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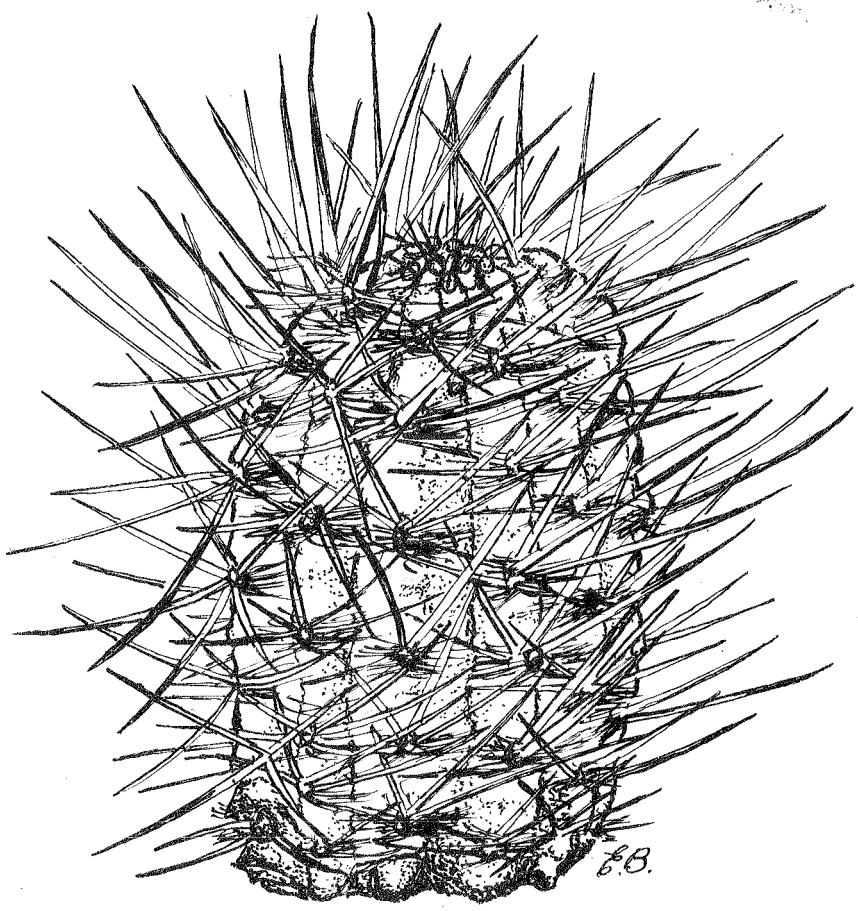
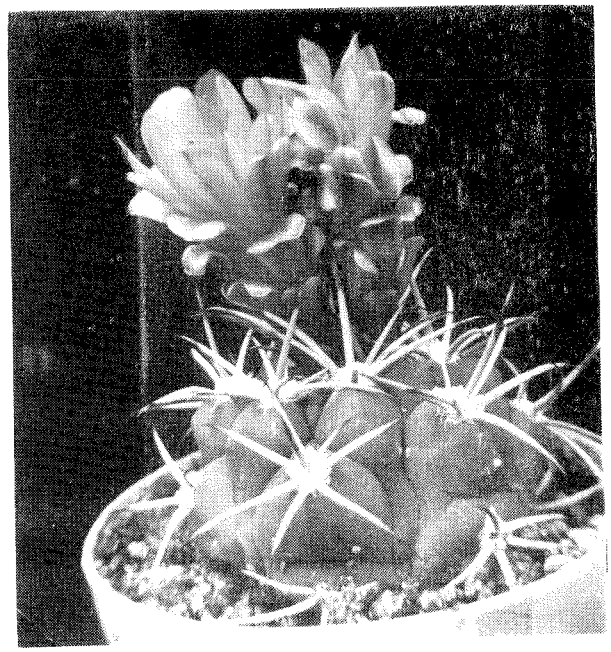


MATUCANA HYSTRIX

Collection E.W.Barnes

GYMNOCALYCIUM OENANTHEMUM

PHOTOGRAPH - BACKEBERG

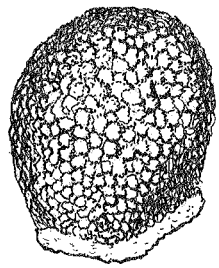


GYMNOCALYCIUM OENANTHEMUM

COLLECTION & PHOTO Mrs. L. MacINTOSH

SEED

K.u.a.S 22.4.71



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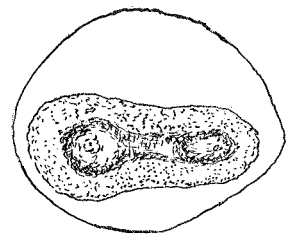
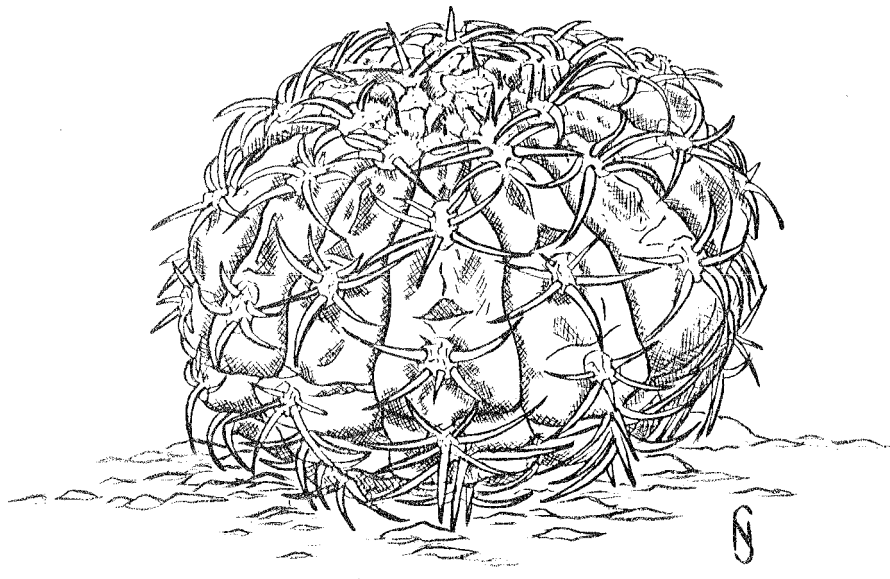




GYMNOCALYCIUM OENANTHEMUM

Zurich I.O.S. Collection

GYMNOCALYCIUM OENANTHEMUM FLOWERS by Mrs. L. E. McIntosh

Did you know that Frau Winter sold seed on her own account before F.R. started collecting? Her first list was just a typed sheet undated - about 1950-52 we think; on this she listed seed as having been collected by Backeberg and Fric or seeds from plants collected by them. A fellow collector here in Napier has a collection of plants dating back to the 1930's and from the Winter catalogue in his possession, I see that Gymno. oenananthemum seed "from Backeberg collected plants" was offered as Winter No. 89. I believe that it was a plant grown from this seed offer, grafted as a seedling, and then rooted down, that is still in that collection. It is now only 3½ inches across but all of 6 inches tall, fairly flat on top and has only five spines plus one central.

As a result of experimenting with sprays etc. in the early days, and perhaps either from damage or old age or due to suffering sometime from neglect, many plants offset freely. The plant in my photograph is an offset from the Winter 89 plant in that glasshouse.

There are also half-a-dozen plants grown from the later offering of FR 347 seed alongside this elongated specimen, the largest of them being approx. 5" across and 4" tall, bun shaped, with 7 radial spines. The sketch of the Zurich plant could be any one of seven of these specimens of FR 347 (the remaining two plants - from the same packet of seed - do have central spines, quite long, from every areole and all stand straight up).

The Winter 89 plant could never become bun-shaped, for it is far too angular, the tubercles don't form distinct ribs whilst all the FR 437 plants do form ribs even though the tubercles are large and bumpy. Even as a large plant the Winter 89 looks the same as my photograph - you will also see that the areoles are large and more or less round with quite a lot of wool, whereas in the FR 437 bun-shaped plants the areoles are quite elongated and only have wool in the new areoles.

In 1965 I grew some plants from Ritter's seed as FR 437 Gymno. oenanthemum. These 7 year old plants are now quite large and flower well. At first flowering I was most disappointed for the flower appeared so wishy-washy compared with the offset plant, lighter in colour and in texture. Having only just learned of G. tillianum I can see now why these seed grown ones of mine are so different. I had not made any notes up to now on my FR 437 plants because of the apparent differences with my Winter 89 offset. I had come to the conclusion that they were hybrids, but they are, however, identical but smaller editions of the FR 437 plants in the collection in Napier.

	Offset ex Winter 89	FR 437 seedlings
Body:	Dull grey green, 7 cm across	Dull dark grey green, 8 cm across
Ribs:	8, not distinct, tubercles large, round, sharply pointed chins, deep groove below	8 distinct, deep groove between, tubercles more flattened, chin pointed, groove below not so defined
Areoles:	Round, large and cream wooly	Elliptical, large, cream wool only in new areoles.
Spines:	Mostly 5, occasionally 7, fairly uniform length 2½ cm, standing out from body with slight curve, flat on underside. 1 central 3 cm long, straight, not flattened. All spines horn/dirty cream colour with grey bloom, brown and shiny at tip.	7 set comblike, 3 each side 3cm long, 1 at bottom 2cm long, all curved back over body, very strong, needle sharp, very flat on underside, occasionally one short (1 cm) stiff spine from top of areole, straight and pointing out like a central, not flattened. All spines dark pinky-brown grey bloom except at tip.

I had not kept a full description of the flowers on the offset plant from Winter 89, but have some brief notes: Tube light blue-green, scales and sparse, translucent, tipped rose. Flower chalice shaped, rosy cerise, petals wide and blunt, stamens pink with yellow pollen, stigma with 12 large cream lobes, stands well below the topmost stamens. The flowers in the photo are dying and would have been out for at least a week; the picture was actually taken to show the central spine, for at the time I was not interested in the flowers.

The FR 437 seedlings are in flower with me at the moment. The sepals (outer petals) are 10 in number, a fresh green colour edged and tipped with rose; they are also blunt club shaped. The next row of petals are the same length as the outer sepals and then there is an inner row of very small petals - approx. half as long and half as wide as the outer ones - they are bright cerise red, with a darker mid-stripe, club-shaped with a pointed tip and a very long narrow "stem" to the club shape. When the flower is wide open this gives the sparse petal look, for this long narrow lower part of the petal leaves a gap between one petal and the next. In full sun and about 3 days after opening, the petals open out flat like a daisy, and as there are spaces between each petal this is what gives it the wishy-washy look when compared with the Winter 89 flower. The stamens are rose and attached to the tube wall in rows, the last row being the longest with the anthers all turning in but still leaving plenty of space to get at the deep down cream stigma lobes.

The picture from the French Journal will be a reproduction from one in Backeberg's 1934 seed catalogue, I think - it appears to have the flower propped up by a seed pod. In this picture, even though the spines are badly broken, you can clearly see the difference in colour, texture, and mode of growth from FR 437. I am beginning to think that this true G. oenanthemum has not been collected again since Backeberg found it.

I also think that we shall confirm Rausch's findings about the seed being different from tillianum, for it was from the pods and seeds of cross between my FR 437 seedlings and the Winter 89 plant that I started to become suspicious. However, all the plants are just showing buds now, so this time I shall watch the flowers closely and make notes and photos. Seed should not be any trouble and I shall send you the fruits.

I also have some seedlings about 1" across from New Mexico Cactus Research seed as G. rubriflora, and some G. grandiflorum from Uhlig. These could both by hybrid as they only have five spines but feature Winter 89 rather than FR 437 characteristics.

GYMNOCALYCIUM TILLIANUM Rausch sp. nov. by W. Rausch (translated from K.u.a.S. 21.4:1970 by H. Middleditch).

Simplex, late globosum, radicibus horizontalibus, ad 10 cm altum at ad 15 cm diametiens, glauco-viride; costis ad 15, recte decurrentibus, 15-20 mm latis, in gibberes 15-20 mm longos angulatos crenatis; areolis in superiore parte gibberum si tis, ca. 8 mm longis et 5mm latis, tomentosis; aculeis marginalibus 3 paribus, uno deorsum directo, divaricatis et ad corpus curvatis; aculeo centrali nullo ad 1, patulo et paulum sursum curvato; aculeis omnibus ad 30 mm longis, subulatis, basi incrassatis, nigris ad fuscis, postea canescentibus. Floribus 30 mm longis et 25 mm diametientibus; ovario brevi, receptaculo viridi squamis roseis tecto; phyllis perigonii rotundis rubidis; fauce et filamentis coccineis; stylo et stigmatibus (8-9) aurantiacis; fructu late globoso, viridi-fusco, squamis clarioribus tecto; seminibus vix 1 mm longis, pileiformibus, testa fusca gibberulosa et hilo magno volvato albo praeditis.

Patria: Argentinia, Sierra Ambato, 2,600 - 3,500 m alt.
Typus Rausch 227 in Herbario (Naturhistorisches Museum Wien).

Body - Solitary, flattened-globular with shallow roots, up to 100 mm high and up to 150 mm diameter, blue-grey-green.
Ribs - up to 15, running vertically, 15-20 mm broad, divided by cross-grooves into 15-20 mm long, angular tubercles.
Areoles - Situated on the upper half of the tubercle, ca. 8 mm long and 5 mm broad, woolly.
Spines - Radials in three pairs and one pointing downwards, spreading and curved with the body.
- Central spine 0 to 1, upstanding and somewhat curved upwards.
- All spines up to 30 mm long, awl-like, with thicker base, black to brown, later going grey.
Flower - 30 mm long and 25 mm dia., ovary short, tube green with pink scales. Floral leaves (petals) round, dark red; throat and filaments carmine red; style and stigma (8-9 lobes) orange yellow.
Fruit - flattened-globular, greenish brown with paler scales.
Seed - scarcely 1 mm long, hat-shaped with finely tubercled, brownish testa and large, beaded edged, whitish hilum.
Habitat - Argentina, Sierra Ambato from 2,600 to 3,500 m in altitude.

I have originally spoken of this species as G. oenanthemum Backbg.; it is to be distinguished however therefrom by the longer and + spreading spination and often by a middle spine as well as by the smaller and darker flower and the entirely different seed form. The longer and more or less spreading spination is very similar to that of G. mazanense. I name this species after the Austrian Gymno enthusiast, Hans Till.

GYMNOCALYCIUM TILLIANUM Rausch by D. J. Van Vliet. (Translated from Succulenta 50.3: 1971 by H. Middleditch).

In the German K.u.a.S. Journal 21:66, 1970, Rausch described this new species. For the Gymno enthusiasts I will chat about these plants with some reminiscences.

The plants were found on our joint trip with Fechser through Central Argentina. Fechser could not accompany us any more at the time concerned, because only the day before we were to go into the Sierra Ambato, he had fallen shockingly heavily upon his backside. He could now only lie upon his stomach, with a splendid 'Rembrandt' concealed in his trousers in the meantime.

The diary relates events as follows:- Thursday Feb. 1st. - arrived at Poman. Fechser fell from the motor lorry upon his end. Looked for guide and found one as well as a camping place by a flowing stream out in the wilds. In the afternoon already scouted the surroundings with Ramundo, the guide. Found Blossfeldia liliputana and a strongly bespined Parodia catamarcensis.

Friday Feb. 2nd. In the early morning left on horseback with Ramundo for the highlands of Sierra Ambato. The frontal ranges are entirely overgrown with impenetrable shrubby vegetation growing more or less 3 m high. The inhabitants of the region have chopped horse-breadth paths here through it all. On account of the many footpaths it is a veritable labyrinth and but for guides one loses one's way. Under the bushes were countless G. schickendantzii, now and then up to half a meter high! Colossal old plants. Up at about 2,000 m altitude this species disappeared. After four hours had gone by we drank coffee with a hospitable native family. The native's horse had been killed in the night by a puma. At an idyllic spot beside

a little brook Ramundo unpacked the midday meal. Delicious cakes and cheese, all prepared by his wife. He is visibly pleased when he sees that it is to our taste and invites us to a meal when we get back.

At 2,600 m altitude I first find a red flowered Gymnocalycium. Towards the evening we reached a small farm hut at 3,000 m. We had come upon a branch of the Ramundo family. These people had not received a single visit in 8 years. They were very pleased and slaughtered a goat for a celebration meal.

Saturday Feb. 3rd. - Approaching the highland. On the way, Gymnocalycium with red flowers in abundance. The fierce red colour scarcely varied. Small Soehrensia as well, red flowering. Moreover Opuntia and Tephrocactus similarly red flowering. The stones between which the plants were growing dripped with water, supporting luxurious vegetation. Amongst juicy grasses, Begonias - double and single - flowering in many shades of red. Further on, many ferns starting from Adiantum (Maidenhair) gracillimum with fine leaflets, to A. tenerum with very coarse leaves, and in between, A. cuneatum and a tremendous amount of moss. Everything points to a low pH of the soil and a high air humidity.

Rausch hankers after the summit. On the way we were caught in a dreadful stormy squall with a snowstorm. Summer time is rain time - or, more accurately, thunder time. We returned, unsuccessful. Our hostess stoked up the open fire in the hut thoroughly in order to dry our clothes and warm us up. During the meal and afterwards the hut was illuminated by smoking oil lamps. Ramundo related the latest news. The situation here is very romantic. The temperature sank rapidly and sleeping bags provided the necessary comfort to a tired body.

Sunday Feb. 4th. - In the morning everything is frosty, here and there snow as well. Rausch once more attempts to reach the summit. This time without the leg weary Dutchman. He returned, having been turned back again on account of the weather aloft. After that we begin the return journey proper. In the evening, back in Pomona where it is distressingly hot in contrast with high altitude where it is absolutely cold. That is typical mountain climate in the summer. The evening and night are clear and bright. The start of the morning also. After that clouds form up on the peaks. At noon, thunder and then it clears up, and so on until the winter season comes and every day is a 'Sun'day.

So much for the diary.

In my view G. tillianum therefore should be included in the section Mazanensia of the Microsemineum sub-genus of Gymnocalycium, established by Schutz. It is not clear what in this section are species, varieties, or forms. Specialists see several species in the various forms of plants which I collected in the surroundings of Mazan. It is certain that an extensive area lies fallow here, that can only be investigated co-operatively.

In the classification of my plants of the genus Gymnocalycium I use the Schutz system. In my view, he has the best experience with this genus, not only theoretical but above all practical as well. I would regard the latter as of greater importance.

It may happen that there are enthusiasts who possess plants under the name G. oenanthemum that also bloom with deep red flowers. These plants all emanate from seeds which Ritter offered in the 1959 catalogue of Winter under the number FR 437 Gymno oenanthemum. After the field number he remarks "Catamarca, large flower, intensive red (vermilion-carmine)". We found G. tillianum likewise in this region around the town of Catamarca. This is in my opinion explained by the fact that the G. oenanthemum Backbg of Ritter is identical with G. tillianum Rausch and not with the species described by Backeberg.

Backeberg in his turn has described but not found G. oenanthemum (latin = wine red flowers). As the habitat he gives Mendoza or Cordoba, with a question mark. Of the flower colour he says "deep salmon-red, can vary".

In conclusion I should like to comment about the cultivation of these plants, that they thrive outstandingly in Meyer's Chemi-earth, that they do not want too much water in the spring and are not able to bear a high temperature.

GYMNOCALYCIUM OENANTHEMUM Backbg By C. Backeberg

Abstracted from "Blatter fur Kakteenforschung" 1934:9

Pallide griseo-viridis, costae ca. 11, acute angulatae et traverso-sulcatae, tuberculis supra areolas productis praeditae. Aculeis radiales 5, subrubro-grisei, ad 1.5 cm longi, ex areolis oblongis orti. Flores nitide coccineus, ca. 5 cm longus.

Patria: Mendoza (Argentina).

Dull pale grey green, solitary, ca. 11 ribs, up to 2 cm wide, sharply angled, proturberances above the areoles with sharp grooves below. Radial spines 5, reddish slightly curved, up to 1.5 cm long, from narrow elongated grey areoles. Wool in areoles yellowish. Central spine wanting. Flowers pale claret coloured (!), large, up to 5 cm long, scales pink edged; fruit pale green, slightly mealy. With the exception of Gymnocalycium venturianum the only species so far known with red flowers.

Comments on Gymnocalycium tillianum and oenanthemum

..... from Mrs. E. Graydon

"You were asking about G. oenanthemum in the Chileans. I enclose a slide of my plant which was grown from seed by another grower in New Zealand - I think it most likely that the seed came from Winters where New Zealanders were getting more of their seed a few years back. This plant is now seven years old, it is about 3" across and growing in a 5" pot, on the top shelf of the greenhouse in full sun. The body is dark green, with seven ribs, the spines very stout and strong, greyish white, brown when wet, up to $1\frac{1}{4}$" long (3.0 cm) and curved.

"For the last three years it has produced just one flower each season, ruby red, long lasting and fading to pink; it had been in bloom for several days (waiting for the weekend) when the slide was taken and the camera has picked up more pink than red. It has set seed for the last three years; I did not keep the first year's seed, the mice got it the second year, but this year I am able to send some to you. The fruit was dark green and a roundish berry. On ripening it split down the side and then lifted off the plant body. The seeds were slightly sticky and had to be rubbed off the fibre and seed case."

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

"My larger plant of G. oenanthemum was bought, I think, from De Herdt and it resembles the Zurich plant, except that it has one central spine per areole. Details are as follows: Body dark bluish green, 8 cm diameter, 5 cm high, 7 mature ribs, 3 more immature ribs forming. Ribs sharply grooved to 1.5 cm below the areoles, which are buff, becoming grey, 8 x 4 mm at 1.5 cm centres. Spines: 7 radials, somewhat irregular and curved to the body,

1 central. All tapered and curved, amber, tipped brown, turning to grey, through pinkish, 1.5 - 2.0 cm long.

"It flowered last season and this year it had three buds which all opened in July, wide open, approx. 6 cm diameter and 5 cm high. Outermost petals greenish, graduating to wine red (crimson-purple), with slightly lighter edges on the innermost petals. Many stamens, one group half-way up the style, others close to the tube with the topmost ones about the same level as the open petals. The lower stamens ripen earlier that the upper ones. Anthers deep cream in colour on wine red filaments. Five lobed stigma, deep cream colour, with short, stout wine-red style.

"Fruit was set both years, the pod being onion shape but the flower remains are broad based. At 1 cm long and 8 mm diameter it may not have attained full size. It is mid-blue in colour (with slight green influence), with white-edged scales, each with a touch of red at the top centre. The flowers are apparently self-fertile. The seeds are black. I will send you some seed when ripe.

"I also have some younger seedlings grown from de Herdt's seed of oenanthemum, which have five relatively longer curved spines, which stand out from the body and turn pinkish - these are more like the photo from Mrs. McIntosh.

"I would think that unless there are radical differences in the flowers that G. oenanthemum and G. tillianum may be different manifestations of the same species.

"My own seed off the plant last year was sown in early April this year and was very slow in germinating - apparently only three seeds germinated. However many more have appeared during the summer months, most of them at about the flowering time for the species, or just after. The same thing happened with G. damsii v. rotundulum and - to a lesser extent - with G. nidulans. In future I shall sow my Gymno seeds somewhat latish and keep the pots moist until after seed ripening time."

..... from H. Middleditch

"The original diagnosis for G. oenanthemum, published by Backeberg and reproduced above, was accompanied by an illustration itself reproduced from the Czech Journal Kaktusar for August 1934. That particular illustration depicted an almost spineless centre to the crown which was filled with tubercle humps; those spines which can be seen do not overlap those from adjacent areoles. The ribs follow the description in being sharp angled; one might guess at about a dozen ribs.

"The drawing by Mrs. N. Swales, made from a slide taken in the Zurich City collection, is likewise of a plant with spines which generally fail to overlap those of neighbouring areoles, and one might estimate thirteen or fourteen ribs. However, one gains the impression that the ribs are rather less steeply angled than the original Backeberg illustration, and also the crown, instead of being bare, is white with numerous areole cushions. The plant described by G. E. H. Bailey would appear to have a large flower matching Backeberg's description, but the spines are rather longer. On the other hand, the flower size and spine length quoted by Mrs. E. Graydon would seem to be nearer G. tillianum. This could well be explained by Van Vliets suggestion that the Winter distribution of FR 437 was in fact G. tillianum and not G. oenanthemum.

"There is a colour illustration of G. tillianum on the front cover of the Succulenta Journal in which the above article appeared, and a black and white print accompanying the article in K.u.a.S. In both illustrations the flower is shown partly open with the uppermost stamens standing upright; as Mrs. McIntosh confirms, they do not curl over and obscure sight of the stigma, as does occur in some species of Gymnocalycium.

"I am rather suspicious of the validity of Rausch's observation that the seeds of G. tillianum are markedly different from those of oenanthemum."

..... from D. Supthut.

"(Following a request to assist in identifying the sketch of the plant which carried the label G. pflanzii in the Zurich City collection).

"The matter of the G. pflanzii is really amusing. Herr Krainz and I engaged in a thorough search yesterday. Using the photocopied sketch, it was easy to find the plant in question. It is undoubtedly G. oenanthemum. Probably the label had been mixed up at some time. The exact origin of this plant is unfortunately no longer known. It has already been in the Collection over twenty five years. In the seed collection we have two examples, of seeds from some plants in the year 1942, and imported seeds collected by F. Ritter in 1956 (FR 437). I am sorry to say that we still lack seed of G. tillianum and from the diagnosis one can glean little about the seed in question. At least it is certain that both species are very closely related indeed."

..... from C. Webb

"In his Die Cactaceae Vol III Backeberg's description of G. oenanthemum differs from that quoted from his B.f.K in giving the radial spines as "translucent reddish grey" and the areoles as "yellowish at first, later grey feltlike".

"In Friciana No. 16 of 1963, Dr. Schutz states that G. oenanthemum is similar to G. hybopleurum except that it has only five spines and that the plant only flowers when very mature.

"I have two small plants under this name, both about 4.5 cm in diameter and 3 cm high, which agree basically with the description given; both my plants have mostly seven spines with the upper two very short (when seven are present). I have had one plant since about 1968 but I can't recollect where I got it. This one has eight ribs at present, sharply angled, matt grey green with stout spines up to 1.3 cm long, 5 or 7, curved slightly backwards. This tiny plant has produced one flower each year since 1969, long lasting, deep wine red, and large. A very slow grower but this may be due to the fact that it never seems to get a decent root growth.

"The other one is a matt blue-green, ribs a bit more rounded. Spines stouter and deeper coloured, especially at first, later greyish brown. Mostly five spined. This one came from De Herdt in 1971 and is much faster growing.

"I do not possess a reliable G. hybopleurum so can't make any comparison here but there is a similarity with G. mostii forms."

..... from R. Moreton

"I hope to have seeds of both G. oenanthemum and tillianum shortly so I will be able to make a comparision. From my own observations I would say that the flower shapes of the two species put them in different groups - oenanthemum is much wider and shorter tubed and is a true wine red, as opposed to tillianum's more crimson colour. Also in oenanthemum the body is yellowy green with the spines quite closely adpressed, whereas in tillianum the body is blue-green and the spines horizontal.

"Have you met G. rubriflorum which is said to be a synonym of G. tillianum?"

..... from R. Ginns

"The sketch of G. oenanthemum from Zurich corresponds fairly closely with my own plant under this name, which I bought from Churchman in the early 1950's. It has a deep red flower corresponding to the figure in Die Cactaceae.

"Surely Herr Schatzl has made a mistake when he says (Chileans No. 12 pp80-81) that G. oenanthemum is characterised by pale lilac flowers?"

..... further from H. Middleditch

"The seed from Mrs. Graydon in New Zealand and from G. E. H. Bailey was examined in conjunction with G. J. Swales, together with other examples of seed of this and closely associated species. Allowing for the inevitable degree of variation in depth of hilum margin, angularity of testa tubercles, degree of Vee on the hilum when viewed from the side, and in the existence and magnitude of a bar of spongy tissue across the base of the hilum when viewed hilum upwards, all the seeds of G. oenanthemum were alike. Some seed of so-called G. tillianum from New Mexico Cactus Research were also identical to all the oenanthemum. A packet of "G. tillianum" seed from Uhlig contained some seeds like oenanthemum and other seeds which were a little larger than all seeds of oenanthemum, and also had rather more marked spreading of the testa envelope adjacent to the hilum (giving the seed more of a fireman's helmet shape), and a somewhat thicker layer of spongy-looking hilum tissue. It is possible that these distinguishably different seeds may represent what Rausch describes as "entirely different" seed form. Different, possibly, but hardly entirely different.

"Any member able to spare four or five seeds of G. tillianum would find them given a good home for study purposes."

..... from G. J. Swales

"The black and white photographs which came from Mrs McIntosh are of various views of the plant and of the flowers. Without looking at the names on the back of the prints, I found no difficulty in separating them into two sets, one of which showed a plant with the tubercles arranged in ribs, the other set of prints showed a plant having tubercles which lacked any pattern of clearly defined ribs.

"On reading the notes from Mrs. McIntosh, I see that she also observes that FR 437 has ribs whereas her Winter 89 does not. I could agree with her comment that the Zurich plant "could be any one of her FR 437 plants" as they both have ribs. The various illustrations of oenanthemum and tillianum in Succulenta, K.u.a.S., Haage's book, the National Society Journal, Kaktusy, and a slide of a plant taken in the Monaco Jardin Exotique, together with my own examples of these two species, all exhibit a fairly clearly defined rib pattern. Mrs McIntosh's Winter 89 plant would appear to be the only one which I have come across which lacks the clearly defined ribs - a feature which is uncommon amongst Gymnocalycium.

"The petals received from Mrs McIntosh have kept their colour beautifully. They are quite distinct in shape, the FR 437 being slender and spathulate, with a pointed tip (acuminate), whereas the Winter 89 is much broader, oblong in shape with little or no point. Although it is not altogether reliable to make comparisons on the basis of a photograph, I would have thought that the illustration of Backeberg's plant on the inside front cover of this issue appears to exhibit more elongated petals with a pointed tip, rather similar to those of Mrs. McIntosh's samples from her FR 437.

"The flower of G. tillianum illustrated on the cover of the Dutch Journal Succulenta, appears to exhibit the spathulate petals of similar shape to those on Mrs McIntosh's FR 437, but without the pointed tip of the latter; indeed, they appear to be notched in some cases in an irregular manner, so that the ends of the petals exhibit a rather ragged appearance.

"My own plant labelled G. oenanthemum (which is under my access number G 64) possesses the raised humps near the growing point, rather like those which can be seen on Backeberg's photograph. The tubercles are also arranged in clearly defined ribs. The shape on the petals and

their arrangement would also seem to place my G 64 closer to Backeberg's plant than to Winter 89. When the flower closes up, the tips of the sepals remain reflexed, so giving the flower an appearance somewhat similar to those on Mrs. McIntosh's photograph - which also shows sepals quite distinctly reflexed. However, when my flower opens out, the petals reflex to meet the sepals so that the effect is much less pronounced but the tip of the sepals are still reflexed even then.

"This would suggest that my G 64 which does have ribs, produces reflexed sepals similar to Mrs. McIntosh's Winter 89, which does not have ribs.

"A slide of my G 64 plant would give the impression that the spines are quite white, whereas on the plant itself they are dark brown when new, (as on my G 64) but appear to become white rapidly. Even on the b & w prints from New Zealand of FR 437, one can see the darker spines in the crown.

"In reviewing Gymnocalycium in the N.C. & S.S. Journal, J.D. Donald observes "In the Sierra Ambata, Lau searched for and found Rausch's tillianum. This has a bright green epidermis with strong greyish or brown, slightly curved spines." The term "greyish or brown" spines would cover both the forms of spine coloration noted above. On the other hand, Mrs McIntosh's Winter 89 has mature spines with dark tips, a feature absent on any examples of oenanthemum or tillianum which I have come across.

"In the same article, J. D. Donald also observes that "Gymno. oenanthemum has a flower colour similar to tillianum, but with a longer tube, a more greyish or bluish-green epidermis, and generally fewer and shorter white spines. The seed of G. oenanthemum is quite distinct and belongs to the Schutz section Hybopleura or the Buxbaum series Mostiana."

"My own G 64 (tillianum) has a slightly shorter and fatter tube than my oenanthemum, but the latter does not have white spines.

"Buxbaum's series Mostiana includes G. mostii and oenanthemum, but tillianum, being a later discovery, does not feature in his review. In Krainz's "Die Kakteen" and later in K.u.a.S. Buxbaum reviews Gymnocalycium by seed types and for almost all seed types he gives two views of a typical seed; but in the series Mostiana he gives one view of an oenanthemum seed and the other view is of a mostii seed. (See those reproduced inside front cover - H.M.). This would suggest that the seed of these two species may be very similar and brings us to the discussion of the relationship between these two species in the comments from H. Middleditch.

"All the available evidence would tend to support the view put forward by various authors that FR 437 is synonymous with tillianum. Although Rausch has suggested that the seed of tillianum may be readily distinguished from that of oenanthemum - a view echoed by J. D. Donald - yet there would not appear to be two easily identifiable seed types in general circulation. Lacking firm evidence of two seed types, there is apparently no reliable alternative method of separating tillianum from oenanthemum.

"So far, we seem to have found very little to differentiate plants under the names of oenanthemum, tillianum, and FR 437. All appear to have ribs, to have dark spines when new, maturing rapidly to a paler shade, whilst flower characteristics do not seem to be a precise factor. Looking at all the information and photographs to hand, it would appear that the mostii-tillianum - oenanthemum complex may be various representatives of a variable population group.

"However, Mrs McIntosh's Winter 89 can be distinguished from other plants in the species complex by its lack of definite ribs and by the retention of the dark tip on the mature spines. At this stage some seed from Mrs McIntosh's FR 437 was placed under the microscope, side by side with some seed from her Winter 89. The seeds of FR 437 (tillianum) were virtually identical with all the other seeds which I have obtained from several varied sources under the names of either oenanthemum or tillianum. However, the seeds from Winter 89 turned out to be rather

exciting, for although it was about the same size and colour as FR 437, there were some quite readily distinguishable differences, as follows:-

	FR 437	Winter 89
Testa shape:	Waisted above the hilum.	Oval, no waisting above the hilum.
Hilum:	Covered by a fairly thick spongy coat (or strophiole), cream in colour.	Hilum dark, apparently lacking any spongy coating.
Basal cut-off:	Shallow vee.	Almost straight.
Hilum size:	App. equal to width of seed and $\pm \frac{1}{2}$ to $\frac{2}{3}$ breadth of seed.	About half as wide as seed and half as broad.
Testa cells:		
- size	More warty.	Less warty.
- disposition	Apparently completely random.	Several definite lines of testa cells to be seen.

If these two batches of seed were mixed up together there would be little or no difficulty in separating them out again into the two quite distinctive types. The cream hilum coat on FR 437 would be the quickest means of separating them.

"Buxbaum's illustration of seeds of both oenanthemum and mostii checks pretty closely with the New Zealand FR 437 seed and all my other examples of FR 437, oenanthemum, and tillianum, but will not match this Winter 89 seed. Indeed, the Winter 89 seed does not seem to quite fit any of the different seed types illustrated by Buxbaum. I suppose it could be nearest to Buxbaum's illustration of G. saglionis seed, but even then there are some differences.

"I can see that I shall have to have a look through all my other Microsemineae seed, to try and find any which may bear a similar appearance to those of Winter 89. It would appear that Mrs McIntosh's ribless wonder could be something out of the ordinary."

..... P.S. from H. Middleditch

"Perhaps Mrs McIntosh's ribless wonder may even persuade Gordon Rowley to relent and accept that there could be ten species of Gymnocalycium not just nine, after all?"

The slide from Mrs. Graydon is now in the Slide Library - A.W.C.

GYMNOCALYCIUM - of the GROUP MICROSEMINEAE FRIC - Part 6 by Dr B. Schutz (Translated by K. Wood-Allun from Friciana Nr. 16/1963)

Section Hybopleura

G. hybopleurum Bkbg. This is the only plant of this related group which was known to K. Schumann, but he considered it to be a variety of G. multiflorum. The difference between the two is, however, so striking that the erection of a separate species by Backeberg in 1935 was fully justified. It is a flat, broad plant with 7-9 radial spines and no central. The flowers are relatively large and white, and, according to Schumann, with a red patch in the centre of the flower. Backeberg describes the throat as greenish pink. True G. hybopleurum are rare. Fric imported them under G. mostii. To my knowledge only three plants exist from Fric's seed. One is in the Prague Botanical gardens,

one in the Brno Municipal collection and the third, raised from seed obtained from Fric, is in my collection. Seed offered here or abroad produces all sorts - but no examples of G. hybopleurum. There is an illustration of a fine species in 'Die Cactaceae' III No. 1680.

G. mostii (Gurke) Br. & R. G. kurzianum (Gurke) Bckbg. Both these fine plants were described by Prof. Dr Gurke, who carried on Schumann's work. Both descriptions were of imports sent to the Botanical Gardens in Berlin Dahlem by a certain Carlos Most of Cordoba. They are different from each other in that G. mostii is bluey green, whereas kurzianum is light green. Mostii has seven radial spines to kurzianum's eight. Each has a central spine. The flower on mostii is bright pink with a darker throat whereas that of kurzianum is white with a strawberry throat. They are without doubt closely related. Britton and Rose recognised only mostii. They believed that kurzianum was only a synonym. Backeberg claimed that kurzianum is a variety of mostii. I have studied many of these plants, including imports and I believe that the two species are clearly distinguishable from each other and that we should respect Gurke's legacy. The most important distinguishing feature is body colour. Dark green plants are mostii and light green, kurzianum.

G. grandiflorum Bkbg. This species is closely related to those mentioned above. It has only five radial spines. It is characterised by its large, pure white flower. At the present time the species is not represented in our collections although a single specimen is reputed to exist in Southern France. According to information received from F. Bozsing, an imported plant flowered in Austria last year whose flower corresponded exactly to the description. In the event of another of the same species, imported at the same time, flowering too, it is to be hoped that seed could be obtained so that more plants could be produced.

G. bicolor Schutz. The description of this plant was published in Friciana Vol I No. 7. A very characteristic plant with one central and eleven radial spines. The spines are two toned in colour and this is heightened when they are wet.

G. horridispinum Frank. A further plant from this group which was only recently described in K.u.a.S. Vol. 14, 1, 8-10 by G. Frank of Vienna in 1963. It has 10-12 radial spines 20-25mm long and four strong central spines, thickened at the base, of some 3-4cm in length. Initially the buds are purple-red. Flowers white with a lilac pink edging and central stripe, throat white. The species originates in Cordoba where it grows on grassy hills at a height of 700 to 800 metres. We have already sown seed of this novelty.

G. valnicekianum Jajo. Described in 1934 in 'Kaktusar'. According to Jajo, the plant was grey-green, matt, flat to spherical with 7-9 radial spines and one central. The radial spines were fragile, lightly incurved, the central spine awl-shaped, bent, and robust. I am familiar with the holotype. It came from a large number of imports owned by Bohumil Chronc and I bought one from him. Plants corresponding to the type are seldom to be encountered in our collections today. Different forms of the plant arrived later; they were light green and had more secondary spines and, most important, more central spines which were thin. Their whole appearance was significantly different and I therefore considered it advisable to describe them as a variety - G. valnicekianum var. polycentralis. The description and the photograph were published in 1949 in Kaktusarske Listy, p.41.

Backeberg, in my opinion wrongly, would not recognise this variety. My variety polycentralis differs from the type much more strikingly than many of Backeberg's varieties e.g. weissianum, mazanense, etc. where transitional forms occur. It would clearly be detrimental to the subject if the dark green type with one central spine were not separated from the light green variety with 4 to 6 or sometimes even more central spines.

From ignorance of the original description, our plant has been described by Castellanos

and Lelong as G. immemoratum and by Schick as G. tobuschianum. Through the kindness of Herr Bozsing I have an offset of Schick's original plant. It corresponds to the description of G. valnicekianum. In Czech collections there are many forms of this fine plant, of which some have fairly strong and firm spines and others weaker and thin spines. All G. valnicekianum offset, so that they are easily increased. Old plants are columnar.

G. oenanthemum Bkbg. Described in 1934. It very much resembled G. hybopleurum except that it has only five spines, but we can distinguish them clearly by the flower which is dark wine red. It is a very beautiful flower but one has to wait a long time for it for the plant only flowers when very mature. The habitat is Mendoza and the plant is fairly well represented in our collections. The Brno grower Zdenek Fleischer rendered a great service by continuing growing on from seed and distributing.

G. rubriflorum Hort. This name without its author appeared in a catalogue before the war. We acquired a few seedlings which did in fact produce red flowers but an entirely different red to that of G. oenanthemum. These were carmine. It is not known where the plant was discovered. In appearance it reminds one of G. oenanthemum but its 'chins' are more widely separated, it has fewer ribs and the spines are more protuberant. I still have the original plant which is autogamous and occasionally forms offsets so that its future is assured.

G. nigriareolatum Bkbg. We know this plant well from the illustrations which were published in 1934, not only in B.F.K. but also in Kaktusar. Later it was quoted in various plant lists. The same photograph appears in Die Cactaceae, but I have never seen the plant which corresponds to the photograph. The nigriareolatum in collections resemble all kinds of plants but they do not have the black areoles from which it of course takes its name. I assume that seed distributed under this name was not true. Stuemer collected the plants and he apparently claimed that they were discovered in Catamarca Province. According to Backeberg the seed is medium large and this would indicate that the species does not belong to the Microsemineae group. Further misfortune occured when Fric took it for his G. curvispinum. In this was curvispinum mistakenly named nigriareolatum and a typical nigriareolatum became curvispinum. More will be said about this in the discussion of the next species.

G. curvispinum Fric Catamarca. G. curvispinum Fric Portezuelo. Fric offered seed of this species in his 1930 list. No further information was published until 1935 when, in Kreuzinger's Revision, curvispinum (Gurke, Iconographia) was included. From this it became clear that Fric was mistaken. He had considered Echinocactus curvispinum, which was illustrated in Gurke's Iconographia, to be a Gymnocalycium. In fact, as was later proved, it was a Horridocactus, a Chilean plant. True G. curvispinum is very similar in spination to this Horridocactus. G. curvispinum is however very different from not only the photographs of G. nigriareolatum but also the plants raised from seed of that name. I obtained authentic curvispinum from the late Jan Suba who got his seed from Fric.

G. curvispinum 'Catamarca' has sharp ribs whereas the ribs on the form called 'Portezuelo' by Fric are more rounded. The flower petals are white with a pink central stripe. In this it also varies from G. nigriareolatum which has white flowers with a green throat. It is my view that it is our duty to grow G. curvispinum in both its forms so that we can use it for comparison and we should, where ever possible, also grow the true G. nigriareolatum.

Comments on Section Hybopleura

..... from H. Middleditch

"Several things puzzle me in this article - my own impression of what constitutes a plant of G. hybopleurum would put that species outside this section. In addition, now that we have seed of

G. horridispinum, one could consider placing this species too outside the Schutz section Hybopleura, although the spination may be considered to place this species close to G. mostii.

"I find it very interesting to open out Britton & Rose's "The Cactaceae" Vol. III at Plate XVII and see there an illustration of G. mostii, with the scales standing out a little from the tube just like those on Mrs McIntosh's photograph of her oenanthemum, and also to see on the same Plate the separate open flower with the fairly broad petals and an extra row of small inner petals. This reminds me of Mrs McIntosh's description of her flower with ". . . an inner row of very small petals . . . bright cerise red." And now Schutz describes the flower of G. mostii as "bright pink with a darker throat". On looking at the colour print of "G. oenanthemum" in flower at Zurich in the October 1961 K.u.a.S., (perhaps the same plant as that depicted inside our cover), I see a bright pink flower with broad, untidily arranged petals - similar to my own slide of "G. oenanthemum" in flower in the Jardin Exotique at Monte Carlo.

"When I look at the original Backeberg photograph of Gymno. oenanthemum, it would appear to have only a single row of narrow petals, just like the colour photograph of "G. tillianum" in flower on the front cover of Succulenta. Have Krainz and Kronlein perhaps so led everyone (including Rausch and van Vliet) to believe that their "G. oenanthemum" is according to Backeberg's original description, that when Rausch and van Vliet did find a plant with a flower conforming to Backeberg's original G. oenanthemum they decided to call it G. tillianum?"

..... from J. D. Donald

"Briefly I am satisfied that G. oenanthemum and G. tillianum are separate species. I have two quite different seed types from the plants that I grow under these names. Both the G. oenanthemum I have are very similar and raised from quite separate batches of seed. I have never seen an imported G. oenanthemum, only G. tillianum comes in this category and they are quite variable in body, spine and flower form. The Rausch plant is deeper coloured than the majority of Lau plants but some of the latter are quite dark. The seed from Ritter's plant called "G. oenanthemum" proves that Van Vliet was right - Ritter's plant is G. tillianum. This suggests that the Zurich plant illustrated here is G. tillianum as it is exactly like Ritter's plant in my collection.

"The pink flowered mostii I also have - it varies in depth of colour from plant to plant - generally it is rather pale with the inner smaller segments deeper in colour than the outer but it is never as deep as the oenanthemum, which does not vary much in tone from outer to inner segments. Both oenanthemum and tillianum have a more open flower than mostii i.e. the segments are more reflexed when fully open. I could never call G. mostii cerise red, but I have plants of G. baldianum that are cerise red.

"To me the big question is - did G. oenanthemum come from "Cordoba" or further south?"

..... further from H. Middleditch

"This is most interesting to have one view confirming Rausch's note about seed differences - perhaps any members fortunate enough to flower an imported G. tillianum and set fruit might care to spare a few seeds so that further comparisons may be made."

..... from G. J. Swales

"My own G. mostii flower is but the palest shade of pink and my impression is that this species has a flower which is a great deal lighter in colour than either oenanthemum or tillianum. I think that it may be more worthwhile looking elsewhere in the literature for really red-flowering plants, which could be more closely associated with tillianum."

..... from H. Middleditch

"Such as G. baldianum, described in 1905, and G. sanguiniflorum, described in 1932, perhaps? Both having red flowers, it is interesting to see that Backeberg accompanies his diagnosis of G. oenanthemum, in 1934, with the comment "with the exception of G. venturianum, the only species so far known with red flowers".

..... from G. J. Swales

"There is yet one more red flowering Gymnocalycium on record before Backeberg's oenanthemum was published, as we are told by Dolz, in his article on G. sanguiniflorum in K.u.a.S. for 1938:- "We have today a second good pronounced red flowering species in G. oenanthemum Backbg. (B.f.K. Sept. 1934). The "Echinocactus spec. nov. red flowering" illustrated in the catalogue of Haage in the year 1932 p.51 is undoubtedly identical to this, particularly as Herr Haage in a letter to me likened the normal body form of G. oenanthemum to a weakly spined G. kurtzianum. Likewise, the Haage plant occurred in an imported batch of G. kurtzianum."

..... and from H. Middleditch

"Many years ago I was presented with various pieces of vintage literature by the retiring Secretary of the Newcastle Branch of the N.C. & S.S. On occasions in the past I have sorted through these papers and half-resolved to dispose of them. Perhaps it is fortunate that I hung on to them, for amongst them I find I have Haage's catalogue for 1932 and inside it is the very illustration to which Dolz refers."

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

"The photograph in Haage's catalogue depicts a Gymno with well defined ribs and a quite distinct hump above each areole which is rather like those on the Zurich plant (on the inside front cover) and the spines appear to be of comparable length and disposition. The flowers are fairly short in the tube and the sepals do not fit closely to the body of the flower. All in all I am inclined to believe, like Dolz in his time, that the plants which we can see in collections now under the name of oenanthemum are by and large a reasonable match for Backeberg's original plant and description - with the exception of Mrs McIntosh's ribless wonder."

SOME CLEISTOCACTUS on the RIVIERA By T. Lavender

On our last visit to the Riviera we were given the opportunity of viewing both the magnificent collection of Mr Marnier-Lapostolle and the nursery section of the Jardin Exotique, which is not open to the general public. We were keeping a special look-out for certain sorts of plants, including Cleistocacti, and we found quite a number of these in bud, flower and fruit.

C. reae, from Inquisivi, Bolivia. This plant was about seven feet in height and carried several buds and flowers near the crown. The buds were covered with chestnut brown wool and the flower tube was clothed with wool of the same colour. The flower was slightly zygomorphic, having a slight bend at the junction of the pericarpel and tube. One of the buds exhibited a partially exserted stigma but when we viewed the flower at about 2.00 p.m. there was no noticeable stigma exsertion.

C. pungens, from Ayacucho, Peru. This plant was about 4' 6" high, with fruit and buds near the crown. Some of the spines on this stem must have been almost 2" long; most of the spines were curved, in various directions. There were three fruits to be seen, nearly 2 cm in diameter;

the fresher fruit was pinky brown, the ripest very dark purple, almost black, globular, slightly pinched in under the dead flower remains, with very few scales. When we projected the slide of this plant, we discovered that it was carrying two small pieces of a parasite which appeared to be phrygillanthus - which we had not observed when taking the photograph; presumably it was an imported plant.

C. tominensis, from Sucre Bolivia. Again with buds from near the crown, slightly zygomorphic flower pointing outwards and slightly upwards, carrying numerous small scales on the tube. Flower petals very dark at the tip, red in the middle and shading out to brownish-red at the base.

Cleistocactus ipotanus was carrying buds, flowers, and fruit, borne about nine or ten inches down the stem from the growing point. The fruit was rather more top-shaped than globular and carried numerous scales laid in neat spirals. The last inch or so of the top of the stem exhibited a distinct taper so that the crown was much narrower than the rest of the body.

Cephalocleistocactus ritterii from the Bolivian Yungas, was carrying a number of very fine, hairy, straw coloured bristles in the crown which were longer than the normal spines - somewhat similar to Seticereus icosagonus. One bud was appearing below this zone of longer bristles, but all the other flowers were in the zone of the "pseudocephalium". The flowers were a very pale butter colour with a light green tip when young that was less evident later, and an orange-red band adjacent to the green tip.

Cephalocleistocactus pallidus from the Consata basin, Bolivia, exhibited numerous flower buds over a length of stem right up to the crown; all the buds were covered with a dark chestnut-brown wool.

Cleistocactus parapetiensis, from Cordillera Province, Bolivia, was carrying a number of buds from part way up the stem; the buds had a red tube and were green at the tips.

Cephalocleistocactus chrysocephallus, from Inquisivi, Bolivia, carried a brush of very long thin spines at the crown where the buds were appearing. The crown of the stem was somewhat swollen into a club shape rather reminiscent of Arrojadoa.

Cleistocactus ayopayanus from Ayopaya Province, Bolivia, carried spines which appeared to be quite short and sparse for the size of plant, thus making the woolly areole even more outstanding in contrast. A number of buds were appearing near the crown.

Cleistocactus 8190 exhibited extremely large areoles - honey coloured humps of felted wool. A few flowers appeared very close to the crown - yellow flowers covered by dark brown scales.

Cleistocactus 5368 exhibited a starry spination together with one central spine projecting upwards, downwards, or outwards. At first glance the areole seemed to have a black eye, but a close scrutiny revealed that this was an optical illusion, the areole was very small indeed and the bases of the spines were coloured black. There were several flowers, shaped like a leaning letter "S", with the stamens just projecting from the petals which were scarlet in colour. The scales were less dense on the tube compared with the pericarpel, and there were signs of a little woolly white hair in the scale axils. The fruit was like a round pink berry carrying the thin base of the withered flower remains. The pollen appeared to be still ripe on the stamens projecting from the withered flower. There were only a few scales on the fruit.

Cleistocactus 2515 carried several flowers a few inches below the crown, of rather stumpy form and barrelloid in shape, brownish green at the very tip and a red tube infused with greenish-brown at the base, hairless. The honey coloured needle-like central spines pointed downwards.

In examining the slides of all these plants at leisure at home, one could appreciate even better the differences between the flower or fruit of one species and another. The accompanying

sketches were inspired by seeing so many of these Cleistocactus from the various collections that we have visited at various time. All of these drawings were taken from colour slides and therefore I may not have been able to draw them exactly like the living flower. I find it difficult to see all the detail that one would expect to be able to see on the plant itself as opposed to a colour slide.

I found the shape and colours of the flowers that I saw fascinating and decided to make a small collection of Cleistos and study the various characteristics of the flowers and seeds, and of the plants also. I would imagine that the flower tube has hair in the scales in all the species - but probably more on some than on others. However, I could not see any hairs on some of the colour slides and therefore preferred not to guess and only drew what I could see. I would appreciate any comments from readers on this genus - if these can be forwarded either to The Chileans or to myself, we will assemble the information and compare observations.

As I was sketching these flowers I found myself wondering if the shape of the flowers had any significance in identifying certain groups of species. Perhaps those Cleistocacti that had the least amount of bend in the flower tube come from a particular area, or perhaps the thicker stemmed plants had the greatest amount of bend. At this stage, I do not know and so I must wait until my own plants grow a little more and flower before I can comment.

We have a number of slides of Cleistocacti in the slide library but any flower close-ups would be very welcome indeed, especially of the newer species. - A.W.C.

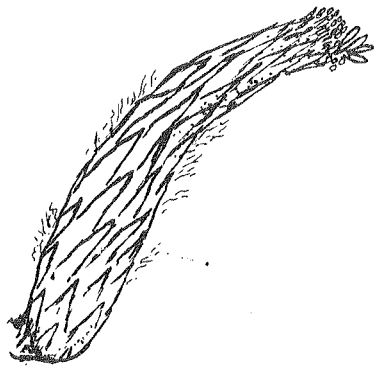
Reflections on the Cactus Vegetation of Peru By Prof. Dr. Werner Rauh (Translated by H. Middleditch from "Cactus" (France) 11.51; 1956) Part 2.

We return to Lima with a rich harvest, in order to undertake - after the shipment of our plants - a new expedition towards the South, with Arequipa as our goal.

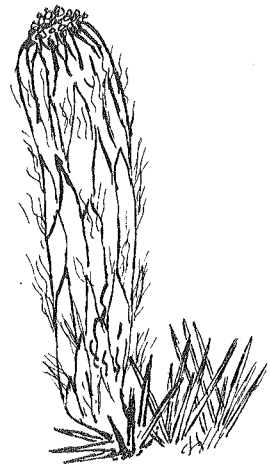
We press forward expeditiously on the Pan-American Highway, a fine asphalted road, and after a few hours we reach Pisco, centre of the Peruvian whaling industry. A bitter-sweet and repulsive smell of rotting meat and fish oil is carried by the sea breeze from the direction of the shore towards the desert. Here we left the main road and came across vines and cotton fields on a very poor road across the valley of the Rio Pisco towards Castrovirreyan. A change again - the spurs of the Andes here have a magnificent desolation, entirely deprived of vegetation. It is only after 900 meters that the cacti appear, at first in ones and twos, then more and more numerous.

At first an Armatocereus predominates reaching 4 to 5 meters in height and somewhat tree-like; the foot of the trunk is replete with a ridiculous number of spines. This species particularly attracts attention on account of the yellow-brown colour of the old branches, a coloration which we have never noticed, moreover, on other cacti; the small white flowers give rise in due course to fruits of 4-5 cm in diameter, and with sharp white spines. Backeberg, who did not visit Pisco Tal in the course of his expeditions, believes that this Armatocereus is a new species and has given it the name of Armatocerus procerus. At 1,200 meters A. procerus forms numerous groups and generally grows in company with Haageocereus acranthus and with Melocacti.

At 1,100 meters, one likewise meets Neoraimondia macrostibas (white flowers) of which the most dense populations are to be found around 1,400 meters, then becoming scarce at 1,600 meters. Espostoa melanostele, which predominates in the Rimac Tal in the high parts, is

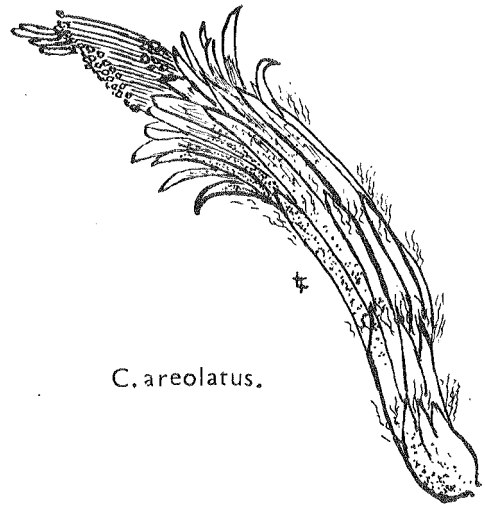


C. wentlandiorum.

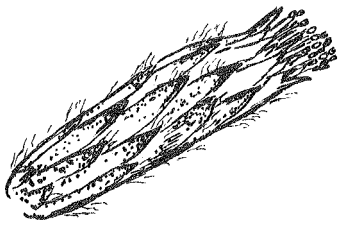


F.R. 325.

C. candelilla.

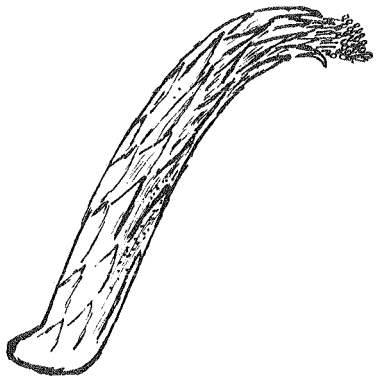


C. areolatus.

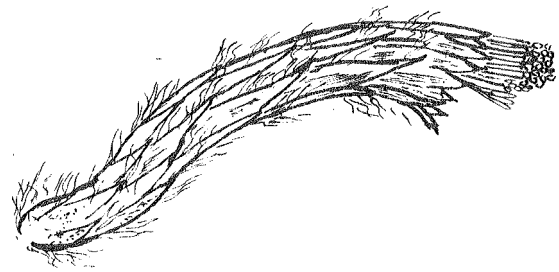


C. viridiflora.

C. tupizensis.



C. vulpis-cauda.



C. baumannii.

CLEISTOCACTUS FLOWERS - T. Lavender

absent in the Pisco Tal.

Above 2,000 meters, an Armatocerus shaped like a candelabra, which is remarkably similar to A. matucanensis; it is accompanied by small shrubs of Carica candicans and, in respect of the cacti, in comparison with the Rimac Tal, the Pisco Tal is no longer poor in individuals, or in genera and species. On the contrary, this valley assumes a special importance on account of the number of new species which have been harvested there. As in the Rimac Tal, the lower parts are populated with giant cereus.

Our next objective is a valley located to the south and which climbs from Nazca towards Puquio. Once again we cross an arid and desert-like landscape and run alongside the celebrated burial grounds of Nazca, dating from the Pre-Inca times. At 700 meters the cacti already occur, starting with Armatocereus procerus, already encountered in the Pisco Tal. At 800 meters, there is in addition Neoraimondia macrostibas. By virtue of its vast sedimentary terraces the valley gives us an impression of being even more arid than Pisco Tal. At 1,000 meters altitude one meets once again columnar cacti of less height, such as Loxanthocereus jajoianus, which particularly distinguishes itself by its cylindrical branches of 10 cm long and sharply bent by the weight of the flowers of a vermilion-red colour.

Amongst the other species, we collect Haageocereus pseudomelanostele which, according to Backeberg, is also to be found in Rimac Tal. It is a very ornamental species, branching from the base and possessing stout columns with a score of ribs, the height of which can reach 1 meter. The areoles are furnished with numerous radial spines and with one or more central spines, grey, up to 10 cm long. The flowers have a slightly curved tube of 5-7 cm in length. The interior petals are, in general, of a green coloration and the outer ones coloured red, the anthers yellow, the tube green. The globular fruits of 2-3 cm in diameter are of a reddish-brown colour. This plant is very ornamental, on account of the lively coloration of the crown in grey and reddish-brown and will be found in many amateur collections.

At 1,200 meters, the cacti are joined by a small shrub of the genus Loxopterygium. Compared with the Pisco Tal, the cacti populations are again less numerous. On the other hand, the most remarkable species in this valley is Browningia candelaris, which we come across for the first time at 1,700 meters. Its occurrence here is doubtless the most northerly extent of its growth. Backeberg is said to have come across this plant some kilometers to the south of Lima, which we have not been able to confirm.

The genus Browningia seems to be one of the most primitive and phylogenetically the oldest family of Peruvian cacti. The young and old forms differ from each other in a remarkable fashion. The young plants are not branched and form great columns, covered with a vast number of spines, looking from afar like telegraph posts. Branching is heralded by the abrupt discontinuation of the production of spines, without any transition; thereafter the areoles will only produce very fine hair. The column continues to grow upward for some time and then finally ceases its upward growth. A considerable number of stout lateral branches then appear which at first grow out vertically and give the impression, with their naked areoles, of the trunks of the Sigillarian fossils. The old specimens, with multiple branches, of which the stems hang down like serpents towards the ground, recall the prehistoric world.

Towards the south, the Browningia become more and more numerous and can be considered as the characteristic plants of the town of Arequipa, where they cover the desert mountains to the west of the town to an altitude of 2,000 meters. Browningia, moreover, is the only aborescent cactus which does not propagate vegetatively - the detached branches do not root down, as is well known to the natives. The large fruits have a strong aromatic scent and contain a sweet pulp, of which the ants are very fond, which explains why one comes across relatively few young plants. At 3,000 meters, Browningia candelaris reaches the upper limit of its growth in Puquio Tal.

At 3,400 meters there then appears on the gently inclined slopes which are carpeted with shrubs of Lepidophyllum, the magnificent Oreocereus hendriksenianus (already referred to above),

the clumping colonies of which, covered with a white felt, provide a cheering tone against the grey and uniform mass of Lepidophyllum (Tola). On the road which climbs towards Puquio we again find ourselves in the presence of one further species, Corryocactus brevistylus, of which the area of distribution reaches as far as the vicinity of Arequipa. The areoles of the offsets at the sides (which reach a height of 1.50 m) carry one central spine whose length may be as much as 20 cm.

Heavily laden, we left Puquio Tal and undertook our return trip with a magnificent harvest.

Many of the place-names appearing in the above article will be found at the southern end of the map in Chileans No. 24 p140 - H.M.

FLORAL GEOGRAPHY of the PERUVIAN ANDES - 2 By A. Weberbauer (Abstracted from "The Flora of Peru" by J. F. McBride, Field Museum of Natural History.)

The coast land of the lomas was described in detail in Chileans No. 24. In southern Peru, from Arica to the Rio Lomas, the vegetation of the loma is continuous except for the interruptions caused by the river valleys. The flora contains a considerable number of species that are wanting in the north, such as the bulbous Zephyranthus albicans, several Nolanaceae, and Palaua species. The shrubs are associated in stands oftener than is common. The lomas of Atiquipa, near the port of Chala, surpass, perhaps, all other of the Peruvian coast in abundance of water and in luxuriant vegetation, but have no unusually copious flora. They are crossed by rivulets where bananas, grapes and other cultivated plants thrive.

The Western Andes of southern Peru might also be called the zone of Franseria and tola shrubs. It comprises the western slopes of the southern Peruvian Andes with the western Cordillera ridge and in the south continues beyond the political boundary of the country into Chile and Bolivia. In the north, the limit lies more or less at 14°S latitude on the ridge of the Western Cordillera. In the lower parts of the western slopes, southern and central Peru meet in the system of the Rio Grande, about Nazca. The zone of Franseria and tola shrubs is marked not only by climatic and botanical peculiarities about to be described, but also by its orographic features - the wide plateaux, high volcanoes rising from them, and deep steep-walled canyon valleys.

The general aspect of the vegetation, as well as the form of the characteristic species demonstrate that the climate is drier than in the adjacent inter-Andean district and on the western slopes of central Peru. From the foot of the Andes the barren desert reaches up sometimes to 2,000 meters and even higher; again we meet in the higher Andean region, sometimes as low as 4,200 meters, great tracts of bare soil. The columnar cacti (cereus) ascend higher than anywhere else in the Andes of Peru. Low, small-leaved partly evergreen shrubs are predominant in the formations. Often such shrubs join to form stands, either of a single species, or mixed. Examples of the former case are Lepidophyllum quadrangulare, Franseria fruticosa, Fabiana densa and others. The leaves of many species have a resin secretion, protective against dryness, and thus present a viscous, shiny surface (Franseria, Lepidophyllum, Fabiana, Baccharis, Adesmia and Coreopsis). Much smaller is the number of shrubs whose leaves have a thick covering of hairs (Balbisia, Malvastrum rusbyi and Senecio iodopappus). Among the herbs, the annual ones grow plentifully up to 3,800 meters, sometimes even to 4,100 meters.

With regard to the flora, it must be remarked that many species scarcely cross the northern limit of this zone, and that several genera are represented here by a larger number of species than beyond the northern limits. The close relation of the western part of southern Peru with Chile and Bolivia is indicated by Fabiana, Lepidophyllum, Adesmia, Verbena aspera,

V. juniperina, V. minima and Senecio iodopappus. Cantua buxifolia grows wild in the higher western slopes of south Peru, probably the original home of this well-known shrub, which has long been cultivated in the upper sierra of Peru for its beautiful flowers and perhaps also for medicinal purposes. The characteristic floral elements are found principally in the plateaux, which are of huge extent and occupy by far the greatest part of the surface.

The zone of the Franseria and tola shrubs is divided into four regions:- the desert region; the herb-poor region of columnar cacti and Franseria fruticosa; the mesothermal region of the tola heath; the microthermal region of the tola heath.

No satisfactory explanation has hitherto been found for the varied upward extension of the desert region. It seems that on the plateaux the upper limit lies on the average at a greater elevation than in the valleys. In several places it is at 1,800 to 2,000 meters, below Candarave at 2,600 meters, and in some valleys very low, between 500 and 900 meters.

The evergreen river bank brushwood has a similar composition to that on the coastal land. In dry beds there are scattered shrubs of which the largest is the evergreen Schinus molle. Outside the river banks and the dry beds the soil is generally bare of vegetation. At the lower margin of the desert, to the limit reached by fogs from the sea, dense groups of grey Tillandsias are found here and there.

The upper limit of the herb-poor region of columnar cacti and Franseria fruticosa generally lies at 3,400 to 3,600 meters, rarely as high as 3,700 or as low as 3,200 meters. On the plateaux columnar cereus species and rainy-green shrubs or half-shrubby plants form an open thicket, in whose gaps appear during the rainy months herbs, mostly annual, and a few tuber-bearing or bulbous plants. As the herbs affect the appearance of the vegetation for only a short time, and as their number of species is much smaller than in the higher regions, this region may be called "herb-poor".

Among the columnar cacti the tree like Cereus candelaris five meters high is a most conspicuous object at the lower elevations. Small cacti of the genus Opuntia spread over the ground. Franseria fruticosa is by far the most requent shrub, easily distinguished by its light green, pinnate leaves. It often occurs grouped in small stands. Its vertical extension reaches from the margin of the desert to altitudes which fluctuate between 3,200 and 3,500 meters. Other common shrubs not reaching the lower altitudes are Kageneckia glutinosa, Adesmia and Balbisia species, Malvastrum rusbyi, Verbena juniperina, Fabiana densa, Grindelia peruviana, Diplostephium tacorense, Proustia pungens, Coreopsis fasciculata, and Senecio adenophyllus. The type of leafless shrubs is represented by Ephreda americana and Colletia spinosa. The Jatropha species are restricted to the lower border of the region. In the north Orthopterygium huaucui is frequent from the desert margin up to 2,800 meters.

Local differences due to the stone-poor dry plains, the stony or rocky places, and the dry beds may be observed within the limits of this formation. On the stone-poor dry plains the shrubs remain small and the number of columnar cacti is often greatly reduced. Stony fields and rocks are the preferred habitat of columnar cacti and the large spiny Puya tufts which, always green, rise at the tops of prostrate, thick, much-branched stems. The dry beds, where at times of heavy rains the water gathers and flows off, favour the growth of shrubs. These stay green longer here than elsewhere, grow to a larger size, and reach further downward. Among the most vigorous shrubs of the dry beds are Schinus molle and Stenolobium arequipense.

The upper limit of the mesothermal region of the tola heath fluctuates between 3,800 and 4,000 meters. Ascending the western slopes of the Andes and entering this region we observe that the rigid columns of the cerei disappear or grow only at certain places. The stiff tufts of perennial grasses, which are hardly altered by the season, and the evergreen tola shrub, Lepidophyllum quadrangulare, are the most remarkable of the new elements that appear. The lepidophyllum shrubs are called tola around Arequipa, and taya farther north in the Province of Parinacochas. In Chile and Bolivia the name tola is used also for other shrubs, which, like

Lepidophyllum, burn easily in green or even wet condition because of their resin content. The imbricated, scale-like leaves of Lepidophyllum quadrangulare remind one of certain Coniferae, and the fragrance of its resin increases the similarity.

Among the shrubs of this region Lepidophyllum quadrangulare is by far the most frequent, and the others likewise are small-leaved. We meet here some shrubs which belong also to the herb-poor region, but not Franseria fruticosa and Malvastrum rusbyi, and only rarely Balbisia and Kageneckia. Furthermore, there grow Tetraglochin strictum, Baccharis incarum, Senecio iodopappus, and Chuquiragua rotundifolia. Among the more frequent tufted grasses are Stipa ichu and Festuca orthophylla. Some cacti also constitute a remarkable part of the vegetation, among them semiglobose to conical, sparsely hairy opuntia cushions (for instance, O. ignescens), and in some places the columnar stems of Cereus celsianus and its relatives, distinguished by the tuft of long, white or brown-red hairs covering their top. A tall shrub-like opuntia related to O. subulata (referred to above) is a common plant of the valleys in this region, and in the upper part of the herb-poor region.

Although the plant growth on the whole is much denser than in the herb-poor region, nevertheless it shows everywhere bare spots of soil, for while the water supply is more abundant here, it is still scant. The most extensive formations are the tola heath and a grass steppe containing scattered shrubs. Their limits often become vague by gradual transitions.

The tola heath is a shrubwood which consists entirely or preponderantly of Lepidophyllum quadrangulare. Frequently it extends continuously over several kilometers. It covers chiefly the plateaux, while in the valleys it is less developed or entirely wanting, and it seems to grow by preference on dry, sterile soil.

Other stands of small-leaved shrubs are far more restricted in extent than the tola heath. Sometimes they consist of a mixture of several of the above-mentioned species, in which Lepidophyllum may also take part; sometimes they contain individuals of only one species - for example, Tetraglochin strictum or Baccharis incarum. Moreover, these shrubwoods belong principally to the plateaux.

The grass steppe with scattered shrubs is found on plateaux and also in some valleys. Its composition is not the same in both cases, especially as regards the shrubs. On the plateaux these are Lepidophyllum quadrangulare and the other above-mentioned species. In the valleys, in place of these, there occur many shrubs that recall the flora of central Peru, such as Mutisia viciaefolia, Barnardesia dombeyana, Hesperomeles pernettyoides, and Monnina crotalarioides. Often there are vigorous dicotyledenous herbs growing among the grasses.

Beside the two most important formations there may be mentioned two lesser ones that are associated with certain soil conditions: the vegetation of the dry beds, characterised by tall shrubs, often of different species than those existing elsewhere; and the Polylepis groves, which prefer stony ground and belong mostly to the following region.

One might equally well call the microthermal region of the tola heath the "High Andean region of the tola heath". It begins between 3,800 and 4,000 meters. The tola heath, so dominant in the landscape, here covers great tracts, occasionally up to 4,500 meters and small patches reach even higher. Most mesothermal shrubs and also the cultivated plants do not ascend beyond 3,800 to 4,000 meters and above this level high-Andean plants, principally cushion-shaped ones, constitute a prominent part of the plant growth.

With the scale-leaved Lepidophyllum quadrangulare is associated Lepidophyllum rigidum, easily distinguished by its needle-shaped, spreading leaves. The high-Andean tola heath either contains only one of these species or is a mixture of both. On the whole, Lepidophyllum quadrangulare predominates at lower elevations, and L. rigidum - which thrives even at 4,900 meters - in the higher ones. Less common than the tola heath are shrub stands of Tetraglochin strictum, which always is of very low growth in the high-Andean region.

Other high-Andean formations occurring here will be described in more detail below. The high-Andean bunch grass formation consists of vigorous tufts of tall perennial grasses, like the grey-green Festuca orthophylla, and contains few or no shrubs. The puna mat is composed of cushion and rosette plants. Erect shrubs are absent. On account of its abundance, great size, and peculiar form, Azorella yarita, called yareta by the native people, becomes a characteristic element of this formation. Its very convex, hard and resinous cushions rise one meter above the soil, and serve for fuel. The grey-hairy Merope aretioides form convex but smaller cushions, as do also the sparsely hairy opuntias, like O. ignescens. The cushions of Pycnophyllum species are flat, like those of Verbena minima, a shrub of almost wholly subterranean branches. Puna mat, bunch grass formation, and tola heath are connected by numerous intermediate types. In the Distichia moor the convex cushions of Distichia muscoides are crowded as a thick, succulent, evergreen plant covering. Species of Polylepis, which develop into shrubs or small trees as much as five meters high, in some places form Polylepis groves.

In the highest part of the microthermal region the vegetation becomes poor, and at last one reaches the cold desert, where the vegetation is wanting or confined to a few places, such as rocks and stone fields. In the proximity of the western slopes, the microthermal region has rather a dry climate. On this account the limit of the cold desert lies comparatively low; even at 4,300 meters bare soil is of much greater extent than that covered by vegetation. Farther inland where the climate is moister and the vegetation extends higher up, the cold desert begins generally between 4,600 and 4,800 meters.

The high-Andean region of the tola heaths is a special kind of puna, which I describe below. It differs from the common puna of Peru by the wide Lepidophyllum heaths, and by the greater abundance of convex cushion plants.

The puna - in central and southern Peru generally this name is given to the region lying above the limit of agriculture. The term is used here in almost the same sense; it ends below at 3,800 to 4,000 meters, and above at the highest summits - but excluded from it is the western Cordillera of southern Peru, since its high-Andean region shows a divergence of vegetation already described above.

While the floristic connection of the puna with the western part of the Andes - including the inter-Andean valleys - is very clear, a relationship with the eastern side is almost entirely wanting. From the former the puna is distinguished by the absence of nearly all the shrubs that grow there, and also by the possession of many peculiar species of such genera as often are found also in lower regions: Lupinus, Astragalus, Geranium, Viola, Gentiana, Valeriana, Cerastium, Senecio, several genera of Gramineae, etc. Genera restricted to the puna or with few exceptions are: Anthochloa, Aciachne, Distichia, Pycnophyllum, Arenaria, Draba, Nototriche, several small genera of Cruciferae and Valerianaceae, Azorella, Culcitium and Werneria. The flora of the puna is distributed according to altitude and also to the increase of humidity eastward and northward.

A common peculiarity of the high-Andean plants is their slight elevation above the surface of the soil. In numerous species the stems and stalks, the leaf sheaths and petioles, the peduncles of the flowers and fruits, even the lower parts of the very flowers, are hidden in the soil. In other cases such organs or their parts are visible, but they remain very short or are adpressed to the ground. This happens also with the blades of many leaves. All these modes of growth enable the plants to take advantage of the high temperatures of the uppermost soil stratum. Some of the underground organs likewise utilise this warmth. The subterranean stem portions are also generally short. The larger ones lie more or less horizontally, slightly below the surface. The length of the roots often contrasts strangely with the minute leafy shoots springing from them. Often they grow deep in the ground, with other long roots growing horizontally. In many species the old roots are replaced by new ones that arise near the surface, sometimes on other roots, sometimes on subterranean stems.

The leaves of the high-Andean plants are small, and either glabrous or more or less hairy. At times the hairiness is confined to the upper surface, or is denser than beneath.

The great majority of the puna plants are perennial herbs. If their stems are simple or sparingly branched and at the same time subterranean, so that only the leaves are visible, they are rosette herbs (Calandrinia acaulis, Liabum bullatum, species of Nototriche, Hypochaeris). The cushion-shaped plants are similar to them at the beginning of their development, but later their form is altered by continuous branching, which little by little causes the stem ends to crowd together so as to form a large, compact mass. This mass, comparable to a cushion, may be flat (Plantago rigida, Lucilia tunariensis, species of Azorella, Pycnophyllum, Werneria, Senecio) or convex, with a hemispheric or conic form (Azorella species, Aretiastrum aschersoniamum, Merope aretioides, Distichia muscoides). In the former case the branches often become independent individuals by the dying back of the older parts, as in Lucilia tunariensis. In the latter case they generally retain their organic coherence. At times the cushion plants become woody in their older parts, and thus may be considered as suffruticose.

A singular type of cushion plant is produced by certain opuntias already mentioned with fleshy stems and reduced leaves. I refer especially to Opuntia lagopus, whose cushions are highly convex and thickly felted, and Opuntia floccosa, which has flatter and more loosely hairy cushions.

With herbs having stalks with elongate internodes it often happens that one individual produces numerous stalks standing close together, as in several Graminaceae and species of Lupinus, Culcitium, Senecio and Apium. Such growth forms resemble the cushions but are much looser, and may be called tufts.

Bulbous and tuber bearing plants are but sparsely represented in the high-Andean region. Thick, turnip-shaped roots are often found, but on the whole they do not resemble typical storage organs; their length is greater than their diameter, and their consistency is woody rather than fleshy.

The woody plants are evergreen and have knotted, weirdly twisted branches. Their number is much smaller than that of the herbs. The shrubs grow sometimes spread out upon the soil or even partly under its surface, but sometimes they are erect. The type of leafless shrubs is represented by an Ephedra. Some species of Escallonia, Gynoxys, and Polylepis by their comparatively large size are exceptions to the general dwarf vegetation of the puna. They attain a height of four meters, and grow either as shrubs or small trees. The most remarkable giant of the puna is Puya raimondii, a tree of the Bromeliaceae whose height is as much as ten meters.

The change of the seasons alters the aspect of the high-Andean vegetation but little. Its influence increases towards the north, yet nowhere does it cause a complete general rest of vegetative processes. Humid places always retain their green fresh colour. On water-poor soil the growth at the end of the dry period is less dense and of paler colour than in the wet season, because many of the plants are dry, but new leaves are sprouting on plants of many species. The scant precipitation of the dry season also is useful to the high-Andean vegetation, for the vessels of these tiny plants are very short, and the tufts and cushions hold the water like sponges. Also, the precipitation is almost always in a frozen or half-frozen state. Snow flakes and hail stones melt slowly, and consequently their moisture can be utilised more completely than quick running rain water. The reproductive organs are much more dependent on seasonal changes than the vegetative organs. The flowering of most species takes place in the moist months, from January to March, but with some it continues throughout the year.

The most important formations are the puna mat, the bunch grass formation, the Distichia moor, and the vegetation of the rocks and stone fields.

The puna mat (cushion and rosette) seems to be the richest of all formations in species. It occupies level or slightly sloping land of earthy or slightly stony soil with moderate water content. The vegetation is very dwarf, and consists chiefly of herbs, which form sometimes more or less scattered rosettes, sometimes tufts or cushions. Among them are certain prostrate shrubs like Baccharis serpyllifolia, Astragalus species, and Ephedra. Tall, tufted grasses and erect shrubs are wanting or very scarce. Lichens and mosses likewise are of minor importance. Everywhere growth-covered patches alternate with bare soil, and this prevails at high elevations.

In striking contrast to the abundance of bare patches is the crowding of the plants on growth-covered ones, and the sprouting of incongruous elements among the tiny stems of the tufts and cushions. Overgrown places seem to offer better conditions for the germination of seeds and development of young plants than the bare ones, and many seeds and fruits driven by wind or water are caught there. From the alternation of bare and plant-covered soil and by the manifold colouring of the leaves - pure green, yellow-green, and different shades of grey - the formation derives a characteristic dappled appearance. The colour of the flowers, however, is of little importance, because small insignificant blossoms predominate, and the larger, highly coloured ones are widely scattered.

The bunch grass formation, which surpasses all others in extent, occupies earthy and earthy-stony slopes. The characteristic elements are vigorous tufts of perennial grasses, chiefly Festuca and Calamagrostis species, about half a meter high and separated by considerable spaces. All these tall puna grasses are called ichu by the native people. This formation also has many bare soil patches. The bunch grasses are accompanied by a large proportion of the flora that exists on the puna mat. There are also many dicotyledonous herbs with enlarged stalks, and erect shrubs, but these are less frequent than on the stony fields and rocks that are described below.

The distichia moor needs constant moisture underground, and therefore finds most favourable conditions for development on level land. It grows near lakes, and many a lake has been supplanted by this formation. Slow brooks are bordered in many places by the distichia moor. It always retains a fresh green colour, and in strong contrast with its surroundings, is closed, without gaps, and has neither bunch grasses nor shrubs. The characteristic plant is Distichia muscoides, which belongs to the Juncaceae. Its short, needle-shaped leaves end in a sharp point. The branches crowd together in highly convex cushions, which give the moor a wavy surface, and are so solid that one may cross by jumping from one to another without sinking in. When the ends of the branches grow upward, the lower parts are transformed into peat that serves as fuel for the shepherds and miners. Distichia is accompanied by several small herbs, especially in the hollows between the cushions, where puddles frequently are formed. In the lower part of the high-Andean region moist ground generally bears brook bank mat or meadow moor instead of the Distichia formation.

In the vegetation of the rocks and stone fields, lichens, mosses, ferns, erect shrubs and tall-stalked herbs occur more abundantly than in the formation previously discussed. Among the lichens, the crustaceous ones predominate. The erect shrubs are rarely taller than half a meter, and belong chiefly to the Compositae (Chuquiragua, Senecio, and Loricaria species). Procumbent shrubs also are found. As examples of stalked herbs may be mentioned species of Bomarea (which are perhaps better called suffruticose plants), Descurainia, Apium, Leuceria, Senecio and Culcitium. Tufted grasses are not rare.

Of greatest importance is the fact that on rocks and stone fields the vegetation reaches up a greater altitude than on earthy soil. On the latter, vegetation disappears between 4,600 and 4,700 meters, while rocky or stony ground bears plants even above 5,000 meters, among them several flowering plants. Evidently the temporary high heating of rocks and stones is, in this cold climate, of great value for plant growth. By this we can explain the fact that in these places occur those more vigorous forms such as erect shrubs and caulescent herbs, whose habit reminds one of plants belonging to lower elevations, and that here the vegetation ascends higher than elsewhere. Thus rocks and stone fields are warmth oases on the lower margins of the cold desert, which

comprises the highest part of the puna region and is, in places, covered with snow or glaciers.

Comments

..... from H. Middleditch

"It would appear that Matucana breviflora and hystrix emanate from the transition zone between the herb-poor region of columnar cacti which includes Browningia candelaris and Armatocereus, with the tola heath where grasses, Oreocereus hendriksenianus and cushions of Tephrocacti grow."

MATUCANA BREVIFLORA Rauh & Backbg. spec. nov. By Prof. Werner Rauh (Translated from "Contribution to the knowledge of the Peruvian Cactus flora" by H. Middleditch)

Plantae singulae crescentes numquam pulvinos formantes; caules + globulosi, usque ad 15 cm in diam., tam dense vestimento aculeorum involuti, ut neque color caulis neque costae visibilia sint; aculei marginales numerosi, rigidi, usque 2 cm longi, + verticiformiter partiti, cum illis areolarum proximarum implexi; aculei centrales 3-4, rigidissimi, sed elastici, erecti 4-7 cm longi colore variabili; colores aculeorum hi notati sunt:

a) caeruleo-canus; b) basis laete brunnea, apex atrobrunneus; c) profunde ater.

In omnibus formis aculei centrales senectute griseo-pruinati; flores breves, aculeos vix superantes, tubo ca. 3.5 cm longo, 0.6 cm crasso in regione ovarii viridi ceterum rubescente, squamis bracteaneis anguste trigonis in mucronem gracilem excurrentibus laxe obtecto; in axilis squamarum basalium pili lanei breves partem liberam squamarum non superantes; phylla perigonii exteriora reclinata, interiora erecta laete punicea basi aurantiaca margine subviolacea, 1.8 cm longa, 0.7 cm lata breviter acuminata; filamenta fasciculata apice punicea basi pallida antheris flavescentibus, interiora nectarium brevissimum (2 mm longum) modo diaphragmatis claudentia; stylus gracilis apice pallide puniceus tam longus quam phylla perigonii interiora; cavum ovarii minimum, 2-3 mm in diam.

Solitary growing plants, occasionally branched, but never forming clumps: body more or less spherical, up to 15 cm in diameter, enveloped in a dense spine coating; radial spines numerous, sturdy, up to 2 cm long, more or less pectinate, interwoven with those of the adjacent areoles; central spines 3-4, very stout, stiffly erect, but flexible, 4-7 cm long, very variable in colour. The following spine colours were observed:- (a) blue-grey, (b) pale brown at the base, dark brown at the tip, (c) deep black shade. In all forms the central spines have a platinum grey coating when older.

Flowers short, slightly extending above the spines which incline together over the crown; with a 3.5 cm long, 0.6 cm broad, usually reddish tube, green in the vicinity of the ovary; this sparsely furnished with narrow-triangular scales terminating in a slim point, short hairy wool in the axils at the base, which does not extend beyond the unexposed face of the scales; outer perianth leaves reflexed, the innermost ones erect, vivid carmine red, orange-red at the base, almost violet at the edge, 1.8 cm long and 0.7 cm broad, with short pointed tips; filaments bunched together, carmine red at the tip, pale at the base, with yellowish anthers, the innermost diaphragmlike closing off the very short (2 mm long) nectar chamber; style slim, pale carmine red at the top, as long as the innermost perianth leaves with 5 yellowish stigma lobes; ovary very small, 2-3 mm in diameter.

Discovery place: Tola heath, 30 Km westwards from Incuio (South Peru), near the Lagunas Parinocochas at the foot of the Sarasassa Volcano, at 3,600 m altitude; Field collection number K 123 (1956).

Matucana breviflora possesses, in comparison with other species, distinctively small flowers; with regard to the spine colouration, they exhibit a great deal of variation, in respect of which they are similar to other species.

The following species should probably also occupy a close relationship to M. breviflora, from which it is distinguishable on account of the still fiercer spination and the substantially larger flowers.

MATUCANA HYSTRIX Rauh & Backbg. sp. nov. By Prof. Dr. Werner Rauh. (Translated by H. Middleditch from "Contribution to the knowledge of the Peruvian Cactus flora")

Caulis globosus vel breve cylindricus, usque 30 cm longus et usque 10 cm crassus, etiam in statu minimo floriparus; costae ca. 23, aculeis omnino involutae; aculei marginales numerosi ± verticiformiter partiti, rigidi, usque 1.5 cm longi, cum illis areolarum proximarum implexi, aculei centrales 1-4, usque 5 cm longi, multo rigidiores quam illi M. breviflorae; rigidi, inflexibiles, erecti et reclinati, senectute omnino cani valde colorem mutabiles:

a) aculei centrales rubiginoso-violacei vel brunnei, basi vix incrassati;

b) aculei centrales atri, rigidiores, basi incrassati;

c) aculei centrales purpureo-violacei, saepe laetius zonati, basi parum incrassati; planta Pyrrhocacto umadeave simillima.

Flores in omnibus varietatibus 3, quoad visi aequales; usque 7 cm longi zygomorphi, tubo leniter curvato, 1 cm crasso puniceo, aperti ca. 2.5 cm in diam., squamae bracteaneae spiraliter insertae, quarum pars libera late trigona, acuminata; phylla perigonii profunde atropunicea, 2-3 cm longa, 0.9 cm lata, acuminata, apicem versus sulcata; filamenta lutescentipunicea, stylus eodem colore; antherae luteae; stamina exteriora ex diaphragmate orienta, quod nectarium brevissimum (2 mm longum) claudet; stigmata virescentia; fructus pusillus, ca. 1 cm longus, virescenti-ruber, fissuris verticalibus se aperiens.

Body globular to short cylindrical, up to 30 cm long and up to 10 cm thick, quite capable of flowering at an early stage of growth; ribs c. 23, completely enveloped by the spines; radial spines numerous, more or less pectinate, sturdy, up to 1.5 cm long, overlapping those of the adjacent areoles; central spines 1-4, up to 5 cm long, much stouter than in M. breviflora, stiff, not flexible, directed upwards and downwards, uniformly grey in old age, very widely variable in colour when young:- (a) central spines red-brown-violet to chocolate coloured, slightly thickened at the base, (b) central spines black, slimmer, thickened at the base, (c) central spines purple-violet, often with paler bands, somewhat thickened at the base - plants very similar to Pyrrhocactus umadeave.

Flowers on all three forms, so far as observed, similar; up to 7 cm long, zygomorphic, with slight curvature, 1 cm thick, carmine red tube, open end up to c. 2.5 cm in diameter; scales standing well apart, the unattached section broadly triangular, drawn out to a point; inner petals extremely dark carmine red, 2-3 cm long, 0.9 cm broad, pointed, denticulate at the tip; filaments and style brilliant carmine red; anthers yellow; outer stamens in a double row, reaching beyond the length of the petals; inner stamens some originating from the diaphragm closing the very short (2 mm long) nectar chamber. Stigma lobes greenish; fruit small c. 1 cm long, greenish red, opening up lengthways.

Discovery place: Rock clefts and cliff tops between Nazca and Lucanas (southern Peru) up to 3,400 m on the Pacific side of the Andes, in the upper distribution area of Browningia candelaris and the lower part of the Diplostephium-rich Tola heath.

Field collection number K 113 (1956).

Comments on Matucana hystrix & breviflora

..... from D. J. Lewis

"I purchased an imported plant of M. breviflora which was very well spined and shaped when acquired but not well rooted. When the plant eventually started to grow, the growing point produced much weaker spines and the body became of less diameter than before, similar in fact to the shape of a Melocactus crown. Now, a few years later, the spine length and strength is returning to some extent, so that if I decapitate the plant I will have a reasonable plant from the top and a large mother plant from which to propagate further below."

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

"My imported plant of Matucana hystrix was purchased in 1970, from Sargant, as SH 208 from Puquio. It had evidently had a hard life and had grown near a rounded stone on one side - the spines were just about rubbed off there and the body hollowed.

"I potted it up in a mixture of 2 parts John Innes plus one part of very coarse sand. For a week or two it received a regular spraying with warm water - I found it useful to check the water temperature by spraying on to my hand before spraying the plant. The spray of water tends to be a little cooler than the temperature of the water inside the pressure sprayer, so the water needs to be fairly hot to start with if it is going to be warm by the time it reaches the plant.

"The plant was slightly elongated on receipt, it is now about $4\frac{1}{2}$" high and some 3" in diameter. The habitat-grown spines would be about 3 to 3.5 cm long and the central spines especially are pretty robust for a Matucana. The first new growth in cultivation produced only fine white spines less than a centimeter in length - very poor in comparison with the original spines. But they have gradually grown longer and a little stouter and now they are about $1\frac{1}{2}$ to 2 cm long, showing a pale brown tint with darker tips."

..... from R. Moreton

"About the drawing of SH 166 (on the cover - H.M.); if there had not been a name on it, I would have said that it was Arequipa erectocylindrica. It seems to be completely devoid of the characteristic fine white radials which normally cover the body of this type of Matucana. My own imported specimen of M. hystrix came from Sargant - it has conspicuous dark brown central spines. I find that the hystrix types of Matucana seem to show the weaker spine growth in cultivation, whereas Matucanas of the comacephala type grow on without any "tide mark".

"The flowers on M.hystrix are totally different to those on breviflora - they are twice as long and half as thick. We received some plants at Holly Gate which everyone thought to be breviflora; they were not really elongated bodies, but when they flowered they were identified as M. hystrix."

..... from A. W. Johnson

"My plant of Matucana hystrix v. atrispina came to me as an import; the habitat grown

centrals are over one inch long, the upper half coloured black or going grey. It is a pity that they do not put out good spines on the early cultivated growth, but then they gradually become stronger and darker. The plant body now has a more or less conical shape with a rounded top."

..... from R. Martin

"In 1970 I obtained an imported plant of M. hystrix v. atrispina from De Herdt. It was globular in shape when I acquired it and has made very little growth since; the new growth from the centre has a conical shape and the new spines are very short, so it doesn't exhibit a very good appearance at all."

..... from H. Ewald

"I have a plant of M. hystrix v. atrispina which I bought from De Herdt a year or two ago. The particular parcel in which this plant came must have been lying in the customs at Dover for about a month and the M. hystrix had bolted at the growing point. Now the plant has had a chance to settle in it is much improved; the original plant was about $3\frac{1}{2}$" tall and broad - the new growth is slightly narrower so the plant tends to a bottle shape, but the spination compares fairly well with the habitat growth. There is much less dark colour in the new spination, but the most recent growth has central spines with a dark pigment over more than half their length."

..... from H. Middleditch

"The discovery place for M. hystrix between Nazca and Puquio can be located on the map of Central Peru which appears in The Chileans No. 24; the discovery place for M. breviflora at Lagunas Parinacochas, is about 100 miles south-east of Puquio, just off the edge of that map and close to the border of Arequipa Province.

"Together with Matucana multicolor, these three species represent the southermost limit of the distribution of Matucana, approaching the borders of Arequipa province. Barely 50 miles closer to the coast we find Lau reporting the collection of the northernmost species of Arequipa - Lau 165, Arequipa erectocylindrica. Perhaps it is a little surprising that it is the stumpy M. breviflora which is reported to be found geographically nearest to plants of Arequipa, rather than the more elongated (and thus more Arequipa-like) Matucana hystrix.

"This would appear to be one of the rare occasions when the author describing some plants gives a clear indication of the vegetation formation associated with a particular species of cactus - a picture which can be amplified in more detail from the description provided by Weberbauer which is quoted in the abstract from his Flora of Peru appearing elsewhere in this issue.

"Although the diagnosis does say that plants may occasionally be branched, I do not having recollected seen other than solitary examples. The specific reference to "numerous" radial spines in the diagnosis would seem to add further support to the comment from R. Moreton about the plant on the cover - but the plant in the collection of H. Ewald bears a striking likeness to that on the cover!

"The phrase about M. hystrix with the purple-violet central spines being similar to Pyrrhocactus umadeave has me very puzzled; I always think of imported speciments of this latter plant as having fairly robust spines, all swept upwards as if prepared for Crufts; there seems to be precious little resemblance here to the plants of M. hystrix which I have seen in cultivation."

..... from J. D. Donald

"The sketch by Eddie Barnes could equally fit a large number of Matucana species with strong central spines and even some Arequipa species - particularly as the fine radial spines appear to be relatively few and not interlacing to any extent.

"Matucanas like so many other genera of the Cactaceae especially from South America show an extensive variation in each species population so that study of a single individual plant or a sample of selected similar looking plants can be quite misleading as to the truth pertaining to the species as a whole. It is evident that many of these variations have a particularly local distribution and represent ecotypes and/or genotypes within a larger species distribution. These genotypes are just as valuable as examples of variation within a species population as the plants which correspond exactly with the type description, but they should not have separate specific status; instead a subspecific category is more appropriate for them. Whether the category be a subspecies, variety, subvariety, form, or even subform depends on the scale of departure from the type description and the extent of the isolation of the local race showing such departure. Sporadic occurences of abnormal forms within a race rarely deserve such categories.

"Matucanas hystrix, breviflora and multicolor, published by Rauh and Backeberg, together with Matucana clavispina (KK 575) and "Vila Rica" (KK 580), are only genotypes of Matucana haynei, but the departure from the type and also the more southerly distribution of these forms from the type locality, suggest that some form of taxonomic recognition is appropriate. Ritter has already described Matucana var. gigantea from the same general habitat as the species mentioned above and is itself hardly distinguishable from them. I myself have already reduced hystrix, breviflora and multicolor to be varieties or forms of Matucana haynei in my commentary published in the National Journal. Since then, further studies and observations on the plants and in discussions on their distribution with Alfred Lau and Karel Knize, I am even more convinced that their varietal, let alone specific, status cannot be upheld.

"M. hystrix, like haynei v. gigantea, tends to be more cylindrical than globular, whereas breviflora, multicolor, clavispina and 'Vila Rica' tend, particularly when young, to be more globular than cylindrical. With age in any particular population however, globular and more or less cylindrical individuals can be found together. Central spine colours and spine lengths also vary, from yellow to brown to red to black, from 15-30 mm up to 60 mm in length, thick and awl shaped. Some populations tend to be more uniform than others - M. hystrix var. umadeavoides Backbg. predominantly thick black spined and snow white bristles - M. hystrix var. atrispina thick dark reddish black spines and yellowish white bristles. In age however, virtually all the spines are greyish white in all populations on the older areoles and only the younger areoles show the characteristic spine colours. M. clavispina has predominantly yellow brown spines, very long and strong. M. breviflora has mostly black central spines as does M. 'Vila Rica', the latter being similar in all respects to M. hystrix var. umadeavoides. Matucana multicolor and M. haynei v. gigantea are more variable in spine colour within any population from white, through yellowish to brown to dark reddish brown to black.

"The flowers show least variation of all in colour as tones of crimson or blood red for virtually all the species mentioned above. Receptacle lengths too are remarkably constant between 50 & 70 mm long, even in the case of M. breviflora '. Alfred Lau says that he could only call the plant M. breviflora because of its habitat, not from the shortness of its flower. At Heidelberg, too, there is little difference between the size of the flowers of alleged breviflora and alleged hystrix, in cultivation.

"All flower very easily in cultivation and appear not to easily deform in spination. Young growth produces as strong a spination as on the original collected plant."

..... further from H. Middleditch

"I am amazed at the foregoing comment that they "flower very easily in cultivation". So far I can almost count on the fingers of one hand the collectors whom I have met in this country who have flowered Matucana of the haynei complex, and one only who reports having flowers on plants of the hystrix-breviflora section.

"The observation regarding the field identification of Matucana breviflora by geographical location alone, is very interesting. It may, perhaps, explain why the owner of the plant on the cover received it under the tital of "SH 166 Matucana breviflora".

"The description of the vegetation of Western Peru given in the articles written by Weberbauer which appear in this issue and in No. 24, depict an almost textbook-like pattern of climate and vegetation, running in altitude zones more or less parallel to the Pacific coast; from Matucana village southwards to Lagunas Parinacochas, there is little change in the altitude, rainfall amount and annual distribution, temperature, or undersoil rock, within the Puna vegetation zone. In consequence, it is hardly surprising that we find a great deal of similarity amongst the Matucana of the haynei complex emanating from this zone. Nevertheless, I find it very handy to use the various Backeberg and other names to distinguish conveniently the different varieties which fall within this complex. Personally, I would prefer to append the tital breviflora to a short plant with short flowers and hystrix to a taller plant with longer flowers, so everyone else will know what I am talking about."

How we found NOTOCACTUS BUININGII Buxbaum By A. F. H. Buining (Translated by W. W. Atkinson from Succulenta 50.2:1971)

It was mid-January when Leopold Horst and I tried to enter Uruguay. This turned out not to be so easy. Completion of the various formalities had kept us busy for several days and when, on Sunday January 15th everything seemed to be in order, the customs was not open. We had therefore to while away the day. On the previous days we had systematically inspected the area around Livramento, a frontier town in the Rio Grande do Sul in Brazil, and found many Fraileas, Gymnocalycium, Notocactus linkii, N. ottonis, N. arechaveletai and also the beautiful flowered N. herteri - the latter in very large specimens. We wanted now to try our luck in the immediate frontier area with Uruguay.

As borders often do, this one runs along the watershed. This watershed is the ridge of the so-called Cochilla Negra (cochilla means mountain chain) which is about 400 m high here. On the Uruguayan side the ground drops quite steeply, sometimes in broad, sometimes in narrow valleys. On the Brazilian side the height is more or less maintained, although the terrain is still somewhat undulating. Here and there are small lakes and swamps where a few water birds were to be seen. This extensive hill area consists almost entirely of pampas with wild grass and very scattered grazing of cattle and sheep. We also saw a (luckily protected) small South American ostrich, the Nandoe, which lives on lizards, insects and small snakes.

A few times we entered a valley on the Uruguayan side and found forms of Frailea pumilis, and everywhere the inescapable Notocactus ottonis and N. mammulosus, both in several varieties. The route consisted of a space of about 30 m wide between the walls of pampas on either side. The so-called road twisted about in this space through puddles, deep ruts and around protruding rocks. Here and there it was scarcely possible to go further with the car. But we always took particular notice of the spots where the rocks stuck out of the pampas grass, for here there were always cacti to be found.

About midday we saw in the distance a group of trees, and decided to have our lunch there. Closer to, we discovered that a large herd of cattle was moving by the trees, under the charge of an at first decidedly unfriendly gaucho. The cattle were scared by the motor - an infrequent appearance here - and the gaucho (the South American cowboy) had quite a bit of trouble keeping them together. When all was quiet again we told him that we were only collecting plants, and he went back to his fire. He had been with this herd for a week now, and was on his way to deliver them for slaughter. Where, he wouldn't say.

While we lighted a fire to warm a pot of soup, he went to his horse and hauled out of the saddle-bag a large piece of meat, impaled it on a ready-prepared stake and stuck this in the ground directly next to the still-smouldering charcoal fire, thereby roasting the meat. At intervals he sprinkled saltwater over it from a bottle; after a while he cut a piece of cooked meat from the outside and ate it up heartily. When, by degrees, the meat was totally consumed, he lay down contentedly for a while. This was the real old-time 'churasco' as the Brazilians call them, or assado in Spanish speaking lands. When our soup was finished we bade a friendly farewell and pushed off further to the south west. However, the terrain became gradually flatter, and the valleys towards Uruguay further away from the frontier line. This is clearly marked with large concrete blocks, which are always so placed that one can see the next one in the distance. The road twisted savagely, and we decided to turn back in order to be in Livramento before dark and to get ready to set off for Tacuarembo in Uruguay the next day.

On the way back friend Horst announced that he thought there was going to be some decidedly not uninteresting rocky ground to be inspected in Uruguay.

It being a fairly large area we decided each to examine a part. At first it seemed very bare and uninteresting, but gradually the rocks became larger and more numerous and I found several good specimens of Notocactus (Malacocarpus) erinaceus. Then a few dried-up, dead-looking N. mammulosus and also a few Notocactus mueller-melchersii. The latter species had been collected a few years before on this Cochilla Negra by Mr. Mueller-Melchers, who sent them to Fric amongst others. They vary greatly according to the habitat.

Suddenly I saw before me a pretty-well dried up plant which I couldn't possibly bring home. After inspecting it closely I shouted excitedly to friend Leopold that I had found a cactus new to me, and probably a new species. But at the same moment he also let out a yell to the effect that he had found something new. They seemed to be the same species, but were both in a miserable condition. We pushed further into the land and came across small ravines where we were lucky enough to find a number of nice healthy specimens of the new species. The interesting and most obvious point about this plant was the notably light green colour of the epidermis. Between larger and smaller outcrops of black rocks grew a fair amount of wild grass and various other plants including a very lovely unknown thistle. They were protected as much as possible in crevices, but there was a goodly quantity eaten by sheep. Also the burning off in the spring of the long dead grass made many victims of them. Only on protected spots on steeper places were they able adequately to maintain themselves.

When the plants flowered, it became apparent that we were dealing with an as yet undescribed Notocactus species which should be placed somewhere between the subgenera Neonotocactus and Malacocarpus. During my second stay in South America, we visited the same area at the end of August 1968, but pushed further into the valleys. Here we saw splendid examples on less protected spots, and also a larger Notocactus herteri-like plant.

After publication of our species in the December number of K.u.a.S., 1968, by Prof. Dr. Buxbaum, it was found quite by coincidence by a cactus amateur from Montevideo. It is quite remarkable that such a noticeable plant had never been discovered in an admittedly remote, but still not unknown, area.

Luckily it produces seed quite freely so that in a few years the demand from Notocactus lovers will be adequately met. Grafted or not it is not difficult in cultivation, although the ungrafted plant needs very much more care. A really fine collectors plant.

Comments on N. buiningii

..... from J. R. Gooch

"I have a fairly small plant of N. buiningii - it is about $2\frac{1}{2}$" in diameter and it flowered for the first time in 1973. There were three buds on the plant but one of them aborted. Among my Notocacti this was the earliest plant in the season to flower."

..... from J. Yorke

"Flowering for the first time this year is N. buiningii; of special note are the distinctive brown buds - Notocacti have quite a large range of colour in their buds, all shades of grey both and brown can be seen, each species having its own particular shade. This particular plant came from De Herdt in the autumn of 1970. It was a seedling $\frac{3}{4}$" in diameter on a Harrisia stock. By the spring of 1973 it had reached a diameter of $3\frac{1}{2}$ inches. In early April three buds formed and these reached a size of $1\frac{3}{4}$ inches high by $\frac{3}{4}$ inches in diameter by the month of May.

"The flowers opened around midday and closed again around 4.00 p.m. They lasted for six days - they remained funnel form for the first five days; on the sixth day they opened fully campanulate. At this time the flower was $3\frac{1}{4}$ inches in diameter and pale yellow. The anthers were a dark yellow. The style was pale yellow with no trace of red, the stigma was dark red. The stamens were not sensitive as in other Notocacti. It will be of interest to see if the fruit is set and if it conforms to a normal Notocacti, or if it pushes up an elongated berry as in Wigginsia."

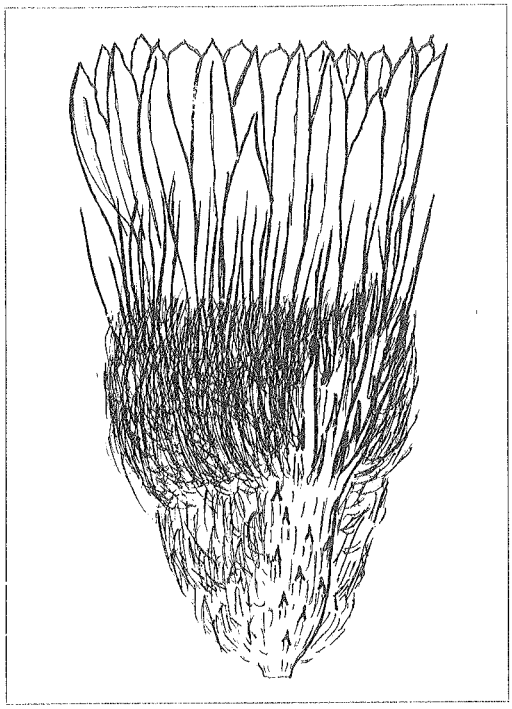
Slides of the plant in bud and flower are enclosed (now in the slide library - A.W.C.)

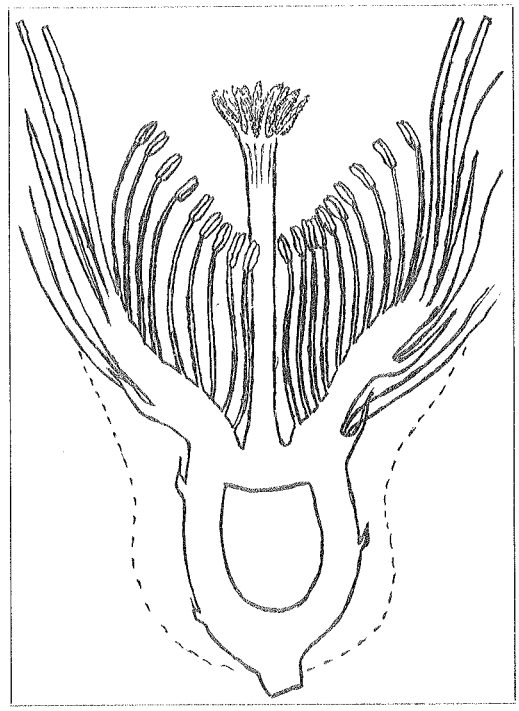
..... from H. Ewald

"Three or four years ago I obtained four seedlings of this Notocactus from De Herdt. I have kept two of them, one with glassy spines and the other with dark spines. The glassy spined one has now flowered two years running - the plant would probably be about $2\frac{1}{2}$" in diameter when it flowered last year. It must have grown fairly well since then because the areoles which carry the remains of the base of the 1972 flowers are now half way down the side of the plant. Noto. buiningii is the first of my Notocacti to flower each season - it would be early April when it was in flower. I suppose it must be self-fertile because it set seed last year without any help from me. It is very difficult to tell whether there is a fruit or not, because of the dense white wool that surrounds it. The flower remains which were removed from the plant in September 1973 looked as though they might be carrying seed, but when it was opened up there was nothing there."

..... from H. Middleditch

"During the 1973 Brooksby weekend we had a look at a number of slides of Notocactus buiningii in flower, including those from J. Yorke, J. R. Gooch and others. There did appear to be quite a range of variation in the shape of the flowers and the stamen arrangement; in one case the stamens filled the receptacle as shown in the accompanying sketch, whilst another flower appeared to have an ottonis type of stamen arrangement with one series bunched up close to the style and the outer stamens spread over the outer half of the receptacle. This latter flower also seemed to be taller and slimmer than we expected to see on this species; indeed, there was even some suggestion that the demand for plants of Noto. buiningii might have been accommodated by fertilising flowers on imported plants of buiningii with ottonis pollen. However, it may equally be that we are not altogether familiar with the range of natural variation in this flower."

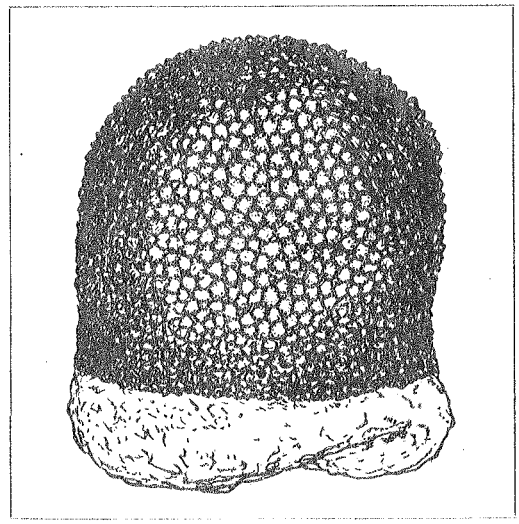


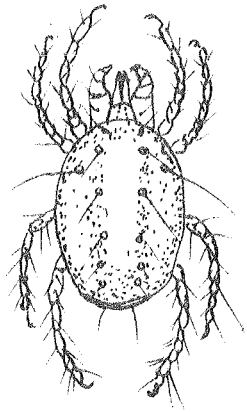


NOTOCACTUS
BUININGII

Flower & Seed

K.u.a.S.
19.12:68





RED SPIDER MITE

D.J. Lewis

..... from A. W. Mace

"I am interested in the comment made by Buining that N. buiningii needs extra care when ungrafted. Extra care in what way, I wonder? Certainly my seedling of this species has lost its roots and I have heard of this happening to other specimens."

GLASS HOUSE RED SPIDER MITE (Tetranychus urticae, Tetranychus cinnabarinus).
By D. J. Lewis

The nomenclature of this particular pest is rather confused and the subject is under study at the Glasshouse Crops Research Institute. There are two forms which occur in British glasshouses, a non-hibernating form in which all the females are reddish brown, and a hibernating form in which the summer females tend to be greenish. The red form is probably the American species T. cinnabarinus.

The range of plants attacked is very wide and both species can be present on the same plant.

Life Cycle The eggs are globular, whitish, translucent, becoming red shortly before hatching. The incubation period is 3-5 days. The larvae have only six legs and are not very active. They remain in this stage only two days and then change into protonymphs, having eight legs, for another one to one and a half days.

The male and female spiders then take separate courses, the female going through a dentonymph stage lasting two days before becoming an adult. The male leaves out this stage altogether and becomes adult two days earlier.

Unfertilised eggs produce males only and the full life cycle to maturity takes 10-15 days, depending upon the time of year.

Each female can produce up to 100 eggs over the three week period of adult life. Rapid increase in spider population takes place in temperatures over 70°F, with 85°F as the peak with a low relative humidity.

Control There are many products on the market that will control red spider but growers must ensure that the chemical is safe for the particular plants grown. In mixed houses this can cause problems.

After reading the instructions the following products may prove suitable:-

Malathion (Murphy)
Systemic insecticide containing Rogor and D.D.T. (Murphy)
Chlorbenzide (leaves a deposit on plants)
Derris liquid (Murphy)

A petroleum oil emulsion should not be used on plants with a wax bloom on the leaves such as Echeverias, Crassulas and blue cacti such as Azurocereus.

Comments on Red spider mite ..... from R. Moreton (see p. 99)

"Regarding your red spider problem, what you want is the predator which is used by cucumber growers. An alternative is to use Derris. Last year I had a lot of red spider on my capsicums and aubergines but they did not bother the cacti. The predator red spider is called Phytoseiulus and it is available from the R.H.S. at Wisley."

..... from D. Angus

"I see from an article in the Sunday Times Business News that the red spider predator that feeds on red spider mite is Phytoseiulus persimilis. Apparently this will eat 15 red spider mite a day and it breeds faster than the mite. It is described as a quick moving insect. Apparently it can be obtained for the price of £12 per 1,000 from Mark Savage Bsc. Hort., Predator Services, Lee Valley, near London."

..... from Mrs. M. Jones

"Recently I enquired about a red spider predator to control red spider mite and the following came from Predator Services of Mimram Road, Hertford:- "In regard to your enquiry about control of red spider mites on cacti using red spider predator, I have no experience with such a crop but predator has worked well on cucumbers, tomatoes, roses, peaches and orchids under glass and can be expected to do so wherever spider occurs. Speed of control depends upon initial spider infestation and temperatures in the glasshouse.

"I have no idea of the area involved or what other pests cactus may have which might require chemical control which could in turn upset predators. I could supply you with predator at £1.25 per 100 and suggest this would treat a glasshouse of 10' x 10'. "

..... from E. W. Putnam

"The red spider which preys on red spider mite - the animal in question is, I think, Allothrombium fuliginosum, a member of the Arachnidae. It is a red, velvety looking creature about 1/8" long. I find it occasionally in my garden and in the greenhouse during the warmest months of the year. One only finds the occasional specimen, usually on a hot, bright, day. It is a soil-denizen, so I presume that it spends most of its time below the surface.

"It has been pointed out to me on one or two occasions by people who thought that it was a giant red spider mite and no doubt some of these predators are mistakenly killed for this reason.

"Len Newton reported some years ago that it fed on mealy bugs in his greenhouse. I had not heard of it eating the mites, but there is no reason why it should not. The arachnid predators seem to seize any moving creature of suitable size as prey and this tiny spider would no doubt find the mites to be quite tasty morsels.

"As to sources of the animal, I can only suggest that one keeps a number of small bottles or stoppered tubes in one's pockets during the summer and hunts around on rockeries, at the bases of garden walls and similar places whenever the opportunity offers. The animal is very distinctive and easily seen.

"According to one authority the larvae of Allothrombium can attach themselves to human beings and cause intense itching and painful skin eruptions. This report was from the U.S.A. and may perhaps refer to a different species. At any rate I have never heard of any such dire consequences in this country.

References to Allothrombium:-

L. E. Newton in Essex Succulent Review I, 21 (June 1964) and 11, 13 (June 1965).

E. W. Putnam in Nat. Cact. & Succ. J. 21, (4) 106 (Dec. 1966). "

..... from E. W. Bentley

"About the red spider mite, I have trouble with it every year - last year it was an Encephalocarpus and a Frailea cataphracta that got it - and I rely on malathion and frequent looking at plants with a lens. I have had a little damage to crassulas with malathion but some, like C. mesembryanthemoides, stand up to it quite well.

"If by 'red spider' you mean the bright red beast that one sometimes sees indoors (Bryolium, I think) I believe that it is true to say that it does not attack red spider mites. I think it is a plant feeder. The only predators that I know about are other, larger mites (Haemogamasids, for example) that I have sometimes found running over cactus seedlings. But these don't seem to do a marvellous job - I have seen them walking past red spider mites without attacking them!

"And in fact I would not think that it would be practical to control red spider mites by introducing predators. My experience is that the trouble occurs spasmodically, here and there, without one knowing which part of the greenhouse is due for trouble next. So that you would need to have your predators in every pot - and they wouldn't last long in the absence of prey!

"What I do is to rush out of the greenhouse any plant with spider on it and spray it with malathion - complete with saucer, spray the staging all round and look at every pot surrounding the affected plant with a lens and probably spray these too. Also, I look at the affected pot or pots about ten days later to see whether any more spiders have hatched out and if I happen to pass the plant anytime thereafter while carrying the malathion gun I give it a burst. Certain groups like the Coryphantha, Rebutia, etc., seem more susceptible than others and I look at them more often with the lens.

"There is a M.A.F.F. advisory booklet on red spider mite."

..... from P. Goodson

"The larger red spider which I believe you are referring to in the note in Chileans No. 21, has no connection with the red spider mite (Tetranychus urticae) as far as I can find out. However, a predator is available for biological control of red spider mite. It can be obtained from the Ministry of Agriculture Research Station at Starcross, Devon. Whether this predator can be obtained from any Agricultural Research Station, I do not know, but I happened to visit Starcross while on a Horticultural course where I heard all about this pest and predator. The predator is also a mite, Phytoseiulus persimilis and was discovered in Chile feeding on red spider mite by Dr. Dosse, a German."

..... rejoinder from D. J. Lewis

"You have managed to gather a large amount of superfluous gen regarding red spider that will tend to confuse the issue at stake.

"There are a number of predatory mites and other creatures that will eat the red spider if they just happen to fall over them in its travels. This includes the red velvet mite mentioned by Bill Putnam. There are also smaller quick moving mites seen mainly in dry weather that seek out less mobile mites on plants and dry warm surfaces e.g. rock garden stones. What the plantsmen have found is a mite that lives only on red spider mite - i.e. Phytoseilus persimilis. This mite keeps the level of infestation low but not exterminated or else it will itself be killed off by starvation.

"I do not think that a biological control is possible with cacti as there are a number of pests to consider. Plant hygiene by cultural and chemical means with the emphasis on prevention rather than by cure is by far the easier method.

"Let me know if you want some lovely red spiders to try the predators on, won't you?"

..... from Mrs. L. E. McIntosh

"The Senior Horticultural Inspector at The Department of Agriculture is a good friend of mine so I went along to learn all about the "mites". There are two which are serious pests on cactus - the red spider mite Tetranychus pelarius - and a little bronze fellow very much smaller than the spider mite. He goes by the name of the European mite, commonly called here in New Zealand the ornamental mite because it attacks the ornamental shrubs, etc.; both belong to the family Eriophydae.

"There are only three predators of these mites that we could find any record of - Stethorus bipidus and Typhlodranus pyri - two minute insects of a browny colour and of course the lady bird Coccinella bipunctata. We could not find any mention of a red spider which preys on the mites. We do have a little insect, possibly a spider, about the size of a pin head and bright scarlet which scuttles about the woodwork round glass houses etc., but I cannot give him a botanical name."

..... from Mrs. L. Teare

"I understand that the predator which eats glasshouse red spider mite is the bright orange mite from South America, Phytoseiulus riegli. Effective control of red spider mite is only attained if the predator is introduced into the glasshouse early, before the red spider mite becomes established. If introduced later, the predator remains in the area where it is introduced, because the high population of red spider mite supplies plenty of food in the immediate area. If introduced when pest numbers are low, the predator is forced to spread over the glasshouse in search of its prey, therefore effects control of the pest before it can get out of hand."

..... from A. J. S. McMillan

"As one who has unwillingly cultivated red spider mites for many years, I would like to add my pennyworth. First, so far as cacti are concerned, they are very selective and can be almost endemic on some species, e.g. Chamaecereus silvestri, some Aporocactus especially hybrids, some Echinocereus, some Rebutias and Pfeiffera ianthothele, to name a few. I found it almost impossible to clear from Acanthorhipsalis monacantha, and have had a lot of trouble on Schlumbergera truncata and opuntioides. The attack on the latter is very insidious and often the first intimation is when the whole plant drops to pieces !

"They are also very fond of 'Busy Lizzies' (Impatiens cvs.) and I have noticed that they are a brownish green on this plant although red on cacti. Presumably in the same way as aphids are different colours according to their host plants.

"Secondly, the best control I have found personally is a thorough spraying with a systemic insecticide containing rogor, repeated twice at 10 day intervals. This 10 day gap is essential as the insecticide is only effective against the adults, not against eggs. This treatment will clear up an infestation on cacti without bad side effects, but this insecticide is pretty poisonous to 'Busy Lizzies' and Pelargoniums.

"Another point is that the predators would be of little use to cactus fanciers as it is essential to maintain a supply of red spider mites for them to live on otherwise they die right out, and there is no doubt that we want absolutely clean plants ! The predators are only effective against massive infestations.

"As E. W. Bentley says, constant vigilance is necessary. A check around the growing point with a 10x lens will quickly reveal these horrible little bugs at their dastardly work before the characteristic brown scorched appearance develops.

"It is possible that the European or Ornamental mite mentioned by Mrs McIntosh, very much smaller than the red spider mite, is the one referred to in the correspondence colums of

the National Journal in Sept. and Dec. 1971 and Mrs McIntosh's letter in June 1972."

SEARCHING FOR ECHINOCACTUS CUMINGII Hopff. From H. Middleditch

The original diagnosis for Echinocactus cumingii Hopff. was reproduced in Chileans No. 25, when it was indicated that this plant was most likely to be a Neochilenia which had been collected by Thomas Bridges during his trip from Copiapo to Santiago during the year 1841.

The original description by Hopffer is fairly comprehensive and enables a useful search to be made among the Neochilenia to seek an example having body and flower characteristics matching the description. Considering Hopffer's description of the body, the term 'five-sided' used to describe the tubercle does appear to be a little puzzling at first; however, following John Donald's suggestion of "Pyrrhocactus Santiago No. 12" as a synonym for Echinocactus cumingii Hopff., I had a look at my own plant carrying this label, which happened to be in flower at the time.

At first glance the tubercles did not seem to be particularly five-sided; however, when I picked up the plant off the staging and held it at eye level, I was suddenly confronted with a twin of the sketch of a pair of tubercles of Echs. centeterius Lehm. which appears in Schumman's Gesambt. der Kakteen. At that instant the 'five-sided' tubercle was explained, for the tubercle gives the impression of being more or less diamond shaped when viewed at eye level; the bottom of the diamond shape was the sharp-angled chin, two sides of which ran down almost into the next lower areole; the two upper sides of the diamond shape terminate against the underside of the next tubercle above. The areole-bearing face of the tubercle is approximately flat and faces slightly upwards; this must be the fifth face of the 'five-sided' tubercle referred to by Hopffer. Bearing in mind the similarity between this tubercle shape described for Echs. cumingii Hopff. and the tubercle shape illustrated by Schumann for Echs. centeterius, it is perhaps not altogether surprising that these two species were considered to be closely related.

In browsing round the Neochilenia on the staging, I find quite a few species which might be considered to conform to the description of a 'five-sided' tubercle with the sharply angled hump under each areole. At a glance, Neochilenia scoparia, intermedia, confinis, rupicolus, fusca, hankeana, paucicostata, taltalensis, occulta and pygmaea catch the eye with this type of tubercle - and doubtless other species will exhibit this same feature. But many of these particular species are excluded from being considered for synonymity with Echs. cumingii by other features. Neochilenia occulta and taltalensis certainly have cream inner petals, the outer petals having a broad pink midrib internally and a brown midrib externally, before the buds open the sepals are browny-green and the buds are accompanied by some snow-white wool - although one would hardly describe it as copious; but the stigma is cream on both plants, not pale red as in the description of cumingii. Neochilenia rupicolus has a pale red stigma carried on a quite rich red style, but the flower petals are pink throughout and are little more than 1" high and barely as broad when fully open. Neochilenia confinis is similar but with a slightly paler pink flower.

Neochilenia intermedia and Neochilenia scoparis have rather larger flowers but still hardly qualifying as 2" high and broad; the inner petals are a clear pale cream - possibly the palest shade of all the Neochilenia flowers on the staging. The stigma is pale red, the outermost petals have a pink midstripe and there is a generous amount of snow-white wool round the buds and on the flower tube. So far, not a bad match for Echs. cumingii - but, there are three or four central spines which clearly exceed one inch in length; however, on the older part of the plant the spines

are much less well developed, with either one or two centrals which in length are around the ½" of Hopffer's description and radials also much shorter than on later growth and again matching Hopffer's quoted sizes.

The yellowy-brown spines now growing on Neochilenia pygmaea are a reasonable match for Hopffer's spine lengths on cumingii, and the areole is certainly sunken; the flowers have finished for the season, but I do believe that the stigma was a cream colour, not pale red. In addition to the white wool round the tube, these flowers also have numerous, quite long, bristly hairs of a yellowy-brown colour arising from the axils of the scales - either such bristles were not present on Hopffer's plant, or else he did not see them, or did not bother to record them.

And so it would seem that I have not been able to find anything which is really a good match for Echinocactus cumingii among my Neochilenia, but I will be looking at all my Neochilenia as they flower next year, to see whether any others come closer to Hopffer's original description. In this situation, the arrival of the following translation was very welcome, especially as it was just in time for the discussion on this particular species at our Brooksby Gathering.

The Cultivation of Echinocactus cumingii Hopff. By Herr Gardener Peltzer. (Translated by E. W. Bentley from Allgemeine Gartenzeitung No. 29, 1843).

The distinctive echinocactus described by Herr Hopffer was found in the Peruvian Andes by Herr Bridges, a noted naturalist traveller, the subject of mention several times in these pages, and introduced by Herr Cuming, in whose honour it was named, to the Berlin Botanic Garden and to several English gardens.

Its culture does not differ from that of most other Echinocacti; like the other species from those regions that are grown here it needs in winter a lower degree of warmth than its Mexican relatives and overwinters well in a dry house with an average temperature of 5° R (Reaumar? - E.W.B.) when one takes care not to water too much and for safety lets it stay quite dry from November to February. In summer it likes an open bed and an airy, sunny site.

In habitat most of these species, as can be seen from the soil adhering to imported plants, occur in a gravelly, friable loam. If this particular plant is planted in an open border in the summer, as is the custom here, one does not need to worry about what soil to select - only it must be porous and coarse so that water quickly runs through it. To this end the kind of soil used in local gardens is either broken up by hand or poured through a sieve and to it is added an equal amount of peat and leaf mould containing wood fragments and of soil that has already been used once for pot plants and left lying for several years - also some loam and sand added.

Should the soil still be too fine, coarse peat particles or small pebbles can be mixed with it. When the plants are well rooted in the bed, one can water the bed thoroughly after each drying out if good drainage of the water is provided by an underlayer of stones or something similar.

Only in continuous strong sunlight is it necessary to shade the south-facing border for a few hours during the middle of the day. In excess shade the plants become much too bloated and acquire a finer colour but however do not make as strong spines by far and on the whole remain more sensitive than plants that are exposed to the sun unprotected for a longer period.

Likewise for growing in pots only coarsely sieved soils should be used, namely peat and leaf mould and well-rotted old meadow loam in equal parts and sand as required - or, even

better, coarse gravel and again good drainage of water provided by a bottom layer of small stones.

The Echinocactus described by Herr Hopffer had a turnip-like firm main root going straight down into the soil, as one observes in many plants from habitat. It may be supposed that this species occurs in deeper soils like others nearly related to it, such as Ech. centeterius Lehm. of which we have received a fine specimen from the same district through Herr Cuming. Because of the distance separating us from the countries where they occur and the length of time that it takes before they reach the hands of the gardener, these turnip-like, fleshy roots shrivel up and become - to use a common expression - leathery, or in older specimens become woody and it is advisable to remove them completely to prevent them from developing rot which soon spreads to the whole plant. If, however, the root - as is often the case in young plants - is still sound and fleshy, this operation is not necessary.

The root on our plant, although somewhat forlorn, was still fairly good but was almost 4 inches long and if the risk had been taken to leave it on the plant, then in the favourable event of it growing well, a tall pot would be necessary in winter and a deep bed in summer, for further growth and neither are beneficial for cactus cultivation. The root was therefore cut off the plant and put in a warm bed. When it was inspected after a long time, the top part had produced a $\frac{1}{4}$ inch long thin branch which, when exposed to the light, grew into a plant. Fresh roots first appeared in the following spring and, after the first branch had been removed, three more strong little plants grew soon afterwards.

The same treatment was given to another splendid new species from the same batch, of which the root was however a good deal more robust than the first and almost 5 inches long; the plant put out strong roots and the severed root remained alive and put out three plantlets and yet there is less hope that it will be possible to use it for further propagation than in the case of the weaker one.

At first sight it seems to be risky, on receipt of such a specimen, to sever the whole root from the body of the plant and it always rests with the grower to decide from the general condition of the whole plant whether to do it or not, although in badly damaged woody roots of older plants it is usually the only way to save them from death. Fibrous roots are hardly ever produced from the side of these tap-roots and only rarely from the lower extremity, but almost always from the lower side of the plant body itself.

In older, original specimens of Ech. coptogonus from Mexico, the strong roots were broken and damaged but however were quite fresh and therefore, since this species is sensitive anyway, were only trimmed cleanly and then the specimen planted out. As the fleshy body shrivelled more and more, there appeared from time to time on the cut surface of these 2-$2\frac{1}{2}$ inch long roots, a part that looked quite moribund or like rotten wood, that was easily removed up to sound tissue. It was only on the underside of the plant body itself, where one would least expect it, that young roots were formed, while the old roots were removed in order to prevent them from going rotten later and bringing about the demise of the plant.

The removal of the main root in these cacti admittedly detracts from the nature of the plant; the rapiform root is undoubtedly a characteristic of many cacti, which goes to show that many plants grown here from seed put out roots that in respect of size stand in insignificant proportion to the other parts of the plant, such as in Mammillaris conifera, ottonis, schiedeana and most thin-ribbed Echinocacti, as for example in Ech. phyllacanthus, etc.

Certainly much of the originality of the plant thereby escapes us; however, for the reasons set out here, circumstances require it and there is no alternative method.

Generally speaking we shall need more experience before we find that we can grow in our collections large original plants that take a long time to reach us from the cactus areas, as happens at present. The cause of this may lie mostly in the difficulty of reproducing the

characteristic root capacity of the plant and establishing it in conformity with their nature. This may be the next task for the gardener to solve.

Comments

..... from H. Middleditch

"This article provides a most enlightening account of the nature of the root formation on the original Echinocactus cumingii Hopff. The production of new growth from a headless swollen root has been illustrated previously in the Chileans for Neochilenia (No. 15) and Pygmaeocereus (No. 20) and the growth of an additional head on the swollen root of a Capiapoa was illustrated in No. 18. As indicated in Chileans No. 25, the original description given by Hopffer would suggest that it referred to a specimen of Neochilenia. It may be thought that we could narrow the field of search for this plant amongst those currently cultivated, by singling out the species which exhibit a swollen root (or buried stem). However, as the author indicates, this may prove difficult since seed-grown examples may not reproduce the natural swollen root-stock. There is also the possibility that the head off an imported plant would establish itself in our conditions on a fibrous root and fail to reproduce a natural swollen rootstock.

"If we are to rely on the descriptions given in Backeberg's Lexikon as a guide to Neochilenia species which possess a swollen root, one finds that the list reads almost like a parade:-

Neochilenia	aricensis	dimorpha	glaucescens
	calderana	duripulpa	huascensis
	chorosensis	eriosyzoides	imitans FR 499
	confinis	floccosa	intermedia
	iquiquensis	nigriscoparia	scoparia
	kraussii	paucicostata	setosiflora
	lembckei	pilispina	simulans
	mitis	pseudoreichei	transitensis
	monte-amargensis	pygmaea	wagenknechtii
	napina	recondita	

"If we are to accept as correct the account of Thomas Bridge's collecting trip undertaken in the years 1841-1842, which was quoted in Chileans No. 25, then we can discount from the above list those plants which emanate from north of the River Copiapo valley i.e. those plants from Chanaral, Taltal, Paposo, Antofagasta, Arica and Iquiqui (see map on front cover of Chileans No. 11). However, this does not eliminate many contenders, only the following:-

aricensis	intermedia	pygmaea
floccosa	iquiquensis	
glaucescens	paucicostata	

"Where, then, do we look amongst the many other Neochilenia species with thickened rootstocks for Hopffer's Ech. cumingii? The discussion at Brooksby during our 1973 Gathering did suggest one or two possibilities; we hope that those members with Neochilenia in flower next season will let us know if they find they have a plant which appears to come close to Hopffer's original description."

OF TAP ROOTS AND UNDERGROUND STEMS By Rene Zahra

From time to time articles and comments have appeared in the Chileans about tap roots and underground stems. However, no first hand information seems to have been supplied by our readers. Accidently I was able to make some experiments on this subject, and recorded in detail what happened.

About midsummer 1970 I was repotting seedling plants of Copiapoa remontana (or perhaps I should say C. humilis va. remontana) which I had germinated in 1967. These plants were in very small pots, and were totally pot bound. The thick roots had packed the pot completely. I tried to tap the pot on the side to shake the soil out and free the plant. I had tapped the pot about six times and the last tap must have been rather stronger than the others, because on this last tap the upper part of the plant - that is, the part out of the soil - fell off, leaving the roots in the pot. I picked up the part that had broken off, and noticed that the scar left by the break was very small compared with the diameter of the plant. The plant was 45 mm in diameter and the scar was only 18 mm across. I left the roots in the same pot but placed the upper part of the plant in a propagating tray so as to produce roots again.

I now tackled the next plant with more caution. Being more careful this time, I broke the pot before the plant to make sure not to damage the roots. Now I could see that the plant was attached to the very thick roots by a very narrow, soft, neck, that could break very easily. This neck was part of the stem rather than part of the roots, because on it remains of old areoles could be traced. Remembering what had been written in the Chileans about tap roots and underground stems, I placed the roots in a larger pot and made sure that the top, where the scar was, was left uncovered by the soil.

For some time there was no change, but after about four weeks the roots from which the stem had been broken produced three offsets. After a year I inspected the two plants involved. The three offsets produced by the roots had grown to 18 mm in diameter. The stem which I had placed in the propagating tray had produced a complete ring of offsets all round the base of the plant. When I uprooted this plant, I noticed that its roots were very thin but every offset had produced its own small thick 'tap-root'.

In the late summer of 1971 I removed the three offsets which had grown from the detached root, and tried to root them separately - but in two weeks time the roots had again produced three other offsets. Like the others, these were produced at the very top of the roots close to where they had broken from the head. I noticed that a little bit of the stem had been left attached to the roots and this is the part which produced the offsets.

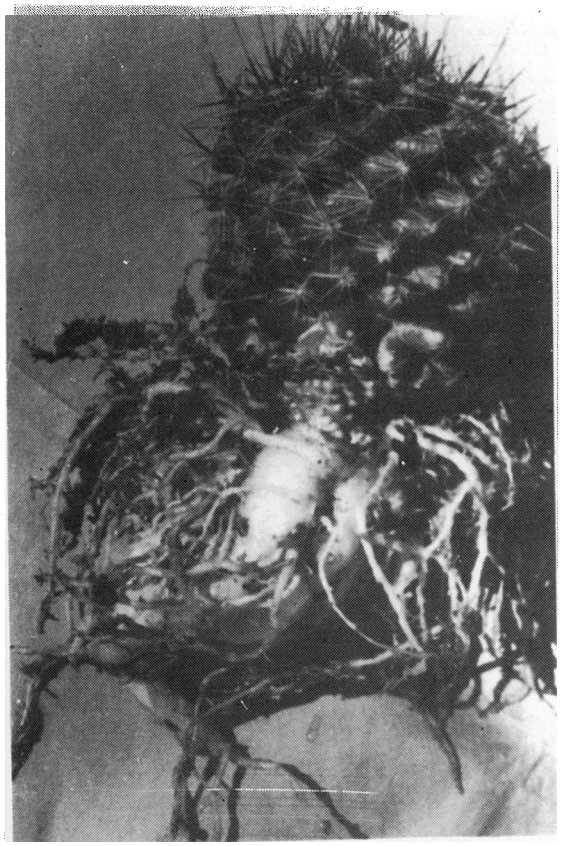
Comments

..... from H. Middleditch

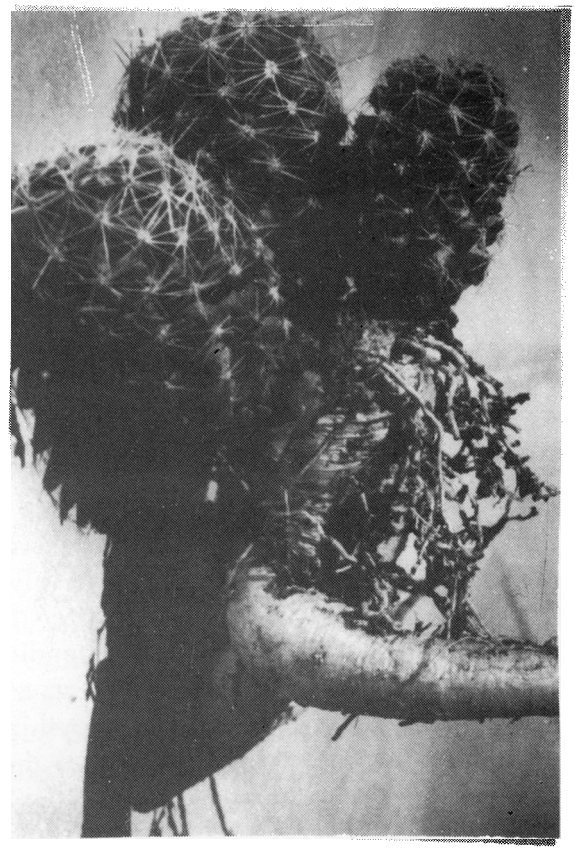
"From Rene Zahra's observations one may see the similar response in cultivation to loss of the plant "body", to that described much earlier by Herr Peltzer in respect of Echinocactus cumingii. One naturally wonders if this phenomena occurs with plants other than Copiapoa and Neochilenia."

..... from A. W. Craig

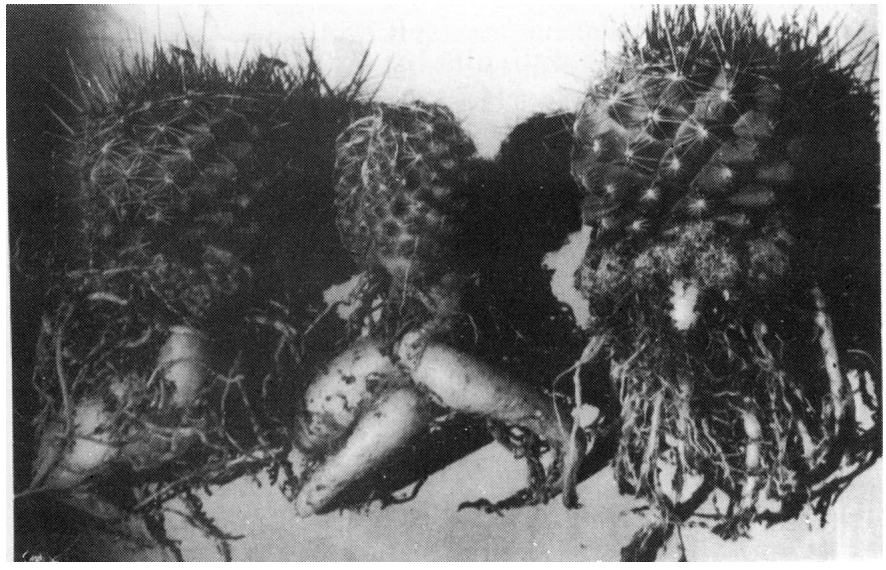
"About three years ago I sent for some plants from Sargant, amongst them a Pygmaeocereus bylesianus. This was an imported plant with a big thick tuber and a small head, the two being



Typical normal seedling
(on left, below)



Beheaded root offsetting
(center, below)



Detached head rooted down with thinner roots
(on right)

COPIAPOA SEEDLINGS

Collection & Photograph R.Zahra

joined together by a very narrow neck - and when I opened the parcel I found the plant had broken in two across the narrow neck. The tuberous root was potted up to see what would happen and it eventually put out three offsets from the top of the very thin neck. The detached head rooted down and it has not grown much - but I have not had it out of the pot yet to see if it is producing anything remotely like a thickened rootstock."

FLOWER SECTIONS

..... from Mrs. A. Lavender.

"I have been trying to take one or two flowers off my Weingartia in order to section them and then press them, but it has been terribly awkward. To start with, I had a terrible tussle getting the flower off the plant, and after that it would not lie flat when I laid it on the paper for pressing. Some of the petals kept bending over and getting in the wrong place somehow. There were some pressed flowers which we saw at Brooksby last year - and some slides of sectioned flowers - but mine weren't anything like those. How had the people who pressed those flowers managed to get them looking like that?"

..... from R. L. Purves

"I am taking some more flowers off my Sulcorebutia this year and pressing them ready for the Brooksby weekend. I am rather wondering what is the best way to lay them out for pressing. Usually I cut the flower along the full length of one side and then open it up like a fan, before putting it in paper for pressing. It is rather difficult to get the ovary to spread out flat and in any case I seem to think that I have seen most flowers that have been pressed are not done this way. Is there a correct method for cutting and pressing a flower?"

..... from J. Arrowsmith

"So far I have not found any undue difficulty in sectioning flowers, apart from the fact that some stigmas tend to twist out of position when the flower is cut. I have overcome this by cutting halfway through the base of the stigma - it can then be laid into the position required. I find it a somewhat delicate operation, but it works for me.

"The procedure I use for sectioning a flower is as follows:- The flower is separated from the plant body with a very narrow surgical scalpel - this allows an all-round cut without damaging the plant. Next a new razor blade is used to section the flower, from the base upwards. The sections are then placed in position on a board (a piece of hardboard which I painted matt black and added a cm scale both vertical and horizontal). The sections are then photographed straight away. I shall let you know when my slides are returned how good or bad they are."

..... from H. Middleditch

"I can well imagine how difficult it is to cut a flower off a Weingartia, what with the fairly close-set areoles, the outstanding spines, and the base of the flower partially sunken into the areole. I expect that a knife with a long but quite narrow blade would be the best for this job - not a penknife, nor a domestic knife, but one having a long slender handle which provides adequate grip for the fingers so that the knife can be properly controlled when cutting close to the base of the flower, and with a narrow blade so that it may be manouevered amongst the spines without too much difficulty. The blade may be better having a cutting edge at both sides, so that cutting can be done in both directions after the initial insertion of the point of the knife into the base of the flower.

"It may be better to lift the flower off the plant with a pair of tweezers, to avoid inadvertently damaging the flower by grasping it with one's fingers - unless it is a large Lobivia or Gymno flower which can be held around the tube without difficulty. To section the flower it is best to try and cut right through the ovary with one steady movement and it may be convenient to rest the flower on a hard surface to make this cut. One has to try and cut just slightly off centre in order to leave the style untouched by the cut; at the same time, this first cut should penetrate just into the base of the tube. Without removing the knife from the cut, the blade should then be turned up through the wall of the tube. This leaves only the opposite wall of the tube to be cut; the flower can be opened slightly to allow the blade to be positioned accurately and the flower then cut completely into two halves.

"The half of the flower which contains the style should be mounted or photographed with the flower interior exposed, whilst the half which lacks the style should be mounted or photographed with the exterior of the flower exposed."

..... further from Mrs. A. Lavender

"Not long after trying to remove and section one or two flowers from my Weingartia, I was talking to Horace Kennewell about my problem in getting a sharp knife between the spine cluster, and he gave me a scalpel to use for this job. This is a very good implement for removing a flower without doing any damage; once you have got used to using it, it is possible to use it not only to cut through the flower but also to lever it up out of the areole. I can hold the detached flower in my hand and cut through one side with the scalpel and then cut through the opposite side.

"We put the cut flower into paper for pressing, using a book for a weight. We pressed some flowers between filter paper and some inside a folded newspaper. They seemed to come out best when pressed in newspaper - but not just any old newspaper. The local advertising rag is best of all, it is not as porous as the Daily Mirror and not as fine grained as the Times, Instead of changing the paper, the flower sections were moved round on the paper from one spot to another quite frequently. When it was new and fleshy the flower was moved on the first day it was being pressed and subsequently moved almost every day afterwards.

"By the time we had about half a dozen examples nicely dried and pressed, we were looking round for a rather better method of mounting them than just having them laid between two sheets of filter paper. The first idea was to attach each flower to a card with a little spot of glue, cover it with a sheet of cellophane and sellotape this down at the side of the card. Another idea was to use two or three strips of very broad sellotape over the flower. Then I heard about Joan Hobart using clear self-adhesive plastic sheeting ("Contact" or "Fablon") as a cover - I had never heard of the clear variety of this sheet although the usual coloured sorts are common enough. Anyway I found a shop selling some of the clear sort and this has proved a very succesful method of covering the sectioned flowers. Each one has been put on a separate card and I shall be able to write the name and any other information on the back.

"To find out whether a flower could be preserved in this manner without first pressing and drying it, I put the two halves of a flower straight on to a card and covered it with the clear self-adhesive plastic. It is not possible to exclude all the air as the bulk of the flower prevents the cover being in contact with the card all the way round the edge of the flower. It will be some time before we will be able to see whether this idea meets with success, or whether all the sap and moisture trapped with the flower set up some fungus growth. Perhaps the backing card will suck up some of the moisture."

More thoughts on Lobivia flowers From J. D. Donald

John Hopkins is to be congratulated upon an excellent and accurate summary of the range and variation found within Lobivia flowers. However, there are one or two personal points of view that I would like to air and a few supplementary observations to add.

Lau 459 from Portrero is probably a new longspined variety of L. drijveriana. It has a beautiful flower with pure scarlet perianth and a startling white corolla or hymen. Walter Rausch recommends that this plant, along with L. kuenrichii and L. poncapoma are made varieties of L. drijveriana. This would then place Lau 459 in John Hopkins "densispina" group rather than in the "jajoiana" group to which I would agree with John that at first sight of the flower it seems to belong. But the seed of 459 is quite distinct from the "jajoiana" group and matches that of the "densispina" group, hence I believe that Lau 459 is indeed a variety of drijveriana.

This is but one example of the dilemma that faces any taxonomist basing a classification on a single characteristic: which is the more important in determination of the phylogenetic relationship - the flower or the seed? Obviously both count, but do they count equally? All in all the soundest phylogenetic classification is that which uses the greatest number of significant characters. For Lau 459, clearly the seed and flower are not enough, but by taking into account the body, areole siting, and fruit as well, on reflection, the overall picture favours drijveriana rather than jajoiana, despite my earlier remarks in Chileans No. 22.

I am a little unhappy in discussing L. incaica and L. cinnabarina in the same breath as L. pentlandii. I agree that they have funnel form flowers but they have very distinctly different tube length to diameter ratios, which I believe are important in floral morphological classifications. Whilst the actual size of the flower may vary, it is remarkable how constant is the value of the tube length to breadth ratio for each series.

The "incaica" group has flowers mostly of the same size but in both the "pentlandii" and "cinnabarina" groups there are both large flowered species and small flowered species, e.g. L. pentlandii and L. maximiliana on the one hand, L. cinnabarina and L. oligotricha on the other, respectively the large and the small in each case. L. wrightiana, L. chilensis, and L. backebergii would fall into the incaica pattern while L. weghiana, L. camataquiensis, L. cariquensis and L. charazenensis etc. fall into the pentlandii pattern.

Lobivia larae or at least one of my original Cardenas' plants will belong to the incaica group, but the Knize version of L. larae and also Lau's L. taratensis belong to the pentlandii form.

Lobivia prestoana, L. zudanensis and L. draxleriana belong to the large flowered cinnabarina group, while L. oligotricha, L. neocinnabarina and L. pseudocinnabarina belong to the small flowered group. Another feature of the cinnabarina group is the almost naked tube - the scale axils bearing almost no hairs or only a few long black hairs. There is one important exception in L. acanthoplegma - this is a medium sized cinnabarina flower but with a very hairy tube.

It is interesting to note that John Hopkins' observation on L. backebergii differs from mine - he suggests that the tube of this flower is shorter and wider than L. wrightiana and nearer that of L. cinnabarina. I would say that there is no difference in their respective tube length/breadth values - L. backebergii has a shorter tube but also a correspondingly narrower diameter than L. wrightiana measured at the equivalent point. I wonder if our plants are indeed the same species? I had hoped to get some recollected plants of L. backebergii from both Karel Knize and Alfred Lau. Karel Knize sent me some plants he believed might be L. backebergii from the La Paz area, while Alfred Lau could find nothing resembling L. backebergii. Knize's plants have flowers - the colour is blood to bluish red with short rounded petals and a short thick tube with copious black hairs in the scale axils - fitting neither incaica nor pentlandii forms exactly. Werdermann's original description in my opinion favours a flower like L. wrightiana in form but

with the rounded inner petals of the pentlandii group. Maybe L. backebergii is an intermediate form between the incaica and pentlandii groups?

I would certainly agree with Walter Rausch and also incidentally with Friedrich Ritter who expressed the same sentiments regarding the proliferation of pentlandii species much earlier than Walter Rausch - that most of Cardenas's and Backeberg's species should be united under the single name pentlandii. I have seen a slide prepared by Ritter showing the enormous variation of colour forms of pentlandii collected by him from a small area near the Lake Titicaca on the Peru-Bolivian border.

The question of L. cinnabarina and the length of the tube is odd and appears to be a case of mistaken identity. The original painting in Curtiss' "Botanical magazine" shows a large red flower pressed close about the plant body - the description gave only the diameter of 8 cm for the flower, no length. Britton and Rose redescribed the plant and gave it a tube length of 7-8 cm as well. Many plants have been collected by Cardenas, Rausch, and Lau from Comarapa southwards to Sopuchoy and down to Cajas Pass in Tarija, Bolivia. This is a large area producing plants with varying sizes in flowers, but almost always with short, near naked, green tubes. One important exception was the plant Lau 414 from the Cajas pass; this indeed did have the long tube and large flower of 7-8 cm length and diameter, and a blood red perianth. This latter has been named L. cinnabarina v. grandiflora by Rausch and is, I believe, identical with the Britton and Rose description. Lau 392 from Sopuchoy is closest to the Hooker description in Curtis Bot. Mag. Another from - Lau 352 from Pucara - is probably L. draxleriana Rausch; Lau 388 from Zudanez is almost certainly L. prestoana, and I suspect that Knize's L. zudanezensis Card. n.n. is also L. prestoana.

The short flowered L. maximiliana group again probably could all be united under a single name. The flower certainly looks quite distinct from the longer, wider opening pentlandii group but nevertheless the tube length/breadth ratio is nearly the same. The real difference appears to be the behaviour of the inner row of tepals which do not open laterally like the outer tepals and the reflexed sepals. At first sight the flowers look reminiscent of an Oroya flower, which have the same inner vertical or slightly incurved tepals. The tube of L. maximiliana appears very short but this is due to the strongly reflexed sepals which can be taken for outer tepals. Measurement of the tube needs to be made on a vertical section and not externally; the tube length is measured from the base of the pericarpel to the corolla, for the purposes of determining the tube length/breadth ratio. Besides the species mentioned by John Hopkins, L. camataquiensis, L. cariquensis, and L. charazaniensis all belong here.

I wonder about L. corbula for this again is a mystery plant; there are plenty of things called L. corbula but they do not correspond to Herrera's original description. Only Backeberg thought L. corbula to be synonymous with L. pentlandii - in which case, why is L. corbula associated with L. maximiliana unless it is by common experience of what we all grow as L. corbula. Lau collected a very interesting plant (Lau 154) near Paruro some 20 Km S.E. from Cuzco, which is close to Herrera's description. It has a relatively long thin tube, 30-35 mm long, a fairly small perianth 30-35 mm across, consisting of short broad rounded scarlet overlapping tepals with an orange corolla. The filaments are bunched together about the style and virtually fill the tube, so that one has almost a solid columnar axis reminiscent of Aylostera. This flower is neither incaica nor pentlandii - is it L. corbula (Herr) Br. & R.? L. sicuaniensis is also very interesting and again like L. backebergii but in a different way an intermediate between incaica and pentlandii groups.

As John Hopkins says there is much to be discussed and I am grateful to him for providing the opportunity for widening discussion of this topic.

..... Response from J. Hopkins

"My survey of Lobivia flowers was intended only as a brief guide and hence many species were not mentioned and others not discussed at the length they deserved. However, I accept some of the points raised by John Donald but others leave me in doubt.

"I am particularly pleased that he now considers Lau 459 from Portrero to be a member of the L. densispina complex, which my seed study led me to believe some time ago. At the time of writing my flower survey I had seen only a slide of this species and suspected that it could be a L. jajoiana form, as John Donald originally suggested; I assumed that my single seed sample was incorrectly named. On seeing my own plant in flower, however, it was immediately obvious that it was not L. jajoiana but maybe a relative of L. sanguiniflora. The rather bell-shaped flower tube does not seem quite right to me for L. drijveriana. The body habit is like that of L. sanguiniflora but I have not seen flowers of this latter species. Seed from my Lau 459 plants confirm their placing in my L. densispina seed group 1.

"At present I have insufficient data to be able to comment usefully on the flower tube length/breadth ratio, but from memory I would be surprised if it were indeed a constant for the L. pentlandii flower type group as a whole and it is certainly not constant for the L. pentlandii seed group which includes L. westii, L. tegeleriana, L. mistiensis, L. caespitosa, etc.

"The inclusion of L. camataquiensis in the L. pentlandii group surprises me. Although Cardenas mentions a flower size on a par with L. pentlandii viz: 4-5 cm long, 4 cm diameter, many other features of the plant are quite different and my own view is that it is a L. cinnabarina form. From observations on the two plants of Kz 661, the flower is typical of the L. cinnabarina complex and these plants fit the description of L. camataquiensis quite well. It is all too easy to be misled by flower dimensions, however, and I noticed that in normal conditions the flowers were indeed 4-5 cm long and 4 cms diameter, but in continuous sunshine and a resultant high temperature (abnormal conditions !) the flowers opened much wider to some 7 cms diameter and only 2 cm long - a size which to my mind fits the original description and illustration of L. cinnabarina in Curtis's Botanical Magazine very well indeed. Lobivia camataquinsis is very free flowering and often the sheer number prevent all of the flowers opening fully. A very similar plant is the so-called L. claeysiana offered recently by Uhlig, less floriferous but the flower otherwise identical to L. camataquiensis.

"My reason for thinking that L. cinnabarina v. grandiflora is not the closest approach to Hooker's plant, as suggested by John Donald, lies in the red anthers quoted in Rausch's description. This feature is common to the plants mentioned above and to L. prestoana and L. draxleriana, but it is only obvious in the latter two by virtue of the fact that the pollen is easily and completely removed from the anther, which is not the case with L. camataquiensis etc. Furthermore the pollen of L. prestoana and L. draxleriana is of a golden yellow - almost golden-brownish - colour, quite noticeably different in fact to L. camataquiensis etc. and to the "yellow anthers" quoted by Hooker and shown in the colour illustration in Curtis (reproduced in the Kakteenlexikon). I am of course assuming that L. cinnabatina var. grandiflora is related directly to L. draxleriana and that the pollen is easily removed from the anthers, leading to Rausch's inclusion of the "red anthers" in his description. If this is true, then the further assumption is that the pollen is golden rather than yellow and hence the species is not L. cinnabarina !

"L. backebergii is indeed a problem plant and the specimen depicted in Die Cactaceae Vol III appears to me to belong to the L. pentlandii group. The quoted habitat of La Paz would support this view and seems to me to preclude the possibility of it being included in the L. incaica complex which is concentrated around the Rio Urubamba valley and confined entirely to Peru being at its furthest south around Sicuani (L. sicuaniensis) some way north of the Peru/Bolivia border. What then are the plants we grow as L. backebergii? All my seed samples of the species are not of the L. pentlandii type, being closer in fact to the L. aracnacantha seed, itself in a group all on its own. Are we dealing with perhaps a mass produced hybrid? I hope that some

seed from Rausch's plants will soon be available.

"I would like to apologize for two errors which crept into my flower survey as a result of trying to think about too many names and collection numbers at the same time. Firstly Ritter's L. winteriana is in fact associated with L. wrightiana and the L. incaica group, having nothing whatever in common with L. westii. Secondly, L. miniatiflora does not tend more towards L. pentlandii in flower shape than Lau 962 (L. caespitosa) but rather the reverse, having a thicker and much fleshier flower tube than L. caespitosa."

Comments on L. flowers

..... from J. R. Gooch

"My own collection includes some Lobivias in the cinnabarina group; one of my first acquisitions in this section was called Lobivia cinnabarina and came from Uhlig. The flowers are about 3 cm diam. and 2 cm long. This plant now rather looks as though it is pseudo-cinnabarina. Similar or slightly smaller flowers have been produced on L. acanthoplegma, neocinnabarina, pseudo-cinnabarina, and oligotricha, while blooms of 5-7 cm diameter occur on L. prestoana, zudanensis and Lau 352 (draxleriana). Lobivia tarabucensis, flowering today, also seems to fit in here. Lobivia larae may well fit in the cinnabarina group by seeds, but both body and flower make it an odd one out, to me. The strong spines on my plant are very pectinate, only nearly approached by L. taratensis, and the flowers are a lilac pink shade, following from a very pointed as opposed to the flattened bud more usual in the cinnabarina complex.

"All these plants are flattened globular with me, except oligotricha which is almost cereoid, being some 10 cm high and 3 cm in diameter."

..... from H. Middleditch

"My so-called L. claeysiana ex Uhlig flowered this summer, producing short and fairly fat, deep-red flowers, which seemed to be rather similar in general appearance to the illustration of the Lobivia cinnabarina flowers in Curtis's Botanical Magazine."

CHILEANS MELOCACTUS ROBIN Reported by Mrs. S. L. Teare

The Melocactus Robin started on April 12th and has just flown in from England on its second round. Small in numbers, it makes up by the enthusiasm of its members. It is inter-continental and shows very different conditions for cultivation.

Brian Chudleigh in New Zealand : summer temperature 80° / 85° F down to 30°F in winter. Brian has a 60 ft by 13 ft lean-to greenhouse. As well as Melocactus, he grows Discocactus and other plants forming cephalia, such as Espostoas and Buiningia (Coleocephalocereus). "I grow my plants in a heated propagator and stand the pots on damp peat. Last year, after a particularly bad season - very rainy and cloudy - Melocactus and Discocactus fared very badly and a number of plants died; most of the mature plants lost their roots. These plants take all the heat you can give them. Time for Melocacti to mature varies from species to species. Buiningias are every bit as interesting as Melocacti and Discocacti. The seedlings are very attractive - I have two. B. aurea and B. brevicylindrica, but only one is really thriving; this genus often produces slightly greenish flowers late in the afternoon, which stay open till next morning. The lateral creamy cephalium is very wooly with yellow bristles - quite a contrast to Melocactus and Discocactus. Other mature cephalium bearing plants I have are a large Espostoa hylea, 7 ft high with several branches, most with cephalia; the first

three branches to mature produce branches from the cephalia, which in turn produced cephalia. Only 3" to 6" in length, the wool of the cephalia is a ginger colour."

Charlie Lipscombe, New Zealand : "The humidity in Auckland is often around 70-80%. All my Melocactus seem to need these sort of conditions. If the roots get even slightly dry, they start to go yellow on the ribs. I do not think the Melocactus bahiensis seen in New Zealand is the true one. Borg says "4 centrals and brown cephalium". The M. bahiensis I have seen all have 1 central spine and a ginger cephalium. I have discovered that Melocactus do not stop growing completely when the cephalium forms. My bahiensis is now noticeably larger than before the cephalium formed; it is now almost hemispherical instead of depressed. I bought a seedling of M. macrodiscus last week which should provide me with another cephalium in a couple of years. With any luck my 2" M. matanzanus will also oblige by the end of the season. In a few species such as M. ernestii and matanzanus, I noticed that growth speeds up after the first 12 to 18 months."

Howard Wise, California : "I started growing from seed in 1967, although I have a good number of collected plants, most of my plants are cultivated examples. I have recently obtained some new Discocactus - D. boliviensis var. KZ 667, D. minimus KZ 662, D. heptacantha and D. tricornis. I have rooted all my imports within ten days. I put them in my usual potting compost, water them till they are dripping wet, enclose them in a plastic bag and put them on the hot bench. These plants will not root if allowed to dry out. I have several hundreds of HU 324 seedlings and although they are only one year old, they are from $\frac{1}{4}$" to $\frac{3}{4}$" in size. I have grafted many on to Cereus peruvianus stock and they are fine. I can see no difference in the HU 329 and HU 329 M. violaceus; there is a great deal of confusion in this genus. Our summer temperature goes up to 120° in the summer with no humidity so I have installed an automatic sprayer over my Melocactus. These plants grow well here for the first three years, then they slow down. Perhaps this added humidity will speed things up, as my plants grow much better in wintertime. My growing house is lath covered with plastic in winter and a small heater keeps the temperature between 60°-70° F."

Tony Mace, England : Albert Buining on a visit to Tony suggested that Discocactus should be grown as orchids - he also gives his Melocactus high humidity. "The winter has not been kind to my Melocactus, owing to severe power cuts I lost two mature Melocactus and two small seedlings. The Buiningias brevicylindrica and aurea are much easier to grow than Discocactus !."

He was shown a slide of a new plant of Coleocephalocereus with rose pink flowers very similar to that of Melocactus with a few more petals and slightly larger. He expressed the opinion that "all the Peruvian spp. of Melocactus are closely related and many could be better regarded as individual forms of M. peruvianus, endemic to each Peruvian valley. M. bellavistensis is exceptional, being very distinct. The plants from Curacao are probably all forms of M. macrocanthus; Br. & R. list about 100 synonyms."

Harry Mays, England : "My Melocactus are kept in the heated part of my glasshouse in a propagator at 60°F. My experience indicates that Melocacti do not like high humidity. Melocactus sp. nov. rotted from the outside at the base, as did M. matanzanus. A collected M. macrodiscus is now showing signs of discoloration and in December Discocactus tricornis began to rot at a tubercle near the cephalium. All these plants were in the enclosed propagator. I can only assume that it was the humid atmosphere that caused the trouble. Another M. matanzanus left on the staging all winter and not watered very much did not siffer in any way. I too find collected Melocactus and Discocactus very difficult to root".

I have grown Melocactus in England and like Harry Mays I tried both ways - very high humidity at 75°F (sugar cane were also grown in that glasshouse) and found the mature Melocactus continued to grow a little in the winter, but the 2" seedlings were not at all happy and several died. Melocactus with cephalia need a minimim of 60°F to be happy.

Here now in South Australia, the summer temperatures vary between 90-100°F and the atmosphere is extremely dry, so that while in England I grew them in full sun, here they need shading. All my Melocactus, both mature and seedlings are kept in a propagator as in winter the temperature drops to 45°F and goes up to 60-65°F during the day. Like Howard Wise in California I shall have to provide extra humidity in the summer. The plants here just stop growing in mid-summer. So the degree of humidity really depends upon what part of the world one lives in.

The CHILEANS BORZICACTINAE ROBIN

The second round of this Robin set away in New Zealand where Mrs McIntosh comments on the perennial bogey faced by Matucana growers - the constant creeping corkiness round the stem: "The winters in Hawkes Bay usually have frosts at night up to 20° with high day temperatures up to 60°F so I have to dry off the collection completely for six months; it is during this resting period that I find the Matucanas develop the dead corky look at the bottom of the plants, which does not grow out again during the summer. This winter however has been mild and very, very wet with no frosts and temperatures seldom below 45°F. Matucana celendinensis has sat under a small water drip all winter and looks really wonderful, plus no corking! I am now inclined to think that a little moisture through the winter would be beneficial.

"Regarding the two markedly different M. ritterii grown from FR seed by David Lewis, I would say that it is more than likely that these could be hybrids. Frau Winter buys a lot of her seed from two growers in this country, the biggest exporter living a stone's throw from myself and whilst we are good friends, we argue like mad! For I tell him that he hasn't any conscience - he simply pollinates any two plants that look alike, the seed being named for the plant that bore it!

"To me the Matucanas could be divided into two groups - the closely interwoven spined type and the sparsely spined sorts. The closely interwoven spined species flower profusely for me in late spring and then no more for the rest of the year. They set seed readily with any other species in their own group but not so readily with any sparse-spined species and I have not been able to cross-pollinate them with any other genera. The seed pods are barrel shaped and change colour from green to wishy-washy pink just before they split open.

"The sparsely-spined species, on the other hand, flower spasmodically from early spring, through the summer and then profusely in the autumn; they also set seed readily. I have cross pollinated intertexta, aurantiaca and ritterii with Borzicactus, Loxanthocereus, Seticereus and Oreocereus. This sparsely-spined group have quite large top-shaped pods, bright green and fleshy, fading in colour only a little before splitting - I have never seen a coloured one! This group of Matucana also flowers much younger than the closely-interwoven spined species; I have had M. ritterii flower when only $1\frac{1}{2}$" across; M. corrundayensis just two years from seed and 3" across is in bud at present.

"The species with closely interwoven spines like yanganucensis seldom flower before five years of age and more often even seven years old. The haynei varieties are the largest Matucanas in my collection - seven years old and yet have to flower.

"I have added a print to the Robin of my Matucana intertexta in fruit - there were six pods on the plant, all split the same night and I harvested 2217 seeds from them."

THE CHILEANS GYMNOCALYCIUM ROBIN

Opening a new round of the Robin, E. W. Barnes suggests that "most Gymnos seem reluctant to set seed or even produce fruit pods. I find that certain ones set seed very regularly, whereas others never do. I have tried titillating the stigmas with foreign pollen, but this seems to have no effect whatsoever.

"I have found that heat stimulates flower maturity more than sun and seed is set better and more freely if the weather is very warm. I have tried this by placing budding plants in my seed propagator. Flowers opened and reached maturity much more quickly."

Commenting upon the species which have flowered for him this season, E. W. Withers observes that "G. mostii has a large flower of salmon pink to pale red in colour".

The contribution from T. Lavender includes some b. & w. prints of Gymno. flowers and fruits, amongst which is one of G. damsii with the slender flower tube commonly found in the Muscosemineae. In addition there are large sketches of the seed of G. gibbosum and of G. denudatum, both made "with a watchmakers' eyeglass" but showing clearly the form of each seed.

Following this, S. Johnson added further seed sketches and notes on other seeds which he had examined and found to be of similar appearance. The sketch of the seed of G. michoga showed a narrow hilum and a pitted testa which was a "dull brown in colour, the hilum cream; other seeds of similar appearance were G. fricianum, knebelii, pirarettaense, and joosensianum." The seed of G. ragonesei was described as having "a very thin shiny brown testa; the seed of G. koselskyanum is very similar". The seed of G. bicolor was sketched nearly spherical in form, with a very slight cut-off for the hilum. The seed of Gymno. horridispinum was shown as snail-shell shape, a form most unusual in the Gymnocalycium.

On the subject of flowers and fruit, S. Johnson observes that "I have found that the fruit takes on the same colour as the flower tube. The colours vary from green for G. denudatum and G. mostii; green with a chalky surface for G. calochlorum; to pinky blue with a chalky surface on G. quehlianum and G. vatteri."

Following this last comment, E. W. Putnam then points out that "Not all fruits take on the flower-tube colour. With G. mihanovichii v. friedrichii the tube is pale blue-green but the ripe fruit is dusky red".

"The so-called G. albifructum has flowered. Plant and flower show considerable resemblance to G. baldianum, thus supporting the information I have had from Guenther Moser that this plant is a hybrid produced in Holland.

"Flowering has gone on unusually late for several species of Gymnocalycium, notably G. damsii, mihanovichii, joosensianum, and damsii v. centrispinum and v. tucavocaense. These are all species in the 'chaco' group and I find that it is usual for them to flower late in the year. They begin towards the end of July or early August, but it is quite unusual to have so many flowering in November, though. Possibly the rather high average temperature and sunshine hours this autumn have caused this."

A contribution from R. Williams enclosed some samples of various seeds sellotaped to the sheet, amongst which the brown colour of the Muscosemineae stand out conspicuously.

Describing some of the many Gymnos which flowered in her collection this season, Miss A. Dixon adds "I try to have two or more similar named plants in my collection for seed purposes. I had a plant of G. joosensianum which had ruby red buds when they were young, later becoming green with brownish green tip. The anthers were grey and the filaments pale pink, but the following year the anthers were cream and the filaments white." (Any explanation for this? - H.M.)

Starting the second round, E. W. Barnes records that "Dr A. Lau wrote to me recently to say that he has collected quite a number of Gymnocalycium in Bolivia. He collected red blooming Gymno. damsii on the Divi Miserato Mountain. He climbed the mountain south of San Jose de Chiquitos and found Gymno. hammerschmitdii in full bloom, but says he can see very little difference between this species and G. chiquitanum. He went to a place called Loudres near Tarapas and found G. pseudomalacocarpus and remarked that he had never seen such large, snow-white blossoms on a Gymno before.

"He was told by Padre Klingler, an associate of Padre Hammerschmidt (now deceased), that Hammerschmidt had never been there, much less in the salt dunes along the Paraguayan border and because of the lack of interest of Klingler in cacti, the localities given in Backeberg are wrong. He looked for G. griseo-pallidum among these Salinas, but could not find it and wonders if it occurs there at all. He collected many Gymnos with a greyish-pink epidermis, but without the black spines described by Backeberg in 'Das Kakteenlexikon' as for griseo-pallidum.

"I have looked up this species and note that it had been marked 'flora ignotus' - flower unknown and that it was offered by Uhlig as U 2197. Lau says that the plants he collected were in flower and that the flower was white but smaller than pseudo-malacocarpus. He goes on to say that the 200 Km journey will never be forgotten by him, as only after 90 Km is there a stagnant water hole and if anything goes wrong with your car it is certain death for you in the inferno. About eighty trees had fallen across the track and these had to be removed en route and he only averaged 10 Kms per hour. Also, the Salinas are roamed by savage Ayareo Indians though luckily for him he did not see any. The only signs of life he saw were huge tapirs, ocelots, deer and monkeys."

Receiving the Robin again in Spring, T. Lavender observes that "this is the part of the season when my plants are starting into growth; I still have a few plants that are difficult to stop shrivelling severely in the winter when watering is restricted owing to the plants being at rest and our very cold weather of course. The worst affected this year have been G. michago and G. schickendantzii, as yet they are still not growing or filling out".

In commenting upon the one-year old seedlings "now growing into recognisable plants", S. Johnson refers to both G. knebelii and G. megatae having a dark brown horse-shoe shape round the tubercles; and also that G. bicolor and horridispinum seedlings still look rather similar.

A hand-sketch of a section through a flower of G. mihanovichii v. pirarettaense is added by H. Middleditch with a comment on the striated zone observed immediately below the lowermost filament insertion.

Bob Carter added further fine slides to those already with the Robin. One of these was a close-up shot of the fruit on G. eytianum, a deep red colour, of which he says "fruit about 5/8" diameter, almost a round berry. Colour green, changing to what I would call tomato red on ripening, when the fruit splits in the manner shown" i.e. from the base upwards. "I notice that all fruits that are practically round, the split develops from the lowest part of the fruit, whereas long fruits split in the centre at the widest part of the fruit. The fruits on G. zegarrae were round berries, 5/8" diameter, staying the same colour until splitting, a lovely bluish-green with a slight bloom. Scales few, of the same colour with whitish margins."

CHILEANS NATIONAL GATHERING - BROOKSBY '73

Our National Gathering for 1973 was held at Brooksby Agricultural College: although the venue was the same as for 1972, there were several welcome changes to be found at the College on this occasion. On arrival we found it possible to park cars next to the new teaching block so that it was far easier to carry plants into the lecture rooms. There were no piles of builders rubble and paraphenalia lying about, and all the pathways had been completed. It seemed that further internal decoration had been carried out, and altogether it added up to a perceptible improvement in the general surroundings. Even the weather failed to repeat the sharp cold snap which made the sleeping quarters not so hospitable as one would have wished in 1972. Indeed, it was even possible to stroll around the gardens in the sunshine in shirt sleeves at odd times of the day. In addition, there was a most acceptable bill of fare provided which was considered (by those who were also present at the 1972 Gathering) to be an improvement on the previous year's menu, although at the time that had been considered quite satisfactory.

Since our previous visit black-out facilities had been installed in the new teaching block and it was found to be practicable to use one room not only for giving the talks and showing slides, but also to display the plants and other data relevant to the talk. Slides brought by members of plants under discussion were also shown at the same time, a change from the arrangements tried in 1972. Any queries on the subject of the talk or about the plants on display and a general discussion were scheduled to follow on after the talk, without a break. This was a decided improvement over the previous year's arrangements and in practice discussion frequently broke out during the course of the talk, causing the speaker to display some agility in seeking out relevant slides, turning up the relevant answer in the literature to hand, or otherwise producing an appropriate response. The projector driver was obliged to engage reverse quite frequently to facilitate cross-checking of slides and the black Venetian blinds were conveniently switched from darkness to light to permit reference from a slide to a plant on the table and back again, without the rather more severe change in lighting intensity caused by using the electric lights.

The swing tables attached to each chair proved quite useful for making notes during talks, or as a convenient rest for any reference book or journal or for slides. Nevertheless, the numbers of slides and books that were called into use as the weekend passed gradually occupied more space on the floor, the tables, the window sill and the radiators so that in walking round the room one had to exercise increasing care to avoid the numerous slide boxes, notes and papers, mounted flower slices, Chileans back numbers, plants, Kakteenlexikons and so on that were all being kept to hand.

There was some concern at the opening of the Gathering that the absence of some speakers who were on the programme and who had had the misfortune to find that their work had regrettably interfered with their hobby, might reflect adversely on the extent and diversity of interest that it was hoped to offer during the course of the weekend. Suffice to say that in the event the Saturday programme, starting at 9.00 a.m. and originally scheduled to be completed by a short talk after High Tea by an absent speaker, did not terminate until about 10.00 p.m. - and then largely out of sympathy for the barman who would otherwise have been left in splendid isolation for the whole evening.

The formal talks led off with a review of the genus Weingartia from H. Middleditch, and appreciation of the background to that plant with the troublesome name, Weingartia cumingii. As the talk proceeded, the plants of this genus which had been brought by various members, were laid out in turn in correct geographical relationship upon the table. This showed up very clearly the difference in body and spine formation between the northerly and southerly members of the genus and permitted a fairly definite line to be drawn between the two on the basis of the plants on the table. Indeed, three plants were placed "geographically" to match the body characteristics, although this did not conform with the name on the label.

Mounted specimens of flower sections from several species of Weingartia were on display from Agnes Lavender, which had been taken from plants in her collection. One plant on the table with a cumingii label was felt to be more happily placed amongst the woolly-areoled plants more to the south-east, away from the cumingii habitat location. Accompanying this particular plant was a sectioned flower which had been removed much earlier in the season and preserved in clear resin. When this particular example was laid over the flower section taken from W. hedinian, it was evident that the two were virtually identical in form. In consequence, the name on the label was changed on the basis of both flower and body comparisons. This was by no means the last time that suggestions for changing the names on a plant label were voiced during the course of the weekend.

The show of slides started with the northerly species of Weingartia and after one or two slides it was suggested that the flowers hardly exhibited much difference between one species and the next amongst this group - a view which received murmurs of agreement. However, before many more slides had been shown, this view had to be radically revised; variations in stigma form and location, bud shape and petal shape were soon apparent, a comparison of differences and similarities between species being made by referring back through the various slides to hand. Slides of the pink-flowered Weingartia totoralensis in bud and in section from two different members, brought into prominence the close link between the northern end of the Weingartias and the Sulcorebutias.

The programme for Saturday opened with Neoporterianae and the talk commenced by placing various species on the table in their correct geographical relationship. This made it easier to designate those species which lay within that part of Chile which was visited by Thomas Bridges in 1841 when he discovered Echinocactus cumingii. This was followed by various slides of Neochilenia from amongst the species which occur in that territory. Hopffer's original description of Echinocactus cumingii was referred to and related to the features shown by the plants on the screen. No great difficulty was involved in narrowing down the field, largely on account of the combination of the big flower size and the short spine length. From this examination, a tentative suggestion as to the identity of Ech. cumingii was put forward. This suggestion was further supported by the translation of an article from the Allgemeine Gartenzeitung for July 1843 which referred to the cultivation of the original plant described by Hopffer - this particular translation, had fortunately come to hand only a week or two before this event.

After a break for coffee, a couple more tables were brought in to support the concourse of Lobivias assembled before John Hopkins, who proceeded to tell us more about those plants which had flowered for him during the course of the year. The flush of Lobivia imports over the previous two years has provided collectors in this country with an excellent source of habitat collected material and a high proportion of the plants on display here came into this category. Most of the flower slides which were shown were of imported plants, including some which contended for the title of Lobivia cinnabarina Hook. In addition, there was a most welcome number of slides of flower sections which showed most clearly those characteristics which were obscured in even the best photograph of the normal external view of the flower. In this way a most unusual flower from Lobivia westii was revealed which proved almost a piece de resistance for the subsequent talk on humming bird flowers. In order to illustrate the locations of the plants under discussion, an outline map covering their growing areas was on display during this talk.

Although there were not many plants of Frailea available for display, there was an extended discussion concerning the relationship between flower opening and the number - or even absence - of seeds in the subsequent fruit. One of the plants on display carried a number of fruits, some of which still exhibited shrivelled flower remains; one of these fruits was removed from the plant and cut open, when it proved to be completely empty of seeds; some members present also reported finding this phenomenon on their own plants. Following the

discussion came a number of slides of Fraileas of various species, including a surprising number which were carrying open flowers.

Then came a supplement to the programme in the shape of a review of the Notocactus groupings by Joan Hobart. Plants of various species were on display on the table for reference and - as it rapidly turned out - for discussion. These plants were arranged into the various groups according to similarities or differences in flower, fruit and body characteristics. This was followed by numerous slides which showed the different sorts of fruit to be found on Notocacti and also close-up views of flowers illustrating the various stamen arrangements which are to be found within this genus. Quite a good selection of flower sections were again shown on the slides, these being especially useful for those species which sported a flower receptacle well filled with stamens. There were slides from several members which showed Notocactus buiningii in flower and the variation in flower form displayed amongst these slides evoked quite a lengthy discussion.

During the course of the 1972 Gathering we were shown one or two slides of flowers in section - and there were also quite a number of pressed flowers on display. In the course of the discussion at that time it was asked whether the preserving of flowers in clear resin was practicable, but as far as members then present were aware, it did not seem to have been attempted up to that time. On this Sunday morning we were treated to a display by Joan Hobart of various articles and flowers which had been preserved in resin since the idea was generated at our previous National Gathering, together with a description of the process and its problems. The items encased in resin ranged from early experiments with coins and seashells, through various wild flowers such as daisy and buttercup, to a complete sea urchin and various cactus flowers. There were also a number of flower sections preserved in resin and for comparison there were also a number of sectioned flowers mounted on white card and protected with a self-adhesive transparent cover sheet. This talk was followed by a number of slides which showed cross sections of various cactus flowers. This enabled comparisons to be made between the three alternative methods of displaying a flower cross section; although each method has its own particular advantages, it did appear that a photograph taken immediately after cutting the flower and shown as a slide probably permitted certain detail to be seen more clearly than either a pressed and mounted flower or one preserved in resin. Nevertheless all the various examples on display proved to have considerable interest.

We then welcomed Roger Moreton who, at quite short notice, had stepped into the breach left by an absent speaker, to give a talk on Parodia. Many of the plants used for reference in the course of this talk had been raised by the speaker from Ritter's seeds and so formed a valuable example of what had presumably been intended for the name given to them by that collector, and others. Examples were given of plants which matched the original description, whilst the name was being applied to many plants in commercial circulation which were of a different character. The problems associated with identification of the various species within the maasii group were also touched upon. Amongst the plants on the table was a fine specimen of Parodia ayopayana with off-sets and elongated fruits. The talk was followed by slides of species of Parodia in flower and many of those available remained unscreened when we had to break up for lunch.

After lunch came the final talk, given by Harry Middleditch, on the subject of humming bird flowers. As an introduction to the subject, the gradual growth of scientific knowledge concerning the process of pollination was reviewed, and also the growth of knowledge concerning the various agencies responsible for effecting pollination. Of the known pollinating agencies, bird pollinators were then reviewed in general terms and then one member of this group - the humming birds - were discussed in more detail. Reference was made to the flying habits of these birds and especially to their peculiar ability to hover which led to severe demands being made upon their body functions to generate the energy necessary for hovering. From this energy requirement we were led to the bird's feeding requirements and how the necessary nourishment was made available by certain types of flowers - including certain cactus flowers. Observations made by various members during the process of sectioning flowers of this particular type offered support to this discussion, which then turned to the inter-relationship between the flower construction and the construction of the humming-

bird beak and tongue. Several other members then showed flower sections of various cactus genera which permitted the basic differences to be illustrated between the majority of cactus flowers and those specially adapted to suit the humming bird. Slides were shown of flowers in section which were adapted to suit the humming bird and the various features contributing to the inter-relationship between flower and bird were discussed with each slide in turn. Finally an explanation was suggested for the ability of the flower to limit the availability of its nectar to little other than humming bird visitors.

An especially welcome feature of this year's National Gathering was the number of pieces of new information which came to light during the course of discussion. To a great extent this was probably a result of combining the talk and slides with the display of plants and discussion; this arrangement was suggested at the close of our 1972 Gathering and turned out to be a happy improvement. It is to be hoped that the Gathering not only conveyed useful information concerning plants which are sometimes considered fairly common, but also stimulated interest in new fields of cactus culture. We shall look forward to the possibility of an equally successful meeting in the autumn of 1974.

Continued on p. 122.

SEED POOL

I should like to thank all those of you who have contributed seed to the pool this year; without your help the new seed list enclosed with this issue would not be possible. Nonetheless it was felt desirable to purchase some seed in bulk this year to add a little more variety. This seed is on the special list and to cover its cost, it is available at 5p a packet instead of the usual 3p. I hope that you will all support the seed pool by sending for some seed; once orders from members have been met, you could give further support by showing the list to other enthusiasts at your local Society meeting.

Finally I would like to ask all of you who do not normally bother to try to set seed, even for your own use, to try to do so during the next season and so make a contribution to the seed pool. It is quite easy to isolate two or three plants of the same species by bringing them indoors from the greenhouse during the few days of flowering. This guarantees true seed and just one contribution from each member would make a very worthwhile seed list.

J. Hopkins

ERRATA No. 25

Cover. For Pyrrocactus read Pyrrhocactus

p. 51 line 17 for "in the usual many of Lobivia ..." read "in the usual manner..."

p. 59 line 10 for "... rhow away ..." read "throw away ..."

p. 29 The Title should read
"Intelligence from Mr. Bridges in Bolivia. Cochabamba, April 13th 1845"
(From Hooker's London Journal of Botany, Vol IV 1845)

FORTHCOMING TOPICS

We should be pleased to hear from any members who feel that one of their Neochilenia is a close match to Hoppfer's diagnosis of Echinocactus cumingii; or has flowered Weingartia lecorensis or W. westii; or can report seeing flowers of different sizes upon the same plant - whether due to changes in the weather, or in the health of the plant, or whatever; or have grown any Notocacti under HU numbers which have some degree of resemblance to rather better known and named Notocacti.

Brooksby '73 report (Continued from p. 121)

Our thanks are due to all those members who brought plants, slides, books and other material which contributed so much to the success of this Gathering."

Back Numbers

Although steps were taken some time ago to reprint various back numbers, it now appears that the plates concerned were lost in the post. This has already led to a considerable delay in filling orders for back numbers, and we regret to say that it will cause further delay. Members still waiting for back numbers will, however, receive them on completion of the new reprinting order.

CAN YOU HELP?

..... from J. Hopkins

Have you come across any of the following - do you know the full title?

Illustr. Hort. (ca. 1859)
Garten. Mag. (ca. 1878)
Garten. Fl. (ca. 1920)

..... from H. Middleditch

Any one of the following books are required:-

Coats. A.M. "The quest for plants".
Chodat R. & Vischer W. "La Vegetation de Paraguay".
Herzog - "Die Planzenwelt der Bolivischen Anden", and information on South American potatoes, in booklet, book or bulletin form.

FR NUMBERS

We have received from New Zealand one of Winter's trade catalogues which contains possibly the earliest references to the FR numbers. This catalogue comprises four duplicated pages on A4 size pink paper and is entitled "Seed price list 1953/II". This might suggest that it was a supplementary list issued later in the year than the main "1953/I" list. There also came from New Zealand, along with this catalogue, the Winter 1952 catalogue, which contains no reference at all to FR numbers and comprises ten pages.

This early list of FR numbers includes the following, quoted in numerical order, not in catalogue order:-

3. Acanthocalycium sp.
6. Gymnocalycium multiflorum
7. Eriosyce sp.
8. Trichocereus candicans v. gladiator
9. Pyrrhocactus strausianus
10. Denmoza erythrocephala
11. Echinopsis leucantha
12. Gymnocalycium gibbosum
13. Trichocereus strigosus
15. Stetsonia coryne
17. Trichocereus thelegonoides
19. Cleistocactus baumanii
21. Gymnocalycium saglionis
22. Gymnocalycium spec.
24. Parodia microsperma
26. Trichocereus terschekii
27. Cleistocactus v. colubrinus
28. Trichocereus thelegonus
29. Gymnocalycium sp.
32. Pyrrhocactus froehlicheanus
34. Parodia schwebsiana
35. Parodia steumeri
36d. Cleistocactus tupizensis
43. Pfeiffera ianthothele
44. Oreocereus trollii
44a. Oreocereus celsianus
45. Parodia chrysacanthion
46. Parodia maasii
47e. Trichocereus pasacana
49. Trichocereus pasacana
50. Gymnocalycium sp. (red flower)
51. Gymnocalycium saglionis (pink-white spined)
52. Lobivia ferox.

Some of these names differ from those quoted in our Year Book of Collectors' field numbers:

FR 7 The catalogue quotes "not korethroides or ceratistes", so presumably this plant was subsequently identified as Soehrensia formosa.

FR 36 we had Opuntia retorsa on our list; perhaps this is not correct? Or could it be duplicate use of one number?

FR 46 changes from P. maasii on the Winter list to P. maasii v. shaferi. Was this a later conclusion, one wonders?

FR 47 we have Parodia tilcarensis listed; is this an error?

FR 50 what a story this simple epithet can unveil - need we even say it is now Weingartia neumanniana?

There are differences of specific name under FR 9, 24, 32, 34, and 52. Were these revisions, made in the light of later identification, one wonders?

Comments

..... from R. Ginns

"Ritter made his first collecting trip in South America in 1931. We then find a short account of his first post-war trip in Winters 1954 catalogue, together with the seeds he collected. This was the first Ritter catalogue I received. If there are FR numbers in a 1953/II list of Winters I should imagine they were the earliest Ritter seeds to be received, too late for inclusion in the normal 1953 catalogue. In view of the numbers in my 1954 catalogue I doubt whether there was an earlier one. In any case I have never seen one and all the low numbers are included in 1954."

STUDY GROUPS / ROUND ROBINS

Cleistocacti	T. Lavender, 62 Finchale Avenue, Billingham, Teesside TS23 2EB.
Copiapoa	D. J. Lewis, 80 Pencisley Road, Llandaff, Cardiff CF5 1DQ.
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.
Lobivia	J. Hopkins, 25 Crossefield Road, Cheadle Hulme, Cheadle, Cheshire SK8 5PD.
Matucana/Borzicactinae	W. W. Atkinson, 12 Court Road, Tunbridge Wells, Kent.
Melocactus/Discocactus	Mrs. L. Teare, 7 Birkinshaw Avenue, Tranmere, Adelaide, South Australia 5073, Australia.
Neoporterianae	D. Rushforth, 8 Broadfield Road, Knowle, Bristol 4.
Notocactinae	K. H. Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A. W. Craig, Davela, Forest Lane, Kirk Levington, Nr. Yarm, Yorks.
Sulcorebutia	W. G. Sykes, 10 Ashley Close, Thornton Cleveleys, Lancs FY5 5EG.
Trichocereus	N. T. Hann, 5 Lake Road, Shirley, Croydon, Surrey CR0 8DS.

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