neoporteria flowers compared with the volume of the nectar chamber in the large Neoporteria flowers seems to be about 9 to 1. If these nectar chambers are either full of nectar or filled to the same degree, does it mean that the quantity of nectar in the largest flowers compared with the quantity of nectar in the smallest flowers is also in the ratio of about 9 to 1?

If we do accept that, despite this degree of variation, all Neoporteria are bird-pollinated flowers, this factor separates them from the rest of the Neoporteriae, whose cup-shaped flowers and minute nectary containing a barely visible drop of nectar are characteristic of a bee-pollinated flower. The flowers of Neoporteria differ from those of the other Neoporteriae in being orientated towards quite different pollinating agents, so they are of basically different external appearance and hence there is no real problem in separating them visually on the basis of their flower form. On this account I would see no problem in continuing with the name Neoporteria confined to the bird-pollinated Neoporteriae. It may be possible to use the name Neochilenia to describe the bee-pollinated Neoporteriae.

However, when it comes to the question of using Chileorebutia, Thelocephala, Pyrrhocactus, etc., then the taxonomists can have themselves a field day. There would appear to be taxonomic arguments in favour of using a single generic name, on the grounds that the features used to draw a dividing line between (say) Horridocactus, Pyrrhocactus and Islaya, are not adequate. At the same time, most growers of these plants who are familiar with the features of each of these genera seem to encounter very little difficulty in satisfying themselves as to which plant should carry which generic name. As there are clear divisions of opinion here it might perhaps be preferable to let the "authorities" on the subject take stands and in the Chileans we can continue to relate the plant to its ecology and cultivation without worrying ourselves unduly about what nomenclature we use.

#### **THE CHILEANS AUTUMN WEEKEND 1980**

At the close of our recent weekend event, the date of September 12th/13th/14th was settled upon for our 1980 weekend. At our 1979 weekend the incidence of pale yellowish-green patches on cacti was discussed and the possibility considered that these were a virus disease. (Some notes on this will appear in a forthcoming issue.) In the course of this discussion it became evident that many members were not familiar with the nature of a virus, nor of the manner and extent to which it could affect a plant. At our 1980 weekend, Geoff Swales will be providing some basic information on this subject. In the meantime, efforts are to be made to obtain some analyses of plant tissue suspected to be suffering from virus disease.

Although John Arnold was prevented from discussing Discocacti at this year's weekend as he was in the midst of moving house, he anticipates making up for this at our 1980 weekend and requests supporting plants, slides, and comments — especially on the placentiformis-insignis-tricornis question.

The Sulcorebutia floor map introduced at our 1978 weekend attracted considerable interest but proved to be rather small for the location of plants in the many species, forms and field numbers now in cultivation — a larger version should be available for the 1980 weekend.

Provisional bookings to Mrs. M. Collins, 11 Tudor Gardens, Upminster RM14 3DE, please.

#### **THE CHILEANS VOLUME 11**

At our 1979 Autumn weekend many of the members present expressed a strong preference for a more frequent appearance of The Chileans, even if this involved spreading the same total material over more issues per volume. This current number of The Chileans represents the first issue of Volume 11 which is published on this new basis. The total number of issues in this volume will be controlled by a combination of subscriptions received and the annual rate of inflation; the latter is currently running at some 25% for commercial and industrial materials and services.



## REPORT AND ACCOUNTS FOR CHILEANS Nos. 34-36 Inc.

Income		Expenditure	
Subscriptions	1,238.90	Printing of Journals etc.	1,490.09
Sale of back numbers	279.10	Postage, stationery and sundries	258.00
Other sales of publications	46.15	Purchase of plants	982.65
Plant sales	1,166.55		
Miscellaneous	80.22		
Bank Interest	156.92		
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Sub total	2,967.84	Sub total	2,730.74
Reserve brought forward	758.63	Balance carried forward	995.73
	<hr/>		<hr/>
Total	3,726.47	Total	3,726.47

As a result of very poor workmanship, delays, and other problems with the printers of Nos. 34 and 35, a financial acknowledgement was requested and received. Had this not been the case, printing costs would have exceeded subscriptions by some 50% and reserves would have been seriously depleted. On the basis of tenders received, new printers were obtained for No. 36. The Treasurer actually advised a £10 subscription rate on the basis of budgets for Nos. 37-39; the current subscription represents a compromise and assumes that present members will be able to recruit new membership in order to make up the difference. It is inevitable that costs will continue to rise; staples for binding this Journal have quadrupled in price in six years. The official figure for inflation hides an underlying rate of some 40% in medium-heavy engineering equipment with which the writer is familiar from on-line computer print-out; latest Iranian oil prices at forty dollars a barrel presages petrol at £2 per gallon within a few months and all associated implications, miners wages (and then the rest) likely to follow suit, all now indicating a probable ongoing inflation rate of 40%. In such a climate it is extremely difficult to set a subscription rate which is acceptable to membership when set and capable of avoiding bankruptcy on meeting the last invoice for three issues. **H.M.**

### COUNTING FLOWER PARTS

..... from D. Hooker

After the discussion at the Chileans weekend which touched upon the number of flower parts such as petals and stamens, you wrote to ask whether I might try making a count on some flowers. I went down to the greenhouse right away when your letter arrived and chopped off the first readily available South American cactus flower, which happened to belong to *Notocactus vanvlietii*. The flower was brought indoors and a quick attempt made at petal counts, etc. However, this was doomed to failure because I was in too much of a hurry and I lost count of the filaments. But it did teach me a lesson on how to go about this job — don't rush! I am quite willing to dissect a few of my flowers to try to determine whether there is any set pattern in the number of flower parts. In the meanwhile I would be interested in any tips on how to remove sticky filaments from a razor blade.

### FLOWERS AND OFFSETS BURSTING OUT

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

You may remember that when we looked in the greenhouse that I showed you how *Echinocerei* develop their flowers under the skin, so that they are fairly well developed when they emerge through a hole torn in the epidermis. This is characteristic of this North American genus. Most South American species start with a tuft of hair above the areole and develop the flower externally. Inspection, using a X8 glass, shows that *Mediolobivias* of the costate species behave in the same way as the *Echinocerei*, developing their flowers under the skin and pushing them through a ragged hole above the areole, which is deflected downwards. I have observed this in *Mediolobivia costata*, *eucaliptana*, *pectinata* v. *ururensis* and *pygmaea*. Can our botanical members explain why this phenomenon occurs in such widely-separated genera?

..... from J. R. Gooch

I have been trying to bring to mind any plants that produce offsets complete with areoles, from under the skin of the main plant body. Most of the *Mediolobivia* exhibit this characteristic, though the size of the offset on "break-through" would not be anywhere near the 2cm that has been observed on *Copiapoa*. Once again I am able to quote *Lobivia*. In this instance, a habitat collected *Lobivia rebutioides* Lau 566 had its first pup burst through the epidermis, forcing off an areole. I did not measure the new head but would estimate it to have been rather less than 1cm in diameter.

## STUDY GROUPS/REFERENCE COLLECTIONS

Cleistocacti	T. Lavender, 62, Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
Frailea	J. Forrest, Spring Garden, 2 Darngaber Road, Quarter, 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/Borzicactinae	P. H. Sherville, 51 Park Road, Enfield, Middlesex, EN3 6SR.
Melocactus/Discocactus	J. Arnold, 11 Greenbank Drive, Middlebank, Lincoln, LN6 7LQ.
Neoporteriaeana	R. Ferryman, Nichelia, The Street, Stonham Aspal, Suffolk, IP14 6AH.
Notocactinae	G. J. Charles, 138 Whitehouse Common Road, Sutton Coldfield, Birmingham, B75 6DT.
Opuntia/Tephrocacti	J. W. Bagnall, 22 Perlethorpe Avenue, Mansfield, Notts.
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, The Retreat, 28 Beckenham Road, West Wickham, Kent.

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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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