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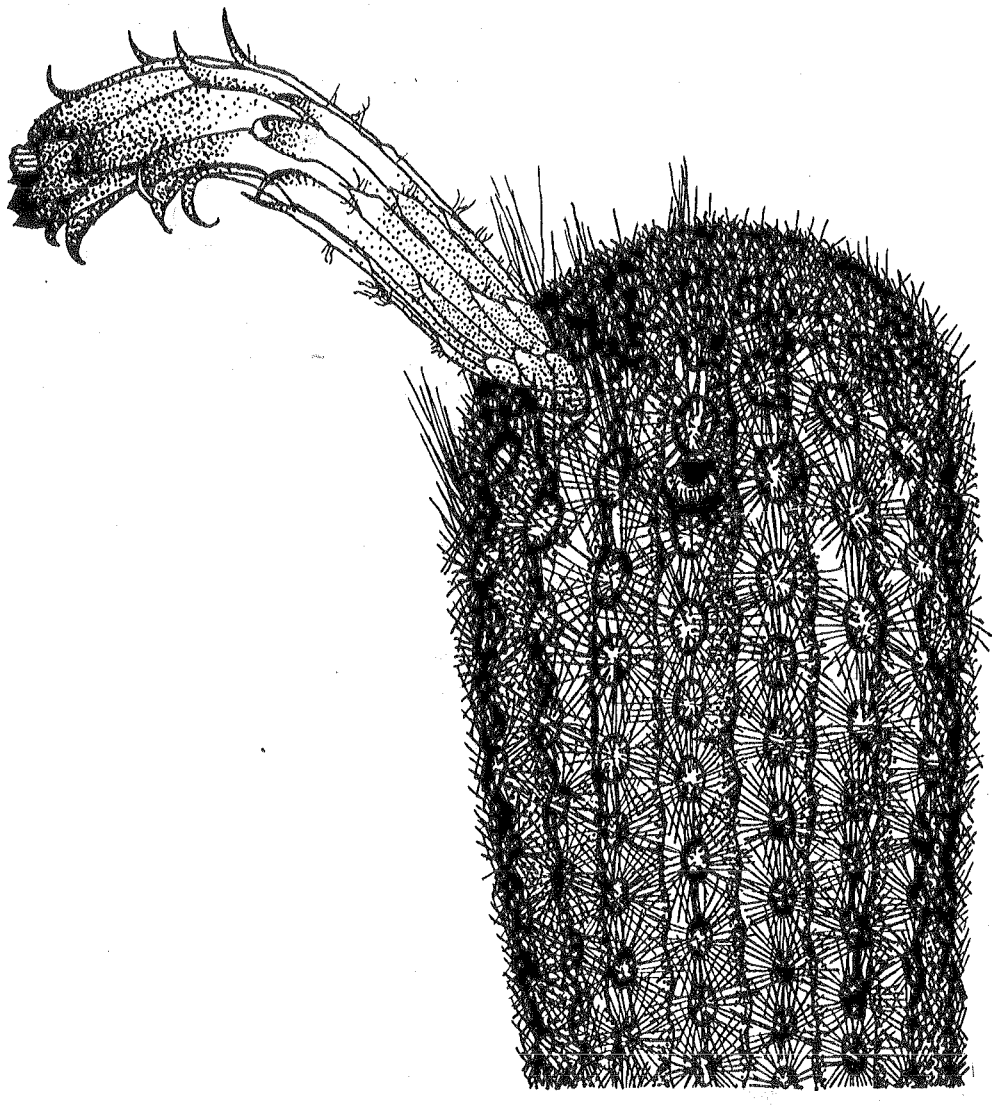


SETICEREUS ICOSAGONUS

ACTUAL SIZE - CROWN OF LARGE SPECIMEN.
COLLECTION: D. ANGUS

CARL J. LAZZARI

Loxanthocereus acanthurus FR 628
Collection & Photo: Mrs R. Howard.

BORZICACTUS sp.
Collection – D. Angus

LOXANTHOCEREUS GRACILIS FLOWERS by R. Martin

My plant of Loxanthocereus gracilis was purchased from Mr Fuge of Bristol in 1961 as a three year old seedling for the price of 2/6d, and I must confess that I was very ignorant of this family until I read an article in a N.C.& S.S. Journal by Mr Sam Peat of Somerset who apparently had quite a collection of them. This article stimulated my interest in these plants.

I remember being quite concerned at first as the plant would not stand upright and spent much time trying to stake it to grow upright - and then through the article realised that it was not meant to grow that way. After that, of course, it could not stay on the staging as it would topple over and so on; eventually I put it into a hanging basket about 6" from the roof glass, where it still resides to this day. The plant itself is now in a 5" plastic pot within the hanging basket.

The main stem of the plant is now just over 10 inches long from soil level and about $1\frac{1}{4}$ inches diameter. In the late summer of 1968, four other new stems began to appear, the longest now being just over 2" long. A point that I have noticed is that any new spines that appear on the main stem are always on the side nearest to the roof glass, and are more colour ful and longer, whilst those on the underside are vastly different in all these aspects. I imagine that this is all tied up with the intensity of light on the one side as compared with the other. This spine work is very wonderful to me, and most attractive in the sunlight.

The flowers appear from both old and new stems and without any set pattern it would seem, sometimes near the crown or midway down the stem and even near the base of the stem

on occasions. For me, the flowering period exists practically throughout the summer and into autumn; in fact at this very moment (September) there are still some 6-7 buds newly appearing.

At this early stage they seem to be very slow and take a long time to reach their initial length prior to the period just before opening. One could say that it is very like my Matucana paucicostata in that the speed of flower growth increases greatly during the final stages just before opening. The flowers on my plant stay open for 4 - 5 days in good condition and they they begin to droop and go limp. I would say, from my own two plants (one Loxanthocereus, one Matucana), that the Loxanthocereus flower stays open a day or two longer than the Matucana - though this may alter according to one's greenhouse environment.

Unlike Matucana, the flower on Loxanthocereus is a tube for about half its length and petals for the upper half. In Seticereus and Matucana the tube and flower are similar in colour; but in my Loxanthocereus the colour is darker at the base of the tube and becomes gradually lighter to the flower itself.

The flower on the Loxanthocereus pictured in New Zealand is similar to my Lox. gracilis except that the tube is not so long. There is a good photograph on p.603 of Backeberg's Lexikon of Loxanthocereus acanthurus v. ferox carrying a flower and on p.604 another photo, this time of L. piscoensis also with flower.

The photograph of the flower of Loxanthocereus in Backeberg's book differs from my own plant in that the outer petals on mine curl back to a far greater degree. I do not know the reason for this, but I remember that this reflexing was not so noticeable when the plant was standing on the staging as it was some years later when the plant became more mature and I hung it from the roof. Whether it develops these strongly reflexed outer petals as it gets more mature, or whether it is because it is hanging nearer the glass, or whether on the day I took the photograph it was due to the high temperature combined with high humidity, I would not like to say.

As stated above, my L. gracilis is most accommodating in its flowering, but my other two plants viz: parvitesselatus and otuscensis, are not so forthcoming. Early in 1968, my L. parvitesselatus put forth buds for the first time but when they had grown to about $\frac{1}{4}$" long, some just dropped off whilst others just disappeared back into the plant. This is also hanging from the roof but is still in a clay pot, being rather large.

I should certainly like to acquire some more species of this genus.

We have one slide of Loxanthocereus gracilis in the slide library - A.W.C.

Comments from H. Middleditch ....

I can only recollect having seen one Loxanthocereus in flower and that was in the Jardin Exotique at Monaco. I was particularly struck by the occurence of flowers at odd places over a four or five feet length of stem, probably on two or three season's growth of stem, a characteristic which seems to me is not met with in all genera of the Loxanthocerei group.

Lox. gracilis may also be found in collections under the name Maritimocereus gracilis, as it was first described by Akers & Buining in 1950. There is a good colour photograph of the plant in flower under this name in Buxbaums book 'Cactus culture based on Biology'.

In "Die Cactaceae" Backeberg describes this plant as having up to 20 stems up to two metres long, from a woody subterranean rootstock; he also quotes the flower as having a zygomorphic tube, but this has not been evident in the few illustrations which I have seen of this plant in flower. The habitat is given as Chavina in South Peru. I am unable to trace this locality on my map of Peru but I would expect that it cannot be far from the sea to merit the original generic name of Maritimocereus.

A BORZICACTUS FLOWERS - by D. Angus.

About six or seven years ago I acquired a cereiform plant about thirteen inches high which carried a label whose validity I doubted. Evidently the growing point of the plant received some damage either before or shortly after I acquired it, for there was no fresh growth from the crown and two new branches appeared from quite near the top of the plant.

I decided to remove these branches and root them to try and produce a rather better looking plant. One of these freshly established plants was about five or six inches high in 1965 when it showed signs of producing a bud some distance below the crown; this developed slowly and finally produced a flower around about midsummer.

The flower itself was red in colour, not so long as that on my Seticereus icosagonus, and without any oblique or zygomorphic shape at the mouth of the flower such as one may clearly observe on Seticereus icosagonus. The plant was then identified as a Borzicactus from an illustration of a plant in flower. The sketch of the flower is made from a slide taken at the time.

The vegetative progeny from the original plant have grown well and all those which have in turn produced offsets have done so from the base of the plant, never from part way up the stem; but none have so far flowered since that first occasion.

SETICEREUS ICOSAGONUS (HBK) BACKBG. by H. Middleditch.

The plant portrayed on our front cover was first brought back to Europe from South America following the exploratory journeys of Baron Alexandre Humboldt (see Chileans No.14 pp 43-45). It was named Cactus icosagonus Humboldt, Bonpland and Kunth, in 1823.

When Britton and Rose published their work 'The Cactaceae', they listed this plant as Borzicactus icosagonus. They also listed as Borzicactus aurivillus a plant described in 1903 by Schumann as Cereus aurivillus; they quoted the habitat of this species as "probably Peru" and gave a description rather lacking in detail.

One also finds in this same work the genus Binghamia, together with an illustration of a 'Binghamia' fruit which we would now consider to be either a Seticereus or a Haageocereus fruit, and a 'Binghamia' flower which has petals opened flat and rotate - that is, with the flower opening square to the long axis of the flower - which is typical of Haageocereus. One species listed under the genus Binghamia Br. & R. was melanostele, first described as Cephalocereus melanostele by Vaupel and now satisfactorily located in Espostoa. The other species under the genus Binghamia was acranthus, now firmly in Haageocereus.

Backeberg must have observed that when Borzicactus icosagonus flowered, the flowering areoles produced spines of distinctly greater length than those on the non-flowering areoles, as can be observed on our cover illustration, a characteristic not observed on other Borzicactus species. In consequence, in 1934 Backeberg transferred this species to Binghamia, as Binghamia icosagona. In "Die Cactaceae" Vol II p.62, Backeberg gives as his reason for this move, that the characteristic long bristles in the flowering areoles accord with the description of Britton and Rose who "characterised the type plant of Binghamia (B.melanostele) as 'areoles of the flowering plants long-bristly', which applied neither to the cephalium of melanostele nor to the acranthus".

However, in accordance with the International Rules for Botanic Nomenclature, a generic name is invalidated if the type plant is removed therefrom, so that the resurrection of the generic name Binghamia with icosagonus as type plant was not acceptable under the Rules. The genus Binghamia Br. & R. was relegated to a Genus confusum since the illustrations and descriptions in the works of Britton and Rose did not cohere. The genus Binghamia Backbg. was a homonym of Binghamia Farlow & Argardh - an alga - which had precedence. Thus the generic name Binghamia had to be discarded from use, but meanwhile many plants had passed into collections as 'Binghamia icosagona' and the name remained in many catalogues

and imprinted in the minds of collectors - just as today the name 'Malacocarpus' continues to be widely used although it was invalidated and replaced by Wigginsia some years ago.

In order to give icosagonus a home, with Binghamia invalid, Backeberg proposed the genus Seticereus in 1936, but this generic name was not validated with a Latin diagnosis until 1942. It was not until some years after the war that this name came into wide circulation, meanwhile the species continued to be grown and distributed under other generic names.

The genus Seticereus was included in the collective-genus Borzicactus by Kimnach in 1960, a proposal acceptable to many authorities, but nevertheless the name Seticereus icosagonus tends to be in most general use for this plant today.

In 'Die Cactaceae', Backeberg gives aurivillus as a synonym for this plant - again one commonly finds plants in collections carrying this specific name which may be entitled 'Haageocereus' or some other generic name, and which should be relabelled Seticereus icosagonus.

The flowers on this species, as may be seen from the cover illustration, open with the mouth of the flower oblique to the long axis of the tube. This is one form of zygomorphy in cactus flowers; a zygomorphic flower can have a bend in the tube which may be seen when the flower is growing on the plant (e.g. many Cleistocactus). The flower of Seticereus icosagonus has a straight tube, the petals opening wide on the lower half of the mouth of the flower and hardly at all over the upper half. In consequence of this oblique opening the stamens and style tend to lean very slightly away - downwards - from the axis of the flower tube, on account of the force of gravity and the availability of space; this slight leans adds to the impression of the flower's zygomorphy. The true nature of the flower petals may be readily ascertained by detaching a flower, splitting it down one side and pressing it for a few days. It may then be readily seen that the petals are generally of a similar size and all are in line with the axis of the tube.

This form of zygomorphy found in the flower of Seticereus icosagonus is particularly striking in the other cacti within the group Loxanthocerei Bkbg., which includes Arequipa, Oreocereus, Morawetzia, Matucana, and others.

Many of the Backeberg genera in his Loxanthocerei group exhibit rather uncommon features adjacent to the nectar chamber. Perhaps the best known is the formation of some wool or hair near the base of the inside of the flower receptacle, just above the nectar glands. This 'wool-ring' is found not only in Borzicactus, Clistanthocereus, Bolivicereus, and Submatucana, but also in plants of the genera Denmoza and Acanthocalycium.

In Seticereus icosagonus, however, we find quite a different and most unusual feature. Here the primary stamens i.e. those inserted lowermost in the tube, are fused together at their base and this fused element is 'also elongated into a tube which surrounds the style for a distance of about 1 cm' (Buxbaum, Morphology of cacti). This is perhaps somewhat reminiscent of the tube within a tube which characterises the flower of Zygocactus - considering how unusual is this particular feature, it is somewhat surprising that it has received such little publicity. Nor does one know whether this characteristic is confined to S. icosagonus or appears in the other species of the genus.

The fruit on Seticereus is fairly large, generally similar in size range, shape and smoothness of outer coating to those on Haageocereus and Morawetzia. The fruit on S.icosagonus is quoted in Backeberg's Lexicon as being 5 cm in diameter (i.e. in excess of two inches in diameter). A fruit this size should prove a first class novelty in any collection, making well worth while the exchange of pollen to assist fruit setting by crosspollinating flowers which are more likely to be from different clones, or stimulating the flower to set fruit by the use of foreign pollen (Chileans No.14 pp 37-38, also this issue p.49).

Plants of this species flower from near the top of the stem, at or close to the shoulder, from recent growth. Those plants flowering in Britain seem to produce buds at one shoulder only and it seems likely that this is the south side of the plants in question. Plants seen in flower in the Jardin Exotique and elsewhere on the Riviera flower all round the crown of the plant, pointing to the probability that these plants have a preference for a sunny position when grown in

cultivation - perhaps hanging near the glass when they could be allowed to grow in a decumbent manner. They are likely to obtain ample ultra-violet light in habitat - which Backeberg quotes for Seticereus as 'Nabon, by Loja, Catamayo valley, South Ecuador, to North Peru - Rio Huancabamba valley and Olmos valley, at about 2,000 meters altitude (6,500 ft.).'

COMMENTS ON SETICEREUS ICOSAGONUS

..... from G.W. Sykes

My plant of Seticereus icosagonus flowered very early in August, the second set of flowers this year. The flowers lasted for about 3 - 4 days; pollination attempts between flowers proved literally fruitless. The plant itself is semi-procumbent and has a few basal offsets, with long bristly spines at the flowering zone.

..... from D. Angus

My plant was acquired nearly three years ago, since when it has put on about five inches of growth, making it now about fifteen inches high. It has remained upright and is without any offsets. It flowered for the first time this year, very early in September, the first flower lasting for a few days, after which it was borne away to be a model for the sketch on the front cover. .I would say that the flowers came from that side of the plant which faces south-east; many fine, long spines were developed at and around those areoles from which flowers appeared.

..... from R. Martin

During 1968 and again this year, Seticereus icosagonus has had two distinct flowering periods - this year it was May and August. On each occasion between eight and ten flowers appeared; during the other years when it has flowered there has only been one flowering time, about the end of June to early July. The peculiar thing about this plant to me is the way that the flowers appear from just one side of the plant and just below the crown. They are always on the southerly side of the plant.

I always bring the plant into the house when it is about to flower in order to observe it better, but it is always put back in the greenhouse facing exactly the same way. It has not branched or offset yet and remains a single stemmed plant, quite vertical with no sign of becoming procumbent. A fellow-collector not far away also has one of these plants with four or five stems, every stem procumbent from the start but lifting slightly upward at the growing tip. Although a bigger plant than mine, it has not yet flowered.

My own plant was purchased in 1960 from Winters of Frankfurt; at that time it was about four inches high and it was estimated that the plant was about five years old. I have had the plant nine years and it is now 13 inches high exactly, which means that it has put on about one inch of growth per year. It first flowered in 1962, bearing 7 flowers in all at that time; it must then have been around six inches tall.

..... from H. Middleditch

I am in the ranks of the multitude - those who have never flowered Seticereus icosagonus (dare one say 'yet'?). But I wonder if the plant described and flowered by R.Martin might perhaps have been an offset from a much more mature plant, since it seems to have flowered when at a remarkably small size. In making this comment I have in mind both the sizes of the plants that I have heard of and seen in flower and also the following notes contributed by Krainz to the K.u.a.S. for April 1961:-

"One rarely sees it in flower, probably stems of 25 cm in length are capable of flowering. A stem ready for flowering usually forms a bristly head, although it can also flower without

the bristle formation developing. On the other hand, a short stem of 5 cm in length often forms long bristles at each spot (possibly the author means areole. Ed.), without any flowers following. The flower colour varies from carmine through vermillion to yellowish orange, which has let to the separation of forms. The single stems are up to 6 cm thick and can grow up to 60 cm long. Old plants form sprawling colonies, wherein the old spines then grow red-brown to black. Upon the 18-20 tubercled ribs (Greek - icosagonus = twenty sides) are closely spaced areoles with their 20-30 needle shaped spines scarcely 1 cm in length."

It may also be worthy of note that one might commonly expect the flower on this species to open its petals a little more than the amount shown on our cover illustration, so that the uppermost petals would then form a straight line with the upper outline of the flower tube. Possibly the evening hour or the age of the flower itself, or both, might account in some degree for the down ward droop of the uppermost petals. Conversely, one would expect that immediately before the flower opened for the first time, the pointed top part of the bud would "swan-neck" downwards slightly in this very same fashion: indeed, David Angus observed it adopting this drooped shape for most of the period of growth of the bud.

We have a few slides of this species in bud and flower, together with a close-up of the flower, in the slide library - A.W.C.

LOXANTHOCEREI Backeberg

In Backeberg's Kakteenlexikon we find sixteen genera under the Loxanthocerei group, viz:- Clistanthocereus, Loxanthocereus, Winterocereus, Bolivicereus, Borzicactus, Seticereus, Akersia, Oreocereus, Morawetzia, Arequipa, Submatucana, Matucana, Cleistocactus, Seticleistocactus, Cephalocleistocactus, and Denmoza.

In 1960 Kimnach suggested that these genera, with the exception of the last four, be re-united under the name of Borzicactus Kimnach. The unification of these twelve genera appeared to meet with some measure of acceptance amongst authorities on cacti, if not amongst collectors in general. (For example, see "Borzicactinae Buxbaum" by J.D. Donald in Nat.Cact.& Succ. Journal, March 1970 Ed.).

In his Kakteenlexikon, Backeberg listed the leading characteristics of the twelve genera concerned, as follows:-

"Plants without cephalium.

Arequipa Br.& R. Short-cereoid plants with ± slightly oblique flowers, without ring of wool (near base of style - H.M.); fruit dry, opening basally, seeds then released.

Bolivicereus Card. Slim cereiform with strongly zygomorphic flowers, with ring of wool (near base of style - H.M.); fruit like berry.

Clistanthocereus Bkbg. Shrub forming plants with sturdy, symmetrical flower tube (i.e. not oblique, depressed, or zygomorphic - H.M.); seed fairly small.

Loxanthocereus Bkbg. Less-slim cereiform with ± S shaped funneliform flowers and berry-like fruits.

Matucana Br.& R. Initially globular plants with bald and zygomorphic flowers, fruit a splitting berry.

Oreocereus (Berg) Ricc. Cereiform plant with massive trunk, zygomorphic flowers and large hollow fruits.

Submatucana Bkbg. Initially globular plants with ± hairy flowers, fruit a splitting berry.

Plants with cephalium.

Morawetzia Bkbg. Low growing cereiform with terminal cephalium zygomorphic flowers and hollow fruits.

Seticereus Bkbg. Low growing to decumbent cereiform with short - and slightly oblique - flowers with flattened tube and berry-like fruit; flowering zone growing with dense long bristles."

Backeberg enlarges on this information under the heading of each genus in his Lexikon:

"Borzicactus Ricc. Only moderately stout to slender, upright cereiform, height to 1½ meters in length, with ± thickened ribs rounded and with a cross-groove close to each areole; relatively large flower tube, the end oblique, its opening fairly narrow. In the interior of the flowers grows the well-known staminoidal wool-formation. The green fruit is rounded, the seeds are fairly small and black. The Ecuadoran species form geographically, as well as in the uniform characteristics of the trunks and flowers, a sound genus."

In his foreword Backberg also states that "the tube is not funneliform when open". He lists the following species:-

Borzicactus aequatorialis Bkbg.

B. cutakii nom. prov.
B. morleyanus Br. & R.
B. pseudothelegonus (Rauh & Bkbg.) Rauh & Bkbg.
B. sepium (HBK) Br. & R.
B. ventimigliae Ricc. - type species.
B. websterianus Bkbg.
Do. var. rufispinus Bkbg.

"Seticereus Bkbg. Low-growing, sometimes half-creeping to bushy and almost tree-forming cereiform plants from a restricted habitat in northern Peru and extreme southern Ecuador. Seticereus is separated from Borzicactus in the following generic characteristics (comparative features for Borzicactus in brackets). Flowering zone with ± plentiful bristle formation, thicker and longer towards the crown (Absent). Flower relatively short (longer). Tube flattened (round). Hair formation absent in base of flower (present). Fruit as big as an apple (smaller). These characters appear regularly in all four described species, as well as the high bushlike and ± treelike form of growth, which in general do not appear in Borzicactus.

Seticereus chlorocarpus (HBK) Bkbg.
S. humboldtii (HBK) Bkbg.
S. icosagonus (BHK) Bkbg. - Type species
S. roezlii (Hge Jnr.) Bkbg.

"Clistanthocereus Bkbg. Tree or bushlike thick bodied cereiform, with strongly tubercled ribs, with large uniform fairly distinctly outlined and hairy flower. This genus includes the largest species and the biggest flowers in the Loxanthocerei. The perianth is not funnel-shaped. The fruit is generally larger than Cleistocactus and also than that of Loxanthocereus (thus 'relatively small' - Rauh)".

In his foreword Backeberg also states that "the interior of the flower exhibits the hair-formation". He lists the following species.

Clistanthocereus calviflorus (Ritt.) Bkbg.
C. fieldianus (Br. & R.) Bkbg. - type species.
C. samnensis (Ritt) Bkbg.
C. tesselatus (Akers & Buining) Bkbg.

"Loxanthocereus Bkbg. Upright to lowlying and again turning upwards, in the main comparatively slender columnar cacti. Some species exhibit mild hair-formation in the crown. Ribs divided, neatly to knobbly. The flowers are red in various pale tones, predominantly ± oblique in outline, rarely almost radial, the flower opening funneliform, not narrowed, the tube ± zygomorphic. The fruit is relatively small, the seeds probably always ± black. Occurs only in Peru from near the coast to about 3,300 m in altitude.

Loxanthocereus acanthurus (Vpl) Bkbg.
aticensis Rauh & Bkbg.
brevispinus Rauh & Bkbg.
camanaensis Rauh & Bkbg.
canetensis Rauh & Bkbg.
cantaensis Rauh & Bkbg.
crassiserpens (R.& B.)R.& B.
cullmannianus Bkbg.
erectispinus Rauh & Bkbg.
erigens Rauh & Bkbg.
eriotrichus (Werd & Bkbg.) Bkbg.
eulalianus Rauh & Bkbg.;
faustianus (Bkbg) Bkbg.
ferrugineus Rauh & Bkbg.
gracilis (Akers & Buin.) Bkbg.
gracilispinus Rauh & Bkbg.
granditesselatus Rauh & Bkbg.

Loxanthocereus hystrix Rauh & Bkbg.
jajoianus (Bkbg.) Bkbg.
keller-badensis Bkbg.& Krainz
multifloccosus Rauh & Bkbg.
nanus (Akers) Bkbg.
neglectus Ritter
otuscensis Ritter n.n.
pachycladus Rauh & Bkbg.
parvitesselatus Ritter n.n.
peculiaris Rauh & Bkbg.
piscoensis Rauh & Bkbg.
pullatus Rauh & Bkbg.
riomajensis Rauh & Bkbg.
sextonianus (Bkbg.) Bkbg.
splendens (Akers) Bkbg.
sulcifer Rauh & Bkbg.

"Akersia Buining. Slender body, upright growing cereiform with finer, thicker, and yellower spination. In the flowering zone there are in addition finer and longer spines in brush-like form. The zygomorphic, rose-pink and oblique outline flower has bristles on the tube and ovary; a wool-ring was not found inside. This plant was taken at first to be a hybrid, but after all this is improbable, for elsewhere in the Andes no similar cereiform plant occurs with bristly flowers."

In Vol. VI of Backeberg's Die Cactaceae are two illustrations of this species (Akersia roseiflora) in flower, from which one may observe the close bunched stamens typical of the Loxanthocerei group but with rather broader petals than one normally associates with flowers on plants in this group.

H.M.

Readers will find a fairly thorough coverage of Matucana, Submatucana and Arequipa in The Chileans No.11 pp.47-49, No.12 pp.98-101, and No.13 pp.154-157. Winterocereus was illustrated and described in Chileans No.10 pp.1-4.

Comments from J.D. Donald.

Arequipa. Some plants do show a ring of wool near the base of the style. Thus A. hempeliana v. subtilispina shows it but A.hempeliana v. hempeliana apparently does not or, at best, it is very much reduced.

There is a difference between Arequipa and Matucana in the dehiscion of the fruit - in Arequipa the fruits dehisce mostly basally and in Matucana, as with all the other Borzicactus, vertically.

Hildewintera (Winterocereus) dehisces with four equally spaced vertical slots; but how important is this character when judged against all other similarities?

Clistanthocereus - which Ritter, too, makes a synonym of Borzicactus. The flower marks the gradual transition from the zygomorphic Borzicactus Ricc. of Peru to the actinomorphic Hildewintera of Bolivia. All other characters within normally expected size variations are morphologically identical. The change is very gradual and in Clistanthocereus flowers, the species calviflorus possesses a thick wool ring whilst, for instance, samnensis lacks it. Similarly, the flower of the latter is very much reduced towards that of a Cleistocactus compared with, say, fieldianus which is large and comparatively open flowered. Certainly 90% of the length of the flowers may be tubular but I would still call these flowers basically funnel-form.

Loxanthocereus - the difference between these plants and Borzicactus is in the stem - where Loxanthocereus seems to merge with Arequipa - the reduction being: cereoid Loxanthocereus - semi-cereoid Arequipa - low cereoid Matucana. The flowers of Loxanthocereus are certainly quite open in the case of L.gracilis, one of the largest flowers and certainly funnel-form, smaller and more reduced in L.faustianus and sextonianus, still further reduced in L. sulcifer to that of L.hystrix and L.neglectus when they resemble the flowers of Matucana and Arequipa completely.

Oreocereus represents the most massive development of stem in the Borzicactus, but the flowers are morphologically similar. These plants have a wide distribution from northern Argentina over the whole of Peru and Western Bolivia. The hollow fruit with basal dehiscion resembles Arequipa.

Matucana and Submatucana present a very odd mixture of flower forms, all basically Borzicactus but showing a range from extreme zygomorphism, e.g. M.paucicostata to none, e.g. M. aurantiaca with an almost perfect tubular flower. The so-called hairy flowers of Submatucana are again only a matter of degree rather than substance. To external appearances the scale axils of Submatucana appear more hairy than the apparently naked flowers of Matucana, but in the case of the latter they may be microscopic, absent, or quite well developed, but rarely extending outside the axil. Similarly Lau has found that the zygomorphy of the flowers of Matucana and Submatucana are not always maintained throughout each individual species population.

Seticereus. The species which develop larger spines and hairs at the flowering areoles do not have true cephalia in the accepted botanical sense.

Akersia also produces similar long spines and bristles very close to those produced by Seticereus at the flowering areoles.

Morawetzia differs slightly from the others in flowering only terminally rather than from the upper part of the stem and produces copious masses of fine silky hairs through which the typical zygomorphic flower appears, quite indistinguishable from that produced by Oreocereus or Borzicactus sensu stricta.

In general terms I have every sympathy with Kimnach's treatment of the Borzicactinae, written with all the abundant material from Peru that P. Hutchison had brought back with him from his three Peruvian expeditions. I would now regard all the above genera, together with Bolivicereus, as reunited under Borzicactus Kimnach.

..... from H. Middleditch

I note that Backeberg refers to the fruits of the various genera in Loxanthocerei as "hollow" or "dry" or "like a berry". I am not clear how a berry-like fruit differs from a hollow or a dry fruit and I would be pleased to hear from any members who have been able to examine any of these fruits or can from other knowledge explain what these terms mean in practice.

MY VOYAGE TO CHILE. PART 3 - ANTOFAGASTA by Karel Knize.

(Translated by H.Middleditch from Dodonaeus VI, 5. 1968).

One of the most northerly provinces of Chile is Antofagasta of which the chief town has the same name. I have noticed there two clearly distinctive regions during my long walks in the Andes, in the course of which I have crossed one part and another of the red desert of Calama towards the volcano San Pablo then Barros Arena as far as Atacama.

Almost arrived at my goal, I saw some Browningia candelabris on the sides of a volcano and a very rare species of Eriosyce (thought to be Rodentiophila), R. atacamensis.

One can scarcely imagine, without having tried it oneself, how difficult it is to find some small plants in this unbelievable mass of mountains and rocks. With plenty of toil and at the price of much patience and tenacity, I have succeeded in finding some.

Beyond the Banos of Puritana where I remained for some time, I could no longer rely upon my legs to carry out my prospecting and I can assure you that one finds it a severe trial. On the other side of the mountain range when one turns back towards the sea, the places are more numerous and, in that direction, the country is less desolate and one may hope for some assistance from the local inhabitants, but towards the interior of the country there is only chaos, solitude and desolation.

One day when I returned from Antofagasta to El Cobre on a motorcycle (110 Km), I realized how hazardous, if not dangerous, these expeditions could be. For the most of the journey, it is no trouble to follow the main road which is in good enough condition while it climbs, but beyond that I must take a secondary track to the right which becomes an uneven and stony road where one risks meeting no men, no animals, no plants, and where one may only rely upon oneself.

Behind me stretch out slowly the familiar peaks and I have ventured, alone and rashly, into this new desolate countryside with increasing anxiety in the hope of finding some interesting plants in this coastal region.

After 25 kilometers, the desert gives way to a mass of rocks and the track was reduced to no more than abrupt rises and steep descents but without sign of life, when at last from a hilltop I discerned some plants large enough for me to see in the hollow below: Pilocopiapoa solaris or, better still, Echinocactus conglomeratus Phil. to which I gave my number Kz 75. Each had reached a diameter of 10 to 15 cm and the groups comprised as many as 100 stems or more. The flowers were 2.5 to 3.5 cm in diameter: yellow with occasionally a little red, and naked as all Copiapoas. I had in the meanwhile observed some furnished with short wool at the bottom of the tube.

The harvesting of the seeds is deceptive because one finds none in the fruits most of the time because of the ants or the pickpockets .... ! After four hours of searching I abandoned the game having collected a few hundred of these precious seeds.

The species is interesting however because it must be endowed with a resistance proof against almost everything since I discovered no other trace of life in the vicinity. Here the alkaline soil and sand has a pH of 8.0 to 8.4 which, with an average of 300 days of sunshine each year, must exclude all other vegetable life.

Continuing towards the coast, I found another splendid Copiapoa Kz.90. It was inserted in the clefts of rocks and never really produced more than five to eight heads. Its roots are strong and enlarged but they soften noticeably at the entry to the fissure which makes the extraction of the plant extremely difficult. The body is globular or flattened and the ribs somewhat large and it is not impossible that this is a question of Copiapoa marginata (S.D.) Br. and R. whose area of distribution extends from Taltal to El Cobre, covering a considerable area but where, for reasons which I cannot explain, the literature mentions only Copiapoa cinerea.

It is in this very region, where numerous amateurs and professionals have explored - such as Backeberg, Hutchison, and Ritter, who have discovered there the greater part of the new species recently so widely distributed among collectors. In this immense territory which reaches from Taltal in the south to El Cobre in the north one recollects eight species validly described but, besides these eight species, there exists at the same time a whole series of little plants, the more interesting ones collected by Ritter, Lembcke, or myself which are as yet very rare in collections.

In the basin of the Rio Taltal, in the immediate vicinity of the great mountains with their innumerable peaks - virtually inviolate, there is only wind and sun. Lower down, in the valley at the more or less flat spots where the sand accumulates, one finds colonies of C.cinerea which clump in their hundreds, that is to say, thousands of individuals: entire fields which would cause all the collectors in the world to feel faint.

All are covered by a whitish bloom and furnished with very colourful spines, most having five per areole. In the most favourable places where the conditions of life are less rigorous, as in the neighbourhood of the sea where their soft roots have a little more water at their disposal, their distribution is more regular.

The young plants, up to a diameter of 7 to 9 cm ., remain flattened and brownish: it is only later when they approach the adult state that they take on their characteristic chalky appearance. There are certainly several varieties and under my Kz 92 I have collected an especially fine one which has only a single spine per areole.

To the left of the Rio Taltal, at the top of the escarpment, anchored between the brown rocks, I found Copiapoa krainziana, but none of the finest specimens with white spines which one finds in certain collections. They were mostly very flat specimens, half withered and dirty and not at all attractive, I would presume therefore that all the finest specimens have already been lifted or destroyed and that there only remain some stunted dwarf ones. After searching carefully, I did however discover some nice vigorous examples in good condition and I strongly suspect that in the not too distant future there will not be a single one left in that place.

One further point, the collection of the seeds is evidently not a worthwhile activity; after having patiently and minutely searched for five hours under the boiling sun and into the most impossible places, I had only gathered together a miserable fifty or so seeds. Agree with me then that one must be a mad explorer to undertake such an exercise!

PYGMAEOCEREUS Johnson & Backeberg AND SETIECHINOPSIS (Backeberg) de Haas.

Their relationship with ARTHROCEREUS Backeberg by F. Buxbaum.

(Translated by R. Moreton from Kakteen und andere Sukkulenten 20; 5, 1969).

If the genus Pygmaeocereus had comprised a Brazilian group of species and not a Peruvian one, a new genus would probably not have been set up and the species would have been included in Arthrocereus.

The dwarf growth of Pygmaeocereus does not justify a separation, as shown by the following comparison.

	P. bylesianus	A.campos-portoi
Growth	Low, basally branched. Up to 10 cm high and 3 cm diameter.	Dwarf, basally branched; up to 15 cm high, 2.5 to 3 cm in diameter.
Ribs	12-14, low, divided into tubercles.	12, low, divided into tubercles.
Radials	Numerous, radiating on all sides, 3-4 mm long.	25-35 (with bristles), 5-7 mm, lowermost up to 10 mm.
Central spines	Not distinguishable; in P.akersii n.n., much elongated.	1-2, up to 4 cm long, or absent.

Arthrocereus campos-portoi grows much taller in cultivation, which is said not to be the case with Pygmaeocereus. The large gap in the areas of distribution shows that this line of development is very old, already recognisable by the direct descent from Leocereus. This along, however, cannot justify a generic separation, since we know not only in cacti, genera with as wide or still wider separation between distribution areas. However, when one takes into account the even dwarfer A. microsphericus, a resemblance in habit does not prove a congruity. The stability of the species of Pygmaeocereus is still very uncertain, the type locality - as so often is the case - "secret". It is only known that they come from the garua zone - a foggy area of south Peru. As the type of the genus, Backeberg and Andreae chose a

plant collected by Johnson, in Andreae's collection, which differed from the P. akersii, illustrated but not described by Johnson, only in that it had an exceptionally long central spine. This was validly described as P. bylesianus.

I had two externally completely different flowers at my disposal for examination. One, from Buining's collection, under the name P. bylesianus, was collected by Akers near Chala, the reputed typed locality, the second from the G. Frank collection was received from Johnson under the unpublished name of P. vespertinus.

The flower from G. Frank agreed very well with the original illustration of P. bylesianus. Since both plants originated from Johnson they may have been identical, although Johnson labelled the Frank specimen vespertinus. The elongated to wide oval pericarp is covered with very sharply tapering thin triangular scales that have in their axils pale curly hair and longer, stiff, less twisted bristles. Similarly the receptacle, which tapers sharply from the pericarp, carries scales increasing in size towards the throat where the receptacle first becomes funneliform. The tips of the scales are mostly not hardened into spines.

At the point where the receptacle widens out the scales rather quickly develop into narrow lanceolate petals, having a long tapering tip. The next petals are somewhat wider, still having a definite discontinuous tip, the innermost relatively wide and having a rounded end with a somewhat wavy edge and narrowed tip. Externally these are then typical Arthrocereus flowers, resembling the short examples of A. campos-portoi. The difference, which was actually taken as a characteristic of the genus lies in the inner structure and, to be sure, the anthers have only extremely short filaments. They begin, very scattered, around the middle of the receptacle and only above are present in dense rows. The bases of the lowermost stamens run right down the wall of the tube where, exactly as in Arthrocereus, they bear the nectary tissue.

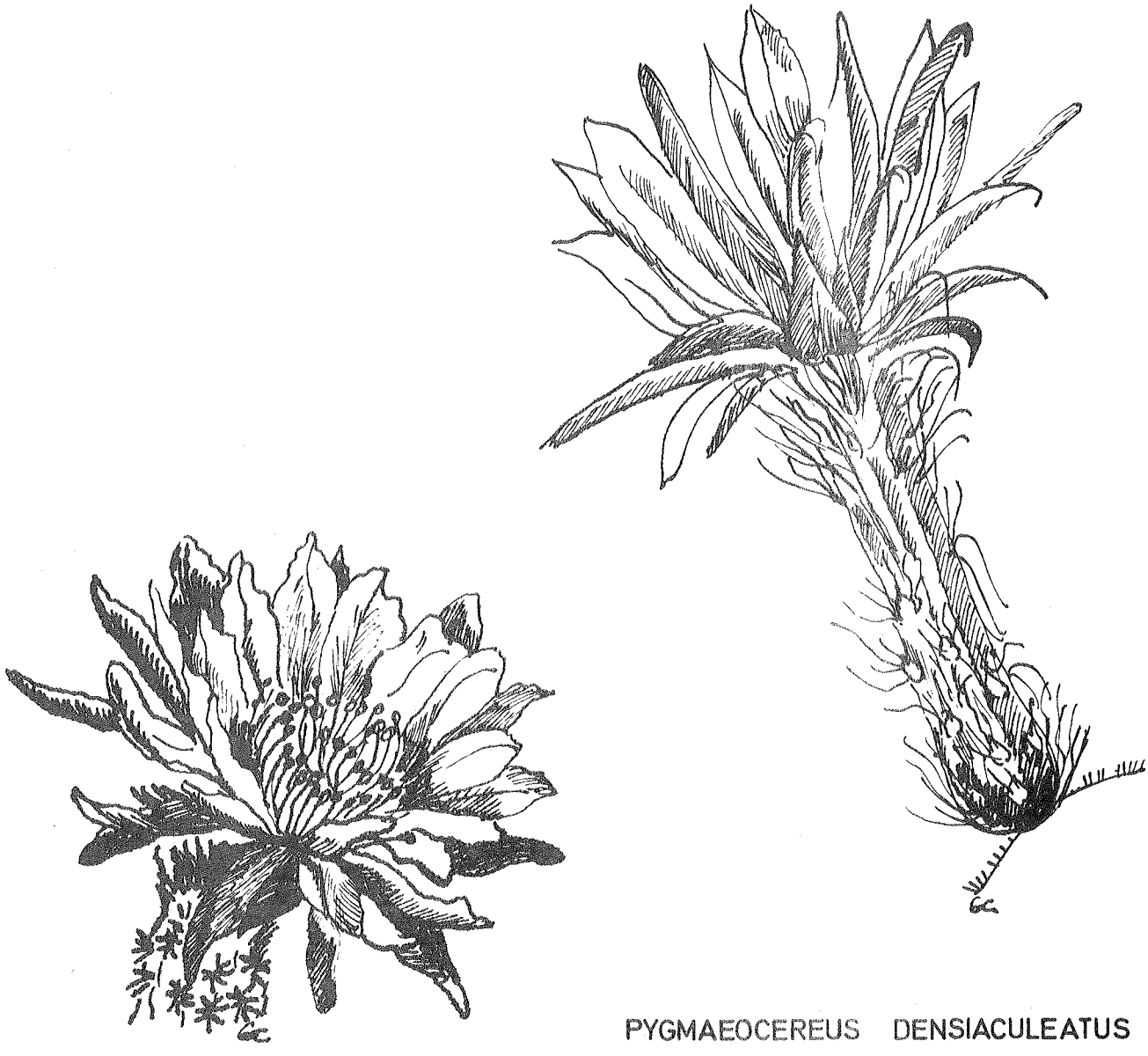
As a second characteristic the relatively short style was quoted, which mostly, but apparently not always, does not reach to the uppermost anthers. Variations of style length are, however, so widely distributed that they are questionable as generic characteristics. Seeing that the length of the receptacle can vary greatly, which is expressed in the relative length of the style, the beginning of heterostylic (i.e. the development of long and short styled) individuals, has been observed in Primroses, Horsechestnuts and Forsythia, and also in cacti. More important it seems to me is the fact that the stigma lobes, which are papillose all round, rise to very uneven heights. This hints that the group is of a very great age. The regular covering of stigma papillae on the other hand points once more to Arthrocereus.

By comparison, the Akers specimen from Chala had important external differences. The receptacle is shorter and thicker, the whole flower thereby being more squat. What strikes the eye first however is the size and, above all, the width of the scales on the receptacle. They are also arched up and thereby stand out conspicuously. Correspondingly, the transition to the wider, but less numerous, petals is looser; the uppermost scales of the wider part of the receptacle are very conspicuous but not so numerous. All scales terminate in a small tip, which in this flower is dry.

In internal construction this flower resembles the previous one, only the filaments are relatively longer and the stigma - in the case of the flower observed - reaches the height of the upper stamens.

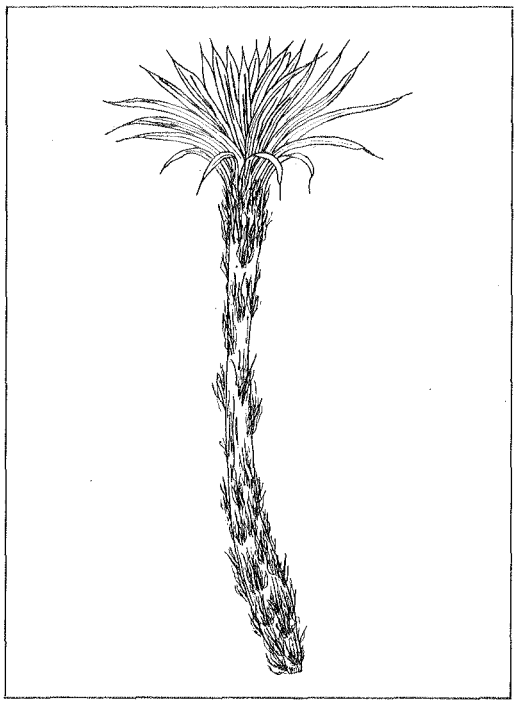
Undoubtedly this internal construction is different, by virtue of the much shortened filaments, from A. campos-portoi and A. rondonianus, but not however from A. microsphericus, the type of the genus. Therefore it cannot serve as a characteristic to define a genus, and Pygmaeocereus must be combined with Arthrocereus.

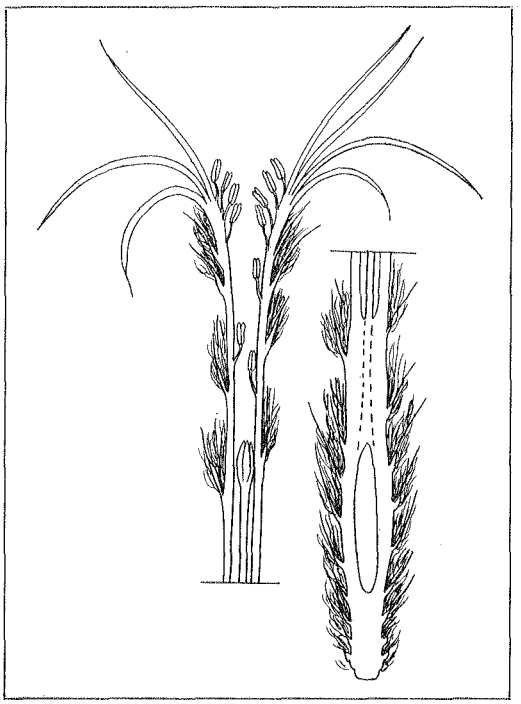
Arthrocereus microsphericus as well as Pygmaeocereus represent very highly developed types of this line of development. The very great distance between the two areas of distribution indicates that the Pygmaeocerei are a side-line which developed very early, which also finds expression in the primitive stigma. On this ground, and this ground only, can Pygmaeocereus justify the rank at least of a sub-genus of Arthrocereus.



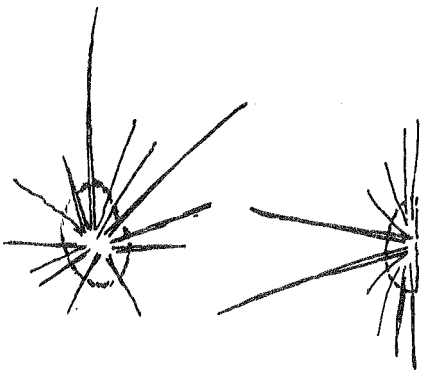
PYGMAEOCEREUS DENSIACULEATUS
Collection – G. Tegelburg U.S.A.

PYGMAEOCEREUS DENSIACULEATUS – Collection T. Lavender.



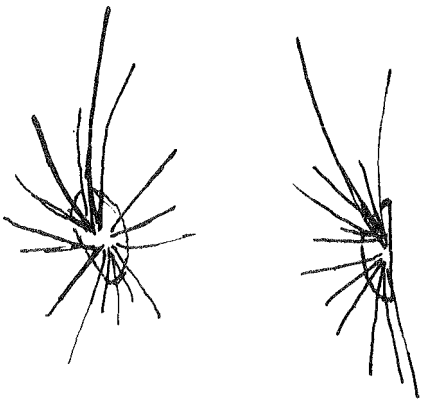


Setiechinopsis mirabilis — K.u.a. S. 20 · 5 · 1969.



Pygmaeocereus
nycticaulis
areole x 4

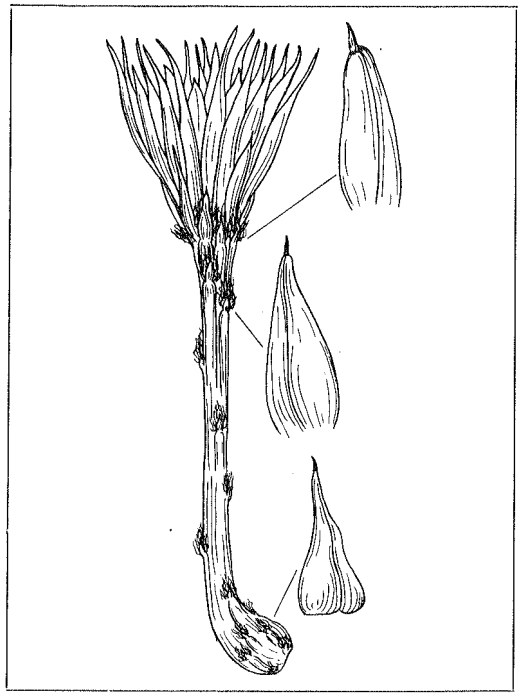
GC.

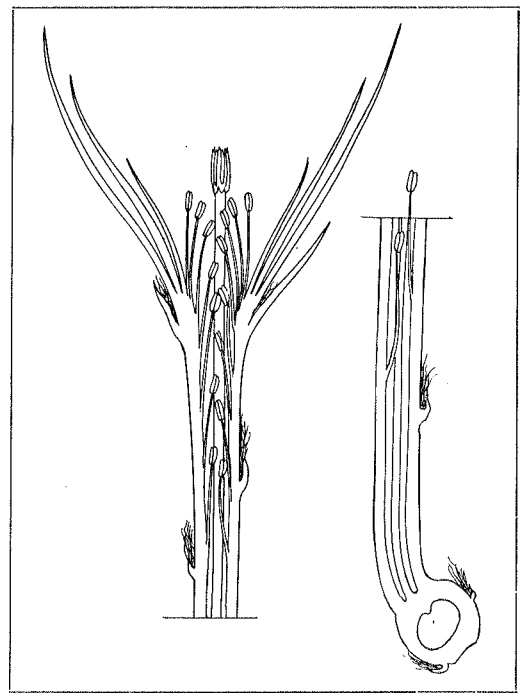


Pygmaeocereus
napina
areole x 4

GC.

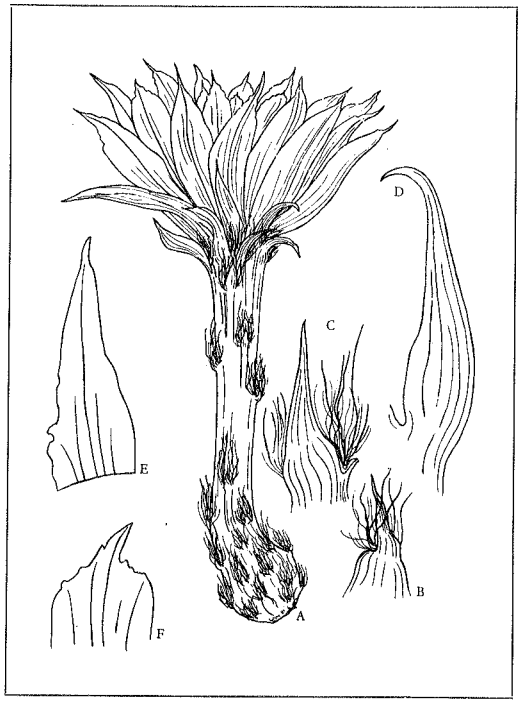
PYGMAEOCEREUS AKERSII Collection A.W. Craig

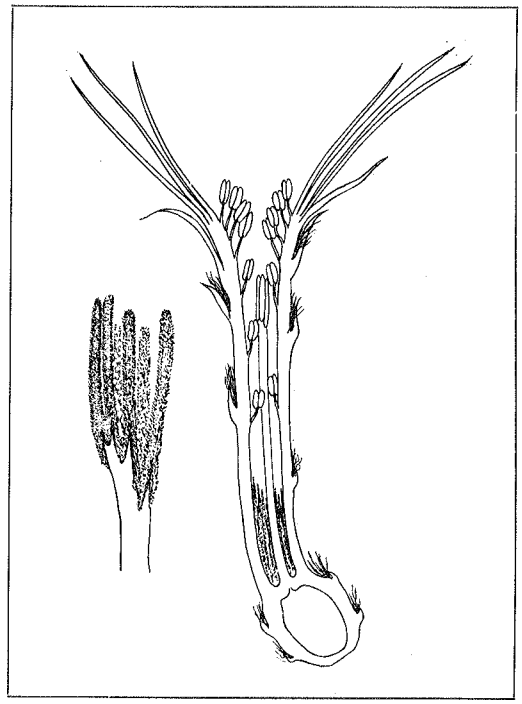




Arthrocereus microsphericus

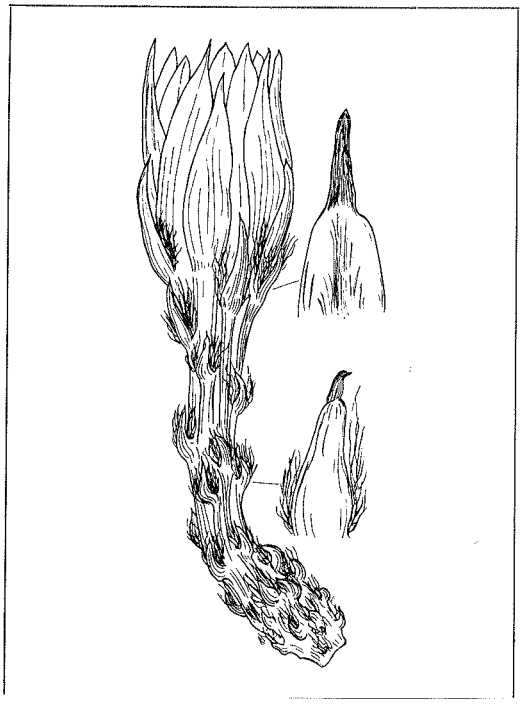
K.u.a. S
20 · 4 · 1969.

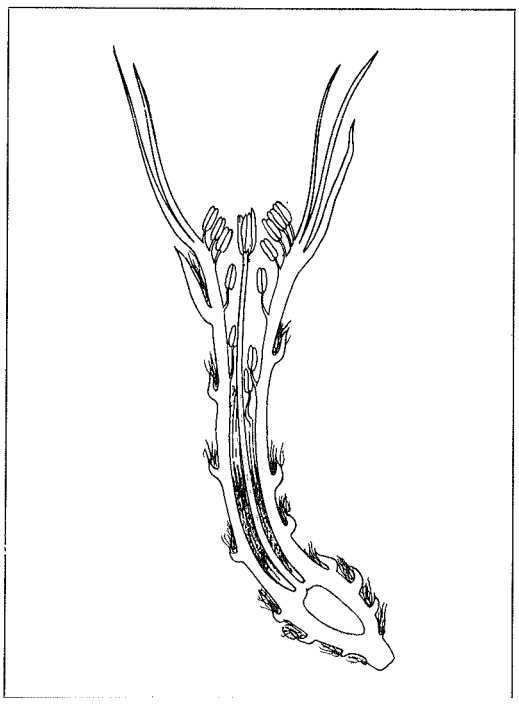




Pygmaeocereus vespertinus

K.u.a. S.
20 · 5 · 1969





Pygmaeocereus bylesianus

K.u.a.S
20 · 5 · 1969

Therefore we have the following new combinations for validly described species:-

Arthrocereus bylesianus (Bkbg.) Bux. comb. nov. Syn: Pygmaeocereus bylesianus in Nat. Cact. & Succ. Journ. 12, 86-87: 1957.

Arthrocereus rowleyanus (Backbg.) Bux. comb. nov. Syn: Pygmaeocereus rowleyanus, ibid.

Also the various nomina nuda species names must likewise come under Arthrocereus.

The only species of Setiechinopsis, S. mirabilis was described by Spegazzini as Echinopsis, since its solitary columnar form and its long tubed flowers had a resemblance to some smaller Echinopsis. Surely the specific name mirabilis expresses how badly it fits into that genus! Backeberg had already in 1938 erected a subgenus of its own and finally De Haas in 1940 raised it to generic status. W.T. Marshall united Setiechinopsis with Arthrocereus and thereby demonstrated a good eye for relationships. There is no doubt that it is very closely related indeed to Arthrocereus and there only remains the question of whether the union is justified and useful. The 11-12 cm long flowers which appear from near the crown of the plant are conspicuous, due to the length and thinness of the receptacle. Above a conspicuous stalk-zone (peduncle), which is also conspicuous in Arthrocereus subgenus Pygmaeocereus, the pericarp is hardly thickened at all, being long and narrow, elliptical. In the transition zone to the receptacle which is even somewhat more slender in contrast to Arthrocereus, is found a very long zone where the style is joined to the receptacle wall. In general the receptacle is exceptionally thin, only a few mm thick and up to near the throat, where it widens out somewhat, it is cylindrical.

Peduncle and pericarp are thickly, the receptacle more sparsely, covered with very narrow lanceolate scales which end in a bristle-like tip. Only on the peduncle is the bristle-like tip of the very small scales very short. The axils of the scales carry flocculent, whitish bunches of hair. Where the receptacle widens out, the scales widen out and the tip bristles are reduced so that they rather quickly change into the numerous still bristle-tipped outer - and these into the tapering narrowed inner - petals, which however still have a short bristle. When the flower is fully open at night the outer petals are somewhat reflexed, the inner ones more or less spreading straight out.

The form and distribution of the stamens is just as in Pygmaeocereus, but the style is so short that the stigma stands below the lowest stamens. Undoubtedly, this flower is a highly developed stage of the morphological type Arthrocereus. The reduction of the vegetative growth to a small unbranched column also speaks of a high stage of development. The form and arrangement of the stamens shows that Setiechinopsis is derived from the same main development branch as the species of the sub-genus Pygmaeocereus, of which only the two areas of distribution - South Peru and the East Andes of North Argentina - are left, so that the connection between them is lost.

Whereas, however, the Pygmaeocereus species do not overstep the limits of variation of Arthrocereus, Setiechinopsis has entered upon other ways of development and has become so far removed in habit and flower from the morphological basis of Arthrocereus that after thorough investigation of that entire branch of development it really seems to me that Marshall's union of Setiechinopsis with Arthrocereus, which earlier I had accepted, must be rejected and the genus Setiechinopsis retained. The complete classification of Arthrocereus will nevertheless only be cleared up when a flower from A. mello-barretoi can be examined.

COMMENTS ON THE ARTHROCEREUS GROUP

..... from G.H. Tegelburg, U.S.A.

I have a plant of P. densiaculeatus which is grafted on to a cereus stock. It flowered in September and October 1969. The plant flowers in the late evening, opening after dusk and remains open during the night. It closes at dawn and does not open again. The flower is approximately 2 inches wide when fully open and the tube is about 2 inches long. The stigma lobes are

cream colour and the anthers are pale yellow. The wool in the axils of the scales is white.

The spines of the plant are covered with white hairs that makes the plant look as if it were covered with frost.

..... from A.W. Craig

My plant of Pygmaeocereus akersii showed the first signs of bud at the beginning of August as a small patch of white wool at the top of one areole near the crown. This tuft did not show any appreciable increase in size until 10th September; it then developed quite quickly and opened around 7.00 to 8.00 p.m. on September 20th. The flower started fading at about 9.00 a.m. the following morning and by mid-day it was finished.

The flower was 4 cm diameter when fully opened, the inner petals were white, the outer with a brown mid-stripe, $2\frac{1}{2}$ cm long, 5 mm broad. The tube was 4 cm long, 5 mm dia., glossy brown with widely spaced small scales with wisps of white hair from the axils. The stigma was five lobed, greenish, and did not project beyond the stamens. The stamens were very short, yellow and confined to the very uppermost part of the flower tube.

..... from H. Middleditch

The flower of P. akersii described by Alan Craig was sectioned and the stamens found in a dense bunch at the top of the receptacle, just as shown in Buxbaum's sketches for this genus. The flower did not appear to possess a peduncle, putting it in this respect closer to Buxbaum's sketch of P. vespertinus than to his sketch of P. bylesianus. The plant itself, however, was entirely without the long central spines which can be seen in the illustration entitled P.akersii in Vol.II of Backeberg's Die Cactaceae, Tafel 99 and which are also referred to by Buxbaum. The plant in Alan Craig's collection named P. akersii appeared to be remarkably similar to Abb 1218 in Die Cactaceae; this plant illustrated by Backeberg appear to have the spreading brush of short spines where radials cannot be distinguished from centrals and all of a somewhat similar length, as shown in the sketch of one areole from the cultivated plant of akersii. Both the illustrated and the cultivated plants are off-setting freely from the base, the main stem remaining longer than the offsets whilst these are yet young. Backeberg describes his plant as P. bylesianus.

When we compare the sketches of the single areoles from the cultivated plants, it is clear that P. nycticaulis possesses a central spine markedly longer the remaining spines on the areole, a feature which literature would lead us to believe is characteristic of P. akersii.

Since the plants cultivated by Alan Craig originated from Kirkpatrick who is in contact with Johnson who originally marketed this genus, one is left wondering whether Backeberg's illustrations and descriptions might possibly be attributed to a name differing from that originally catalogued.

Alan Craig also has a 7 cm long rooted cutting of P. nycticaulis also ex-Kirkpatrick which is reputed to be tuberous rooted; the new root is indeed already thickening up. It appears that in addition to the two validly published species of Pygmaeocereus, this specific name appeared in the 1955 catalogue of Johnson's of California, without a valid description, together with P. akersii, vespertinus and napinus all of which now remain nomina nuda, and densiaculeata which was later validly described by Backeberg.

We have received a number of slides of P. densiaculeatus in flower kindly sent by G. Tegelburg and the two sketches of the flowers on this species by Mrs. G.Craig are done from these slides. The view looking into the flower shows the dense stand of short stamens at the top of the receptacle which would seem to be typical of this genus. The tube on this flower appeared to be distinctly stouter than that on the flower of P. akersii and this can also be seen by comparing the two sketches.

The sketches by Tom Lavender are of a plant in his collection and depict (at left) a single areole from this plant. The assymmetric disposition of the spines on the areole would appear to be fairly typical on this particular plant.

The flower cross sections are reproduced from the German Cactus Journal K.u.a.S., where they accompany the article dealing with Pygmaeocereus and Arthrocereus by F.Buxbaum, the latter part of which is reproduced above. In the sketch of P. vespertinus the annotated parts are as follows:- B.Pericarp scale; C – Receptacle scale; D - Uppermost scale; E - Tip of outer petal; F - Tip of inner petal. It is rather interesting to note the marked zygomorphy exhibited by each of the Arthrocereus and Pygmaeocereus flowers depicted in these sketches.

I find the information on the Setiechinopsis very interesting, having on one occasion attempted to take a flower photograph of this in the autumn dusk, standing over the camera, stop watch in hand, counting the seconds with the shutter open - sixteen second exposure if I remember correctly - wondering if the petals were moving just to spoil the shot and eventually receiving the slide which was not too bad. Like most collectors, I find that these plants seem to have a limited life span; after reaching something like 10 to 12 cm in height they seem to lose interest in continuing their existence and just pass away. It is interesting to note that Mhr. Buining describes A. rondonianus as 'usually grafted' - would S. mirabilis be less likely to pass away if grown as a graft?

..... from R. Moreton

I have several Pygmaeocereus but have never had one flower for me yet. Gordon Rowley told me on one occasion that one being named after him was the greatest non-event of the year. I also have Arthrocereus microsphericus which does very well when grafted but when on its own roots is hopeless. I only have Arthrocereus rondonianus on its own roots at present but it is just as bad, so I shall graft it next year. Neither of these have flowered for me either but at least A. microsphericus is a very interesting shape.

We have a few slides of P. akersii and of P. densiaculeatus in the slide library - A.W.C.

ARTHROCEREUS RONDIANUS* BACKEBERG & VOLL. by A.F.H. Buining.

(Translated by W.W. Atkinson from Succulenta 45. 10: 1966)

We have to thank O. Voll - horticulturalist at the Rio de Janeiro Botanical Gardens - that a number of cacti from the vastness of Brazil are known in Europe. The plants he found were sent with notes to Curt Backeberg, who, together with Voll, published the descriptions.

Amongst these plants was the cereus-like plant named in the title, described in 'Blatter fur Kakteenforschung 1935 - 4' and in the American 'Cactus & Succulent Journal' 1951, p.120, when the description was validated by a Latin diagnosis.

It occurs here and there in collections, usually grafted, and deserves attention.

If we leave 'Echinopsis mirabilis' out of consideration, the genus Arthrocereus occurs only in Brazil, and until now only in the state of Minas Gerais. The known species are all night bloomers and, with the exception of A. rondianus*, all the flowers are white. A. rondianus* makes a sparkling exception with its splendid, graceful pink-lilac coloured flowers. The colour is unbelievably beautiful.

For a photograph without artificial light, one must be on hand early in the morning, for the flower closes its magnificently coloured crown for good in the morning.

The fact that this plant comes from Central Brazil says enough about the temperature. It grows happily in crevices in the rocks near Diamantina at an altitude of about 700 m., so they can stand a good deal more than the cacti growing at around sea-level in that area.

Backeberg set up the sub-genus Cutakia for this species and E. mellobarretoi. The justification for this seems to me very weak.

We can look forward with interest to the publications of Ritter who crossed this district not so long ago.

Comments from H. Middleditch:

I do not have any Arthrocereus plants in my collection, but I note with interest that Mhr. Buining describes this plant as 'A. rondianus' whereas, in Backeberg's Kakteenlexikon, we find it given as 'A. rondonianus'.

*Comment by Editor:

The name is given in Backeberg's original description in B.f.K. 1935/4 as 'A. rondonianus'.

GRAFTING ON PERESKIOPSIS by W.J. RUYSCH

(Translated by W.A. Atkinson from Succulenta, May 1962).

Grafting of cacti is well known and very useful; we find in our collections nowadays many grafted plants.

By using various grafting stocks very good results can be achieved, and we get more enthusiasm for grafting as we can thereby build up a beautiful collection of rare plants and of plants which are difficult on their own roots.

One useful stock for seedlings is Pereskiopsis spathula, better known here as P.velutina, which is really another species. .This stock, which has been in use in our country for several years, was brought from Italy and is a great discovery in connection with seedling grafts. It grows strongly and can be multiplied rapidly by cuttings, so that in a short time we can have a large stock of grafting media.

The advantage of grafting on Pereskiopsis is that very small seedlings develop quickly into plants of a size that can be regrafted in the same summer onto a permanent stock.

Grafting onto Pereskiopsis is quite simple. When the stock plant reaches a height of about 3", it is cut off to about 2" with a razor blade. The seedling is likewise cut straight across and stuck onto its stock. For pressure one uses a strip of glass resting at the one end on the side of a wooden seedbox or something similar. After a few hours the glass can be removed. The offcut piece of Pereskiopsis is put into sharp sand where it quickly roots and can be used for another grafting in a few weeks' time.

Should the graft misfire, the seedling shrivels up completely, but if this doesn't happen, growth can be seen in a few weeks. The stock on an unsuccessful grafting can be used again immediately.

When the seedling begins to grow, offshoots will begin to appear in the leaf axils of the stock. These must always be removed to ensure that all the nourishment goes to the seedling. Apart from the fast growth of the seedling it is noticeable that plants which normally only offset after several years begin to do this after only a few weeks. These can be removed and grown on separately.

Weather conditions for grafting are also important. In sunny weather it is advisable to shade, or the small seedlings may dry out. I had best results in overcast conditions, when there was 100% success from the graftings, and this figure was not reached in sun. Of 320 graftings last summer only 15 misfired. The grafting period is from March to July, also a few in September, but these latter grow very little.

When the seedling is large enough to be regrafted it is cut off the Pereskiopsis. If a part of the plant is left on the stock offsets are produced which leads to a quick multiplication of rare plants. If the plant is wholly removed, the stock can be used again for growing cuttings.

Overwintering of stocks and grafted plants which have not been removed brings problems, as Pereskiopsis cannot cope with low temperatures. Minimum temperature should be about 15°C, and at this temperature the plants should be kept the whole winter on the moist side. In these conditions the plants retain their leaves, which is to their advantage and that of the grafted seedlings. If this temperature cannot be ensured in the winter, it is advisable to regraft as many plants as possible during the summer. To achieve this it is necessary to sow very early in the year, graft onto Pereskiopsis in May and regraft onto permanent stock in August. It is also very important to supply plenty of water in the summer, in fact daily watering, to avoid wilting.

So much for my own experiences with Pereskiopsis as grafting stock, and there are no doubt more possibilities that I have not yet discovered. I hope that many more amateurs will try this method. You can be assured of many surprises. I wish you all much success.

GRAFTING ON PERESKIOPSIS by W. STERK

(Translated by W.W. Atkinson from Succulenta, November 1968).

In the past few years this subject has been written on several times.

Those who have succeeded will not hear of any other method. And there are of course others who won't have anything to do with it.

The plant we use is Pereskiopsis spathula, though I am not certain if this is the correct name. According to Backeberg it should have paper-like sheaths to the spines like Opuntia tunicata, but I have never seen these on my Pereskiopsis. Backeberg says also that Pereskiosis velutina is suitable for grafting. This species is described as having long hairs in the areoles. I have a plant exhibiting this characteristic. It grows faster than the species used for grafting and is a little thicker, but I have not been so successful with grafting on it. Illustration 37 in Die Cactaceae Vol.I by Backeberg is certainly not this species, but the one we use as grafting stock. It wouldn't surprise me if the one we use as stock is a species not yet officially described. There doesn't appear to have been much cactus research of late in the southern states of Mexico, where Pereskiopsis is found.

Pereskiopsis must not be completely dried out, even in the winter. The soil must be rich, and the temperature can be allowed to drop to 10°C. With lower temperatures the plant loses its leaves and is more difficult to start into growth in the spring. A soil heating cable in the soil and regular moisture control can avoid this disadvantage.

Both the seedlings and the stocks must be growing strongly. The seedling must be cut across, just above the root. An advantage of grafting on Pereskiopsis is that the grafted plantlets often begin to offset very soon. Even species that usually only in later life, or never, offset, usually do so on Pereskiopsis. In this manner several grafted plantlets can be cultivated.

Grafting of cuttings on Pereskiopsis is usually, in my experience, not successful, and similarly Notocactus species do very badly, either not "taking" at all or else growing less than ungrafted plantlets. Mammillaria, Coryphantha, Escobaria, Lobivia, Echinocereus and many others do extremely well, however.

Certainly, it is necessary not to use seedlings which have grown too large. I find that the plantlets should not be greater than 3 to 5 mm. It is not necessary during the first or second year to regraft the plants.

I have had many plants in flower while grafted on Pereskiopsis. Roseocactus lloydii which is normally a very slow growing species is now in its fourth year grafted on the same stock. This year it developed a great deal of wool at the crown and I expected flowers. But they did not come. Yet another year to wait.

Pereskiopsis can also be of use to windowsill growers, indeed they are often easier to overwinter there than in a greenhouse.

NOTOCACTUS UEBELMANNIANUS sp. nov. by A.F.H. Buining

(Translated from K.u.a.S. for September 1968 by E.W. Bentley).

Plants flat, spherical, not - or rarely - offsetting, shining dark green, up to 17 cm diameter, up to 12 cm high, youngest areoles without spines, root fibrous.

Ribs: 12-16, up to $3\frac{1}{2}$ cm wide, round, fairly strongly humped, the round humps drawn out in chin-like fashion.

Areoles: up to 10 mm wide, up to 8 mm long, at first with a fair amount of whiter to dirty white wool, later bare, up to $2\frac{1}{2}$ cm apart, under the areoles a small transverse groove.

Spines: depending on the habitat, either on bare flat rocks or under bushes or large Hechtias: more or less adpressed against the body; about 6 radial spines of which one is up to 3 cm long, the longer spine pointing downwards and sometimes a few shorter ones from the top of the areole, whitish to whitish grey, not hard and prickly, of unequal length and often more erect or tangled with each other.

Flower: shining wine red in various tones, $4\frac{1}{2}$ to 5 cm wide (opened), $3\frac{1}{2}$ to $4\frac{1}{2}$ cm long (closed), short funnel shaped; pericarp round to longish, about 7 mm diam. with whitish to brownish wool and brown bristles in the axils of the lanceolate scales; receptacle clothed like the pericarp only mainly with browner wool.

Filaments: from directly above the small network at the base of the receptacle as far as the upper margin, up to 13 mm long, cream-yellow, leaning against the pistil and sealing off the nectar chamber and completely filling the flower tube above, anthers yellow below; nectar chamber somewhat diabolo shaped.

Pistil: 18-20 mm long, $1\frac{1}{4}$ mm diam., whitish to cream below, at the top sometimes going over to the colour of the perianth leaves, which are up to 2 cm long and 4 mm wide and running into a point.

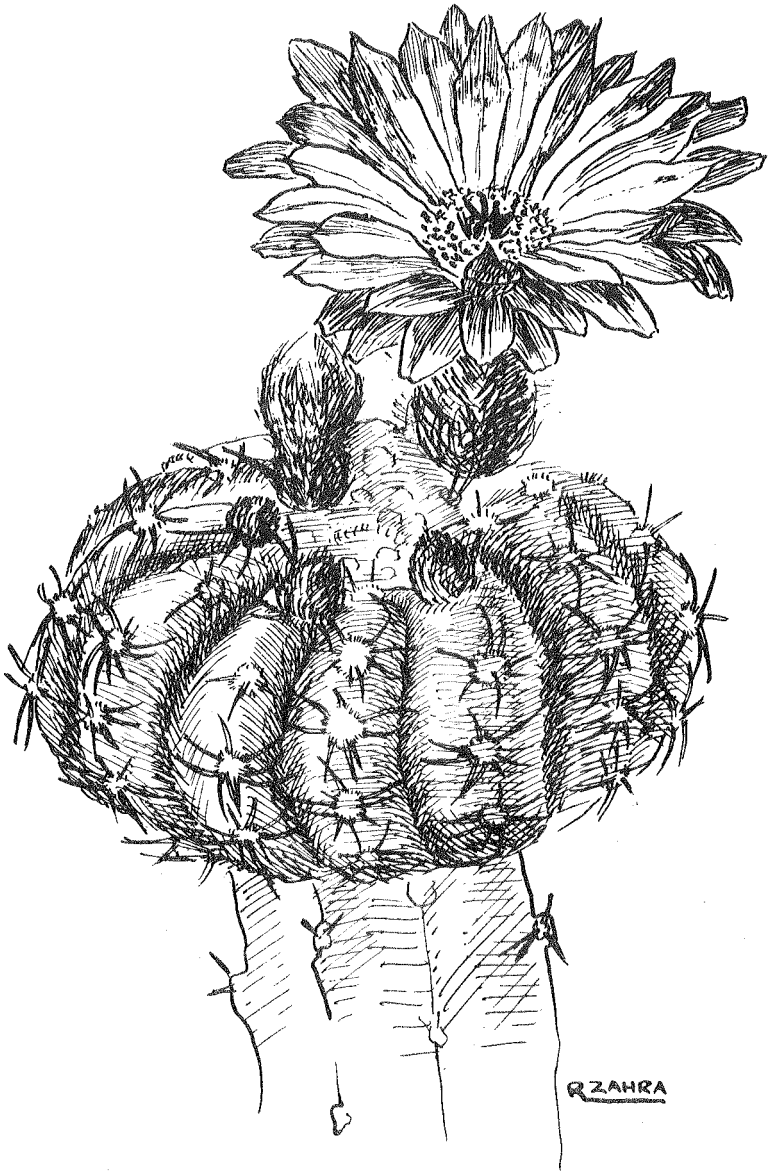
Fruit: at first strongly hairy and bristly, on ripening only hairy and bristly below, then becoming shining red, up to 1 cm high and up to $1\frac{1}{2}$ cm in diam., having a smooth red upper part with small pits in place of the areoles, flower remains persistent 6 mm diameter.

Seed: cap-like, fairly small, typical for the sub-genus Notocactus K. Sch. sensu Buxbaum and like those of Notocactus apricus, but the latter has much shorter flowers.

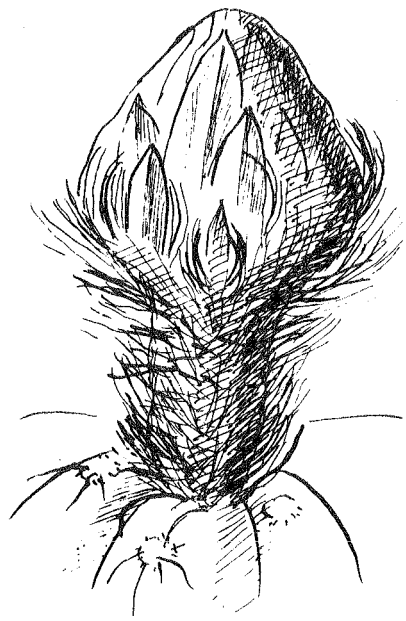
Habitat: Brazil, Rio Grande do Sul, near Cacapava, only found on one mountain peak; seed number HU 78.

This species was discovered by Herr L. Horst on the top of a fairly high isolated mountain in the vicinity of Cacapava. L.Horst and I visited the place in November 1966. There occurs there also a yellow flowering form (seed no. HU 81) that shows no difference in the body from the type. Only the fruit is not flat - rather spherical, the seed is somewhat larger and the flower yellow - I might classify the plant as Notocactus uebelmannianus Buining form flaviflorus Buining: (Latin diagnosis then follows). We came to the conclusion that about 85% of the plants flowered red and about 15% yellow.

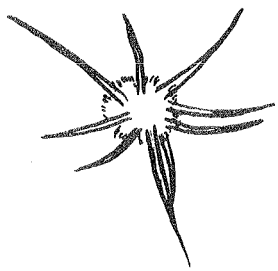
The holotype is deposited in the herbarium of the Botanic Institute of the University of Utrecht.



Fruit
x 2½



Bud
x2½



Areole
x 4

NOTOCACTUS UEBELMANNIANUS - Collection R. Zahra

Some comments on Notocactus uebelmannianus

There are two other Notocacti which - at first sight - appear to be little different from Notocactus uebelmannianus and these are N. crassigibbus and N. arachnites. Chileans No.7 p.13 carried illustrations of both these species, together with a few notes, upon which further comments were made in Chileans No.8 pp.8-11.

A N.crassigibbus seen in the collection of A.W.Craig earlier this year had some gingery brown wool where the buds were forming. It was rather extraordinary to see that this bud wool was formed into an almost square shape and surrounded by a white margin of normal white areole wool. The largest bud would be about 4 mm square, yet this gingery brown wool scarcely projected above the level of the areole at this stage.

The new spines on this plant were very dark brown for most of their length and a bright red - a slightly orangy red - at the base; the spines of N. arachnites were of similar colour and likewise stood upright away from the body when new, the older spines being adpressed. On this species, however, the buds had a covering of dark brown wool; they were also distinctly pointed and projected well above the areole when only 3 mm dia., facing slightly inward over the crown.

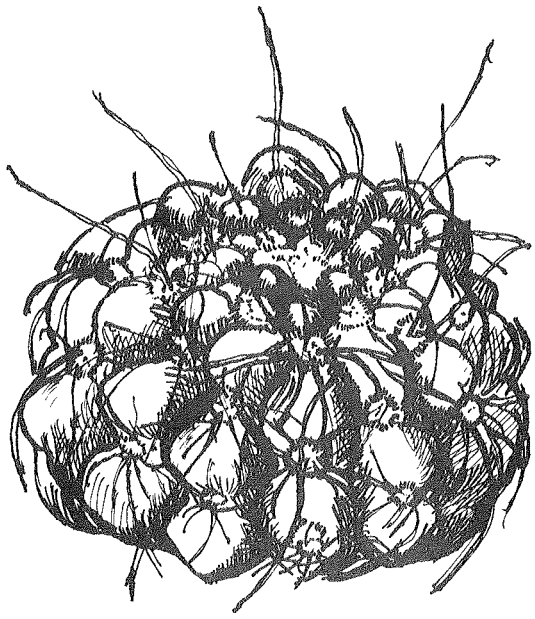
Alan Craig observed that just before the buds opened, the tube on the flower of arachnites was 1.5 cm high and that on crassigibbus was 2.5 cm high.

At an autumn get-together of Chileans members in North-east England, one of each of these plants was examined and the following descriptions made of the plants tabled there:-

N. arachnites. Ribs 12, separated by straight, well-incised, grooves; ribs divided into chins, not very prominent. Radial spines 6 or 7 (rarely 8) 10-15 mm long, usually three to each side and one shorter one (rarely two shorter ones) downwards. Central spines, one up to 18 mm long adpressed over lowermost spine or spines and occasionally one upper central up to 10 mm long. All spines adpressed, overlapping, and twisting. Areoles 5 mm broad, 4 mm high, white felt covering lost on older areoles. The new spines are auburn, later the tips go grey and later still all spines become greyish white. Crown slightly depressed with growing point obscured by creamy brown wool. (This feature may also be observed in the accompanying sketch from E.W. Barnes). Mature buds carry grey wool and dark brown bristles. Slide of plant in flower showed markedly short flower tube, petals commencing from almost immediately above pericarp.

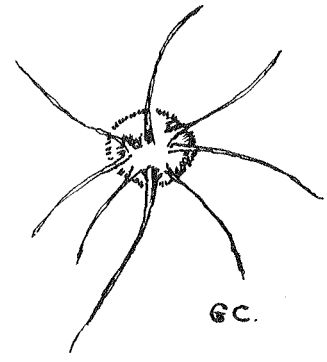
N. crassigibbus. Ribs 12 separated by distinct grooves; ribs divided into prominent chins, well rounded, these being visible in the crown which is slightly depressed and carries less wool over the growing point than the arachnites. Radial spines 6-8, up to 18 mm long, distributed three each side of the areole with shorter spines pointing one upwards, one downwards. Centrals one or two, up to 25 mm long. All spines at first erect, orange-pink in colour at root with black tip, later becoming brown and finally grey. Areoles located in depressions between chins, 5 mm broad and 3 to 4 mm high, white felt being lost on older areoles. Spines all become adpressed at shoulder of plant. From a slide of the plant in flower the pale grey wool and reddish brown bristles were round a much more distinct, taller, pericarp and tube which was about 20 mm high.

Ken Halstead comments on this group of plants "that although in my experience sketches can be misleading, unless my eyes deceive me I can detect in the sketch of N. uebelmannianus one or two erect young spines at the top. If it was not for the small size of both flower and spines this plant closely resembles the one sent to me by Uhlig under the title of crassigibbus. My crassigibbus is bare of spines and wool for about 15 mm out from the growing point and when they do appear the spines are more or less adpressed to the plant with the odd one or two slightly erect, more or less as shown in the sketch. This plant produced four enormous pale lemon flowers which eventually reached 9 cm across. The buds were gingery in colour and quite flat at first and somewhat rectangular but during the development the buds showed deep red through the brown wool giving the impression that the flowers would also be red. Yellow flowers were finally produced towards the top side of the plant, in contrast to arachnites which produces

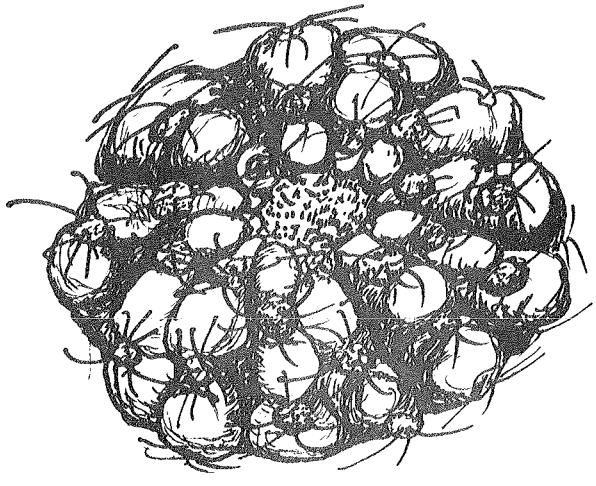


Bud
x 1½

Areole
x 1½



NOTOCACTUS CRASSIGIBBUS - Collection A.W. Craig



NOTOCACTUS ARACHNITES
Collection - E.W.Barnes

NOTOCACTUS CRASSIGIBBUS
Collection - E.W.Barnes

them at the centre.

"I have a plant received from Clive Innes labelled N. uebelmannianus which bloomed for the first time this year, the flower colour being almost satiny white. The flower was much smaller than that on crassigibbus, 6 cm only. I feel that these gymnocalycioid types are as variable as ottonis to which they are closely related, if not an aberrant form of such. Therefore, where does arachnites begin and crassigibbus leave off, and uebelmannianus begin and arachnites leave off, etc. The important question is, which is crassigibbus, arachnites and uebelmannianus?"

The flower reported here for uebelmannianus, the diagnosis by Buining, and the sketch by R. Zahra, would all appear to be in conformity in regard to flower size, viz: about 5 cm maximum diameter.

The flower size reported for crassigibbus is confirmed by E.W. Maddams who describes his flowers as "about $2\frac{1}{2}$ inches in diameter" and also by E.W. Bentley.

On the matter of rib count, D.Angus comments 'Last autumn I received a batch of these plants from De Herdt, three of each species. A rib count of these plants and of my existing collected specimens ex-Uebelmann yielded the following:

	Ex - De Herdt.	Ex- Uebelmann
arachnites	12, 11, 13	14
crassigibbus	12, 16, 15	10 (4 cm dia.)
uebelmannianus	13, 16, 15	12

whilst from A.J. Worral we hear that 'I have a plant of N. crassigibbus with 13 ribs which has an offset having 8 ribs'.

These two observations, together with those previously made regarding rib count on these three species, would seem to dispose finally of the possibility of attaching any importance whatsoever to rib count when it comes to naming these three species. It would seem that the question posed above by K. Halstead is perhaps answered by the following:

arachnites: short, stout flower tube.

crassigibbus: flower tube longer than arachnites, flower large, up to 9 cm in diameter.

uebelmannianus: flower tube longer than arachnites, flower relatively small, about 5 cm in diameter.

H.M.

We have slides of N. crassigibbus and N. arachnites in the slide library - A.W.C.

THIS YEAR'S FLOWERS AT LINZ reported by Dr.A. Bayr, President, G.O.K.

(Translated by K.Wood-Allun from November 1969 G.O.K. Newsletter).

At our October meeting Herr Schatzl, curator of the Linz Botanical Gardens gave a lecture illustrated with slides titled "Plants that have bloomed this year in the cactus collection at the gardens". I must qualify the title by saying that he dealt with a selection only of the most interesting plants, especially recent acquisitions whose flowers are little known or not at all known. This year the cacti bloomed extraordinarily well.

Herr Schatzl began with the Notocacti whose number has much increased in recent years through new discoveries. N.allosiphon, which was sent from Uruguay under the field number R 372 by Walter Rausch, is closely related to N. mammulosus. No differences could be observed in seed from the two. N. mammulosus which also comes from Uruguay, is a strongly

variable species with a large number of forms. N. spec. HU 24, distributed by SU-KA-FLOR only under the field number, is N. mueller-melchersii. This species is strongly represented in the Linz collection and has many forms, amongst which are var. longispinus and var. gracilispinus and also comes from Uruguay. N. werdermannianus R 376 from Uruguay flowered very well this year and a great deal of seed was obtained. Rausch named his collection number R 376 N. werdermannianus v. brunispinus. N. spec. R 375, collected by Walter Rausch in Uruguay came into the collection as a variety of N. werdermannianus but whether it really belongs to N.werdermannianus is debatable. N.concinnus, collected by Rausch under the field number R 348 with its large yellow flowers and typical lilac red stigma, corresponds to other plants of this species which were earlier offered by Uhlig as N.joadii and N. caespitosus. N. fuscus HU 29 tends towards N. werdermannianus both in its flower and its fruit. Unfortunately, however, seed was not obtained. N. muricatus Berger from S. Brazil is still an uncertain species. One can find vastly differing plants under this name in collections. N. ottonis venclusianus is a great rarity. Herr Schatzl obtained one plant from Czechoslovakia where the few available plants of this species are jealously guarded and viewed almost as national holy relics. With its red flower this species is a jewel amongst the Notocacti. N. minimus Fric et Kreuzinger, a small and cereoid growing Notocactus was collected under the field number R 364 by Rausch in Uruguay and delivered as N. caespitosus. Close to the former in habitat and flower is N.tenuicylindricus HU 34. Country of origin is unknown. N. tenuicylindricus differs from the latter through its seed (shape and testa and the colour of the basal part of the seed are different). The plant throws offsets from the neck of the root. A beautiful red flowering plant was obtained from Uhlig as N. spec. N.horstii HU 17 flowered well this year and produced much seed.

The genus Wigginsia, originally Malacocarpus, has been demoted by some authors to Notocactus, subgenus Malacocarpus, since the name had already been used earlier and had therefore to be changed. I will not venture an opinion on whether it is sensible, and above all practical, to make what is a clearly different genus into a subgenus of Notocactus. Wigginsia macrocantha is very different to the other species of the genus with its remarkably strong spination. It was sent from Uruguay under R 369 by Rausch (W.sessiliflora). W.longispina was obtained from Uhlig and is apparently a good species. Herr Rausch sent W. arechavaletai R 351 from Uruguay. W.kovaricii (Fric) Berger, a species already known for quite some time, may well also come from Uruguay. Herr Rausch also sent plants under W.spec. which require closer examination and description.

Amongst the miniature cacti are the Frailias. F.horstii HU 13 seems to be a good species. F.pumila was sent by Rausch from Uruguay under R 368. Plants of Acanthocalycium glaucum Ritter are available in Linz. The plant was described by Friedrich Ritter in Taxon 1964 and the collection includes import plants and plants grown from Ritter's seed. They come from Argentina (Belem-Catamarca). A very rare and interesting plant is Parodia subterranea Ritter (R 309, described in 'Succulenta' 1964). It has a large tap root and in the resting period the body almost disappears underground, hence the name. It was discovered near Camargo-Culpina in the Chuquisaca Department. There is a longspined and a shortspined form.

From Jujuy comes a Lobivia spec. which has two forms: The pure white flowered form is said to be Pseudolobivia longispina and according to Rausch the yellowish to reddish flowered form is L.hastifera. Under the provisional name L.spinosissima the Botanical Gardens received from Frau Muhr from Argentina (La Quiaca) a heavily spined and striking plant. A plant obtained years ago as L. larae is very striking with its splendid lilac red flowers. Meanwhile it has emerged that this plant is in fact Pseudolobivia toralapana Backbg. which, according to Backeberg, belongs to the group of forms around Pseudolob. carmineoflora. The flowers of this species are extraordinarily beautiful. Pseudolob. rojasii Backbg. was raised from seed from H. Winter; it comes from Samaipata in Bolivia. Plants of Echinopsis comarapana raised from seed sown at the same time as the former have not yet flowered. As the name suggests, Pseudolob. calorubra has a beautiful red flower. The seed was obtained from H. Winter and was collected by Friedrich Ritter near San Isidor in Bolivia in the Province of Comarapa. Pseudolob. calochlora K. Schum. is striking with its lively green body. The plant comes from Brazil (Corumba) and came with Dr. Simo's collection to Linz. This fairly old plant offsets freely. Trichocereus purpureopilosus

Wgt. from Argentina is very pretty with its spines which are carmine basally and its carmine petals. The bodies are semi procumbent to upright, up to 35 cm tall and 15 cm in diameter. A plant from high up in the mountains, coming from La Paz at 3000 m is Lobivia charazanensis Card. which according to Rausch is not an independent species but L. maximiliana var. charazanensis. L.caineana Card. raised from seed collected by Ritter, flowered for the first time this year. It comes from Bolivia (Rio Caine) and grows to 20 cm high. L.acanthophlegma Backbg. was obtained from Uhlig. It grows at 2000 m in Bolivia. The plant was first described by Backeberg as a Pseudolobivia. According to Rausch it belongs to the circle of forms of L. cinnabarina (Lob. cinnabarina var. acanthophlegma). From Central Peru comes Lob. wrightiana Backbg. distinguished by its enormously long spines. In the Linz collection is a plant of Lob. rubescens Backbg. from N. Argentina (Quebr. de Humahuaca). According to Rausch it is Lob. marsonerii var. iridescens. From Frau Winter comes a Lob. schieliana Backbg., apparently a variety of the latter. The plant offsets freely but seems to be unwilling to flower. Lob. arachnacantha Buining et Ritter and Lob. torrecillasensis are highly recommended on account of the beautiful yellow flowers in the one case and red flowers in the other and the beautiful body with its regular spines. Both come from Bolivia. Under the field number R 186 Rausch sent Lob. arachnacantha var. densiseta Rausch from Bolivia (Samaipata, Valle Grande-Vera Cruz).

Amongst the most interesting discoveries of recent years are the small uncommonly charmingly flowering Sulcorebutias. The Linz Botanical Gardens already have a collection of this genus with many species, but the collection is still being built up. From amongst the plants in the collection Herr Schatzl was able to show slides of the following species in flower: Sulcoreb. totorensis (S. steinbachii v. totorensis), S. tiraquensis var. electracantha Backbg., S. lepida Ritter. These three species come from the Cochabamba region in Bolivia. They are mostly considered as varieties of S. steinbachii. In the same way S. tunariensis Backbg. and S. canigueralii Backbg. are considered as varieties of S. verticillacantha. S. steinbachii v. gracilior Backbg. is most charming with its black spines, dark body and its beautiful red flowers. From the Province of Comarapa in Bolivia comes S. weingartiana. According to Rausch it should be S. krahnii. S.candiae Backbg. from Cochabamba in Bolivia may be a variety of S. arenacea. From the same region comes S. brachyantha (R 198), presumably identical with S. breviflora. Lob.euanthema R 214 was discovered by Rausch in Quebrada de Humahuaca in Argentina. Backeberg included it in Mediolobivia. A pretty plant is the white flowered Aylostera albiflora Backbg. from Tarija in Bolivia. The bodies are small, roundish and freely offsetting. Ritter and Buining included it in Rebutia, as indeed the whole genus of Aylostera has been by numerous authors, although it is completely distinguishable from Rebutia. A valuable discovery is Gymnocalycium denudatum v. pentacanthum, offered by Uglig. The flowers are creamy white, relatively large and which appear in abundance. The seed is very different from G. denudatum, very much smaller and of a different shape. G. ragonesii R 224, discovered by Rausch in Cruz del Eje in Argentina, belongs to the circle of the very variable G. asterium. G. famatimensis R 126 was collected by Rausch near Famatima in La Rioja Province. Herr Rausch was fortunate in the discovery of an amazing white flowered G. baldianum. He sent it under R 141 from the Sierra Velasco in Argentina. The seed is identical with that of G. baldianum, the flowers are white instead of red. Frau Muhr sent a G.baldianum from Argentina under B 80 which was somewhat different from what we would have expected. Under R 133 Herr Rausch sent a G. schickendantzii from Patquia in Argentina that differed from the usual plants of this species especially because the flowers, instead of appearing from the side areoles, emerge more from the crown. A G.spec. B 21, also sent by Frau Muhr, could not be identified.

Herr Schatzl was able to show the following Chileans in flower: Neochilenia chilensis and Neochil. dimorpha Backbg., as well as a Neochil. spec. K.61 from Uhlig. Especially charming were slides of Oroya peruviana gibbosa (Plants and seed from Ritter) well covered in flowers and buds. This species, which is not normally too willing to flower, flowered well in Linz this year, better in fact than it has ever done.

Since the Tillandsias are also accommodated in the cactus house in Linz with many examples, it was not surprising that Herr Schatzl showed us three 'bonus' slides of the most beautiful Tillandsias in flower. Tillandsia funckiana from Venuzuela, Till. xiphoides from Argentina and Till. cacticola which in habitat grows on cacti, and is to be found in Peru and Bolivia.

PARODIA - GROUPING BY SEED CHARACTERS by D.J. Lewis.

During the last twenty years the number of Parodia species has risen steadily from about twenty eight species quoted by Borg in 1945 to about one hundred and thirty according to Backeberg. This number is made up of eighty-seven described species, thirty eight varieties and possibly fourteen more species as yet to be validly described and named.

Due to this large influx of new species and the possibility of even more plants being found in the near future, the need to group the genus becomes more obvious. It is not a question of lumping or splitting genera, but simply of making the pattern of species grouping clearer to the cactophile for whom these plants are being collected.

It is clear through examination of the seed and some plants that a number of the species are closely related, but what actually determines a species, variety, or just form, is the privilege of the botanical collector and their opinions can differ widely.

The seed groups listed below are those given by Dr. Krainz in his periodical 'Die Kakteen'. Instead of calling the group around P. microsperma the 'Parodia group', as Dr. Krainz does because it contains the type species, I have used the word Microspermae which I hope will make the basic divisions clearer to understand.

Family Parodia

Group Microspermae	Section	- Microspermae
		- Microspermae variants.
Group Protoparodia	Section	- Macranthae
		- Oblongispermae
		- Brachyspermae
Group Obtextosperma	Section	- Obtextospermae

The section of Parodia that would be in question is that with the Neo-notocactus seed types, from South Brazil.

Microspermae. The type species of the genus Parodia - P. microsperma - is contained within this section. All the seeds are minute and usually have a light reddish brown testa coat which is shiny, showing little if any cellular undulation. The testa cap varies in width and length as the first line of the illustrations show.

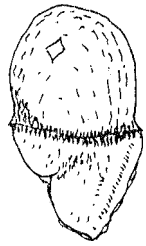
The strophiole or hilum appendage also varies, but as this tends to vary from one seed to another, an average seed needs to be chosen to represent the species drawn. The strophiole colour is creamy white and its texture spongy.

The Microspermae group contains the largest number of Parodia species.

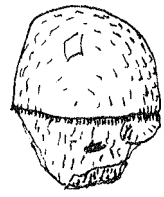
Microspermae variants. A few seeds were found to be sufficiently different from Microspermae to be classed as variants, whilst the majority of characters differentiated the seed from the next group, the Protoparodia.

These seeds have a shiny red brown testa with slight cell definition. The testa shape is different, being larger with a constriction prior to the basal hilum. The strophiole is more angular and keeled than microspermae and has trends towards the next group. Protoparodia.

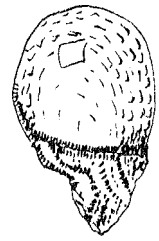
Parodia sanagasta V. thionantha.



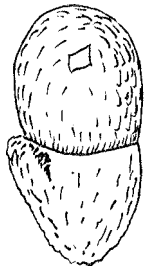
Parodia applanta.



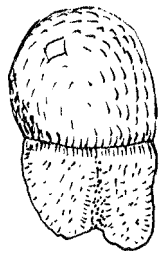
Parodia microsperma.



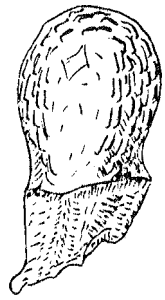
Parodia purpureo-aurea.



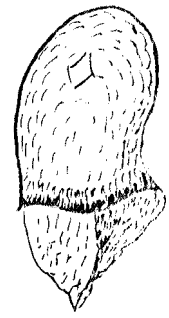
Parodia cardenasii.



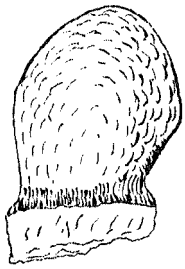
Parodia nivosa V. cruci-albicentra.



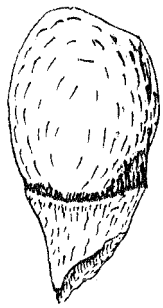
Parodia penicillata.



Parodia penicillata V. nivosa.

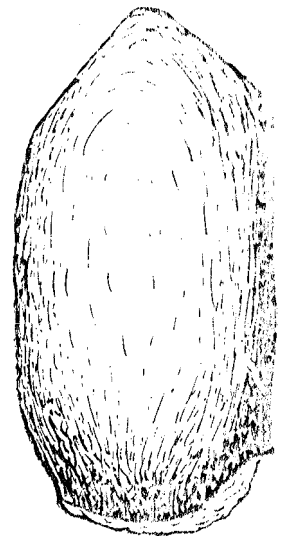


Parodia St. pieana.



Parodia faustiana.

Parodia compressa.



Parodia comarapana.

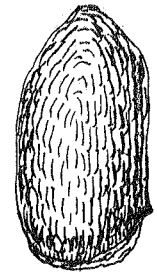
Scale

PARODIA SEED

Parodia
St. piena .

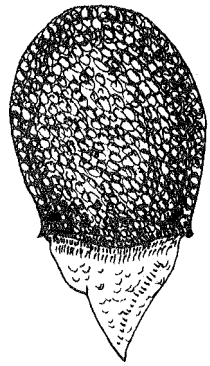
Parodia
faustiana.

Parodia
compressa.

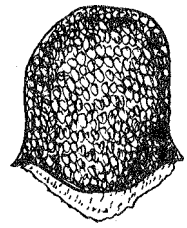


Parodia
comarapana.

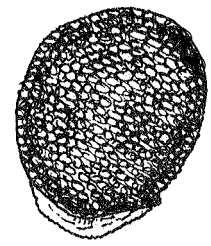
Parodia
chrysacanthion.



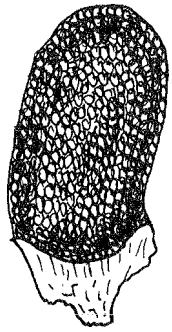
Parodia
rubida



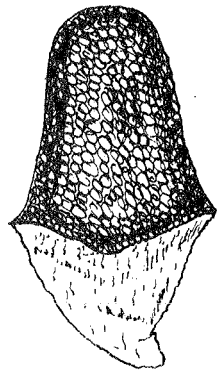
Parodia
gracilis .



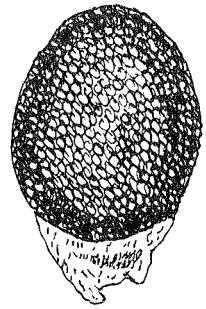
Parodia
ayopayana .



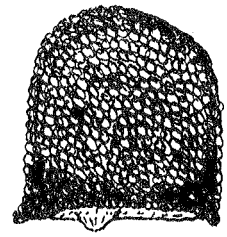
Parodia
otuyensis .



Parodia
multicostata.



Parodia
maasii .



Parodia
beunekeri .

Protoparodia. This appears to be the second largest group, with Parodia maasii as type species. Due to the wide variation in seed characters, the group is divided into three sections: Macranthae, Oblongispermae, and Brachyspermae.

Among the Protoparodia there are a few seeds that have a reddish-brown to brown testa coat and the cell pattern is not so well defined as in the sections below. These seed might be said to be just on the Protoparodia side of the dividing line between this group and Microspermae.

Macranthae. The type species of this section is P. maasii. The seed is much larger than microspermae, the testa being black, shiny, and composed of large rounded cells. The testa shape is usually oval with the hilum appendage keeled and often pointed. The strophiole colour is yellowish white to white. This thin keel-like (i.e. flat-sided) strophiole is placed in side view in all illustrations and forms a fairly constant character in Protoparodia.

Oblongispermae. As the name suggests, the seed in this section have long testa caps and resemble seed of Rebutia in length. The seed is usually slightly bent. The strophiole is medium to long and off-white. The cells of the testa in the case of P. comarapana are dark shiny brown and oblong and the hilum is basal with a heel extending over one edge of the testa case. Examples of this group: P.otuyensis, tuberculata.

Brachyspermae. The smaller seed of the Protoparodia group fall into this section. There is little strophiole and the testa helmet may or may not have a lip at each side. The hilum forms a narrow basal elipse with the small keeled strophiole.

Obtextospermae. This group contains few species whose seed is almost round having a dull black pitted cellular testa. Only a small amount of strophiole is evident on the elliptical basal hilum. The testa case has an arillus covering, light brown in colour. This group includes P. ayopayana and var. elata (FR.746a).

Neo-Notocactus. A number of so-called Parodias have been described which come from South Brazil. All of them seem to have seed more akin to the neo-notocactus group of Notocactus. The seed is fairly large for Parodia and the testa helmet has large black shiny cells. The hilum is large, oval and without any strophiole. There is a small cone like extension around the funiculus opening. The micropyle is usually sunken and clearly visible.

Of the seed examined the following do not match up with accepted Parodia seed characteristics: P.alacriportana, brasiliensis, brevihamata, buenekeri.

Geographical distribution of seed groups.

By plotting the group species on a map it has been possible to observe some pattern. The main centre for the hooked type of microspermae is around Salta in Northern Argentina. Microspermae types with straight spines are more widely spread, reaching northwards into Tarija and Chuquisaca Departments of South Bolivia.

The microspermae variants are found in Jujuy and South of Salta.

In the Protoparodia group, the Macranthae are mainly concentrated in the Chuquisaca and Tarija regions of Bolivia.

The Obtextospermae species are found in the La Paz region of Northern Bolivia at the north end of the Parodia habitat. The Oblongispermae group is located in central Bolivia around Cochabamba.

Comments from H. Middleditch.

I found reading the articles on the subject of Parodia seed by D.J.Lewis and W.De Cocker most interesting when read separately and decidedly stimulating when read in conjunction with each other, especially so when placed alongside the study carried out on some species of Parodia seed by Prof. F. Buxbaum which appeared in the Krainz-Buxbaum 'Die

Kakteen'.

It may be noted that Buxbaum refers to about twenty species of seed, Cocker to some thirty two species - and one presumes that this represents the number of seed species which they examined, whilst Lewis examined some 120 different species and varieties of Parodia seed.

In commenting upon these separate studies it will be most convenient to use the accompanying sketches by D. Lewis as reference. One is immediately struck by the sketch of the buenekeri seed as a quite typical Notocactus seed - Chileans No.11 p.43 sketch 2 will offer a comparison - and provides confirmation, if any were still needed, that the so-called Brazilian Parodia are indeed Notocactus.

The sketch of P. nivosa v. cruci-albicentra illustrates the twin-cone strophiole described and illustrated by De Cocker as typical for this group, which includes P. chrysacanthion - yet the sketch by D. Lewis of the seed of chrysacanthion shows no sign of this feature - indeed it looks somewhat reminiscent of the Protoparodia seed. Has one of the authors received seed wrongly named?

Now if we turn for a moment to the series of articles currently being presented in these pages upon Gymnocalycium seed groups, one should bear in mind that information has been built up over the course of more than thirty years, seed specimens from many different plants having been studied by several collectors and views and opinions exchanged. The comments offered on those groups by G. J. Swales are based not only on seeds of most of the known species of Gymnocalycium, but on several samples of seeds of each species from different sources. On numerous occasions, seed has been received which is clearly incorrectly labelled.

In consequence, it is hardly surprising that one can find some discrepancy between the reported observations of different collectors working independently on Parodia seed, especially since that used by D. Lewis originated very largely from a single source. There would seem to be great scope here for scrutinising further examples of seed and correlating the sections with morphological features of body, spine and flower. We should naturally be delighted to hear from any readers who may be able to offer five or six seeds for study purposes, especially from imported plants.

We come now to an intriguing question of terminology, which has already been discussed with D. J. Lewis and G. J. Swales without coming to any firm conclusion - this relates to the hilum appendage or strophiole as it is called by Buxbaum and by De Cocker, whilst the term aril or arillus is used by Weskamp and by Schutz. The original terminology of Schutz is used in the summary of Gymno seed groups which appeared in the N.C.S.S. Journal for December 1969, whereas that terminology is revised in the comprehensive articles appearing in these pages. It is worth examining this matter a little more closely.

We must start by reverting to the seed when it is ripening in the flower ovary, where it is attached to the inner wall of the ovary by a slim stalk or funicle. This funicle usually dries up when the seed is ripe and breaks off cleanly from the seed at the junction of the hilum and the testa.

We find Buxbaum in his 'Morphology of Cacti' referring to the strophiole as the corky or spongy mass over the hilum, which is presumably formed from that part of the funicle remaining attached to the seed which has failed to break off at the hilum. There appears to be an inference that the thickened hilum margin found in the Trichomosemineae group of Gymnocalycium, in some Notocacti, and in other seeds, does not constitute a strophiole. Only by inference through this and other works does one assume that the strophiole, being an additional feature, covers up the true hilum and also the micropylar and funicular openings.

When we turn to the arillus, D. Lewis quotes from the R.H.S. Dictionary of Gardening "Aril, Arillus. An extra covering of the seed outside the testa, developed in a cup like fashion usually from the top of the stalk of the seed, rarely from the micropyle. An aril for instance is seen in the seed of Taxus (Yew) and Euonymus, where it forms a scarlet coating, and in the Nutmeg where it forms a branched red growth around the seed - and in a large number of other

seeds. In seeds of many Euphorbiaceae e.g. the castor oil bean, and in some Leguminosae, the aril is small and hard, instead of fleshy as it usually is, and is then called a caruncle. In some instances, e.g. in willows and in asclepias, the aril takes the form of a tuft of hairs, developed in the willow from the funicle and in Asclepias from the micropyle. An arillus developed from the micropyle is sometimes called an arilode."

Several botanical reference books illustrate the various forms of aril, usually growing out from the funicle near its junction with the ripening seed, in the form of wings or a cape clothing a part or the whole of the seed. When this dries up it will form the arillus layer over the seed.

Thus it would appear that the arillus layer is formed from an extra growth out of the funicle enveloping the seed, whilst the strophiole is the dried up remnant of the upper part of the funicle.

(Please note that the two pages of seed sketches are to different scales and that the line 'Parodia st. piena to Parodia comarapana' has been repeated for reference purposes. Ed.)

THE GENUS PARODIA by W. De Cocker.

(Translated from Dodonaeus No.2 1968 by H. Middleditch).

When amateurs, rather diffidently, start to interest themselves in botanical systematics and try to understand the subdivisions and submit them to a critical examination, they always run up against the same problem: for an established species or genus, which are the most important characteristics and which are those that can be considered as supplementary?

It does not seem that there is the slightest conformity of outlook on this subject or that the botanists (or pseudo-botanists) could ever arrive at some measure of agreement. Their ideas are so divergent that what one considers as a determining feature is judged as totally insignificant by another, according to their highly subjective conceptions of the criteria for classification and for the elaborate systems each of them have.

And that goes on to such an extent in regard to cacti that many scientists consider this family as a hopeless case .....

It must be admitted that our tendency to wish everything divided up and listed is only un-natural and has not the least effect on nature and its evolution. All systematics are only an artificial means intended to guide us in putting a little order into the labyrinth of species, varieties, and forms, to give a name to our plants.

Friedrich Ritter who has passed the greater part of his life in the natural habitat of our cacti, tries to erect a formal and rational system by discarding established notions but the problem is difficult and the task considerable (Taxon).

We amateurs consider that what we can accept in one instance as an important character should be equally acceptable in all other cases. That is why I have attempted the study of seeds since everyone agrees more and more about their importance: I am also inspired by this since I saw, some years ago, the 'Seminicotheque' set up by Mr. Krainz at the Municipal Succulent Collection at Zurich.

In the course of the conversation which I had with Mr. Krainz, the discussion very quickly came round to talking about the study of seeds as a means of identification of cacti. Each of us were convinced that this constituted, with the study of the flowers and the fruits, one of the few more or less formal criteria in contradistinction to others much more variable such as the habit, the spines, etc. ..... which are subject during the whole of the life of the plant to the influences of the habitat which results in inevitable variations. It is sufficient, for example, that one plant grows in the shade of a bush or in the cleft of rocks where it only receives two or three hours sunshine a day, for it to differ markedly from the same plant standing on a bare plateau. One understands therefore that one can only accord relative

importance to their being a spine or a rib more or less.

On the contrary, the flowers, the fruits and the seeds remain most of the year enclosed in the body of the plant and are only exposed to external influences during a brief period of time.

For the most part amongst ourselves, cactophiles are amateurs since they may only devote their leisure time which is left to them by their occupation and by domestic commitments. It should therefore be especially interesting if they can spend the weekends and the long winter months studying in detail the flowers, seeds and fruits which they have preserved.

There are already numerous occasions on which I have sought a means of preservation for the flowers which does not change their colour or their form - but in vain, whilst for seeds this is very easy. It is sufficient to preserve them between two mounts (glass wafers used in microscopy 76 x 26 mm) between which one sandwiches a wafer of the same dimension of thin cardboard or better still of perspex punctured with a round hole in the centre and intended to allow for the height of the seeds, which one may then examine at leisure, with a magnifying glass or with a microscope, without having to extract them. It is easy to handle and to file and that only needs very little room.

It is appropriate also to note that when one owns only a single self-sterile plant, one may cross pollinate it to obtain seeds in all respects similar to the seeds of the true species and which are entirely acceptable as study material, for their appearance and their morphology are unchanged. The seed is, in effect, quite an intrinsic part of the mother-plant: it is only the embryo which it contains which may, after germination, produce a different plant.

It was at Zurich this idea came to me that I might also establish a collection with a stock of seeds on a reduced scale, and which would contain the seeds from the plants which interested me most - Parodias ! I therefore attempted a study of this genus in respect of its seeds.

If my collection is far from being complete, I believe meanwhile I can already pass on the first results of my observations. To be sure it cannot be a matter of study by the naked eye; for the minute seeds of most of the Parodias it is absolutely essential to have a microscope available - preferably a stereoscopic microscope of slight enlargement (from 10 to 100 times).

I started with those species known longest and the important types.

Already at the end of the last century, Weber considered these seeds quite firmly as a specific character and to describe a new Echinocactus, he called it Echinocactus microspermus and allied it to a group of echinocactus with very fine seeds. It is this E. microspermus which was chosen by Spegazzini as the type plant of a new genus Parodia which he established in 1923 (in honour of Doctor Parodi, who was one of the first to list the flora of Paraguay). Fric likewise considered this characteristic as fundamental when he proposed to rename the genus 'Hickenia' Britton and Rose, 'Microsperma', which could not be accepted on account of the precedence since 1919 of a group of asclepidaciae. Later on, there was transferred to the genus Parodia, then just established:

E. microspermus v. macrancistrus K. Sch.
E. chrysacanthion K. Sch.
E. erythranthus Speg. 1905.

which thus formed a homogeneous enough genus which collected together those plants with very small seeds, with the exception, however, of E. chrysacanthion to which we will return ere long.

When one examines these minute seeds, one discovers that they are formed of two major parts - the seed proper, quite globular with a shiny testa, more often yellow-brown to red-brown and of a diameter of some tenths of a mm; the second part is the strophiole, which covers up the hilum and is formed in an irregular shape and nearly as voluminous if not sometimes larger than the seed and of a texture resembling cork or sponge.

This strophiole only exists in some genera, each one quite distinct and which have not any kind of relationship such as, for example: Blossfeldia, Aztekium, Strombocactus, as well as some Mammillaria for which there has already been established new genera (Krainzia and

Phellosperma).

Turning now to the particular case of Parodia chrysacanthion which produces seed just as small as P. microsperma, but sufficiently different to be able to suppose that it is a question of a distinct species; the seed is no longer globular but more elongated, in the shape of an egg or club, slightly recurved near the hilum. The testa is equally shiny but incised with deep longitudinal furrows. The strophiole has a most unusual form: the micropyle and funicular openings are extended by a sort of small tube which runs right through the strophiole which is slightly elongated into a cone around these tubes, the whole taking the form of a molar tooth of which the roots are the aforementioned extensions.

It is necessary to add also that P. chrysacanthion similarly differs in its morphology in that it possesses thin straight spines in comparison with P. microsperma which is always furnished with small, thin, hooked spines.

In 1929, Berger transferred Echinocactus maasii - Heese 1907 - to the genus Parodia, but, on examining it, one establishes that the seeds are many times larger and totally different in structure. One can best compare them to a slightly stretched raspberry, oviform or like a cap, studded with round protuberances, black or very deep red. They likewise have a strophiole but much more insignificant. Length $\pm$ 1 mm.

Everything in this seed differs in so many ways from that of P. microsperma that it cannot, in my humble opinion, be attached to the same genera. It must also be granted that the plant itself has likewise a totally different appearance: the spines are hooked, much stronger and fewer in number; the flower is campanulate instead of having a funnel shape and its flower tube is very short.

Indeed it is not enough to examine the seeds of Parodia to form a formal opinion on the subject of the genus as a whole, for one must study plenty of other plants of other genera, to scrutinise them for lines of association before proposing eventually the establishment of a new genus (for which one would consider, for example, Parodia chrysacanthion). Besides, up to now I have not yet discovered such lineage to any other South American species.

Up to 1930, the number of Parodia was very limited when, quite rapidly, at the end of his expeditions, Backeberg in his publication "Blatter fur Kakteenforschung" brought into being a complete series of descriptions of new species, so many with seeds of the 'microsperma' type whilst others were larger, of the 'maasii' type, until it was interrupted by the outbreak of the 1940-1945 war.

It was again Backeberg who, after the end of hostilities, put everything in turmoil in publishing with Voll a new species of Parodia originating from Brazil (if one does not take into consideration P. brasiliensis, unknown and doubtful, which was described by Spegazzini). This plant of Backeberg's originated from the province of Rio Grande do Sul, close to Porto Allegre, which explains its name: P.alacriportana. If the systematics of Parodia were already a debatable matter, it was only made more so after this last acquisition which possessed seed which were neither the type microsperma nor the type maasii, but which surprisingly resembled those of another well-known genus: Notocactus.

These seeds are in the shape of a helmet, black and shiny, warty and having absolutely no strophiole. As I also owned a good number of Notocactus, I therefore proceeded without difficulty to make comparisons which resulted in coming to the conclusion that they were identical to those of the Notocactus group "setacei" of Fric.

In comparing this P. alacriportana to the Notocactus of the group setacei, one likewise found other similarities and observed:

- the crowns of these plants around the growing point are pretty well spineless.
- the flower buds appear in a circle around the growing point.
- the flowering period occurs at the same time of the year, that is to say, in my conditions of cultivation, one to two months later than the majority of Parodias.

All these aspects therefore supported this viewpoint that this supposed Parodia alacriportana was a Notocactus.

Originating from this same Brazilian province of Rio Grande do Sul, Haage described in 1956 another supposed Parodia - P. brevihamata with short spines, black and hooked and, more recently still (in 1962) Buining described P. buneckeri with long elastic spines, fine and whitish. The examination of their seeds and considerations of the same order as those above, leads me to think that these are similarly two plants typical of the genus Notocactus.

Horst has, in the course of recent years, truly passed a fine comb through all this province of Rio Grande do Sul and, in the light of the information which he has brought back, we can at present form a much more realistic opinion on the subject of these outstandingly variable plants. It was not so long ago that I had an opportunity to see at Uhlig's the whole of an important batch of these supposed Brazilian Parodias, collected by Buenecker; they were of a very wide diversity and, in examining this batch closely, one could find all the transitional forms and, with the exception of the three species which have already been discussed above, it is impracticable to delimit another group of plants. Without difficulty one could fall into a groove which is only too well known, one could publish a good fifty pseudo-varieties or species .....

To be continued

A NEW PARODIA by Walter Weskamp.

(Translated by K. Prugar from Swiat Kaktusow (Polant) May-June 1967).

In the spring of 1965 I received from H. Fechser, a well known Argentine collector of cacti, a number of Parodias, which according to him belonged to P. scopaoides. When I compared them with other plants of the Parodia family, I came to the conclusion that they looked more like P. atroviridis Backebg, but they differ in their spines, if in nothing else. For the first time in the Parodia family was seen the interesting fact, that the radial spines are of two colours; upper spines are red-brown, lower white. I sent a few plants to a friend of mine F.A. Brandt of Paderborn for his observations. When the plants began to bloom in red, we were convinced that they were a new type of cactus. Due to the two-coloured side spines, we call this species Parodia dichroacantha Brdt & Wesk.

The body is hemi-spherical when young, later columnar and dark green. The crown is slightly depressed, covered with white wool. It has 13 spiral ribs; the tubercles growing on the ribs are first rounded but later become rhomboidal. The areoles have the white felt with a slightly reddish tint, which later falls out: the distance between areoles being about 8 mm. Number of spines 9 to 10, radially disposed, erect and 7 to 10 mm long. Upper spines (4 to 5) are brown-red and stronger than the (5) white lower ones. The single central spine is brown-red, hooked and about 13 mm long. The flower is about 60 mm in diameter, grows at the crown of the body. The petals are about 30 mm long, 4 to 5 mm wide, spade shaped, pointed and bright red; down the middle of the outside runs a pale purple stripe. The flower receptacle is covered with grey-white wool and a few black bristles. The stamens are white, the filaments yellow gold at the bottom, bright red at the top; the style is about 13 mm long coloured cream to red; the stigma has ten cream-white lobes 7 mm long. The fruit is wide rather than long, about 6 mm in diameter, golden yellow and completely hidden in white wool. The seeds are very small, about $\frac{1}{4}$ mm long, round or oval. The testa is smooth, shiny, brown, with a large pale yellow strophiole, which is hemi-spherical or in the form of a truncated cone. Under the magnifying glass the testa shows sectors with slight pimples.

Habitat. North Argentina, slightly north of the dividing line Tucuman and Salta Provinces; found sometimes in the rocky depressions, mostly on red soil at an altitude of 1,000 m. Found by H. Fechser. Type specimen and flower were deposited in the Botanical Museum of Berlin-Dahlem. Classification in accordance with the new system of Buxbaum; subtype of Parodia Speg.

Common features of all the specimens we possess is a dark green body, always 13 ribs and

also rhomboidal tubercles. Spines vary in their length. Sometimes the upper set of coloured side spines can have a whitish base.

As M. Fechser wrote to me, P. dichroacantha grows in very dry territory. I grow these plants in the greenhouse and in the summer I water them well. From the end of September until the beginning of March they hibernate completely dry in a temperature range of 5 - 10°C. They grow well on their own roots and there is no need for grafting.

Comments from H. Middleditch.

In the original article the author used the word 'arillus' to describe the hilum appendage - this has been altered to strophiole in accordance with the comments following the preceding article.

WALTER RAUSCH - by Walter Rausch.

(Translated by E.W. Bentley from the G.O.K. Newsletter for March 1968)

As a result of many requests from home and abroad I feel obliged to introduce myself. I have been interested in cacti since 1951 and since 1954 more especially with Lobivias and Rebutias. The collection of plants, offsets or seeds of these genera from European collections and gardens soon exhausted itself and I therefore added to my study material through imports of the collectors Vatter, Fechser, Cardenas, Zehnder and Hoffmann and this soon evoked the wish to travel myself in the homeland of these plants. Before this however business, family and special financial problems had to be settled.

It was not until December '62 that I could start my first expedition. I went with my friend Hans Borth to Salta via Buenos Aires, equipped with two mopeds. Unfortunately my companion had to give up on health grounds after two months. He couldn't stand heights. So I collected alone for 5 months from Salta via Tarija, Potosi and Sucre to Cochabamba.

Whoever has once lived in these endless high plateaus is drawn back there again next time. It was in December '64 with my friend Ernst Markus. On this expedition we were without vehicles and collected in Argentina from Cordoba northwards to the border, and in Bolivia from Santa Cruz through Cochabamba to La Paz and Lake Titicaca and from there back through Oruro and Tupiza. We were 10 months on the way and then I was a further two months alone in Salta and Chaco.

The more one works in these high valleys and on the peaks the more one realises that one knows so little. In December 1967 I started my third expedition. This time I had teamed up with the Dutch cactus collector D.J. Van Vliet. We spent a whole month travelling in Argentina with the collector H. Fechser. Next we collected for two months in Argentina (Salta and Jujuy), then a month in Bolivia (Cochabamba and Sucre). There my companion found the height too much and he had to go lower. He went back to Buenos Aires and collected alone in the south as far as Rio Negro and I spent two more months in Bolivia. We met again in Buenos Aires and went to Montevideo, bought ourselves two bicycles - in Uruguay the mountains are not so high - and pedalled over 2000 Km in 3 months.

Many are interested in the financing of such an undertaking. That is quite simple. Instead of buying a small car one can go on a year long expedition. Certainly with the capital that a VW represents no fine hotels can be had. One overnights with the teacher in the school, at the black-smith's or with the police (the cells are mostly free), or one sleeps behind a rock, because there is nothing else.

Generally one proceeds as follows:- one enters a village, circles round once to size up the surroundings and decides right away: "I'll go there, or there". Into the rucksack go air mattress, sleeping bag, pullover, some cakes and water - room must be still left for cacti -

and away we go. After two or three days one comes back with a powerful hunger and some cacti - or maybe nothing. One does not become rich from this hobby. If one wants to do that, better stay in Europe.

From the leaves of my diary I observe that as a cactus hunter I have done over 4000 Km, mostly on foot in roadless areas. I have been in over 100 Lovibia localities, over 40 Sulcorebutia localities and have collected Rebutia and Mediolobivia in about 50 places - and there are still white patches on my map.

And so I have been able to get a good look at the forms - rich in many areas - at many forms that in the literature appear as species and at the relationship of individual form-groups. It may perhaps seem paradoxical both that this or that name can be identified as a synonym and also that one makes new names oneself. Such a classification is always somewhat subjective and the various interpretations are ever the 'dynamics' of our hobby.

GYMNOCALYCIUM - of the GROUP MICROSEMINEAE FRIC - 1 by Dr. B. Schutz.

(Translated by K.Wood-Allun from Friciana Nr. 16/1963).

When Kreuzinger's Revision' was published in 1936 there were only ten species of Gymnocalycium known which were included in the Microsemineae group. Their number has increased considerably since that time. Last year I had 36 species names and that is by no means all of them. Also included in this group are G. horridispinum, recently described by Frank and other new discoveries which have not yet been described e.g. U 81, C.S.Fer., U 67 sp. Tolomban, U 140 sp. Famatima, U 148 sp. Angolaya and perhaps others too. We therefore already know over 40 species in the group which is more than half of all known species of the genus. The approx. 40 remaining species are divided between the other four seed groups.

There is a great deal of variation amongst the members of the Microsemineae group. The species differ from each other by numerous characteristics. These differences are often so significant that one may speak of direct opposites. Thus, except for small seeds and naked buds, sigelianum and saglionis have scarcely anything in common. Hardly anyone would consider valnicekianum and spegazzinii to be closely related. I have said that the one characteristic which is common to all these plants is small seed, or more precisely seed which is smaller than 1 mm. But you would be mistaken to think that these seeds are all alike. One can establish significant differences of shape and colour even with the naked eye; with the help of a magnifying glass one can see the differences even better and they become much clearer again when viewed through a 25x microscope. In order to be able to form a definite opinion it would be necessary to study the greatest possible number of seeds. This work could not be carried to its ultimate conclusion since there are not sufficient numbers of seeds of all the species available. Descriptions of seeds used to be very superficial if indeed they were described at all. A collection of seed of all available Gymnos is now being made in Brno by the well-known specialist Zdenek Andrejs. Experience so far has shown that the small seeds can be subdivided into six subgroups.

Before we move on to the description of the seeds we must familiarise ourselves with some fundamental morphological concepts. Seeds are somewhat complicated organisms. Botanists distinguish different structures in them which are described in technical terms. For our purposes we need confine ourselves only to three of these: testa, hilum, and arillus. The testa is the hard shell of the seed and this can take different forms. It can be, for example, smooth or more or less warty. Often hollows may be observed in it. Often it is shiny, sometimes slightly so and sometimes matt. The colour can vary. The hilum forms a sort of scar in the testa. It can be observed in different positions on the surface of the seed and its shape can vary - sometimes it is circular, sometimes elliptical and sometimes long and narrow.

The hilum margin (incorrectly defined by the author as 'arillus' and corrected throughout this article - H.M.) is a corky growth round the hilum. In some seeds it is not developed, in

others on the other hand it is very pronounced. Usually it is a fairly noticeable structure. It is the view of many botanists that the presence of the hilum margin represents a high level of development.

In order for us to be able to reach a correct judgement, it is important that the seeds should be completely ripe. Otherwise bits of the fruit may be adhering to them which form a film which masks the true colour or shine of the testa. With small seeds we cannot rely on observations with the naked eye. Seeds which appear black at first sight often turn out to be brown when viewed under the magnifying glass. Similarly matt seeds often turn out under magnification to be shiny or half shiny.

As I have already indicated, the seeds of the Microsemineae group can be divided into six sub-groups and these are as follows:-

1. (Section 1. will appear under Ovatisemineae; see Chileans No.13 p.144 - H.M.)

2. Seed smaller than 0.5 mm, somewhat elongated, rounded at one end. Testa slightly warty, dark brown (under the glass - with the naked eye they are black) matt. Hilum obliquely cut off at the lower end, somewhat compressed and therefore narrow. Hilum margin light coloured, prominent and surrounding the hilum completely. Hybopleura and Multiflora have seeds of this type.

3. Seed smaller than 0.5 mm, occasionally the same size as in 2. above. Moderately elongated, rounded at one end, somewhat constricted at the other. Testa slightly warty but less so than in 2. above, jet black and matt. Hilum margin mostly very prominent, light coloured, protruding above the constricted testa. Mazanensia have seeds of this type.

4. Seeds generally of the same size as 2. and 3. above, considerably flattened. Testa coarser, rough and shiny (but only under magnification) brown. Hilum oblique to the perpendicular axis of the seed, viewed from the side it is somewhat wavy, oval in shape. The hilum margin forms a light coloured collar round the hilum. This type of seed is produced by G. spegazinii (= loricatum). I had no seed of G. cardenasianum to hand.

5. Seed fine, smaller than groups 2, 3 and 4. Flat and rounded, testa brown, very slightly shiny and under magnification slight hollows may be observed. Hilum depressed along its length, very small and narrow. Hilum margin only very slightly protruding, light coloured. As far as I was able to ascertain the Saglionia have seeds of this type.

6. Ultrafine seeds similar to a fine powder, like Parodia microsperma. Uhlig's imported seed of U 167 sp. Tolomban looks like this. At the present time it is not known what the plants look like. It must be established whether in fact we have a case of the collector making a mistake or getting his seed mixed up and whether these are in fact Gymno seeds at all.

The individual types of seed correspond therefore to the subgroups. They also correspond to the place where the plants were discovered since each species subgroup grows in particular areas. Hybopleura grows in Cordoba, Multiflora and Mazanensia in Catamarca, Saglionia and Loricata in northern Argentina and southern Bolivia, and so on. The individual relationships are characterised by further striking features which make their composition possible and also provide clear distinguishing features between the species contained in each subgroup.

In the following diagnoses we will concentrate primarily on body size and the various differences in the flower. Attention will also be given to pronounced variations in spination.

(Calochlora - this will appear with a future article on Ovatisemineae - H.M.)

Hybopleura. The plants of this subgroup are fairly big; they reach 15 cm in diameter or even more. They are robust looking, tall - even though they are mostly hemispherical - sometimes they become columnar with age. Generally they do not offset, except for G. valnicekianum. The flowers are up to 10 cm. in dia., white to fresh pink or salmon. The throat is often dark red, sometimes greenish. G. oenanthemum and rubriflorum are red. The flowers emerge from the crown, have a short tube and open wide. The seeds are described in 2. above. They grow throughout Cordoba, except that G. curvispinum was discovered in

Catamarca, G. oenanthemum in Mendoza and there is no mention of the place of discovery of G. nigriareolatum.

Multiflora. G. multiflorum is 10-15 cm in diameter, flattened, fresh green and has whitish to amber spines. The flowers are of medium size, white to pink. Seed as in Type 2. above. Grows in Cordoba and San Luis. It was not possible to establish whether G. monvillei also belongs to this group since no authentic seed was available.

Loricata. The body of these plants in our collections is decidedly spherical to slightly elongated. Mature plants have a diameter of 12-16 cm. The ribs are not pronounced, the grooves are very shallow. Spines are relatively long and lie close to the body. This tends to accentuate the spherical body. Flowers c. 6 cm long and wide. Seed is Type 4. above. Habitat Salta and southern Bolivia.

Mazanensia. These are plants of medium size, c 10 cm. in diameter. Body spherical with pronounced ribs. Epidermis mostly dark green, sometimes ashen black and sometimes with a touch of pink, often appearing to be covered in frost, dust or mould. Flowers rather small, c. 4 cm. in diameter, from dirty white through pink to dark pink. Seed of Type 3 above. Habitat of all species in this group are the mountain slopes and valleys of Catamarca province.

Saglionia. The largest representative of the genus Gymnocalycium belong to this group. Saglionis is such a well-known species that it is not necessary to give a thorough description. The flower is almost tubeless, broad, campanulate and is vastly different to the flowers of the other species. The seeds belong to Type 5 above. The habitat is northern Argentina and southern Bolivia. Except for G. saglionis and also G. pflanzii and zegarrae we only know the remaining Bolivian species from descriptions and are not therefore in a position to judge their relationship.

After this short description of the individual subgroups and the establishment of their existence it is necessary to deal with the species which are included in each circle. I do not believe that it is necessary to elucidate the precise diagnosis since the plants are mostly described and illustrated in contemporary literature. The purpose of the further information as set out below will be to take a critical look at many opinions and to draw attention to the various inaccuracies and errors which have occurred in some books. A study of these plants has again revealed that many sources are not sufficiently reliable and that it is always necessary to check the correctness of the information against the original description since often it turns out to have been changed, either deliberately or through negligence. This results in a situation where confusion arises amongst cactophiles not only in this country but all over the world.

The following article, translated from Friciana for 1968 by E.W. Bentley, is abstracted from a later survey of this genus by Dr. Schutz. The incorrect use of the word "arillus" in the original has been corrected here also.

GYMNOCALYCIUM SUBGENUS MICROSEMINEUM

Plants of varying size. Ripe fruits burst not only vertically but in some species of the Section Saglionia also horizontally, whereby the upper part of the fruit lifts off. Seeds small, diameter less than 1 mm.

Type species: Gymnocalycium saglionis (Cels.) Br. & R.

Above half of all Gymnocalyciums belong to the subgenus. One can divide it into five sections:

Saglionia sect. nova
Hybopleura " "
Calochlora " "
Loricata " "
Mazanensia " "

Section Saglionia are eventually large plants up to over half a meter in diam., forming extensive clumps. Fruits burst vertically, but horizontally in certain species (Gymn. pflanzii (Vpl) Werd., Gymn. marquesii Backbg.) so that the upper part of the fruit lifts off upwards. Seeds very small, in some species fine as dust, even to 0.1 mm diam.

Type species: Gymn. saglionis (Cels.) Br. & R.

Section Hybopleura are hemispherical plants, often branching in old age, of a diam. of 15 cm and more, with large flowers. Fruit splits vertically. Seeds up to 0.5 mm diameter - somewhat elongated, testa dark brown (seen under a magnifying glass it seems rather to be black), matt. Hilum at right angles to the long axis of the seed, narrow. Hilum margin surrounds hilum and is light, prominent.

Type species: Gymn. hybopleurum (K.Sch.) Backbg.

Section Calochlora - (notes deleted as this should appear under Ovatisemineae - H.M.)

Section Loricata: plants globose or globose-cylindrical. Cultivated plants often somewhat elongated. Seeds smaller than 0.5 mm in diam. They are flattened. Testa coarsely humped, smooth (only under magnification) brown. Hilum oblique to the long axis, oval, gently vaulted. Hilum margin little developed, forming only a light thickening around the hilum.

Type species: Gymn. spegazzinii Br. & R.

Section Mazanensis are medium-sized cacti up to 15 cm diam. They do not tend to offset, are of spherical appearance. Flowers are rather smaller, ca. 4 cm diam. Fruits split vertically. Seeds less than 0.5 mm in diam., somewhat elongated, rounded at one end, at the other somewhat narrowed. Testa black, matt or, however, smooth, exceptionally brown. Hilum at right angles to the long axis of the seed, narrow. Hilum margin surrounds hilum and is more or less prominent, light.

Type species: Gymn. hossei (Hge.jr.) Berg.

Note: In most species in this section the seeds are black and matt. Gymn. castellanosii has black and shining seeds, at least the imported plants that are distributed as such on the basis of Backeberg's determination. The original plants, that were grown from Backeberg's seeds, possess a matt seed surface. Sp. Chep. V (perhaps G. glaucum?) also has a black shiny testa. Gymn. chiquitanum has black as well as brown shiny testa. This species still needs studying basically.

Species list for subgroup Microsemineum:-

Saglionia

G. saglionis. (Cels.) Br. & R.
pflanzii (Vpl.) Werd.
zegarrae Card.
marquesii Card.
lagunillasense Card.

G. millaresii Card.
izozogsii Card.
chuquisacanum Card.
riograndense Card.
eytianum Card.

Hybopleura

G. hybopleurum (K.Sch.) Bkbg.
kurtzianum (Gurke) Br. & R.
mostii (Gurke) Br. & R.
grandiflorum Bkbg.
valnicekianum Jajo
bicolor Schutz
oenanthemum Bkbg.
rubriflorum hort.
multiflorum (Hook.) Br. & R.

G. brachyanthum (Gurke) Br. & R.
monvillei (Lem.) Br. & R.
horridispinum Frank
pugionacanthum Bkbg.
Sp. FR 430 de Cordoba
Sp. FR 433 de Cordoba
Sp. Quico hort.
Sp. A.R. hort.

Loricata

G. spegazinii Br. & R.
cardenasianum Ritt.
bayerianum Till.

G. C.S. Fer. hort.
U 167 spec. Talomban hort.

Mazanensia

G. hossei (Hge. jnr.) Berg.
weissianum Bkbg.
mazanense Bkbg.
nidulans Bkbg.
guanchinense Schutz.
castellanosii Bkbg.
chiquitanum Card.
curvispinum Fric.

G. nigriareolatum Bkbg.
Sp. Chep. V hort. (glaucum?)
U 140 de famatima
U 148 sp. Angolaya
sp. Desp I-11
sp. Pir
sp. Guasayan
sp a. A.R.

GYMNOCALYCIUM OF THE MICROSEMINEAE GROUP.

Comments on the foregoing articles from H. Middleditch.

It is of interest to remember that this approach to the classification of Gymnocalycium originates from the work done by Fric in 1935. The basic framework established at that time by Fric consisted of five seed groups; these groups were reviewed in The Chileans No.12 p.94 and the five basic types of seed form were illustrated there.

A rather more detailed examination of each group of seeds was subsequently carried out by Dr. Schutz working in Brno, very largely with material originating from the Fric expeditions. This work in turn was reviewed by Till and Bayr and that review will be found in The Chileans No.13 p.143 et seq.

The material used by Till for reference will be largely that in his own collection of which almost half consists of Gymnocalycium, together with consultation over specimens in the Linz Gardens. Bayr, in his position as President of the Austrian Cactus Society and Director of the Linz Botanic Gardens, would not only have the material in the Linz Gardens but also ready access to other Botanic and private collections of note, for reference.

It will thus be seen that the material used by Till and Bayr came from a fair cross section of sources whereas Schutz was restricted to material from almost one source only. It is perhaps surprising, in these circumstances, that there is such conformity of view on classification of this genus, almost the only point at issue arising within the Microsemineae group. Dr. Schutz includes the section Calochlora in with the other Microsemineae, whereas Till and Bayr place it in Ovatisemineae. I understand that Bozsing, at Salzburg, who also specialises in Gymnocalycium, agrees with Till and Bayr in this respect.

..... from Dr. B. Schutz.

The seeds of the plants belonging to the section Calochlora are rather larger than the remainder of the Microsemineum. They are similar in size to the seeds of the subgenus Ovatisemineum but these latter are coated or partially coated with a brown cover. You may well ask, why are Calochlora not logically under Ovatisemineum. The reason is that Calochlora forms a group which in many respects is very different from G. gibbosum, baldianum, etc. Indeed plants of the Calochlora group are nearer to G. kurtzianum, mostii, etc.

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

It would appear that Dr. Schutz justifies his inclusion of the section Calochlora in the Microsemineae on the basis of plant bodies, distribution, flowers, etc together with the fact

that the aril (or arillus layer) is absent. This seems to me to be illogical, as in every other respect, the seeds closely resemble the remaining Ovatisemineae. Also the size of the seed does not really qualify it for the Microsemineae. In any case, the seeds included in the Microsemineae are very varied in appearance and I personally would divide the group into a number of separate smaller groups as does Dr. Buxbaum. The Calochlora would then have to be untied with the Ovatisemineae as they have no close resemblance to any of the possible new subdivisions but a distinct resemblance to the remaining Ovatisemineae.

The implication is that the Microsemineae is not a valid group at all, merely a conglomeration of several seed types, whose only common feature is small size. This I do not consider to be a valid taxonomic criterion.

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

I well recollect that when Geoff Swales started to undertake a microscopical survey of Gymno seeds I refrained from conveying to him the material on this subject which described the classification system originated by Fric and developed by Schutz, until he had drawn his own conclusions regarding the division of the Gymno seed types. When the two were compared, there was an immediate correlation between those groups other than the Microsemineae; the species which are collected together in this group by Fric and by Schutz, had been divided up into groups with seed characteristics differing from each other just as much as the other four major groups differ from each other, by this completely independent examination. When one examines each of the Microseminae sections critically, there is a startling diversity of plant form in certain sections, far more than in the sections of other seed groups. This evidence would therefore tend to confirm the idea that the 'Microsemineae' group needs to be replaced by a group or groups based upon a further assessment of seed, fruit, floral and body habit characters.

SOME FLOWERING NEOPORTERIANAE by R. Zahra

When I started collecting cacti some years ago my main interest was in Mammillaria and cerioid cacti. However many of my friends became interested in the dwarf globular cacti from South America and my own interest also shifted in the same direction. In my collection I now have about a hundred Neoporterianae and amongst these there will be about seventy species represented.

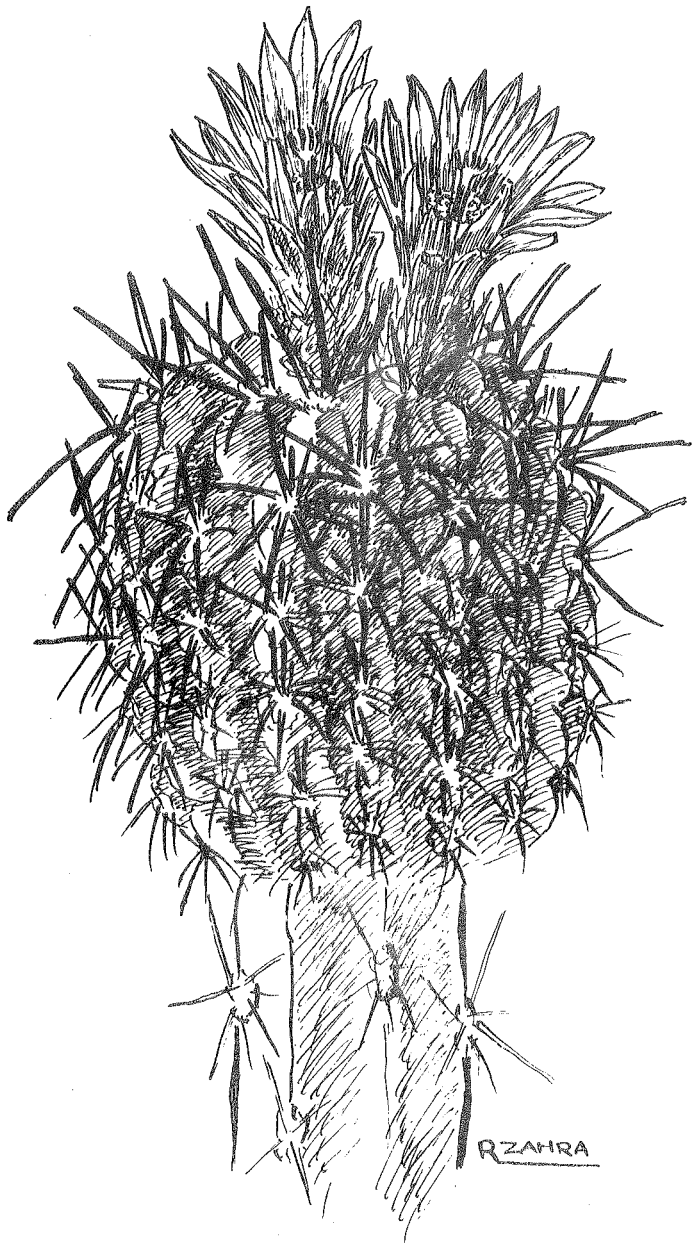
My plants are under a P.V.C. roof but one side is permanently open. This year I made some notes about the flowers on these plants as they appeared, starting about a year ago.

In November N. rapifera produced a number of buds and these proceeded to open in December and during Christmas I had flowers on this plant. In January I noticed buds on Neoporteria littoralis, N. microsperma, N. nigrihorrida v. coquimbana and N. senilis. At the beginning of February buds were appearing on Neochilenia simulans, N. napina, N.chilensis v. albiflora, N.heteracantha, N.robusta and N. villosa.

By the end of March all the true Neoporteria had flowered and none had set fruits. These flowers opened during the coldest part of the year; no insects were seen visiting these flowers and I expect there would have been very few insects out at night. The flowers of the true Neoporteria varies in size but neither in shape nor in the general colour scheme, although some were a shade darker than others while yet others had petals creamy at the base with reddish pink at the tip.

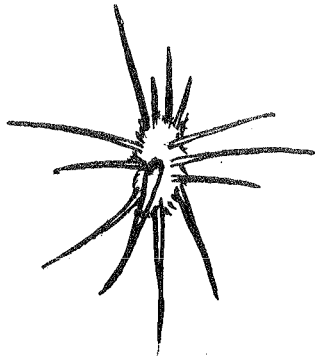
The flowers of N. littoralis were the smallest of them all, being only about 12 mm tall. In comparison, the flowers of Neoporteria nigrihorrida v. coquimbana and N. heteracantha were the largest, being 30 mm high. In between these two measurements came all the others.

In all the true Neoporterias, the petals were very narrow with the innermost ones forming



Plant
x1 1/4

Areole
x 2



NEOCHILENIA SIMULANS
Collection - R.Zahra

a tube which hid the anthers but left the stigma visible. As the flower matures the innermost petals start to open out just a little and one is able to see the anthers. It is easier to do this in the smaller flowering species as the petals are shorter. When the flower is sectioned it becomes apparent that the anthers carrying the pollen are a long way down the tube formed by the inner petals and only insects with a long proboscis would be able to reach the nectar at the base of this tube.

By the end of April the flowers of the true Neoporterias were all over and not one had produced a fruit although I tried to pollinate them artificially with a small brush. At this time, the buds on Neochilenia napina started to open and these were followed in turn by those of N.simulans and N. chilensis v. albiflora. At first glance the flowers of N.simulans and N.napina appeared to be very similar and although their colouring did differ, it appeared to be two shades of one colour rather than two different colours. Both flowers were of similar cup-shape and about 30 mm tall.

On closer inspection I noticed that in N.napina the style was very short and the stigma was embedded in the anthers in such a manner that cross-pollination could hardly occur - unless the plant is self-sterile. On the other hand in N. simulans the style was long and the stigma was clearly visible about 5 mm above the anthers. A number of insects were seen visiting the flowers on both plants. No fruits were formed on N. simulans but there are now three fruits on N.napina. There may be no seeds in these fruits but six weeks after the flower the fruit still appears turgid.

N.chilensis v. albiflora opened its flowers shortly afterwards. These flowers differed from both the foregoing in shape as they were wide open. The individual petals were also different in shape, being somewhat wider. The flower was about 45 mm across when open wide. The stigma protruded about 3 mm above the anthers and again many insects were seen visiting the four flowers it produced.

In the middle of May I observed buds on Neochilenia hankeana, N.fusca and on Horrido-cactus froelichianus. All three flowered in July last year and I expect them to flower again this year at the same time. N.hankeana and N.fusca had produced seeds by self-pollination and as the flowers had opened at different times, cross-pollination was not possible. The flowers of N.chilensis v. albiflora, N.hankeana and N.fusca are all very similar in both shape and colour, whilst that of N. froelichianus is similar in shape of flower but not in colour.

So far I have noticed three different shapes of flowers. Those of the true Neoporteria have narrow petals, the inner petals remaining upright so as to form a tube, all petals being of a reddish colour. Those of N.napina and N. simulans are cup shaped with petals slightly frilled at the top and of a creamy brownish colour, whilst the flowers of N.chilensis v. albiflora, N.fusca and N. hankeana opened wide, had broader petals ending in a point and were pale yellow. My flower on H. froelichianus is also of this type except it has a salmon coloured flower.

Comments from H. Middleditch.

I have never been able to produce a flower on any of my own Neoporteria sensu stricta although I have seen a number of flowering plants in other collections. I would have been inclined to have described the flower colour as rose-pink to pinky-mauve, rather than reddish. The accompanying sketch of N. simulans is very similar to the body habit of my own plant, which has not flowered yet.

GYMNOCALYCIUM - From the German-language Round Robin.

(Translated and abstracted by H. Middleditch).

In this Robin there are participants from all parts of northern Europe and the methods of cultivation are widely diverse. Two contributors from Czechoslovakia, whose winter is severe and heating costs prohibitive, describe how they keep their plants in their cellars over the winter months.

D. Tauber (E. Germany) in describing his method of overwintering his plants says "I have one greenhouse 6 x 4.5 x 2.5 m high and a second 7.5 x 2.5 x 3 m high. My heating is by hot water pipes, however only 20 m of piping is run in the cactus house and on the occasion of a sharp frost out of doors, I approach as low as 0 - 2°C. But my plants have lived through this. I am well known for hard cultivation, as Herr Kinzel can confirm." He also comments that an overwintering temperature of 12°C (53°F) is too warm and also "Can cacti have a proper winter rest at this temperature?"

In response to this, B. Kreutzer-Hansen (Denmark) observes that "you will think that a winter temperature of about 12°C is too high. I believe that a great many cactophiles work at 6 - 8°C (c.45°F) and I have also used that temperature in past years. Nowadays we have central heating and the temperature averages about 9°C. During this winter I have held my study at a constant 12°C as an experiment and the result can now (April 2nd.) be seen: I have buds and flowers on my cacti which have never been earlier and I thereby draw the conclusion that the winter rest conditions were correct. Am I wrong in that?"

D. Tauber adds that he would "with some exceptions, trust Gymnos to a temperature of 0°C, admittedly when fully dry" to which W. Czegka (E. Germany) adds "You can without hesitation over-winter your plants at 0°C, you must only ensure that the plants are completely dry: that means that you must have completely discontinued watering by the middle of September, for not only should the roots be dry but the body should also shrink; only thus have I had admirable success in overwintering."

R. Dlouhy (Czechoslovakia) comments that he uses about 20% of peat in his soil mixture, to which H. -R. Thiel (W. Germany) adds "I also use a large proportion of peat in my soil in the form of a mixture which contains up to 90% of peat. I did try hydro-culture for some years once, but abandoned it for such a cultivation method is only suitable for small collections comprising fewer plants. One achieves a better growth with cultivation in soil mixture also, when one uses additional fertilisers. But who is even interested in fast growth? the fewest members, when almost all will have barely room to play a barrel organ" (I presume the equivalent English would be 'room to swing a cat' - H.M.).

K. Eckert (W. Germany) also observes that 'in the last two years my soil-less compost consisted predominantly of mineral earths, but in previous years I grew successfully in a soil mix with up to 75% of peat. The top layer, however, was a good 3 cm of pumice, for the peat holds the moisture very well indeed, which for our Gymnos would not be suitable in excess around the root-neck," adding "I do not really grow by hydro-culture, only soil-less cultivation and that for half my collection. I feel it is equally suitable for large and small collections."

L. Drabek (Czechoslovakia) comments that "I confine myself to Gymnocalycium, Parodia, Sulcorebutia, etc. I grow these plants hydroponically in crushed charcoal for a lower layer and an upper layer of crushed brick" and D. Tauber adds "I use no special soil mixture for Gymnos, either I use the ordinary white East-sea sand, or clean broken brick as on tennis courts - as do Dr. Schutz and Fleischer in Czechoslovakia" and he also comments "Dr. Schutz in Czechoslovakia has a complete collection of Gymnocalycium - which I have seen - and it is then followed by his friend Vojta and also the Brno City collection (formerly Herr Fleischer). In Austria there is a perfectly complete collection in the hands of Gunter Moser, whom I do not know; likewise almost as complete is that of Herr Bozsing in Salzburg - preponderantly imports".

In response to another comment, D. Tauber observes "If many of your gymnos have not yet flowered, I do not think that this is due to the size of your plants, for mine have already flowered

as small specimens. However, saglionis must grow somewhat larger - but I have an import of this species of 6 cm diameter and it has had two flowers". To this, W.Zander (E.Germany) adds "apart from size, flowering depends also upon the care and cultivation of the plants. Most of my plants flowered first after reaching a size of about 5-6 cm in diameter - but some when smaller, such as G. albispinum which flowered as a two year old seedling at about 2 cm in diameter". L.Drabek comments that "Gymnos do grow very slowly, especially those of the Trichomosemineae group".

On raising Gymnos from seed, D.Tauber observes that he finds "September and October good months for sowing, with day temperatures 25-30°C and night temperatures 5-8°C. At these temperatures I have had the best germination of Gymnos in the winter months". He adds, in response to an observation from K. Eckert that "your yellow flowered denudatum is a hybrid with G. andreae. I know of other such plants, their habit is like that of denudatum": and further to W. Czegka "your slide of a plant like denudatum with pink flowers is G.denudatum v. roseiflorum (Jan Suba), a hybrid between baldianum x denudatum, originating from Pazout in 1928". To this H. -R.Thiel comments "If I come across a fine hybrid in which to me the parents can be seen clearly and without ambiguity, then I would not decline it. For those hybrids between 'gutter and cream', although charming, am I not filled with enthusiasm, for then these characters are rank outsiders, that one really should condemn."

The synonymy of Gymnos. michoga, tortuga, and tudae is questioned and commented upon. L. Drabek observes 'G.michoga has propagated successfully for me. I own a single specimen and from that I have obtained two further specimens in the space of 20 years. These species require more shade, warmth, and moisture - you should try housing them under the orchids!" D.Tauber suggests that these three species are synonymous, to which W.Czegka replies "You write of a likely synonymy between tudae, megatae and onychacanthum; other friends have other views. Herr Moser from Kufstein owns all three species as habitat collected plants and contends that these are separate species. I have obtained seeds of all three sorts from Herr Moser and expect that I can make some comments on this matter within another year".

Commenting upon a doubtfully named plant L. Drabek observes "that plant does not seem to be G. hossei, the true species having 7 radial spines from 4-7 cm long - the length all depending upon the precise habitat of the plant". To this W. Cegka responds "you write that the genuine G. hossei has 7 radial spines from 4-7 cm long. Then has Haage jnr. probably been mistaken in his first description ' ..... spines: 15 mm long, awl shaped'. In my collection I have two G. hossei v. longispinum, they appear to come nearer the plants in question".

H. -R. Thiel suggests to D. Tauber "Perhaps when plants flower we can exchange pollen. I have already arranged pollen exchange with many friends and some has been preserved about six months with calcium chloride. Fertilisation nevertheless occurred 100%, except for those plants where self-fertilisation does not take place, then it cannot occur by this method either. Of fertilisation sensitivity there was not the least evidence. Seeds which have been obtained in this fashion have I already sown, frequently with success, and these are already growing into splendid seedlings. In my last two seed sowings I specially marked all those seed obtained by means of these experiments."

Finally L.Drabek suggests "permit me to recommend the following to each collector: if your plants grow well, you should continue your cultivation as you have done up to now: if your plants exhibit poor growth, then seek for the cause of these conditions and alter your cultivation accordingly."

Comments on the German Gymnocalycium Robin from R.Williams.

When it comes to setting seed on Gymnos. I find that Parodias are good substitute pollen parents, when I cannot get two flowers of the same species out together. I do not know if there

is any parallel between the large round and the small, cup-shaped seeds which are found in both Parodia and Gymnocalycium, but not all Gymnos will set seed with Parodia. I have few Parodias of the large round seeded type which are of flowering size and I cannot get seed to set on G. curvispinus, G. uruguayense, G. baldianum and G. netrelianum. Although I can get seed to set on G. zegarrae in the past three years, it has never been fertile."

..... from R.E. Hollingsbee.

I am rather interested in the use of 'foreign' pollen for cross-fertilisation and I find that Dr. Schutz of Brno was the author of an article which included some references to such work, which appeared in the N.C. & S.S. Journal for December 1949.

I would like to see more experiments carried out in this field so that we may produce true-to-type seed on our imported plants which are self-sterile. It might be possible to buy two or three plants from an importer and get plants from different clones so that seed could be set by cross-pollination. But it might be a hit-and-miss affair.

I would like to revive the suggestion made in the article by Dr. Schutz that 'It will only be possible to ascertain the most suitable pollen donors for each species by tabulating the results obtained through the ..... co-operation of ..... growers and cactus lovers.' I would certainly like to participate if I can.

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

I have found it most interesting to read the contributions of the participants in this Robin and I see that there are various comments concerning winter temperatures. In my opinion winter temperatures are dictated only by the geographical location of the greenhouse and the amount one is prepared to pay for heating. Excessive heat and moisture will no doubt prove fatal because one cannot force a plant to grow in spite of itself and the rate of growth undoubtedly eases up during certain months of the year; but I am quite unconvinced at the same time that a cactus - or any other plant for that matter - really needs a rest and will not flourish without it. I suppose that the ideal conditions for any cactus plant throughout the year would be those which most closely followed the regime normally experienced in habitat, but obviously this is an impossibility in practice. One always has to compromise and give our collections conditions which we can afford and which they will tolerate, but obviously this arrangement is far from ideal. Under these circumstances, the golden rule is, I would agree, the lower the temperature the dryer the plants must be. But surely shrunken plant bodies and dried out roots for months on end each year cannot improve the growth of a plant? Does one put Olympic athletes on a minimal diet prior to a competition? !

Turning now to the comments on soils, the requirements of a plant in terms of soil are:-

a. A means of anchorage

b. A source of various simple inorganic salts

c. A source of water

The pH of the soil should be just on the acid side of neutral, but apart from this, what the anchorage is and from what the soil solution is absorbed is quite immaterial. Assuming adequate drainage, any substrate can be used. Elaborate mixtures commercially produced are a waste of time and money.

There are a few observations made on raising Gymnos from seed and I have also heard it suggested that a fluctuation in temperature is of advantage in the early stages of seed-raising as it matches in some measure the diurnal variation encountered in habitat. My own efforts at seed raising do not yet allow me to be certain, but my two batches of seed - one sown in September and one in November - at a constant temperature of about 77°F, seem to be doing very well, and % germination in both batches was extremely good. It is also the first occasion

that I have grown seedlings without covering the seed in soil or shading the seed pans. All I have done is to protect them from direct sunlight. I am hoping for great things from the small but established seedlings as soon as outside conditions improve this Spring and I can dispense with the artificial heat.

On hybrids: in my opinion the deliberate production of hybrids is a practice to be deplored except possibly when carried out professionally and really adequate records kept, but even then I have reservations. So many so-called documented hybrids are in fact mere chance pollinations and only serve to increase the number of "species" available to collectors who appreciate labels rather than plants. It also makes life extremely difficult for those who are interested in the taxonomy of naturally occuring plants!

In the Cactus and Succulent Journal of America Vol XLI No.6 for 1969, an article on "Hybridisation techniques for succulent plants" is relevant to the comments about pollen being preserved with calcium chloride. Pollen, I understand, is very prone to attacks by fungi when stored and one way of preventing such attacks is by keeping the atmosphere within the container very dry. Anhydrous calcium chloride does just this, but must not of course come into contact with the pollen samples themselves. It is stated in the article referred to above however, that certain plant families (including the Cactaceae) have pollen which does not store well. I am afraid that I cannot follow the statement that "fertilisation nevertheless occurred 100% except for those plants where self-fertilisation does not take place then it cannot occur by this method either". The section underlined surely implies that only self-fertile plants appear to respond to this stored pollen, thus it is probable the plant's own pollen is doing the pollination, not the 'foreign' pollen. "Of fertilisation sensitivity there was not the slightest evidence" - *what do we make of this comment?* Before I could wholeheartedly support the practice of sending pollen samples around the world from one collector to another, I should like to know a lot more about the precautions taken over purity of pollen samples for example, and also a lot more about the biology of the whole process. Otherwise - and this brings me to my comments on hybrids again - it could, if indulged in to any extent, cause more trouble still in terms of fresh 'species' and hybrids!

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

Following the comments made about the bodies of Gymnocalycium shrinking during their winter rest period, I found most of my Gymnos shrank so much during this time that it was a hard task encouraging them back into growth again the following year; some, indeed, were barely back to a state of 'growing' when it was time to discontinue watering for next winter. Last autumn I gave my Gymnos two or three waterings with acidified water, using nitric acid added to the water and the shrinkage has been far less to date (March) this winter, so I hope for a marked improvement in growth next season.

MY CONTACT WITH COPIAPOA by Dr. E. Priessnitz. - 2.

(Translated by E.W.Bentley from the February 1964 G.O.K. Newsletter (Austria)).

I have observed that Copiapoas germinate very well in winter. This may depend on an increased readiness to germinate in accordance with a natural rhythm. But exact observations on the manifold elements of natural and artificial climatic factors are difficult. However I sow Copiapoas preferably in the waning midwinter after the cessation of the very constant valley mist of the Klagenfurter Basin that sets in in the autumn, therefore very early. From these sowings I am able to produce again and again interesting and new Copiapoas, whereby I may make better known to you again today some proven species in my collection.

I consider the easiest species to grow is Copiapoa carrizalensis, which Backeberg believes identical with Copiapoa malletiana, which since his discovery of it has not been found again.

In habit it appears to be a good species and my admittedly only few grown examples are very consistent. The resemblance to C.malletiana is only distant in my plants, which does not exclude the finding of transition forms to C.malletiana within this species. The species in nature is coated grey-white, however in culture I have always seen it of an intense dark to light grey-toned green. As is always the case, the body shape diverges most from the wild form when growth is strong. This can lead to extremes in appearance in plants propagated on Opuntia. The spines are deep-black and noticeably bunched and sideways and downwards directed, shown particularly when the plant is a well-fed specimen. According to my observation the species grows freely on its own roots.

Copiapoa lembckei, a very beautiful species, as a wild plant with grey-white epidermis, in our greenhouses of a dark green colour, with black to grey-black, in 'hard' culture, strong spines. The species varies in spine colour, for in my seed sowings near black and brown also yellow spined specimens have been obtained which were completely in agreement with the characteristics of the species in other form aspects. The species can perhaps only be kept as a propagated plant. Differing from C.cinerea, seedlings exhibit noticeably slow growth and already in the young stages are strongly spined deep black and show grey epidermis. Their growth succeeds at any rate in crushed brick. The seedlings have shown a somewhat stronger body on nutrient-rich peat in which elsewhere also other Copiapoas have shown surprisingly good sowing results in spite of continuous soil dampness.

Copiapoa wagenknechtii: a very fine and in culture strong and quickly growing dark-green plant with strong, robust, black spines bent like a claw. The coarse-tubercled specimens growing spherically when young are particularly fine, while other individuals easily incline to premature cereoid growth and thereby lose much in appearance.

As a very fine plant also Copiapoa dura is numbered among the culture-worthy species. However in this species I have been able clearly to distinguish two forms, a spherical form and a cylindrical growing one. In spite of the ease with which in our middle-European light conditions Copiapoas distort to the cereoid shape, the spherical forms are easy to get in the natural habitat. Already at the hen-egg size the plant strongly inclines towards branching and builds very handsome groups. The species varies in spine and body colour. The colour scale of the strongly curved spines ranges from black to light brown and the broad-ribbed plant bodies are dark brown-green to deep-green.

From another sowing I possess unfortunately only 3 plants, which of strikingly homogeneous appearance and with almost dark-brown body colour, exhibit especially strong spines and mild cereoid growth, and although they have long ago reached the size of the offset-capable plants, show not the least inclination towards branching. Ritter designates Copiapoa dura as a firm desert species and so I made no attempt to grow them on their own roots, until some offsets became available to me from a pensioned-off 'mother plant' which because of heavy shrinkage it seemed to me to be pointless to propagate and I set them in some spare places in a propagating vessel where they surprisingly quickly rooted and cheerfully grew on.

A plant unfortunately only offered to me once in the year 1957 in a 10-seed portion in Winter's catalogue is Copiapoa desertorum. From a sowing I got two germinations for propagating and bringing up. The slow growing species exhibits compact growth with, at first, black, then pale greying spines. The colour of the epidermis is a characteristic dark brown-grey-violet. Ritter speaks of a dusky spined hard desert species. A very interesting plant, which perhaps can only be made available through exchange within a large, interested group of cactus lovers. Up till now I have not undertaken experiments to increase these plants by cutting.

With this, au revoir and do not forget to try some Copiapoas in the present year's seed-sowing.

We have a number of slides of Copiapoa in the slide library but I would like to improve the representation of the species in this genus - A.W.C.

SOME THOUGHTS ON CLASSIFICATION - 4. by R.B. Ivimey-Cook.

I have been reading with interest and not a little concern the recent articles which have appeared under this heading. Interest because it is undoubtedly true that the Cactaceae are one of the worst classified families of flowering plants, and concern because it would seem that these articles are not really reaching the root of the problem.

Dr. Myers castigates Backeberg for his classification of the group and yet, when one really examines the position, Backeberg's classification, such as it is (e.g. Das Kakteenlexikon, pp.17-53) has never been seriously considered as to its merits. What Myers is really objecting to is Backeberg's system of nomenclature which, I agree, is that of a splitter, in extremis.

However, this is not merely a quibble over words, for classification and nomenclature are not the same thing at all. Classification involves the ordering of taxa in groups, based on a variety of criteria, ideally phylogenetic, but in the majority of groups of plants the criteria are generally based on morphology - plants which have a number of features in common are grouped together. This is a process which starts with the individual organisms themselves and one arrives at the concept of a population - a group of individual plants which have some overall similarity but which will, nevertheless, show some variation - the individuals will not all be absolutely identical. Such populations are themselves grouped together and a sufficiently large group is ranked as a species; a group of species is, in turn, ranked as a genus. There are available a number of other ranks in the classificatory hierarchy - variety, subspecies, subgenus, all below the level of genus, subtribe, tribe etc. above. It is a matter for the individual taxonomist to decide at what rank a particular population should be placed; whether the differences between two populations constitute distinctions at the varietal, specific or even generic level, to mention but three of the possibilities.

In order to assist in this exercise, a number of guide-lines have been laid down. Thus the category of form is usually reserved for minor variants, such as colour variants occurring within a population; variety will include differing populations which are found within the same general region or habitat; subspecies where a difference at the varietal level is accompanied by a difference in geographical distribution; the category of species is rather different, since two species are expected to show not only a marked morphological discontinuity between themselves, but also, in general, not to interbreed as a matter of course. However, many species are known to interbreed where their populations meet, though the hybrids are generally sterile. The status of this interbreeding criterion can be discussed at considerable length, and it is probably fair to sum up the conclusions by saying that where a population maintains itself in the presence of other species populations, this is a good evidence for intersterility and the populations are properly ranked at the species level; in the absence of this information, there are no prima facie grounds for not assigning the rank of species if other criteria seem to warrant it.

It is perhaps regrettable that in the system of nomenclature used in Biology, and especially in Botany, a name is given to a population at the species level, this name comprising a generic name and a specific (adjectival) epithet. This name thus becomes implicitly part of the classification system, and assumes an aura of permanency which it does not really possess. If populations were identified by numbers, then it would be easy to say that, for example, populations 2, 3 and 50 should be combined with the rank of species, as should populations 4-7, 13 and 45. If another taxonomist were to maintain that populations 45 and 50 should be removed and combined as a third group also with specific rank, this could be done without altering the names (i.e. the population numbers). Under the present system, such reallocation generally does alter at least one name, and may generate a new one, and tends either not to be done, or looked upon with much misgiving when it is.

If one examines the problem from this point of view, then Backeberg's system of nomenclature is largely irrelevant to the problem of classification, since it matters not whether the pieces of the puzzle which one is trying to fit together are large or small; whether one is dealing with many small genera each with few species, these in turn with a restricted species

concept, or whether one holds broad species and generic concepts and has large groups of individuals to deal with. Indeed, neither of these are really relevant, since classification should aim to classify the individuals and the superstructure should be built up from this starting point.

In his contribution, John Donald makes a plea for "larger boxes" - for a broader species concept which takes into account the undoubted considerable variation within populations growing under natural conditions. This I would echo, for it is biologically sound even if having no real bearing on the problem of classification. It may make the work of a future monographer more difficult by giving him yet more names to have to cope with. He also poses the question "Do we collect plants or names?" but seems to discount the possibility of the answer "Both". Surely this is feasible; one clearly collects plants, a collection of names only requires a proper understanding of what is implicit in a name.

He also mentions the problem of identification. In practice, it is quite distinct from classification, since there are very few classificatory systems which lend themselves to the construction of the keys which are generally used for identification purposes. It is, of course, true, that a key to a genus is a classification - that is, one which starts with a preconceived whole and breaks it down into recognisable bits (the species). Most classifications are agglomerative - they define groups of similar individuals in successively larger aggregates and in a phylogenetic system, add information on relationships as well. Nevertheless, it is astonishing how many keys seem to be the only classification attempted in accounts or even monographs of genera or larger groups. The prize must surely go to Craig's monograph of Mammillaria where, by describing the species in the text in the order in which they appear in the key, he effectively obscures any classification which he may have had in mind based on either overall similarity or even on phylogeny.

Comments from H. Middleditch.

I shall have to plead guilty myself to failing to distinguish clearly between 'classification' and 'nomenclature'. It is of course questions of nomenclature which tend to gain attention - the generic and specific names applied to individual sorts of plants - largely because most collectors prefer to attach a name as an identifying label to their own plants. The diversity of views on nomenclature amongst leading figures in the cactus world, the many and various changes in both specific and generic names which have occurred in recent years amongst South American cacti, have all bred some degree of confusion amongst cactophiles whose prime interest is in growing their plants and knowing more about them. But not only has all this changing of names and pressure for change generated confusion, it has also brought a reaction in its train - some degree of dislike for the subject of nomenclature and doubtless a wish to keep well clear of the unpleasantness which unfortunately finds its way into print even, in exchanges between authorities on this subject.

And to many of us classification has merely been considered (or disregarded) in the same breath as nomenclature, whereas as Dr. Ivimey-Cook rightly observes it is indeed far from being the same thing. Classification is, I suppose, merely a convenient word for describing what we see with our own eyes when we look at a cactus collection. If we see a tall, thin, plant then we immediately classify it with certain other tall thin plants - and so on. If we observe that three of four different plants tend to grow elongated when the rest of the genera remain globular, we are classifying them together. If we have two plants somewhat alike and we observe that their fruits are far from identical, we are wondering if they should be classified apart.

Since classification is concerned with what a cactus is like, where it grows and which are its close relations, it is a subject which encompasses those aspects which many of us find of undoubted interest, an interest unaffected by some change or possible change to the label - or name - which for the time being identifies a plant or a group of plants. By carefully examining the characters which are used for the purpose of classifying a large group of species into small sections, we may well discover a lead to identifying a plant whose name we do not know.

It is because classification can be not only of use, but also of interest to the keener collector, that I feel the contribution from Dr. Ivimey-Cook has been most timely.

SOME THOUGHTS ON CLASSIFICATION - 5 from H. Middleditch.

In many articles from Continental sources which we have reproduced in this Journal, there have been several occasions on which writers have referred to the great variability of spine form and body habit of a 'species' of plant in habitat, often suggesting that it was much greater than would be conceivable to most of us familiar only with seeing a small number of examples in a greenhouse collection. The further variation we can obtain in cultivation was referred to in previous notes under this heading (Chileans No.14 pp.46-47).

All this should not be taken to mean that spine count, spine form, and body habit are of no value in classifying and identifying cacti - merely that they are not too reliable taken on their own. Let's see what else we can look at on our plants which forms a reliable and acceptable feature for classifying and identifying our plants. Generally botanical classification tends to place greater reliance upon those characteristics which show little - if any - variation from place to place in habitat or even when transferred to our greenhouse climates.

We need only think of homely things like winged fruit on sycamore, acorns in their cups, and horse chestnuts in their thick coats, for one plant characteristic which is constant. A relationship between oranges, lemons and grapefruit may readily be envisaged in the form of the thick outer coat and considered a reliable distinction from - say - apples or pears. In cacti, too, as in all fruit bearing plants, the fruit habit is far more constant than the habit of the plant body - so it forms a valuable feature to use as an important factor for the purposes of classification.

If we were now to place side by side seeds of plum, tomato and melon, we should again find in the size and shape of the seed a specific feature which is more constant than the plant habit - for each seed is adapted to do the specific job of reproduction under slightly different conditions as between one sort of plant and another.

Both the micro-climate and climatic routine - before and after germination - are critical if a germinating seed is to be successful (Chileans No.6 pp. 4-8) and become established. A seed must survive before germination, germinate at a suitable time, and nourish a freshly growing seedling until it is self-supporting. The nature of these requirements will differ between the high Andes - where there are temperatures below freezing - and the lower altitude and lower latitude plants whose seed will never meet this degree of low temperature. The requirements will differ between S.E.Brazil, where it rains at least once a week, those in the Chaco where it scorches for nine months and wallows in floods there, to those in the Peru-Chile desert which only have mist for moisture. The requirements will differ between plants on the rocky Andean slopes and those on the grassy plateaux and plains; and so on.

To be able to cope with these diverse requirements, seeds will differ in some degree in abrasion resistance, or moisture repellance, or temperature susceptibility, or size, or some other feature. These diverse characteristics commonly involve some physical differences between different sorts of seed in just the same way as there are between different sorts of plant. These physical features of the seed are found to be reasonably constant in one sort of plant despite variation in plant habit, either from place to place in habitat or from habitat to cultivation. Thus we find that we can rely reasonably well on constancy of seed characteristics for purposes of classification.

In order to produce fruit and seed to guarantee reproduction, a plant must first produce a flower - and the flower has to be pollinated. Any sort of plant should be able to maintain its resistance to disease and the rigours of its environment, but if a flower pollinates itself then any weaknesses in this direction are not only perpetuated but commonly increased. On the other hand, cross-pollination between flowers - especially between flowers of different plants - tends to keep any weaknesses under control so that the proportion of next generation

plants unable to flourish and to reproduce viable progeny, remains small. To gain this end, a plant usually relies on flying fauna - birds, bats or insects - to effect cross pollination by carrying pollen from one flower to another.

The flowers themselves must constitute an attraction to their pollinators or else the likelihood of an insect alighting upon them is reduced and their changes of reproduction dimished. If the visits to flowers proved of no value to the insect, then the visual and odoriferous attractions could become of no avail - so most flowers provide their pollinators with something in exchange for the visit thus making the visit worthwhile and encouraging the visitor to halt yet again, at another flower, to gather another sip of nectar or pollen.

Only when it has once alighted can the presence of nectar encourage an insect to explore a flower, so that in so doing it will rub itself against the stamens and enmesh some grains of pollen in its coat, to be carried to the next flower to be visited. A flying insect must be attracted to the flower by other features - by its shape, its colours, its odour - features which must encourage the insect to alight by conveying a message to the insect that here is where it will find nectar as it has before.

Because flowers specialise to some degree in their pollen carriers, it is possible to distinguish between flowers attracting bees, flies, diurnal or nocturnal moths, beetles, birds or bats. The plant structure will be specially adapted to suit the pollen carrier - thus tropical flowers adapted for visits from herbivorous or fruit bats only open at night (when bats fly around). Such flowers are white (bats are colour blind), large and strongly built (bats are heavy and grip with their claws), equipped with a fermenting odour (bats prefer over-tipe fruit), and suspended on long stems (bats are not very skilled at landing); an unusual amount of nectar is present (bats have a much greater stomach capacity than insects).

Flowers directed at birds, on the other hand, flower in the daytime, have no odour, possess vivid colours and like wise have large amounts of nectar.

Flowers intended for insects are small, possess various odours, produce much less nectar and have colours which are conspicuous to the insect eye. Since insects perceive ultra-violet light, many flowers have a large ultra-violet component in their coloration which we do not see. In addition, such flowers are often patterned, with contrasting flower colour spots, or nectar guides, which lead the insect to the nectar once it has alighted on the flower. These nectar guides are often coupled with odour-guides, which have a more intensive smell differing from that of the petals.

An even finer point of discrimination in pollen carriers is noted by the editor of Spruce's "Notes of a Botanist on the Amazon and the Andes" who says (p.74) "It is interesting to note how often Spruce mentions white flowers as night-blooming, but the Bauhinia (which appears in flower every morning with large white flowers) and the Capparis (which has large white inodorous flowers which begin to open at sunset) are especially interesting because one opens in the evening, the other apparently in the night or long before dawn.

"This accords with the fact that the moth collector for the Tring Museum has found, whilst in South America, that besides the species of moths that come to light or to flowers in the evening and principally up to midnight, there are other species which only appear probably an hour or so before dawn till near sunrise. Presumably these latter moths are those which fertilise these early morning flowering white blossomed trees and shrubs."

In order to minimise the likelihood of self-fertilisation, the physical construction of the flower may be arranged to keep the stigma and anthers well apart. Another means of achieving the same objective is for the stigma lobes and pollen sacs to open at different times - either different times of day, or different days. All these devices will be self-evident from observation of the flower itself and will often differ from one sort of plant to another, but are always constant in one sort of plant.

The way a flower is adapted to attract and accept its pollen carriers and how it avoids self-fertilisation will be evident from the physical form of the flower, from its opening habits, and

from the form of the nectar chamber. All these features will vary in greater or lesser degree from one sort of plant to another, but will be pretty constant in any one sort of plant. Thus they constitute another set of features which we could use for classifying and identifying our plants.

These notes will, I hope, now offer an answer to the question posed in The Chileans No. 14 p.47 under 'Some thoughts on classification - 2'. Indeed, we have several reasonably constant characters in plants viz: flowers, fruit and seeds, which can be used jointly with body habit, in order to classify a plant. Having classified a plant it should then be less difficult to identify it and give it a name.

Comments from Dr. R.B. Ivimey-Cook.

The problem of classification of cacti, and, indeed, of many other groups of organisms, is very difficult to resolve. It is a problem which is invariably made much worse where a group has horticultural or public appeal, since the tendency to generate differences is emphasised at the expense of the similarities. Classification ought to be based on similarities, and until this is done, any stable classification is unlikely to materialise. Most classifications have to be based on morphological differences or similarities, since it is usually necessary to identify plants in the absence of their habitat. This in itself makes any method based on pollinators almost impossible to operate. Of course, in the case of cacti, the fact that most of them grow in countries where only few of us will be fortunate enough to visit, does not help the situation, one which is complicated further by the fact that growth forms are sufficiently plastic to change between their natural habitat and the artificial environment of a temperate greenhouse. It ought, nevertheless, be possible to contrive a classification which will deal with these sorts of problems; the trouble is that while it might satisfy professional botanists, it would probably be highly unpopular with the majority of collectors and dealers.

Further Comments on Acanthocalycium from C.J. Lazzari.

The plant depicted on the front cover of The Chileans No.14 was purchased in 1968 under the name Gymnocalycium glaucum and is of very singular appearance. It has ten ribs and is very sparsely spined, these being black with brown at the base when young, turning to grey-brown with age. In manner the plant is squat and rather burly in form. The green epidermis is covered with a coating of glaucous greyish white rather reminiscent of mature imports of Copiapoa cinerea.

The true genus became obvious with the development of the first flower during the summer of '69 - the bud being enveloped in dark grey hair. Two flowers were produced singly and not together as shown in the drawing, but for reasons of interest I illustrated both bud and flower at the same time - positioned however at the two actual flowering areoles.

In flower Acanthocalycium glaucum is particularly handsome especially due to the contrast between the rather austere character of the plant body and the beauty of the large yellow flower with its lime green stigmas and dark red blotches at the top of the outer petals. One fruit was produced which was a dark slaty bronze in colour - very striking and quite in keeping with this singular plant. We shall see what the seeds produce!

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

I do not think that there is much doubt that Soehrensia oreopepon and Acanthocalycium oreopogon are one and the same plant. The trouble is that most plants sold and distributed as A. oreopogon are in fact A. catamarcense. My plants of A. orepogon received from two quite independent sources are certainly only forms of A. catamarcense which is itself probably synonymous with A. thionanthum. The only difference is in the colour of the style - red for

catamarcense, yellow for thionanthum.

Spegazzini described Lobivia oreopepon in 1925 in 'Neuvas notas cactaceas' p.45 and Echinocactus thionanthus in 1905 in 'Cact. Plat. Tent.' p.499. The plants are quite distinct and Spegazzini would not have erected a new taxon viz: L.oreopepon, had they been similar. The probable villain is Ernst Werdermann who transferred Lobivia oreopepon Speg. to Echinopsis with an orthographic error as Echinopsis oreopogon (Speg) Werd. in Backeberg's Neue Kakteen 1931 p.85 which Backeberg in turn transferred to Acanthocalycium as Acanthocalycium oreopogon (Speg) Back. in Kaktus ABC 1935 p.225, without resource to the original type material. Had he done so he would have clearly recognised that A. oreopogon (the ex-Lobivia oreopepon) was no Acanthocalycium. Unfortunately newly collected plants what were true Acanthocalyciums with yellow flowers and red stigma, were identified as A. oreopogon (Speg) Back. by Backeberg.

Hence Lamb's photographic reference plate 487a is not Acanthocalcium oreopogon, but Acanthocalycium catamarcense - or I would prefer to describe it as A. thionanthum forma catamarcense.

..... from H. Middleditch.

In the Chileans No.14 p.40 this name A. oreopogon was queried and it now becomes evident that its appearance is due solely to a transcription error and has no standing at all.

There is yet another problem here, for an examination of the plant depicted as A. oreopogon in Plate CXIX of Lamb's Illustrated Reference Vol III p.625, reveals that the stamens are not of the typical Acanthocalycium form viz: with short filaments, anthers drooping, stamens coating the interior of the tube fairly uniformly - these features being shown in the flower cross section in Chileans No.14 p.39 and also visible on plate CXX, Ibid. Furthermore, a comparison between this Plate and Lamb's reference plate 487a shows a marked difference in the spine habit - length, stoutness, and colour of new spines. This might suggest that we have more than one sort of plant masquerading under the title of Acanthocalycium oreopogon.

We only have one or two slides of Acanthocalycium in the slide library and I should like to see more species included - A.W.C.

GYMNOCALYCIUM KOZELSKYANUM Schutz.

Comments from R. Ginns.

I was interested in the article on this species taken from "Kaktusy 66" as I have a collected plant labelled "sp. Capayan" which I have been told is G. koselskyanum. It differs in several particulars from the one illustrated. This makes me wonder about several points in the published diagnosis which maybe one of our taxonomically inclined readers can elucidate.

The main point is the value of the numerical data supplied. We read 10 cms wide and 6 cm high for the body, but to what age do these measurements refer? My plant was 10 cm diameter when received but only $2\frac{1}{2}$ cm high. It is now about 4 cm high but still 10 cm diameter after 3 years. Then we read 14 ribs 3 cm wide. Where is the width of the ribs measured? Presumably this is at the base and naturally depends upon the size of the plant. A simple calculation shows that for a plant 10 cm in diameter with 14 ribs, the width of each rib cannot exceed 2.3 cm.

Next we find "areoles 2 cm apart." This obviously depends on the rate of growth of the plant. In my specimen the areoles are app. 7 mm apart but as the plant has been grown slowly whilst the plant illustrated in the Chileans looks quite lush this difference is understandable.

Spines are given as 2 cm long but here again spine length is a very variable quantity. In many genera and species the length of the spines depends both on age and cultivation and whilst I have many palnts, particularly Lobivias, with inordinately long spines, this particular Gymno has spines only 6 mm long. The number of spines on my plants may be 3, 4 or 5, usually 3. When there are three they are arranged at 90° to each other as in the description. The centre one is not straight but slightly curved. Young spines are light, not dark, brown.

In view of the known variability of many Gymno species, are these differences from the published description significant and is G. sp. Capayan identical with G. koselskyanum?

Response from J.D.. Donald ...

Whether or not G. sp. Capayan is a synonym of G.koselskyanum I cannot say as the name is unfamiliar to me. Apart from this, though, I agree that the description as quoted is not very meaningful or useful except when referring to an illustrated plant. By themselves the measurements quoted have no real significance unless they are meant to be average measurements taken from a large sample of plants. I do not think that age in terms of years comes into the description, unless it refers to a qualifying period, e.g. youth, middle age, old age. How can one determine the age of an imported plant except in such terms? The 10 cm diameter plant having 14 ribs, the average width of each rib can only be - as Ron says - 2.24 cm so either the 3 cm is a careless over-estimate or - less likely - the 10 cm dia. is an under-estimate. In fact all the measurements seem to be overestimated, as Ron says.

My own plant is about 13 cm wide and 6 cm high and here the width of the 14 ribs at the position of maximum diameter is about 3 cm, narrowing evenly to the crown. The areoles are about 1 cm apart and the spines up to 15 mm long, arranged mostly as Ron says in 3's at right angles to each other, all are more or less curved slightly inwards. The colour of the spines is variable but the young spines are mostly from brown to black in colour, older spines being much lighter.

Whilst the measurements themselves may not have much significance, the morphological features such as the distribution of the spines and their shape, the flattened ribs and generally flattened body, the startlingly white relatively small flowers, are more important and readily identify the plant.

The real question is what is the difference between Gymno. kozelskyanum and G. triacanthum Backbg?

Incidentally my own G. koselskyanum was imported under the name of G. vatteri, which it clearly was not!

AN ESPOSTOA FLOWERS - from Mrs. R. Howard, New Zealand.

Another Espostoa lanata flower opened for me yesterday (March) - it opens at dusk and lasts until about the next mid-afternoon. It is almost 5 cm in diameter when fully open - the petals are small, blunt and greenish white in colour with a few of the outer ones greenish brown. The tube is short and straight with numerous medium sized scales lightly covered with fine white hair.

The stamens are white and numerous, erect, standing in a tight-packed circle about 1.2 cm from the base of the petals. The stigma was exserted about 1.2 cm above the stamens. As far as I could see, the stamens came from around the bottom of the tube wall. I am not absolutely certain of this as it was difficult to cut the flower as it was in a very thick part of the cephalium.

The cephalium continues to grow and I wonder why it formed on the side away from the sun on both E.lanata and ritteri.

Espostoa ritteri has grown very tall, being slimmer than lanata. During this summer I cut it down to about 3 ft. in height and will root this away again. My lanata is almost to the roof and it will be the next problem.

Comments from H. Middleditch.

A perusal of both Britton & Rose's 'The Cactaceae' and Backebergs 'Die Cactaceae' had failed to elucidate whether Espostoa had a scaly and hairy flower tube. In consequence, I find the above description very welcome indeed.

It is understandable that it would be very difficult to section a flower in a thick part of the cephalium, since the cephalium on Espostoa is sunk into a trough or gutter in the side of the plant, spanning five or six ribs, so that the flower would be largely buried in the thickly-packed brushy mass of the cephalium.

The notes above are an indication of how valuable are comments from our subscribers in Australia and New Zealand, where there is every likelihood of species flowering which are virtually impossible to flower in Britain, so that we are unable to make any observations upon them. We would welcome similar letters about species such as Loxanthocereus, Mila, Haageocereus, Oreocereus, Matucana, Arequipa, Borzicactus, Corryocactus, Stephanocereus, Trichocereus, etc.

OPEN FLOWERS ON FRAILEA from K. Wahle.

Following the article by W. Simon in Chileans No.14, I would like to say that I have made a special study of the flowering behaviour of my F. castanea. This plant had flowered each year only once and the flowers were completely open five out of eight times. In these five cases the flowers were completely open from 2.00 to 3.30 in the afternoon and only when either the sun was shining or the temperature was 25°C or over.

The interesting part was the count of the seeds after self-fertilisation. When the flowers were completely open, the count per seed was around the 100 mark, whilst when the flowers did not open, the count was around the 60 mark.

In 1969 this Frailea flowered twice with two flowers each time. In the first instance the flowers did not open and the seed count was 65 seeds per capsule. The second time only one flower opened while the other bud dried up. The seed count from this seedpod from the open flower was 105.

These observations may be compared with those recorded by F. Guldemont in Chileans No.11 p.66. We should certainly be interested to hear from any other members who have been able to make a seed count on Frailea fruit.

We have very few slides of Frailea in our slide library and I would like to improve our coverage of this genus - A.W.C.

LOBIVIA - DAWN FLOWERS.

Writing in the Chileans No.11 p.50, R.Zahra commented upon the rather odd hours at which he had found his Lobivia flowers open. P.H. Sherville tells the Chileans that "having observed most of my Lobivia in flower this year I find that they seem to close at about 2-3 p.m. There is a qualification to this, in that it seems that the higher the ambient temperature, the earlier the flowers close, and on dull days - if warm and humid - the flowers tend to remain open for the full 24 hours and for 2-3 days at a time.

"It would seem to me at the moment that this may be some sort of protective device to ensure that in hot dry weather, the flower does not dry up and wither, so extending the life of the flower to allow a better chance of pollination. Presumably the flower reopens ina fresh condition shortly before sunrise the following morning.

"Having reached home one morning in the later early hours and on a subsequent day arisen before the alarm clock, I have discovered that flowers of Lobivia pentlandii, cinnabarina, and weghiana always open at - or soon after - dawn. Flowers of Lobivia tegeleriana remain open fully day and night once they have opened.

"My own plants were practically finished flowering by the end of May; it must be that things are simply that much later with those collectors further north if Lobivia flowers there in June/July."

We have a few slides of Lobivia in our slide library and any additions will be very welcome - A.W.C.

CONTINENTAL CACTUS TOUR 1971

We have received an invitation to visit some collectors in Holland and it is proposed to include this in our Tour for 1971. We hope to revisit some of our acquaintances in Belgium whom we met during our Tour in 1965, followed by a run to Switzerland where we hope to see Herr Krainz again, and all his new acquisitions since our visit in 1962.

The cost of the tour is expected to be about £65 per head, covering thirteen nights accommodation, three meals per day, transport (London back to London) and insurance for baggage and medical expenses. Will anyone interested in making a provisional booking contact me.

H.M.

ERRATA

No.14 The photograph on page 2, of Leopold Horst collecting seed of Notocactus magnificus in habitat, was taken from "Succulenta".

No.15 The photograph on page 52 of Neowerdermannia chilensis should be credited to Garden News, collection R.Ginns.
The reference to SH 807 on p.56 should read SH 842.

SLIDES

We are now able to prepare good quality copies of existing slides, for our slide library. I would be very pleased to hear from any members who would be prepared to loan slides for the purpose of making copies to be added to our slide library.

Please write to me, letting me know what species you could offer us on slides on short-period loan. - A.W. Craig.

STUDY GROUPS / ROUND ROBINS

Cleistocacti	A.A. Sadd, 26 Carlisle Street, Island Bay, Wellington S.2., New Zealand.
Copiapoa	D.J. Lewis, 16 Brundall Crescent, Cyntwell, Cardiff CF5 4RU.
Epiphytes	A.J.S. McMillan, 5 Oakfield Road, Bristol BS8 2AJ.
Frailea	J. Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
Gymnocalycium	G.J. Swales, 5 Hillcrest, Middle Herrington, Sunderland, Co. Durham.
Hydroponic Culture	P.R. Hallett, Llaregyb, 20 The Garth, Bull Bay, Amlwch, Anglesey.
Lobivia	R.E. Hollingsbee, 46 Markland Road, Dover, Kent.
Matucana/Borzicactinae	Contact the Chileans
Mediolobivia	J. Chapman, 5 The Crescent, Raunceby Hospital, Sleaford, Lincs.
Melocactus/Discocactus	E.W. Barnes, 22 Coniston Grove, Ashton under Lyne, Lancs.
Miniature Opuntia	Contact the Chileans
Neoporterianae	D. Rushforth, 80 Cheltenham Road, Gloucester GL2 0LX.
Notocactinae	K.H. Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A.W. Craig, 16 Skeeby Close, Stockton on Tees, Teesside.
Sulcorebutia	W.G. Sykes, 10 Ashley Close, Thornton Cleveleys, Lancs.
Trichocereus	N.T. Hann, 5 Lake Road, Shirley, Croydon, Surrey CR0 8DS.

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