THE CHILEANS '72

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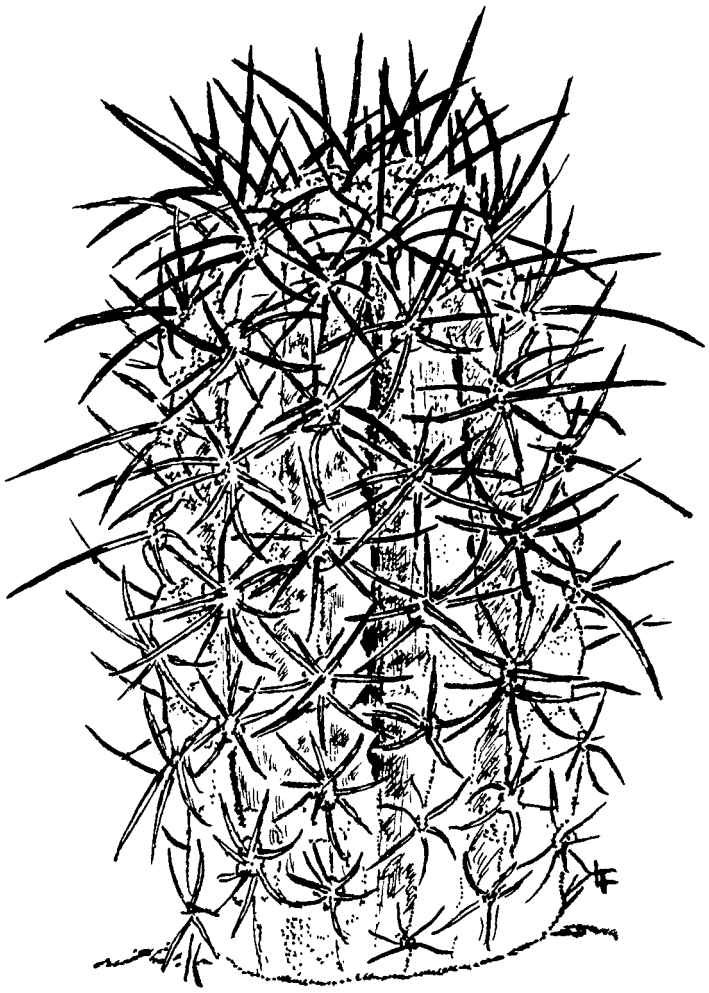


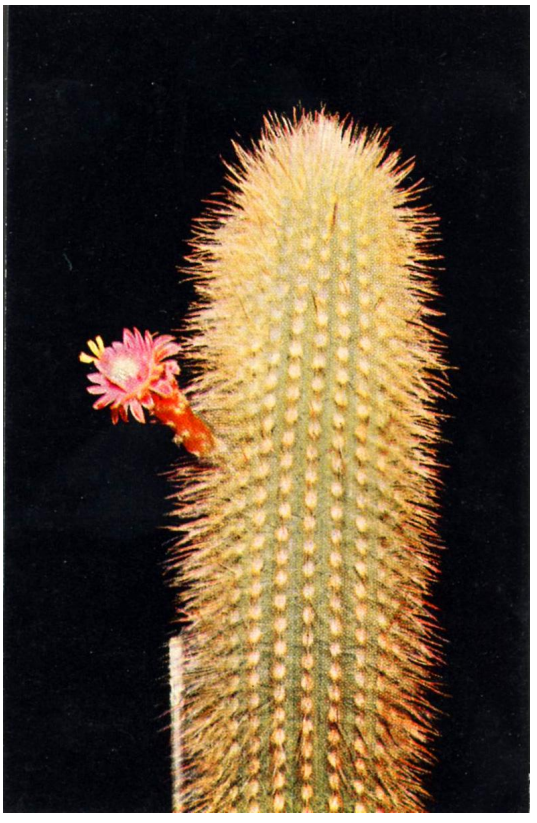
NEOPORTERIA CLAVATA

ACTUAL SIZE

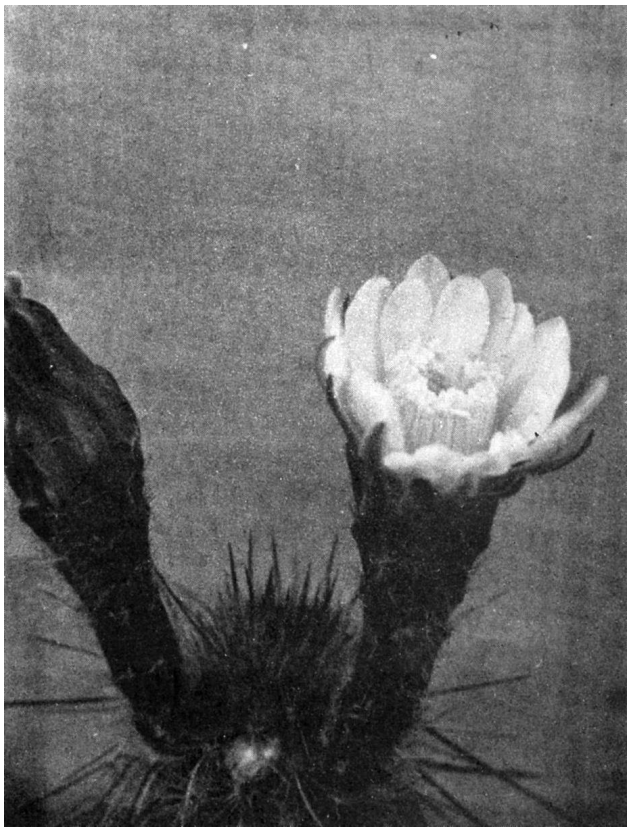
COLLECTION - H.Middleditch

TOM LAVENDER

Haageocereus pacalaensis



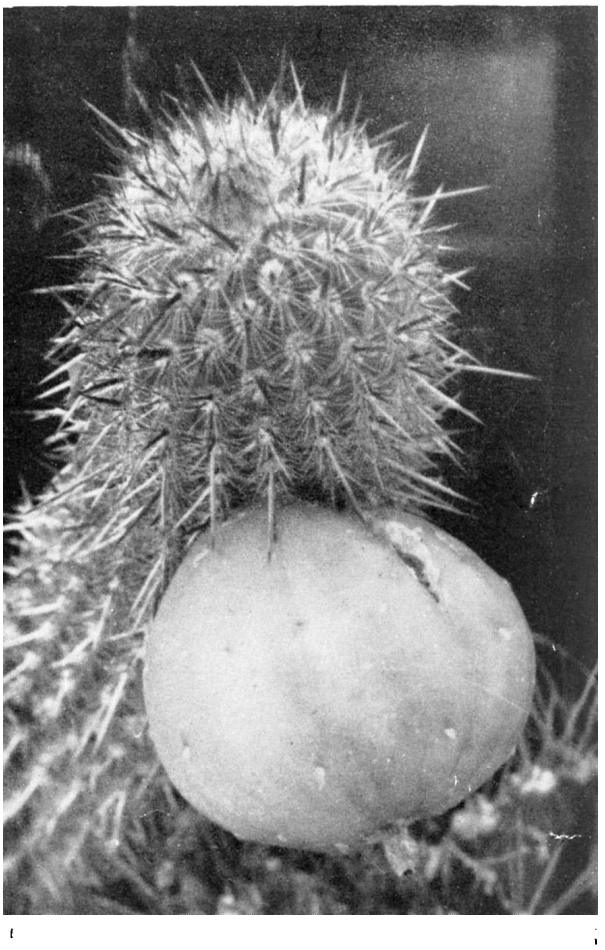
Haageocereus chosicensis



Haageocereus versicolor

COLLECTION — Mrs. M. Walsh.

PHOTOGRAPH — Mrs. L.E. Macintosh



Haageocereus sp. in fruit

PHOTOGRAPH — H. Middleditch

HAAGEOCEREUS MULTANGULARIS FLOWERS from Mrs L.E. McIntosh

My plant of Haageocereus multangularis was bought as a seedling grown in New Zealand from imported seed - it is now about 10 years old and has three limbs up to 26" high. It has always been grown as a glasshouse plant - we find they require all the sunshine summer and winter that we can give them and that's a mighty lot over here. Although they have a very small root system they need copious water in summer and are bone dry in winter.

This particular plant lives close to the glass and receives sun from sun up to sun set. They always go back into the same position after any removals mainly because of the possibility of burning the "shaded" side. The slides you have (now in the slide library - H.M.) are of flowers on the sunny side of the plant where it was near the glass, on that season's growth. There was a second flowering alongside the originals, which appeared well into the resting period and they died before opening fully. By the time June arrived there were six more buds, again on that year's growth but on the "shaded" side of the plant.

The first show of flowers were fully open by 4.00 p.m. The all-night flowering plants usually start to open about this time as the heat drops down and are usually open in time for me to catch a picture before dark. We have very cool nights even after the hottest day and it cools quickly when the sun is low down.

The beauty of the Haageocereus flower, I felt, was in its perfection of symmetry; there wasn't any bend in the tube and the petals all fanned out from an even line. The stamens seemed to be in two rings, one just a little above the other but all were like the veins of the tube.

In the autumn I brushed one of the flowers with pollen from Setericereus icosagonus and the green pod developed slowly all the winter; the fruit grew to about the size of a large walnut. In less than a week it changed from green to pink and unfortunately it fell off the plant before I could get the camera to work. I was expecting it to split open. It seems that there must be an affinity between Haageocereus and Oreocereus for their berries behaved in exactly the same way. Both were very turgid with no sign of shrivelling.

I have never had a Haageocereus fruit split - they fall from the plant when ripe and if left around the greenhouse they ferment and the place smells like a vinery. The odd plant among my Haageocereus seems to be H. decumbens and its variety subtilispinus - as the name implies they sprawl along the ground and the branches are only 3 to 4 cm in diameter. The flowers are also different to my other plants - they have a long thin tube and quite long petals.

Except for the flower colour, the picture of Haageocereus pacalaensis is the same in all details as the flower on my plant - it is the only one I know of with a coloured flower, usually rosy pink. The long petals match - in all my other flowering species the petals are about the same length as the stamens and more green than white. Tubes are always straight with minute scales and tufts of hairs, just as the colour print depicts. Flowers usually come on last season's growth, so I was quite surprised to see them topping the plant. Usually they are 2 to 3 inches from the top, depending on the growth from spring to late summer when they flower; in this way they stick out at the side.

I have made a collection of Haageocereus of all the different spine colours I could get and have them from white, through yellow, bright orange, to brown.

.... from H. Middleditch

" I suspect that there may have been some confusion with the label for the plant of "H. pacalaensis" mentioned above, which I would expect to have a white flower. This species comes from Malabrigo, Dept. of La Libertad in northern Peru. Backeberg described this species in Der Kakteenfreunde in 1933 - presumably following his first (1931) trip to its growing places. In Volume II of his Die Cactaceae his description of this species reads as follows:

"Up to 1.70 m high, yellowish-green; stems 10 (-12) cm diam or somewhat more; ribs 17 - 20, pretty low, initially humped; areoles round, brown-felted; spines yellow, later grey; radial spines up to 25, up to 1 cm long, or also in addition 1-2 occasionally up to 7 cm long, flexible and directed downwards, of straw-yellow colour; flower about 10 cm long; sepals green, reddish tinted; petals white; tube slender, fluted, with short hairs in the axils; style and filaments greenish; stigma yellowish-white; fruit up to 8 cm in size, bulged - spherical, reddish green, creased near the base, inner pulp white; seeds almost black, finely stippled, hilum projection at the slightly curved side."

.... from Mrs R. Howard

"Some of my Haageocereus have flowered - perhaps the oldest is one bought about twenty years ago as "Binghamia laradensis". This has greenish white nocturnal flowers which are about $2\frac{1}{2}$" across with a 2" long tube. The flower petals open out flat with the stamens sitting up in a circle. Also flowering regularly is H. decumbens var. subtilispinus, with white spines and a rather similar but smaller flower. H. elegans v. heteracanthus and H. melanostele also have similar flowers. H. chosicensis has an unusual colour of flower which I thought of as lilac pink. Finally, an un-named semi-decumbent species has red flowers but of a different type - more like Loxanthocereus".

.... from H. Middleditch

"One or two plants collected during Rauh's expedition to Peru were provisionally named Haageocereus, and then when they came into flower they had to be transferred to Loxanthocereus. I suspect that the last-named plant is indeed a Loxanthocereus. In Volume II of Die Cactaceae, Curt Backeberg observes that H. laradensis stands (in appearance) between H. pacalaensis and H. pseudomelanostele. Indeed, the species was first described as H. pseudomelanostele var. laradensis by Backeberg in 1933. It also comes from north Peru, not far from Laredo; Rauh also reported this species from Tambez, practically on the coast."

.... from R. Davison

"My plant of Haageocereus chosicensis was purchased eight or nine years ago as a small half-crown specimen; it is now a proud incumbent of a 9" pot. We had our annual holidays in September, and on our return I was most surprised to find that in our absence a bud - of which there was no sign when we went away - had grown and flowered. It had obviously been a pinky-red sort of flower. This was followed by another bud, which aborted - probably due to the lateness of the season".

.... from A.J. Worral

"There does not seem to have been anything in the Chileans on Haageocerei. Anything you can dig up on them would be of interest even if only to sort out the synonyms and Ritters names".

THE GENUS HAAGEOCEREUS

The story of the genus Haageocereus goes back much further than the year in which this name first appeared, but may be readily taken up from the pages of the widely-valued "The Cactaceae" of Britton and Rose, a book perhaps as familiar to collectors as any other cactus literature written in English. Within these well-thumbed pages we find one of the few points which proved to be a source of long drawn-out disputation - the genus Binghamia.

How easy it is now, with all the accounts we are able to read describing the countryside, the landscape, and the flora of Peru and all the information now available to us a result of many later exploration and collecting trips to that country, to read within the pages of Britton and Roses book the description of Binghamia melanostele, and see the precise nature of the confusion there. Printed on Plate XXIV is the top of a stem which is as distinctive a cutting of Haageocereus as one might wish for. The illustration Figure 236, whilst perhaps not altogether as clear in detail as one might perhaps have desired, depicts an upright growing clump of cereiform plants which, occurring in the Rimac/Eulalia valley, can be little other than Haageocereus. This particular picture was actually snapped by Dr. Rose himself during his trip up the Rimac valley in 1914 and is titled "Binghamia melanostele".

But then we come to the confusion, for we find following the diagnosis of "Binghamia melanostele" the observation that: "The top of the flowering plant is made up of a compact mass of long white or yellowish bristle-like spines from one side of which the flowers appear, and this F. Vaupel has termed a cephalium". This remark was related to the description provided by Vaupel for his Cephalocereus melanostele, the plant which we would nowrefer to as Espostoa melanostele. It is rather difficult to comprehend how Dr. Rose could travel up the Rimac valley and fail to observe the difference between the side-cephalium bearing Espostoas and the shorter, multi-stemmed Haageocereus, some of which bore irregular patches of hair. But confuse them he evidently did, either then - or later in the pages of his book.

Not only did Rose confuse the two sorts of plants, but for the type species of their new genus Binghamia, Britton and Rose selected "Cephalocereus melanostele" Vaupel, or what we would now call Espostoa melanostele. Despite the illustrations and diagnoses of Binghamia being clear and true to themselves, once the name of "Cephalocereus melanostele" was removed to its proper place, the genus was left without a type species. A new type species was required and a new name was also required for "Binghamia melanostele". Backeberg and Werdermann filled the gap, only to run up against the prior usage of the generic name Binghamia (in 1899) for an Algae. This now meant that a new generic name had to be found for these plants.

In 1934 Backeberg published the new name Haageocereus, to give a home to those plants which had now been deprived of the name Binghamia. The type species was designated Haageocereus pseudomelanostele taking as type species the same plants which had been illustrated and described in Britton and Rose as Binghamia melanostele from the Rio Rimac.

The description given by Backeberg for the genus Haageocereus ran as follows in the B.f.K. 1936.4:-

"Thicket-like stems more or less branching having very numerous ribs furnished with many spines.

Flowers nocturnal, rotate to funnelform, with elongated tube furnished with scales and slightly hairy, reaching a length of 8 to 12 cm. The tube is straight, more or less stout. The ovary is likewise furnished with scales. The petals are sometimes of a greenish white, sometimes cream, now and then pink and even violet-red.

The flowers appear at the top of the branches in the areoles which develop a more or less bristly tuft which might be taken for a pseudo-cephalium.

Fruit round, green or red in colour, of a size of a small hen's egg, smooth with some hairs or little scales, but always without spines, with the dried flower reaming at the top.

Seeds black, dull."

In "Cactus" (France) No. 56:1957, Dr.J. Soulaire recalls observations made by Marshall in a previous issue of that Journal on the subject of Haageocereus: "Haageocereus Backbg. was established for Cereus decumbens Vaupel, the only night flowering species of the genus Binghamia Br. & R. The characteristics of the genus were: nocturnal flowers appearing close to the apex of

the branch, slender tube 8 to 12 cm long, perianth wide open, tube carrying scales and some hairs. Much later he included in this genus the two species Cereus acranthus and Cereus pacalaensis. After the prior usage of Binghamia was noted in 1941, Werdermann thereupon altered the description of Haageocereus to make it possible to include therein the ex-Binghamia".

In his "Die Cactaceae" Vol. II Backeberg gives the following description of the genus Haageocereus:-

"Upright or decumbent plants, various numbers and lengths of stems, with or without bristle formation on the crown, these variable in length and stoutness, the bristles hairthin up to some what stronger; the flowers narrow - or wide - funnelform, with slimmer or stouter, almost smooth or fluted tubes, these straight or in part somewhat curved, sometimes somewhat angular, the flower broader or narrower, the sepals ± turned back downwards, the petals from green through greenish white to white, or ± rose pink to dark red, never yellow; the style ± considerably exserted; the tube scales occurring far apart or fairly close together with accompanying flocculent felt up to sparsely or thickly hairy; all species are night blooming, the flowers open earlier or later than noon and are in part still open the following morning; the fruit globular to somewhat elongated, when ripe thin-skinned, various sizes, up to 6 cm long, furnished with (mostly a few) small scales".

This later description contains no reference to flower size, but the species of Haageocereus listed in Backeberg's Kakteenlexikon range between 5 and 10 cm in length of flower (2 to 4 inches).

When some species of Haageocereus have reached flower-bearing age, the areoles exhibit a heavier growth of felted wool or extra long hair; in some species this enlargement of the areole felt can be even larger than an undeveloped bud. In some species a dense growth of longer wool will occur at the flowering areoles only, and this may appear in narrow bands or rings like a step ladder up the body or sometimes is appears erratically over the stem.

It would seem to be this particular feature, along with one or two others, which led Akers to separate various plants from Haageocereus under his generic name of Peruvocereus. His key ran as follows:

Haageocereus - Plants arching to decumbent and without bristles or hairs; flowers nocturnal, medium large salverform with the outer segments recurved. The known species have white or nearly white flowers.

Peruvocereus - Upright plants, columnar, with bristles or hairs near the apex or down the stems. Flowers diurnal, small, rotate, with the outer segments much recurved. Flowers white to bright coloured.

Akers observes: "Backeberg changed the genus Binghamia to Haageocereus and added some day-blooming, small coloured-flowered species. Formerly the genus had contained only large-flowered, nocturnal species. I believe that this genus should be maintained in its original meaning, and I have erected the genus Peruvocereus to cover the small-flowered diurnal, bristly or hairy cerei. These may also form apical or lateral pseudocephaliums and the flowers vary from green to white, pink, magenta, or crimson-red.

"The genus Haageocereus contains two sections: (1) the arching group which includes H. acranthus and its many varieties and H. olowinskianus, and (2) the prostrate group which contains H. decumbens and many others. This group exhibits many fine lateral spines but seldom any evidence of bristles and is never hairy. The night blooming flowers of the decumbent group have medium large, showy flowers which are rarely fragrant as are many of the Trichocerei. The only real similarity in either growth or flower between the genera Peruvocereus and Haageocereus is in the fruits".

Looking at the descriptions of some of the species described as Peruvocereus by Akers provides the following comparison from available data on flower size:

H. albisetatus	4.5 cm	H. salmonoides	6.0 cm
clavatus	6.5 cm	setosus	5.0 cm
multangularis	7.0 cm	viridiflorus	7.0 cm

In addition, Akers observed (U.S. C. & S.J, 9.1948 p.130) "Haageocereus chosicensis and H. pacalaensis are Peruvocereus". The later is described in the Kakteenlexikon with a flower of 10 cm in length, at the upper end of the size range for flowers of Haageocereus.

It is hardly possible to describe the flowers of Peruvocereus as "small" in comparison with Haageocereus, on the basis of these sizes. However, it may be that Akers had in mind the diameter of the flower when he spoke of "large" and "small" flowers, and not the length of the flower. There are undoubted differences in diameters of open flowers brought about by the differences in petal lengths. Short petals produce a distinctly small diameter flower than do long petals, as evident in the two flower illustrations accompanying the article by Akers. A comparison of the flower of H. pacalaensis (inside front cover) and that of H. salmonoides will illustrate a similar comparison of flower diameters arising from different petal lengths.

The photograph of H. multangularis on the inside front cover shows the flower before it is fully open and in this condition it may be taken to have a superficial resemblance to the "small" diameter flower said to be typical of Peruvocereus. One assumes that it would take an hour or two for the flower to open fully and it may even remain in the half-open position depicted in the photograph until dusk. Rauh observes that full anthesis does occur at night - so presumably unless Akers went out of his way to make any observations during the hours of darkness, he would be led to believe that some species did indeed only produce "small" flowers. Perhaps this is how he came to suggest that Haageocereus pacalaensis was a "small" flowered Peruvocereus, whereas the colour illustration on the inside of the front cover shows that the flowers do open wide, with long petals.

Apart from the fact that the short-petalled or "small" flowers do appear to open before dusk, whereas the larger-petalled flowers appear to be but half-open before dusk, there does not seem to be any other evidence of any material differences in the flowering times of Peruvocereus and Haageocereus. This leaves the presence or absence of hair or dense, long, areole wool as the remaining differentiating factor and Akers does not appear to claim that this characteristic was present on all species of his genus.

Backeberg divides the Haageocerei into sections, but the Peruvocereus of Akers are not confined only to one or two of these sections. Other authors continue to consider these plants under the single genus Haageocereus and the name Peruvocereus has now generally fallen out of use.

Excepting a discovery of Ritter in northernmost Chile, the distribution of Haageocereus is confined within the national boundaries of Peru. It occurs on the coastal flanks of the Andes, from the Province of Arequipa in the south almost as far as the boundary with Ecuador in the north. Most species are to be found below the altitude limit of about 1,200 m (just under 4,000 feet) although Haageocereus acranthus has a very broad altitudinal distribution ranging up to as high as 2,400 m.

The genus does include a few red-flowering species and a tabulation of their recorded growing places reveals that they all occur over a somewhat restricted area to the N.E., East, and S.E. of Lima, as follows:-

Haageocereus albispinus	Eulalia Tal
akersii	Cajamarquilla, Rimac Tal
= Peruvocereus multangularis	
comosus	Eulalia Tal
divaricatispinus	Lurin Tal
choisicensis	Chosica, Rimac Tal

olowinskianus v. rubriflorior	Pachacamac, in the Lomas
pseudomelanostele v. clavatus =Peruvocereus clavatus	North of Lurin Tal
pseudomelanostele v. carminiflorus	Rio Eulalia
seticeps	Eulalia Tal
salmonoides	Rimac Tal, 15 Km above Chosica
setosus	Carocales Hugel, South of Lima .

All species of Haageocereus produce quite large fruits, which vary in shape from globular (as illustrated on the inside front cover) to elongated globular. Within the genus, fruits vary in size from around 2 cm in diameter to as large as 4 cm diameter by 8 cm long ($1\frac{1}{2}$" dia. x 3" long). These fruits are all reddish in colour when ripe and carry small scales with woolly hair in their axils. The scales appear few and the wool sparse, although the same number of scales on a small fruit would look close together. The characteristic appearance of the fruit - among other features - sets Haageocereus apart from Trichocereus, some species of which in each genus bear flowers having some degree of external similarity.

These large fruits are comparable in size with those to be found on Oreocereus, Morawetzia, Espostoa, Seticereus, Armatocereus, Neoraimondia, Corryocactus, and Weberbauerocereus. Fruits of this size are far from common on other cacti and one is led to consider whether the method of seed dispersal might perhaps be similar for all these large fruits - indeed, the same sort of bird or animal may be responsible for dispersal of the seed.

Plants of Haageocereus seem to be pretty trouble free when grown in cultivation, but regrettably most unwilling to flower, at least in the U.K.

H.M.

Comments on the genus Haageocereus

.... from H. Middleditch

"It will be noted that Akers stated that "Backeberg changed the genus Binghamia to Haageocereus ..." whereas (according to Soulaire) Marshall observes that "Werdermann altered the description of Haageocereus to include the ex-Binghamia". In the absence of the original article by Werdermann in which this statement appeared, one may perhaps place some reliance on Backeberg's statement in Vol II of his "Die Cactaceae" that:- "For the plant found by Britton & Rose and erroneously named Binghamia melanostele, I established the genus Haageocereus in 1934 with the newly named Cereus melanostele Werd. & Backbg as type species".

"Of all "Those terrible names" amongst the South American cacti, this particular genus may well claim to take top place for being the most tangled."

We have a few slides of Haageocereus in flower but any additions to the slide library will be most welcome - A.W.C.

PERUVOCEREUS - A NEW GENUS from PERU by John Akers

(From the Cactus & Succulent Journal of America XIX.5:1947:)

Plantae columnares 1-3 m altae ad basem versus ramosae. Areolae conspicuae dense tomentosae spinas vel setas numerosas gerentes vel dense lanatae. Flores diurnales laterales vel terminales solitarii anguste infundibuliformes corollae segmenta tubo squamato superantia squamis anguste ovato-lanceolatis, axilis squamarum dense lanatis. Corollae segmenta rotata segmentibus exterioribus reflexis albis viridibusroseis vel atrorubis. Stamina numerosa inclusa. Ovarium squamatum axilis squamarum lanatis, Fructus elongato-globosus viridis rosaceus vel ruber indehiscens. Semines parvi nigri lucidi punctati. Radices lignei, cortice squamato.

Columnar plants that branch from the base and reach a height of less than 1 to over 3 meters; ribs low and numerous (over 20) with conspicuous, felted areoles; areoles replete with acicular spines, bristles and/or hairs (about 80); usually one or more acicular, pungent, central spine; some species being spiny, others bristly and still others hairy or woolly; flowers solitary and produced mainly from the top of the stems but may be produced from anywhere along the stems, from a lateral pseudo-cephalium, or from a central pseudocephalium; flowers diurnal, opening in the afternoon of one day and closing in the morning of the next day; flowers narrowly funnelform with the tube longer than the limb; the limb expanded and rotate and the outer perianth segments much reflexed; the limb averages about 4 cm long; the perianth varies in colour from white, green, pink, cinnabar to garnet; stamens numerous and included, but the style may be slightly exserted; flower tube with long, narrow, elevated scales, tipped with minute thorns, which have numerous whitish, silky hairs in their axils; ovary scaly and hairy; fruits elongated, globose, or sub-globose with persistent floral remains; fruits about the size of a small hen's egg, with small, distant scales that have silky hairs in their axils; colour varies from greenish to pink and red and the pulp is white, translucent, slightly acid, edible and tasteless; fruits usually indehiscent and fall from the plants when ripe; seeds, small, black, somewhat shiny and punctate; roots coarse, long and woody with loose, scaly bark.

Type species: Peruvocereus salmonoideus.

Distribution: Ravines and hillsides on the western slopes of the Peruvian Andes.

There has existed and still exists considerable confusion concerning these beautiful Peruvian cerei. Curt Backeberg erected a new genus Haageocereus which included both the Britton & Rose genus Binghamia as well as some of these new day blooming, coloured flowered plants.

Peruvocereus sp. nov. is readily distinguished from Binghamia by its coloured, diurnal, narrowly-funnelform flowers, while the flowers of Binghamia are nearly salverform in shape, and have a limb that is two or three times the diameter of that of Peruvocereus. The latter is also distinguished by the presence of bristles, hairs or wool at the areoles, whereas Binghamia is mainly spiny. The spines and bristles of Peruvocereus are much more profuse and often hide the body of the plants.

This new genus includes several species with rather divergent characteristics and could be split into other genera, such as those flowering from a lateral pseudocephalium have shorter tubes and smaller fruits. At the present time, I believe it is better to leave them all in one common genus.

Some of the Peruvocerei are very excellent bloomers and produce their colourful flowers all summer long (December, January, February, March and April), but the majority are rather sparse bloomers, being content if they produce a half dozen or less flowers a season. The genus includes some of the most beautiful cacti in the subtribe of Cereanae Br & R., and they make wonderful additions to any cactus collection. The soft, colourful spines and bristles in shades of white, cream, yellow, gold and red make these plants exceedingly beautiful.

They all inhabit the hotter and drier zones in the foothill districts at the base of the Peruvian Andes. They grow at elevations of from 1,000 to 6,000 ft. The stems contract to nearly one-half

their normal diameter during the dry season and the spines and bristles lose much of their bright coloration. The species of this particular genus are indigenous to very restricted zones and are not widely distributed as are some of the other cacti. They are usually associated with Binghamia acrantha Br. & R., and with Espostoa melanostele Borg, and Neoraimondia. They inhabit valleys or hilltops wherever drainage is good, and stand considerable moisture during the growing season.

Cuttings root readily and plants establish themselves quickly. In my garden they grow rapidly and soon become beautiful specimens much superior to those found in the wild. The spines become duller in winter, but never entirely lose their brilliant colouring.

None of the Peruvocereus are frost resistant and they must be protected against cold.

There is no definite flowering period, and the plants may bloom at any time during the summer. Another peculiarity of Peruvocereus is the non-uniformity of the stem diameters. Instead of forming uniform columns, the stems bulge in various places and resemble hand-stuffed sausages. The size of the fruits varies considerably, depending greatly upon the amount of moisture the plant receives.

Comments on Peruvocereus

.... from H. Middleditch

"In his description of this new genus Perovocereus, Akers makes reference to the plants which he includes within its compass having a pseudocephalium. Now we have already examined within the pages of this journal (under the title of "What is a cephalium",) the cause, formation, and construction of a cephalium. We have also commented upon the manner in which the increase in the quantity or length (or both) of wool hair, bristles and spines at certain areoles appears in its most distinctive form as a cephalium, or a pseudocephalium - but that a comparable sort of extra bristly/woolly growth may be observed in a lesser degree on many other plants - such as Seticereus icosagonus or Cephalocleistocactus. The nature and extent of this cephalium-like growth is accorded a fair degree of importance in diagnosing some genera; thus the existence of a cephalium on Coleocephalocereus and of a pseudocephalium on Micranthocereus is virtually the only factor separating these two genera, which are otherwise very much alike in habit, flower structure, and seed. The existence of extra bristly growth in the flowering zone of Cephalocleistocactus is virtually the only factor distinguishing these plants from other Cleistocactus - and a number of authorities do not accept this marginal difference as sufficient justification for separation of Cephalocleistocactus from the rest of the Cleistocacti.

"In considering "What is a cephalium?" it was observed that the additional growth at an areole can range all the way from a magnificent cephalium such as that on Coleocephalocereus down to the rather stronger spination at the flowering areoles of Notocactus scopa, with many and various plants between showing all different degrees of additional growth. At one end of the scale, the differences in degree of form of the additional growth are sufficiently clear and distinctive as to be generally acceptable e.g. to separate Micranthocereus and Coleocephalocereus. At the other end of the scale, where the amount of additional growth at an areole is not only fairly small, but also in consequence not readily distinguishable from a slightly greater or slightly different additional growth, it becomes increasingly difficult to define the extent and character of the difference and thereby increasingly difficult to use it as a differentiating feature.

"Thus, no one has yet suggested that the increased length and strength of spines at the flowering areoles of Notocactus scopa and caespitosus would justify removing these plants from that genus and establishing another genus for them solely on this account. Again the many species encompassed with the genus Pilosocereus range from those with practically no extra woolly hairy growth at mature or flowering areoles to others with a thick growth of woolly hair that completely covers the crown of the ribs in a continuous line, whilst there are various species amongst which any

degree of variation between these two extremes may be found. There has been no suggestion that Pilosocereus should be divided into two genera, respectively the more-woolly and the less-woolly, largely due to the impracticability of deciding where the dividing line would be.

"In a similar manner, the degree of variation in the quantity and length of the extra growth of wool or hair between various species (or varieties) of Haageocereus makes it difficult to use this characteristic as a basis for drawing a clear dividing line to separate off "Perovocereus". Together with the flower size of the various species described by Akers being comparable to the size and construction of Haageocereus flowers, it would have been very difficult to maintain this genus. However, since the type species for this genus was given as Peruvocereus salmonoideus and the original diagnosis of this species did not contain any reference to a Type specimen being deposited in a recognised herbarium (in accordance with the International Botanic Rules for Nomenclature), then the type species is not valid under this generic name. In consequence this genus is without a valid type species.

"Unless it be in retrospect, very little reference will be found to this name Peruvocereus in current cactus literature.

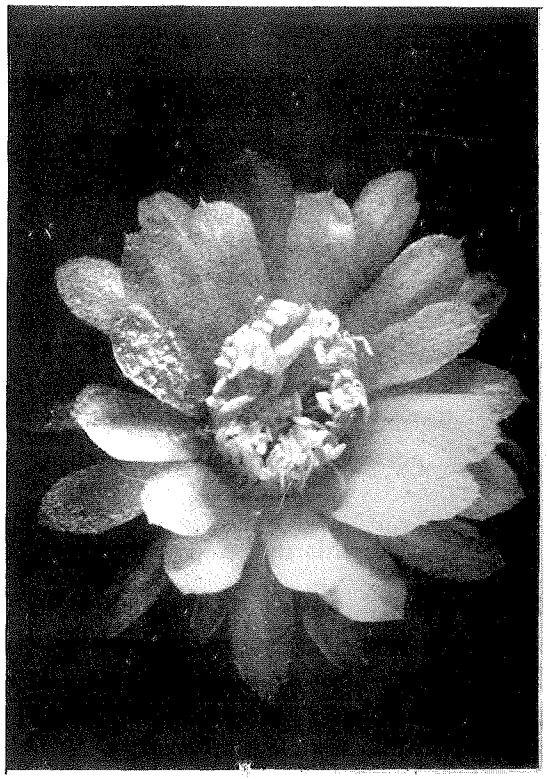
"The author's use of the word "limb" to describe what I take to be the upper part of the flower, or perianth, takes me back to the talk given by Mrs. Hobart to the 1972 Brooksby Gathering in which she discussed terminology for describing parts of a flower and touched upon both strict botanical terminology and many other terms in common circulation."

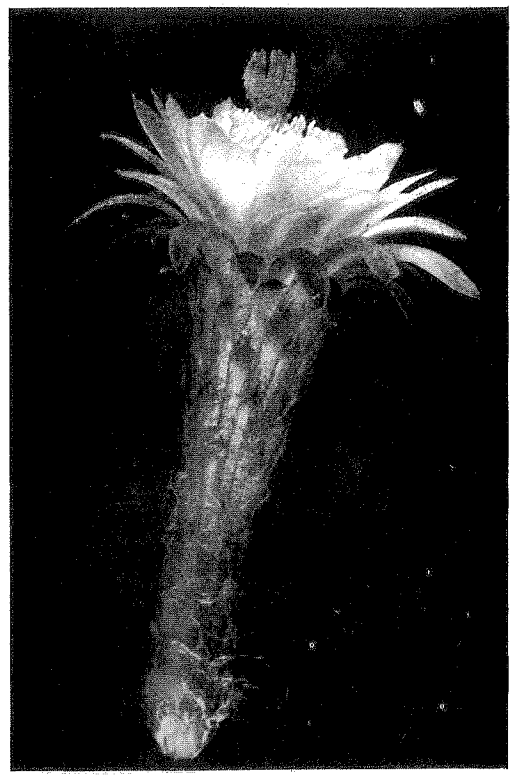
PERUVOCEREUS SALMONOIDEUS Sp. nov. by John Akers

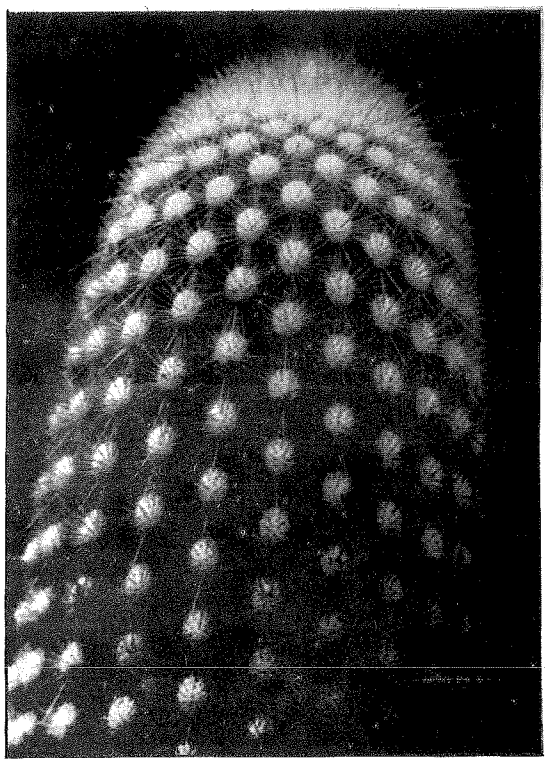
(From the Cactus & Succulent Journal of America XIX.7:1947)

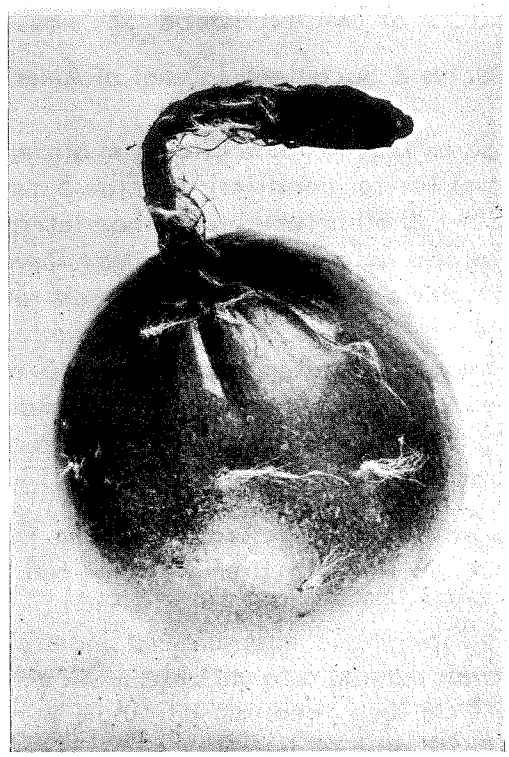
Plantae ex basi ramosae circa 1 m altae; rami 6 - 12 costis depressis circa 22; caules 10 cm lati irregulariter et leviter constricti; areolae 5 mm latae, 7 mm longae 3 mm altae dense tomentosae circa pilis 25 - 30 albis tenuibus; spinae laterales aciculares circa 60, 6-8 mm longae: spinae centrales 1-plures aciculares 2 cm longae flavae vel cinerae; flores anguste infundibuliformes segmentibus exterioribus linearibus brunneis reflexis, segmentibus iterioribus spathulatis rosaceis, limbo circa 4 cm diametro, tubo circa 6 cm longo flavo-viridi squamato squamis angustis apiculatis viridibus pubescentibus; staminibus numerosis inclusis filamentis viridibus antheris circa 2 mm longis oblongis eburneis; stylus paullo exsertus viridus; fructus turbinatus viridis et rosaceus 6.5 cm diametro, squamis fructum apiculatis in quarum axilis pilos circa 20, 7 mm longos; semina nigra lucido-punctata.

Plants up to 1 m high, branching from the base; the number of branches varies from 6 to 12; about 22 very low ribs with prominent, felted, spine cushions; areoles 13 mm distant, large, elliptical and elevated (7 mm long, 3 mm broad and 3 mm high); spine cushions actually composed of dense white, kinky hairs when viewed under magnification; about 80 acicular spines or bristles emerge in all directions making a formidable spiny cushion; spines fairly uniform in length (6 to 8 mm), but one or more 2 cm long, central, acicular, pungent spines may be present; spines yellow when new, turning grey with age; about 30% of the spines are so fine that they resemble bristles; stems about 10 cm thick (during growing season) and non-uniform in diameter; epidermis light green, making an excellent background for the white spine cushions; growth of bristles concentrated at the top of the stems where the white, woolly buds appear; flowers narrow funnelform with much reflexed outer perianth segments; inner segments spathulate and flesh pink in colour; outer segments linear and golden brown; limb about 40 mm in diameter, expanded, rotate; tube about 60 mm long, narrow and light yellow green in colour; tube with long, narrow, apiculate scales which are tipped darker green, scaly and hairy; stamens many, included; filaments threadlike, greenish and attached above the nectary space, along the wall of the tube and at the base of the petals; anthers oblong, ivory









HAAGEOCEREUS SALMONOIDEUS

U.S. C.& S.J. XIX.7:1947

Photos - John Akers

coloured, and attached by a constricted neck to the filaments; anthers small, not over 2 mm long by 1 mm wide; style slightly exserted, greenish and rather slender; stigma lobes 12, 8 mm long, yellow green and velvety; nectary space 5 mm in diameter by 15 mm long, fluted (like corduroy); ovules many, white, minute, translucent (like polished grains of rice); ovules on stalks up to 1.5 mm long; fruits large up to 6.5 cm in diameter, top shaped, epidermis green, tinged with pink; luster-dull; areoles 1.5 to 1.8 cm distant; scales apiculate, minute and bearing about 20, 7 mm long, white, silky hairs in their axils; flower remains brown, white-hairy, persistent; fruits puckered at the base of the flower remains; pulp white, translucent globules, appearing like frozen snow; pulp acidic, edible; seeds black, shiny, small, punctate with a small, narrow, bone-grey hilum; roots thick, long, woody with loose scaly bark.

Type locality: Rimac canyon, Department of Lima, Peru, at about 15 kilometers above Chosica.

This species is quite characteristic of the genus (Peruvocereus - H.M.), although it is not as bristly as many of the other species. Once the plants reach maturity, they flower readily and produce many large fruit. The name is descriptive of the soft flesh or salmon pink colour of the flowers. Although the flowers are not very showy, the spine arrangement and the white spine cushions make this a very attractive species.

Comments on Haageocereus salmonoideus

.... from H. Middleditch

"In his book on Peruvian cactus, Rauh gives a photograph of a plant of this species which is furnished with central spines which are both longer and stouter than the radial spines, a feature which is included in Akers' description but which is not clear from the photograph accompanying the above article.

"Rauh reports finding this plant in Lurin Tal between an altitude of 1,000 and 1,200 m. Although the area of distribution of the red flowered Haageocerei is not large in comparison with the distribution area of the genus as a whole, nevertheless the specimen reported by Rauh is nearly at the opposite end of the red flowered Haageocerei distribution area from the original finding place reported by Akers, with several red flowering species carrying different names in between the two places.

"Haageocereus salmonoideus was the Type species of Aker's genus Peruvocereus".

IMPRESSIONS OF THE PERUVIAN CACTUS VEGETATION by Prof. Dr Werner Rauh

(Translated from "Cactus" France 11.49:56 by H. Middleditch)

Thanks to the assistance of the Societe Allemande pour la Recherche Scientifique and the Acadamie des Sciences de Heidelberg, I was able to undertake a study trip through the Andes of Peru, in 1954, in company with Dr.G.Hirsch, assistant at the Institute of the University of Heidelberg. The principal objective of this trip was the study of the habitat conditions of the plants of the high mountains at the upper limit of vegetation.

For nine months we traversed these massive heights of the Andes by car, on horse or on foot. In many places we established the line of demarcation from leaving the Pacific Ocean and in going over the Andean chain as far as the depths of the virgin forest of the Amazon. Two families of plants particularly attracted our attention: the bromeliads and the cacti, since these two families are represented in Peru by a great number of species and of genera, which are, in parts, a decisive influence upon the appearance of the floral landscape; they can therefore be taken into consideration

when characterising the floral associations. In a previous publication (Cactus Nos. 48-49) we have given a description of the interesting species belonging to the family of the bromeliads which are met with in Peru; this present account provides an impression of the cactus vegetation.

Although many trips for collecting cacti have already been undertaken by Rose, Backeberg, Akers and Johnson, our harvest,in particular that which would come from the high regions, indicates that the study of the cacti flora of Peru is not completed. For this reason, we envisage a second trip to collect in the course of the summer. The whole of our collection of plants is to be found, with a view to acclimatisation and to propagation, at the Botanical Garden "Les Cedres" of M.Julien Marnier-Lapostolle; some globular cacti are collected together at the Municipal Succulent Garden of Zurich and some species form part of the private collection of Mr.W.Andreae at Bensheim (Germany). It is an acceptable duty for me to express my warmest thanks to all those who have afforded me their assistance in the course of this trip and most especially to Mr.Julien Marnier-Lapostolle.

We reached Callao, the port for Lima, the capital, at the beginning of February. A torrid heat prevailed on the coastal desert which runs alongside the Andean mountains, over a breadth of 50 Km and a length of almost 2,000 Km. It was full summer in Peru. The sun was at its zenith and sent its fiery rays perpendicularly on to the earth. All the vegetation of the sandy desert was withered and the growth of plants is only possible in the irrigated zones. But clouds, heralds of a storm, hovered over the Andean peaks at an altitude of 6,000 m. Thunderstorms occur daily, and are accompanied by violent downfalls of rain and snow, which fills the mountain tracks with bottomless mud and renders them unusable.

As it is essential to approach the high mountains before the middle of April, we devoted the first weeks of our stay, after having cleared off the numerous formalities, to a study of the transverse valleys of the Andes up to an altitude of 3,000 m; these valleys, in the opinion of numerous collectors, are very rich in cacti which abound on the stony slopes of the river valleys which are very much channelled and weathered by the elements. The yearly rainfall is light in these high regions and often not a drop of rain falls over several years.

We first selected the valley of the Rio Rimac which stretches from Lima towards the east and leads by the relatively good road of the Carretera Central and the pass of Tiello (at an altitude of 4,850 m) to the highest town in the world, the mining centre of Cerro de Pasco. The only access road, which leads to the coffee plantations in the Chanchamayo valley, situated to the east of the Andes, is passable during the rainy season, although landslides often rendered it impassable for several days.

After leaving Lima, a modern town of nearly a million inhabitants, we came to the endless plain, sandy and yellow, of the coastal desert. Plantations of cotton and sugar cane extend for a short distance on each side of the Rio Rimac, which carries great quantities of water in the season. The desert soil is rich in nutriment and when there is water, the sugar cane and cotton grow there with a luxury of vegetation scarcely conceivable. After 50 Km, we reached the cap of the Andes, formed by mountains of granite, worn away by the climate and entirely arid. It is only above Chosica, a little watering place, situated at 800 m altitude, that one met with vegetation again outside the zones of the river valleys. The abrupt gradients of the valley appeared to us from a distance as if covered with little spots. These are the first cacti with which we are familiar, columnar cacti of the genus Neoraimondia, their tremendous columns resembling organ pipes rising towards the blue sky.

The genus Neoraimondia is peculiarly Peruvian, being distributed over the west flank of the Andes, coincident with the political boundaries of Peru. Backeberg distinguished 3 species: Neoraimondia gigantea, N.roseiflora and N. macrostibas. The first is the mightiest of the Peruvian cacti and reaches a height of 10 m. The flowers are of a purple colour. The distribution area of this species is restricted to the northern and central regions of Peru and often forms, at low altitudes,

veritable forests. N. roseiflora is the predominant species in the valley of the Rio Rimac and the valley of the Canete which is located more to the south but still in central Peru. Unlike N.gigantea, this species only reaches a maximum height of 2 m and has rose coloured flowers. Finally N.macrostibas is spread out to the south and is to be found in places right down to the edge of the sea. Its appearance is akin to that of N. gigantea, but its flowers are white.

The genus Neoraimondia is very interesting and differs from other cerei by the manner in which the flowers are placed on special short growths, reminiscent of cephalium. These cover the five ribs of the columns in long lines and are produced by a normal areole. These strongly lignified floral cones are covered with a dense and feltlike pile, which falls off in the course of time. As the flowers are placed laterally thereon, the cephalium has the chance to grow and reaches a length of about 15 cm, it can doubtless attain a good old age. At the time of flowering, the Neoraimondias present a fantastic spectacle, the enormous columns being covered with long chains of flowers.

As these plants occupy regions which often do not receive the least drop of water for years, one asks, in contemplating these giants, how they fulfil their need for water, especially as the ground is stony and light and very permeable. Their radiating root system, very dispersed, admittedly close to the surface of the soil, enables them to absorb the smallest amounts of atmospheric moisture.

At an altitude of 1,500 m the Neoraimondia are more sparse. In their place appear columnar cacti of smaller size, among which the Espostoa melanostele predominate. This cactus is found in some transverse valleys of the Andes as, for example, the valley of the Rio Huaura, located more to the north, and in such numbers that the rocky slopes, seen from afar, appear to be white in colour. Espostoa melanostele (described by Backeberg under the name of Pseudoespostoa) is differentiated from the true E. lanata not only by its geographical distribution, but above all by its external appearance. E. melanostele loses its hair in aging, so giving to the columns a blackened appearance as if they had been burnt; it always branches from the base.

By comparison, E.lanata - which appears only in the north of the country - forms candelabras and its branching only starts about 1 m above the ground. E.melanostele occurs in two different varieties. One variety exhibits long yellow spines and makes very thick columns, its fine and decorative shape is considered by Backeberg as the type. The other variety is spineless (var.inermis) and is often covered at intervals with hairy down, of circular bands, which without doubt correspond to the stages of growth.

Up to then we knew of the two species of Espostoa here, and I have discovered in the arid forest of Bombax at Olmos (north Peru) a new species to which Backeberg has provisionally given the name of E. procera .It is distinguished from the species already known by its dimensions. The candelabras - of which the long column-forming branches are from the base - can reach a height of 7 m, with the cephaliums being up to 2m in length. The genus Espostoa, likewise entirely Peruvian, crosses the western cordillera in the north and, with E. lanata, reaches the arid inter-Andine valley of the Rio Maranon. E. melanostele likewise crosses the western cordillera and is to be found in the valley of the Rio Santa (Cordillera Blanca) and at Tarma.

All the species of Espostoa are to be distinguished, from a morphological viewpoint, in that their flowers are situated in a special lateral cephalium, the formation of which results from a reduction in the growth of certain ribs and from an increase in the generation of hair around their areoles. The flowers are concealed among the hairs. The wool of the cephalium is collected by the natives who use it for stuffing their mattresses.

Espostoa melanostele are accompanied by other species, like Haageocereus acranthus, Loxanthocereus faustianus, etc. Between the boulders are concealed the woolly and black cephaliums of Melocactus peruvianus, covered with little flowers of carmine red colour. Backeberg refers to Melocactus jansenianus as a second species. I think it can be said that I am convinced that even more species will be discovered in Peru. The species of the genus Melocactus belong to the limited number of globular cacti which colonise the east flank of the Andes. In the north of Peru, Melocactus cross the Andean chain and extend towards the east as far as the Maranon.

Among the slightly higher cacti with the Espostoa group, one may quote the genus Mila, represented in the valley of the Rimac by two species, Mila caespitosa and M. kubeana. A third species, Mila nealeana, has been found by us in the valley of the Canete, located a little further to the south. This last-named species differs from M. caespitosa by the presence of many finer spines. Favoured with large yellow flowers and fruits resembling green gooseberries, the genus Mila may be thought of as the most decorative from this group of cacti.

Other striking examples are Tephrocactus kuenrichianus, a more or less prostrate plant. The centre of distribution of this species is at a much higher altitude, at 4,000 m. As the spherical offsets break off easily, one comes across whole heaps of plants, more of less rooted down, which give the impression that a sack of potatoes had been emptied there.

At an altitude of about 1,800 m the grouping of cacti which we have just described, reaches their uppermost limit. In the valley of the Rimac, one can distinguish two sorts of associations: the association Neoraimondia (800-1200 m) with the absence of any other accompanying flora, and the association Espostoa melanostele (1200 - 1800 m) accompanied by numerous other species of cacti and xerophytic shrubs of low height, as for example the plants which belong to the genera Jatropha and Cnidiusculus.

Above 2,000 m the number of cacti and xerophytes diminishes. The increase in the rainfall leads to a more opulent development of the vegetation, and the isolated clumps of cacti are superseded by colonies of plants where the enormous rosettes of the species of Foucroya and Puya predominate. Despite a reduction in the number of types, the cacti do not disappear completely. All along the steep slopes rising among the rocks at the mountain village of Matucana (altitude 2,400 m) grow Matucana haynei. Overhanging the cliffs, columns of Trichocereus peruviana droop like enormous serpents and, between 2,500 and 3,000 m, there appear the immense candelabras of Armatocereus matucensis, accompanied by little bushes of Carica candicans.

On leaving Matucana, we leave behind the fine permanent highway and we are obliged to continue our journey on a track typical of the Sierra. The Rimac crosses the chain of the Andes through the Gorge d'Infernillo, then the landscape opens out and one sees in the distance the first peaks of the Western Cordillera.

At 2,500 m altitude, areas of cultivation appear. On the less inclined slopes extend the fields of barley, maize, potatoes and Oca (Oxalis tuberosa), cultivated by the Indians of the high plateau, who wrest from the terribly poor soil, with much hard labour, the products of the fields required for their daily existence. Out of the first field there appears a cactus, Opuntia subulata, which is always present in cultivated places. Its distribution was confined exclusively to this region of cultivation and its propagation into the high parts of central and southern Peru must have arisen from human intervention, because the Indians often utilise it as fencing for the fields and paths. Since the pads break off easily and root with the same facility, the vegetative propagation of this plant is considerable.

At 4,000 m, at the highest limit of husbandry, a monotonous steppe starts covered with enormous clumps of grass, belonging in particular to the genera Stipa, Festuca and Calamagrostis. The Indians talk about these grasses, which are furnished with sharp leaves, under the name "Ichu" in consequence of the predominance of Stipa Ichu and all the verdant landscape in Peru is named "Puna". The Ichu steppe occupies the largest surface area in Peru. It covers the high inter-Andean plateau, which extends between the Cordillera of east and west, sometimes over a breadth of many hundreds of kilometers, and at an average altitude of 4,000 m. The Ichu steppe is a prairie which turns green from time to time. During the rainy season, the Puna colours up in living greenery and between the high grasses blaze a great quantity of yellow, red, and white flowers belonging to various families, amongst others the Enzianes. In drier times, on the other hand, the leaves of the grasses turn yellow, the accompanying flora disappears and the Puna takes on a desolate and autumnal appearance. But for us collectors, the Puna is revealed in all seasons as being a mine of discovery of very handsome and very rare Peruvian cacti, in particular the globular sorts. In the Puna one finds likewise the centre of distribution of the genus Tephrocactus and especially of the group

"floccosus", and we have made some valuable discoveries there, for example some new species of Oroya and Matucana.

Some 100 meters lower, we again come across the first enormous cushions of Tephrocactus floccosus, a single one of which may reach a diameter of many meters and when several of them are found assembled together, one has the impression from a distance of seeing a flock of sheep. The arms are short and clothed with a thick layer of hair to protect them against the nocturnal cold. These offsets are closely packed together and form firm and compact cushions, like left-overs from the shearing. These cacti present a magnificent appearance when in flower, for the whole surface is covered with coloured flowers in fiery red or orange red. This is exactly when the season is the coldest (around the months of June and July) and when the difference in temperature between the day and the night exceeds 30° (night-time temperatures go down as far as -15°C) the flowers open up their delicate petals. The presence of hair between the offsets should not be considered solely as a protection against the cold. In practice, Tephrocactus atroviridis, found for the first time in 1931 by Backeberg close to Oroya in the upper valley of the Yauli, likewise forms compact cushions and should undoubtedly be considered as a hairless variety of Tephrocactus floccosus. This latter is linked to T. atroviridis by transitional forms which are only sparsely hairy.

Whilst we knew until now only a small number of species of the floccosus complex, such as T. lagopus, we have discovered in the Cordillera (Cordillera Raura and Cordillera Huaylapallana) accessible only with difficulty and little explored up to the present time by cactus collectors, numerous new sorts, which differ between each other mainly by the colour and the pattern of the hairs. We have also found forms with brown and yellow hairs, which grow intermingled with plants covered with white hair. This produces a magnificent spectacle, the beauty of which only colour photographs would be able to reproduce. There is no need for us to dwell upon these new discoveries as the study of these collections is not yet completed. Unfortunately in cultivation the greater proportion of the fine Tephrocactus from the high mountains lose their typical appearance of growth and their hair almost entirely.

The finest of the recent discoveries is without doubt a new species of Tephrocactus which we found in the south of Peru (District of Ausangate at 6,400 m altitude: Hacienda Lauramarca). It grows with a new species of Lobivia, L. lauramarca, and has been named T. rauhii by Backeberg. Columnar, the plant does not form cushions; of a height of 30 cm and a diameter of 8-10 cm, it is covered with white wool felted and loosely gathered together. It recalls by its outward appearance a small Oreocereus.

One of the largest cacti of the high mountains of Peru is Oreocereus hendriksenianus which we have come across at Puquio in the Tola heath (south Peru). According to Backeberg, it should also be found at Arequipa in the Pampa des Arrieros.

O. hendriksenianus has been found at Puquio in many varieties standing side by side. Some plants have white woolly crowns and others have crowns of brown colour. Certain specimens are furnished with short spines and others with bright yellow projecting spines 15 cm long.

After the short diversion towards the south of Peru, we continue our journey along the Rimac valley. The trail twists and turns in endless hairpins towards the Col de Tiello, at a height of 4,850 meters, which we reach quite soon. Our car has taken us to an altitude of 4,850 meters ! and the view is indescribable. Far below us is the Pacific Ocean in which we had bathed some hours previously. But here, a cold and icy wind blows and so we wrap ourselves in all the warm clothes we can lay hands on. The tops of the glaciers are already lost in the clouds. We have only just enough time to appreciate the view towards the east, towards the Puna down below us, in which there are encrusted yellow and blue lakes, and then we are shrouded in a cold and damp mist; in the distance, the thunder is already rumbling. We leave the pass by a steep and winding trail and drop down towards the high plateau of the Puna in the direction of Oroya.

Here comes the blizzard and we find ourselves at the very centre of a storm. The thermometer drops below 0° and a snow storm rages about the mountainsides and, in a very short space of time, buries the green and flowering countryside under a thick coat of snow. Our car progresses only with difficulty because the track has turned into mud. Towards the evening we arrive at Oroya, the sky clears up and about 6 o'clock the sun sinks behind the mountains. It shows signs of being a cold night, which we are glad to pass at a friend's house, in a well heated dwelling. It is our first night above 4,000 meters. There is no question of sleep as we lack the oxygen needed to breathe freely, and moreover we are struck by the "Soroche", the dreaded sickness of the Andean mountains. But this night passes and it will be followed by many others with freezing cold in a tent stiff with ice. We get ourselves acclimatised to these high altitudes with the passage of time, but we are never able to emulate the activity of our Indian companions, who are in no way affected by the high altitudes.

A bright day opens, the sun burns intensely in a cloudless sky. In but a few hours the snow has melted and, just like yesterday, the Puna shines in a blaze of different coloured flowers. We continue our journey towards a town situated at 3,800 m altitude, with a view to recollecting Oroya peruvianus, originally discovered by the German botanist A. Weberbauer, who lived at Lima quite a long time ago. Just like Backeberg, we found only Oroya neoperuviana, furnished with yellow spines, but this time in large numbers. These truly beautiful globular plants live in a limestone soil, severely channelled by rains, and reach a diameter of 20 cm and a height of 30 and even 40 cm. It is only much later that we encountered in the Puna of Andahuaylas, at about 500 Km to the south-east of Oroya, a new variety of Oroya, very close to O. peruviana (our collection number K72), but which differs from it by the smaller flowers.

In the course of our later journeyings across the Cordilleras Blanca and Negra (Department of Ancash) we found other Oroyas with yellow flowers in important groups and amongst these we have been able to distinguish two varieties, one with red (fuschia) spines and the other with amber spines. Phillipe Borchers, the Austro-German organiser of the exploratory trip into the Andes in 1932, had already encountered comparable varieties in the same district, which have been described by Boedecker under the name of Echinocactus borchersii, admittedly without flowers. It is hard to accept that Borchers was able to collect quite different plants to ourselves; since the nature of their flowers places them in the genus of Oroya one must therefore approve Backeberg when he describes this species under the name of Oroya borchersii.

In the Cordillera Blanca, close to the Hacienda Catac, Oroya borchersii is to be found along with more fine species of Matucana which we have found in Peru. One of these latter is characterised by magnificent silvery spines, a spherical body and a tendency to clump. The very beautiful flowers are carmine red in colour. It is described by Backeberg under the name of Matucana weberbaueri v. blancii. A second variety, with fiery red flowers and furnished with pale brown spines will be described under the name Matucana brunnescens spec. nov.

(The diagnosis of Matucana brunnescens has not yet been published - Editor "Cactus")

Comments on Rauh's account of his Peruvian trip.

.... from H. Middleditch

"Of all the accounts which I have read describing cactus collecting in this part of the world, I do believe that this one is possibly the most informative in touching upon topography and climate as well as both individual cactus plants and other associated flora.

"The French text refers to the Hacienda Lauramarca at an altitude of 6,400 meters - this is well above the normal height of permanent habitation and cultivation and also of the occurrence of

cacti. One is thus suspicious that this is a misprint, which view tends to be confirmed by the reference in Rauh's later book (giving a very full account of all their discoveries) to the discovery of Lobivia lauramarca near the Hacienda Lauramarca at 3,000 meters; also by an illustration of Tephrocactus rauhii at 3,800 meters with the peak of the Nevada Ausangate of 6,400 meters in the background.

"In describing their approach to Oroya, Rauh refers to the approach of evening - this will be around 5.30 p.m. in the tropics, followed by nightfall at 6,00 p.m. (18.00 hours) just as Rauh observes.

"Rauh refers to the bulk of the collected specimens being housed with Marnier-Lapostolle's collection; Curt Backeberg was curator for Marnier-Lapostolle from about 1952 to 1955 and so he would be responsible for the receipt and establishment of those plants. Having covered much of the same ground himself some twenty years previously, he should also have had the advantage of recognising many of the plants collected by Rauh. At this time, Backeberg was busily engaged in preparing the manuscript for his "Die Cactaceae", the first volume of which appeared three years later".

FLORAL GEOGRAPHY OF THE PERUVIAN ANDES by A. Weberbauer

(Abstracted from "Flora of Peru" Ed. J.F. McBride, Field Museum of Natural History - Botany, Vol. XIII)

The Peruvians divide their country into three main divisions: La Costa (coast), La Sierra (Mountains), and La Montaña (forest land). The highest region of the Sierra, beyond the limits of agriculture, is called puna, or in the north, jalca. The montana comprises the lower tropical region of the eastern slopes, with the neighbouring lowland. The upper region of the eastern slopes is called ceja de la montana (brow of the forest). This division corresponds more or less to the principal differences of climate, vegetation, and other geographic elements.

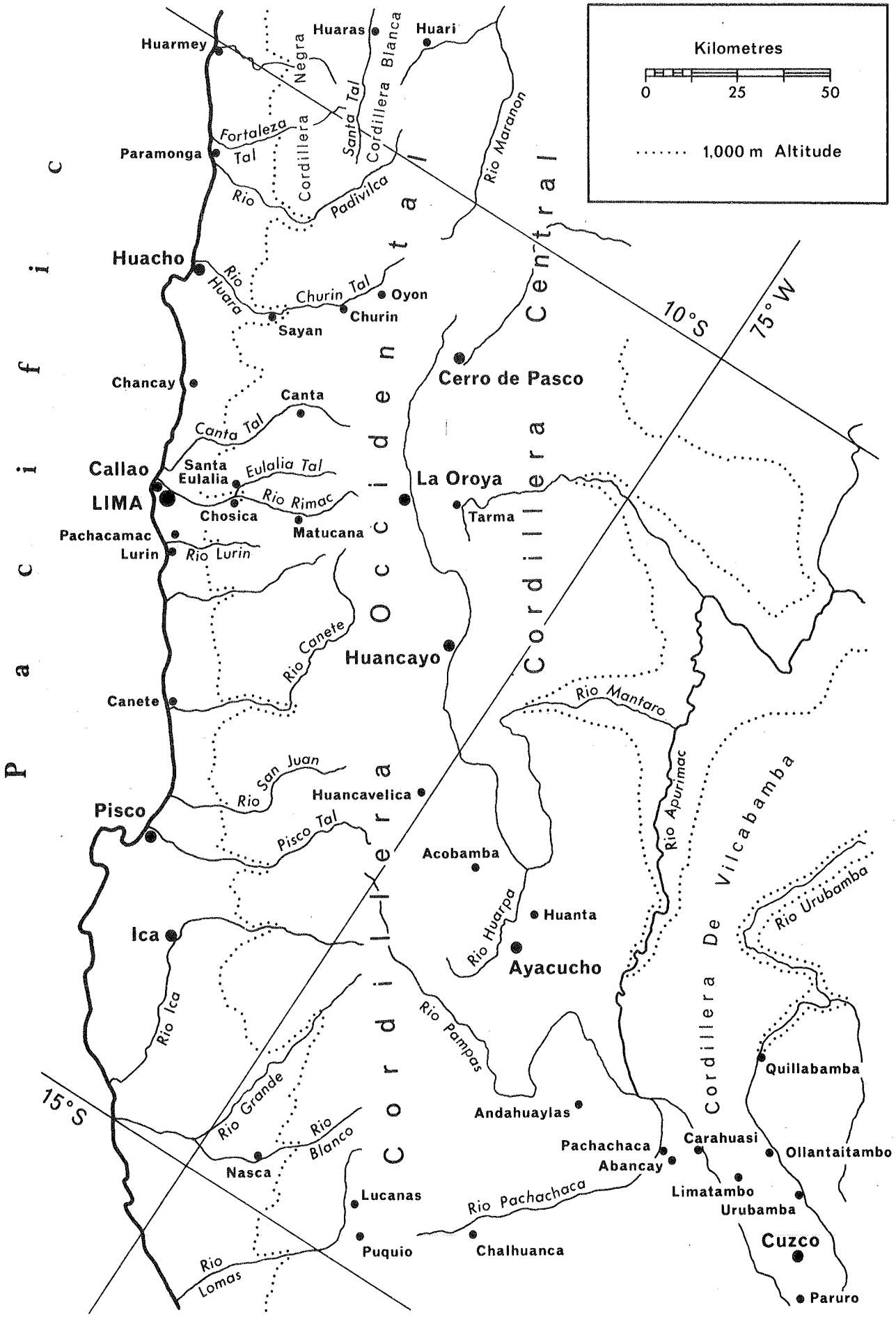
Resting on a lowland of tropical latitude, reaching up to regions of snow, exposed to climatic contrasts of the west and east and north and south, the Peruvian Andes present a marvellous variety of vegetation pictures. The vertical distribution of the plant growth is governed by both temperature and humidity, and by the latter more evidently in the west than in the east. On the contrary, the horizontal order depends almost entirely upon rain. Deserts, semi-deserts, grass steppes, and low shrubwoods characterise the dry west; vigorous forest formations the humid east. Yet in the extreme north only the lower regions offer a great difference in the two sides; the higher regions, on the contrary, are similar to one another, partly owing to the lesser height of the mountains, partly because the humidity in the Peruvian Andes increases not only from west to east, but also from south to north. The general distribution of moisture is slightly modified by the winter fogs of the coast, but they occur only near the sea and only in middle and southern Peru. The changes in the vegetation which take place in the direction from south to north are much greater on the Pacific side than on the Atlantic one.

The coast

The southern and middle Peru the coast in the proximity of the ocean is watered by winter and spring fogs (garuas) that bring forth the growth of the loma vegetation, while behind lies a desert belt which receives neither the winter fogs nor the summer rains of the mountains. This desert comprises, besides the inner coastal land, the lowest region of the Andes, or belongs to this alone where the coast is very narrow. North of the eighth degree of latitude the loma vegetation is almost entirely missing.

The summer rains of the Andes, whose lower limit drops on the western slopes towards the north, reach the foot of the mountains and then penetrate more and more into the coastal land. As a great

Central Peru



Linda Hampshire

exception, in some years summer rains extend over the entire breadth of the coastal land. This happened, for instance, in 1925 and with less copiousness in 1926.

In the coastal region of deserts and lomas, the flora shows decided relationships to the much richer flora of the western slopes. The formations belong partly to the periodically vegetating ones, partly to the continuously vegetating ones. The first group is represented by the loma formation, the second by the Tillandsia associations, the plant associations of the flat sandy strand, the vegetation of wet sea cliffs, and the river bank bushwood.

The vegetation of the lomas, chiefly a loosely jointed carpet of herbs, appears about the middle or end of winter, in the north earlier than in the south, and disappears in summer as soon as the coastal fogs begin to scatter. Everywhere its extent depends greatly on differences in the amount of precipitation. In the driest years the verdure of the lomas covers only the summits and ridges, in the wet ones it extends down to the neighbouring plains. The lomas depend on the vicinity of the sea; at increasing distance from it they are confined more and more to the summits and ridges of the hills, and at last they disappear entirely. However, they are missing on the very strand, and generally move the more away from it, the more gradually the coastal land rises. One finds them up to about a thousand meters. In the vicinity of the sea the hills generally keep below that altitude. The slopes facing the sea or touched by the predominant southern to western winds become wetter than the slopes on the opposite side. Owing to this, many ridges bear a luxuriant loma on one side and have on the other a very poor vegetation, chiefly consisting of cacti and Tillandsias. The most favourable conditions for the growth of the lomas are found in such valleys as are open to the sea or windward, and thus catch and retain the fogs.

The loma formation consists mainly of herbs, among which annuals are predominant, but tuber-bearing, bulbous, and rhizomatous plants are also found. Remarkable is the small number of grasses and shrubs. These occur chiefly at higher elevations and even there are generally scattered. In the loosely woven fields of plants sufficient room is left for terrestrial lichens and mosses. The cacti sometimes are entirely wanting; they prefer stony and rocky places on dry slopes.

The dense fog of the loma season, which on many days the sunbeams can pierce only for a few hours, places the vegetation under unusual conditions. Only to a small degree is there need for protection against drying of the superficial parts. Succulence of foliage is extremely developed only in rare cases. The infrequent occurence of thick felted hairiness can be surmised from afar by the pure green colour of the vegetation. One is reminded of shade plants or the growth of damp ravines at the sight of Begonias, Adiantum concinnum, and the lax, long-creeping, thin-leaved stems of Bowlesia palmata, Astrephia chaerophylloides, Siyos gracilliamus, etc. Also, the abundance of fruticose and foliose lichens as well as of bryophytes is due to the high atmospheric moisture. Lichens and Bryophytes, together with ferns and Peperomias, form epiphytic associations on the branches of the shrubs.

Though the loma is an important climatic formation, it is not everywhere uniform, but exhibits a division into subformations. Considerable differences exist between the level or slightly sloping sand plains and the hills; furthermore, the distribution of plants on these is influenced by clay soil, stony fields, and rocks. The sand plains dry rapidly and, being at a lower elevation above the sea, receive less moisture from the fog than the hills; therefore, their vegetation is lower, looser, and more xerophytically organised than higher up, and the shrubs appear only in a few, mostly procumbent forms. A considerably larger number of shrubs, and especially erect ones, inhabit the hills. Among the stateliest are Caesalpinia tinctoria and Carica candicans, which attain a height of two to three meters.

After the herbs are dried and the shrubs have lost their foliage, lichens, principally fruticose ones which live on earth, stones and branches, remain as characteristic constituents of the "summer-aspect"; thus wide stretches are covered by a real lichen formation.

The aspect of the continuously vegetating formations is not essentially influenced by the change of seasons.

Not very particular as to soil conditions and very frugal in respect to water supply are the Tillandsia associations. These grey Bromeliaceae are densely covered with water-absorbing scale-like hairs, and cling to the ground by a few adhesive roots. They satisfy their need for water with a small amount of atmospheric moisture. We find them in certain places where no other plants except lichens and a few aerial algae can live - on loose quicksand, clayey soil and clay walls of precolumbian ruins, stony fields and rocks. Often the frequency of the Tillandsias increases inland up to a certain limit, and they extend far into the desert belt, which is beyond the lomas.

Near the station of Santa Clara, between Lima and Chosica, on the inner border of the lomas, enormous quantities of silver-grey Tillandsia straminea cover the sandy-clayey plain. Their stems grow towards the southwest or south-southwest, against the prevailing wind, which carries the moist sea air, and they are associated in belts that cross that direction. As the rear parts continually die, one may say that this plant army slowly advances seaward.

Flat sandy seashore is often covered by a green lawn of Distichlis thalassica, sometimes pure, sometimes mixed with other low plants. The creeping and thickly entwined rhizomes of this grass penetrate deeply into the soil and their roots are found even at a meter's depth, where the sand remains constantly moist. The strand presents a different feature in places where the amount of water in the soil is so plentiful that shrubs like Salicornia fruticosa, Batis maritima, and Pluchea chingoyo prosper. These shrubs grow now scattered, now together in stands.

Steep, wet sea cliffs, consisting of a conglomerate, are found near Lima, between Chorrillos and Miraflores. While absolutely barren on top, they are overgrown on the lower parts by a thick cover of mosses, Adiantum concinnum, Nasturtium fontanum, Samolus valerandi, Herpestis monnieri, and other herbs, besides some shrubs and reeds. Seen from afar this vegetation appears as a straight-cut band. It owes its existence to the ground water, which constantly filters from above through the soil. The chalk dissolved in the water is precipitated on the stones, algae, mosses, rootstocks and roots. Thus porous masses of tufa are produced, and increase in volume until they separate and fall on the strand.

Along the rivers, fed by the snow and rain of the higher mountain regions, the constantly moist ground also makes an uninterrupted life possible for plants. Here the mixed river bank bushwood grows. It consists of trees like Salix chilensis, Inga feuillei, Sapindus saponaria, Acacia macracantha, and Schinus molle; shrubs (Rapanea manglillo, Cordia rotundifolia, Cestrum hediondinum, Dunalia campanulata, Acnistus agregatus, Baccharis lanceolata, Tessaria integrifolia, Caesalpinia tinctoria); climbers with slender stems (the twining Vigna repens and Mikania micrantha); and tall reeds (Gynerium sagittatum, Phragmites communis, and the naturalised Arundo donax). Where the soil is swampy or standing water gathers, Typha, Jussiaea and tall Equisetum live.

In the greater part of the district from Rio de Lomas to Canete, loma vegetation is wanting. It is found only in a few places; near the Bahia de San Nicholas; on the hilly land on both sides of the Rio de Ica, between Ocucaje and the sea; and on the Cerro Quemado that rises in the Bahia de la Independencia. Moreover, the vegetation does not develop every year at the places named. The Ica district owes its singularity chiefly to the algabarro groves, which extend along the Rio de Ica and Rio Grande as well as their tributaries. All these rivers have little water. The algabarro groves of Ica remind one of the north Peruvian coast near Piura, and are formed here as well as there by the algabarro tree, Prosopsis chilensis, in Ica called Huarango, in whose shade grows the shrub Vallesia dichotoma. Among the shrubs occurring on the borders of these groves are the almost leafless Bulnesia retama, a Capparis with coriaceous leaves closely related to the northern Capparis avicenni-folia, and the red-blossomed Stenolobium arequipense, called cahuato, which reaches its northern limit for the coastal land at the Rio Pisco.

From Canete to the Rio Fortaleza, the loma vegetation is continuous, interrupted only by the river valleys. Hymenocallis amancaes, a beautiful bulbous plant very popular in Lima and also found in the northern district, seems to have near Asia the southern limit of its distribution. In wet winters the hills of the San Lorenzo Islands near Callao also become green.

The western slopes and high Andean regions

Everywhere a contrast is perceptible between the extremely xerophytic formations of lower elevations, which are characterised by columnar cacti and many decidedly rainy-green plants, and the vegetation of higher regions, whose denser growth and minor or almost absent periodicity are due to a moister climate. Besides, the vegetation changes with the increasing humidity to the north and eastward.

The upper limits of the deserts, which lie on the western slopes below the cactus region and are a continuation of the coastal deserts, become lower, as a rule, towards the north. The cactus formations to the north or eastward descend to lower levels. They are treeless in the driest regions. Later scattered small trees appear between the cacti, and at last in the north the cacti grow with rainy-green shrubwoods and bushwoods. Higher up vigorous perennial grasses supply one of the most important elements of the vegetation.

Very significant for the western part of southern Peru, besides such grasses, are the subxerophytic, evergreen, ericoid tola shrubs, which are often associated in heathlike formations. Then follows, towards the north and east, a rainy-green grass steppe with isolated more or less rainy-green shrubs. At last grass steppes of moderate periodicity alternate with evergreen shrubwoods and bushwoods, and in some parts of the north the grass steppe is completely supplanted by those woody formations.

In the uppermost regions, which may be called the high-Andean part of Peru, many species belonging to different families are peculiar in rising little above the surface of the soil. Rosette and cushion shaped plants are found in the puna with mat and other formations often predominating. Of taller growth and less conspicuous by their species than by their individual number are several perennial grasses. A special vegetation character is imparted to the high-Andean region of the western cordillera of southern Peru by the heaths of low tola shrubs. The other, and by far the larger part of the high-Andean region of Peru, is strikingly poor in woody plants, and these, excepting some procumbent shrubs, are restricted to certain places, especially rocks and stony fields.

The result of the distribution of precipitation is perceptible in the periodicity of the vegetation and especially in the proportion of taller grasses. The periodicity, on the whole insignificant, is most conspicuous in the south. For nearly the entire puna of southern and middle Peru the rule holds that the taller grasses grow in separated tufts; nevertheless, on the eastern border of this region they draw together to form a close covering.

On the western slopes of the Andes of Central Peru, the vegetation above the desert is dominated by columnar cacti, accompanied by other evergreen xerophytes and by strictly seasonal plants - shrubs and herbs - whose green organs function only for a short time; at higher altitudes vigorous perennial grasses are important elements of the main formation and the periodicity is less pronounced. However, because of their less arid climate, the western slopes of the Andes of central Peru have a richer and more equalised flora, which makes it difficult to distinguish the regions. Between the cactus and the grass belts there is an intermediate zone into which there penetrate from below isolated columnar cacti, and from above isolated perennial grasses. Nevertheless, within this intermediate zone there is evident a limit between the two regions which, in the greater part of central Peru, lies between 2,800 and 3,000 meters and perhaps coincides with the frost limit.

Because of the increasing humidity northward, the limit of both regions lies higher at the southern border of central Peru and at the northern lower than is usual. Thus above Pisco the columnar Cereus species are still frequent at 3,200 meters, while above Trujillo they are scarce above 1,800 meters.

Within this general distribution of vegetation we observe differences which depend on the humidity of the soil. The river banks at lower elevations are covered by evergreen bushwood that contrasts strongly with the surrounding vegetation, especially during the dry season. Such a pronounced contrast is absent at greater elevations, though it cannot be denied that there also is moist

ground of the river and brook banks often favourable to the growth of woody plants.

The desert region is a continuation of the deserts on the inner coastal land; the upward extension fluctuates greatly in correspondence with different local conditions whose influence is not yet understood. Probably it reaches nowhere higher than 1,400 meters, and at places only to 900 meters. Besides the river banks, where the evergreen bushwood of the coastal land continues without great changes, the dry beds also are a refuge for the vegetation absent nearly everywhere else. They support several shrubs, such as Trixis cacalioides, Galvesia limensis, Grabowskia boerhavifolia and Wigandia urens, a plant two meters high, sparsely branched, and with huge leaves.

In the evergreen formation of the river bank brushwood there ascend to rather higher elevations various plants which on the coast are found on river banks, such as Tessaria integrifolia, Salix chilensis, Caesalpinia tinctoria, and Schinus molle. In addition, there are others that are wanting or scarcer on the coastal land, like Ficus and Alnus trees, and among climbers Cynanchum ecuadorense and Clematis species. Just as on the coast, cultivation here has greatly reduced the natural vegetation, yet this has survived in places where agriculture has been prevented by the narrowness of the valley floor or by other circumstances. The most beautiful river bank thicket of this region I saw in a valley of the system of the Rio Pativilca, when travelling from the port of Supe to Ocros. Old trees of Salix chilensis, Alnus jorullensis, and a Ficus with great spreading bracket-like roots, with liana stems of Clematis dioica as thick as an arm, were the stateliest objects between 1,300 and 1,800 meters above the sea. Farther up Alnus predominated and persisted as the only tree between 2,400 and 2,900 meters. Up to its top climbed Muhlenbeckia tamnifolia, Colignonia weberbaueri, and on its branches perched broad-leaved rosettes of Tillandsia interrupta as large as a man's head.

In the herb-poor region of columnar cacti outside the river banks, xerophytes of various habit form a loose plant field that may be called mixed mostly treeless, xerophytic formation. The columnar cacti, the huge leaf clusters of Fourcroya, the Bromeliaceae with thick, procumbent, much-branched stems, and the rainy-green shrubs are outstanding features of the vegetation. They are so scattered that room is left for many small patches of herbs that grow during the short rainy season of two to three months, when the shrubs also unfold their foliage. In some years the lowest part of the region receives so little rain that no new foliage develops.

In order to give some idea of the vegetation, the principal ecological types may be listed, as follows:

Leafless plants with succulent stems: Cereus and Cephalocereus, smaller cacti of the genera Opuntia and Melocactus.

Leafy rain-green shrubs with conspicuously thick branches: Carica candicans, one of the largest shrubs of this formation; Jatropha species, chiefly J. macrantha.

Bromeliaceae with thick, much-branched, prostrate, woody stems and evergreen leaf clusters: Puya and less frequently Pitcairnia.

Slender-stemmed Bromeliaceae with few or no roots and grey-hairy leaves: Tillandsias.

Plants with succulent leaves: Fourcroya occidentalis, and smaller plants like Pilea globosa and species of Peperomia, Portulaca, Calandrinia and Cotyledon.

Leafy rainy-green shrubs without conspicuous thickening of the branches; the great majority of all shrubs. Among the larger ones is Orthopterygium huancui, which grows also as a small tree, and Delostoma dentatum. Species with densely hairy leaves are Malvastrum rusbyi, Loasa incana, Balbisia verticillata and Onoseris integrifolia. In some cases resin secretion serves as a protection against desiccation, as in Kageneckia glutinosa.

Leafy evergreen shrubs; the number is small. By means of leaves that conserve moisture or by deeply penetrating roots, or by both, it is possible for these shrubs to retain their foliage permanently.

The most important is Schinus molle, which sometimes grows as a tree, though always smaller than on the river banks. Some individuals of Caesalpinia tinctoria and Stenolobium sambucifolium are green continuously, or at least for a long time. These three shrubs are among the largest ones of the formation.

Shrubs with scant or no foliage: Ephedra americana, Monnina pterocarpa, Asteriscium species.

Bulbous plants: few in number. Chiefly species of Stenomesson and Oxalis.

Tuber-bearing plants: Commelina fasciculata, Anthericum eccremorrhizum, Peperomia species with peltate leaves, Boussingaultia diffusa, Ipomoea nationis, Oxalis sp., etc.

Annual herbs: I estimate that above Lima, between the limit of the desert region and 2,400 meters above sea level, two-thirds of all herbs are annual, and of these the Compositae are most numerous. The grasses take no prominent part as formation elements, either annual or perennial species.

Pteridophytes with protection against evaporation, such as wax secretion, viscous surface, scaly indument, or involution of the leaves or stems in dry weather: ferns of the genera Pellaea, Cheilanthus, etc., and Selaginella peruviana.

With respect to the distribution of the floral elements, the differences between lower and higher elevations must be emphasized first of all. Restricted to the former are Melocactus, Cephalocereus, Cereus macrostibas, Grabowskia, Galvesia, the Jatropha species of the subgenus Cnidoscolus, like J. basiacantha, Monnina pterocarpa and Orthopterygium huaucui. The last occurs between 1,000 and 2,300 meters, and in places is the most frequent woody plant, but it does not seem to go northward beyond 11° latitude. In the upper part of the region the columnar cacti are represented chiefly by a species nearly related to Cereus peruvianus. The xerophytic formation here includes some woody plants which in lower regions live only near watercourses, on account of the scant precipitation: Schinus molle, Caesalpinia tinctoria and Stenolobium sambucifolium. The flora of steep rock walls is often characterised by a preponderance of Puya and grey Tillandsias.

The upper limit of the grass steppe with scattered shrub region lies at 3,800 to 4,000 meters. The amount of precipitation is greater and the rainy season begins earlier and ends later than in the cactus region; and this governs the principal features of the vegetation. Rainy-green grass steppe with scattered shrubs is the most extensive formation. The majority of the grasses, like Calamagrostis, Poa, Festuca and Eragrostris, are perennial, and many have narrow, firm leaves. Their height, exclusive of the flower stalks, is in many cases about half a meter, but may be much less. With the grasses are associated other herbs, partly and perhaps chiefly perennial. The shrubs are scattered, not in dense stands, and only a few of them exceed a height of two meters.

Towards the end of the rainy season, after the climax of the vegetative and flowering season, the plant covering is densely tangled, and in favourable places the ground is completely covered. During the dry season the more delicate herbs disappear, but the tufts of perennial grasses remain standing in withered condition, and some shrubs retain part or all of their foliage. Consequently the season changes of the landscape are slighter here than in the cactus region. Extremely xerophytic organisation is not an essential quality, and is represented by only a few cases. This is shown, for example, by the fact that cacti represent quite secondary elements, restricted to rocky places. Only certain tall Opuntias related to O. subulata are seen occasionally in great quantities, but that is the result of transportation by man or other animals.

The banks of the brooks and rivers lack the peculiar wood formations seen in the cactus region, which differ strikingly from their surroundings. Up to altitudes of 3,500 meters the development of woody plants is, indeed, more luxuriant along watercourses, and often they grow closer together here than elsewhere. However, they are mostly species that grow also in the grass steppe, since there is sufficient soil moisture for their needs. Some especially vigorous woody plants have a decided preference for wet ground of banks and springs. These include Alnus jorullensis, Buddleia and Polylepsis species, Sambucus peruviana, which often becomes tree-like, and peculiar shrubs of the genus Polymnia, whose straight stems attain a height of five meters and when old become

hollow by the shrinkage of their pith. But these trees and tall shrubs are so irregularly scattered that they can not be considered typical formation elements. Moreover, they are planted for their medicinal properties, and for construction material and fuel, and many wild individuals have been exterminated, so that their original distribution is doubtful. Stony brook borders everywhere are decorated by a stately grass, Cortaderia atacamensis, visible from afar by its white panicles.

Above 3,500 meters the number of species of woody plants decreases, and these generally avoid the moist ground. Perhaps it is too cold for the shrubs of lower elevations, and they can live here only in the drier soil. Some high-Andean herbs descend lower in humid places than in dry ones.

In central and southern Peru the name puna is given to the region lying above the limit of agriculture. It ends below at 3,800 to 4,000 meters and above on the highest summits. The vegetation includes grasses, herbs, low growing Opuntia (Tephrocacti - H.M.), sparse shrubs, Puya, and scattered groves of Polylepis.

Comments from H. Middleditch

"The author of the above article is perhaps the best known writer on Peruvian flora. The genus Weberbauerocereus (most species of which are Peruvian) was named after him. Weberbauer's own book on the Flora of Peru was published in 1911, at which time the plants we now call Espostoa were described as Cephalocereus (see under "Binghamia" in Britton & Rose's "The Cactaceae"), hence the continued use of that name in the above article.

"The photographs of procumbent Haageocereus which appear in Backeberg's "Die Cactaceae" and other publications, depict sprawling plants apparently half-buried in the desert sands. The appearance of the plants hardly suggests a well-fed body; some imported examples seen soon after receipt in Horst Ewald's collection appeared to be in need of great patience and attention if they were to be coaxed into active growth. Having read in Dr. Weberbauer's article that the cacti grow on the drier slopes of the hills and ridges in the lomas, where they will receive no moisture in summer and precious little in winter, I can now understand why those Haageocerei got into that sort of condition.

"Then there is that magnificent description of the Tillandsias growing into the wind "like an army marching towards the sea". As the sparse roots possessed by the Tillandsias will loose their tenuous hold on the sand from time to time, presumably they will be blown back inland - and if they are not fortunate enough to meet something which arrests them before they are swept into the barren desert by the wind, they will perish. Presumably where the Tillandsia are absent, the moisture was not enough to keep the Tillandsia growing towards the sea fast enough to keep pace both with the sweep of the prevailing wind and the merciless desert.

"Many authors have described the major features of the Peruvian landscape and flora - the coastal desert broken by the winter-flowering meadows of the lomas, and the occasional thread of green where a river crosses the desert on its way to the sea from the Andes; the cacti above the desert; then higher still the grasslands, and finally the puna. But this article fills in those outlines with a wealth of fine detail which can contribute much to an understanding of the ecological niche occupied by cacti in Peru".

OROYA GIBBOSA FLOWERS from Mrs J.M. Hobart

My seedling plant of Oroya gibbosa was purchased from Hans Till during our 1964 Cactus Tour. It was on its own roots and I suppose it would then be two or three years old, which makes it about 9-10 years old now. It is now about 9.5 cms dia. and 7.5 cms high, growing in a 5" plastic pot and it seems to grow rather more quickly than my O. peruviana.

The body is a shiny green with 19 ribs and more are still being formed. The ribs are divided by cross grooves into low tubercles which are more prominent towards the apex of the plant. The elongated areoles carry 12-15 radial spines 10 to 16 mm long and occasionally a single central spine. The spines are zoned in colour, the tips and the base being reddish-brown while the mid part of the spine is yellowish.

So far I have not found Oroya difficult to grow - my plants are in John Innes No.2 with added grit and are given a normal watering with the rest of my plants together with a dry winter rest. They seem to be resistant to cold, having been down to 22°F without detriment; I managed to scorch a few plants during the summer of 1969 but again the Oroya escaped unscathed. During the winter they always appear plump, without any sign of shrinkage, despite being left dry for several months.

Rawe, in his book 'Cacti in South Africa' says that Oroya need large drops in temperature during the night in summer to induce them to flowers; as they are high altitude mountain plants this would seem to be reasonable. He observes that he has never seen even large mature plants of Oroya in flower in Cape Peninsula.

It was, therefore, with no little surprise and interest that I found my plant showing signs of bud for the first time in 1971. It was on May 3rd that I first noticed the buds and found that there were 14 of them. They were hairless, conical, orange in colour with green tips. However, it seemed that my triumph was to be short-lived for only two days later all but three had withered, the remains of the others being still attached to the plant. The three remaining buds developed and flowered together on 21.5.71. They opened in the morning; the flowers were sessile. The outer petals were reflexed, the inner ones upright (like a Neoporteria). The petals were lime green at the base, with orange-red tips. The stamens and style were yellow. I do not know how long the flowers lasted as I was off on the 1971 Cactus Tour on the 25th of May which was their fourth day of opening.

(There is a slide of this plant in flower in the slide library - A.W.C.)

.... from D. Rushforth

"I have a plant of Oroya gibbosa which I grew from seed sown in 1962. In 1970 when it was some 11 cms in diameter it produced a lot of buds, ten of which opened together in July. The remainder (probably 3 or 4) dried off, in the same way that Neoporterias sometimes do. The flowers and the plant are as described above.

"Cultivationwise, all my Oroyas receive the same treatment as the other plants, being grown on low staging being (by many growers' standards) heavily shaded and also (by many growers' standards) heavily watered overhead by hosepipe on maximum flow."

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

"About 8 years ago I raised some Oroya gibbosa FR 143a from Winter's seed and this year (1972) they came into flower for the first time. The buds appeared in April and by the end of that month there were about a dozen buds on each plant; the weather was very mixed during the month of May and although the plants were watered about once a week - enough for the state of the weather - one plant aborted all of its buds and the other aborted all but three buds. I was careful to see that the plant did not dry out entirely; I have noticed before that a plant will abort its buds the first year they appear - my Neoporteria aspillagai aborted its buds last year at first flowering but it is coming along nicely this year.

"The plant may possibly have been affected by being somewhat underpotted - they are now some $7\frac{1}{2}$ cm in diameter and 6 cm high, growing in a $3\frac{1}{2}$" plastic pot.

"The plant body is dark green with 15 ribs (including two just forming) low and broad, with

pronounced chins above each areole. Areoles 2 mm x 6 mm, cream fading to white, about 1.5 cm apart. Spines 12-14, all radials, 1.5 cm long, ivory tipped brown, changing to brown and fading to grey-white. The flowers are 20-22 mm long and 12-15 mm diameter, all outer petals being red and the inner petals yellow, somewhat like a Neoporteria flower - the inner petals remain more or less upright, leaving an aperture of about 4 mm diameter in which the stamens and style are bunched together. The flowers last for some 4 to 5 days.

"My plants are grown in a mixture of two parts by volume of John Innes No. 2 plus one part coarse sharp sand. They are watered well in summer and kept dry in winter. I give them a sunny position, fairly close to the glass."

.... from Miss E.M. Colley

"My 3" plant of Oroya gibbosa was in flower for me for the first time in May this year. I obtained it as a seedling plant from a nursery and have given it no special treatment; it is kept quite dry during the winter. At first there was a complete ring of buds in a circle round the crown, but most of them aborted and in the end only three came into flower - but I was thrilled enough with those. The flower tube was indeed quite bare, the petals were yellow, flushed with red and the flower lasted for 2 to 3 days".

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

"My plant of Oroya gibbosa was grown from imported seed sown in 1964 and grafted as a seedling on to a low stock in the early spring (September) of 1965. It first flowered in the spring of 1968, when only four years from seed. It was then globular about 5" high and broad and it had two flowers only. In September 1970 it was a picture, with about the top third of the body covered with bloom with a flower at almost every areole. The flowers are a brighter magenta and larger than most I have seen. I have an offset now of O.gibbosa which has been four years on its own roots and is now $2\frac{1}{2}$" wide and high - it will be interesting to see at what age it will flower; I shall watch its progress keenly.

"My O. peruviana was also put on a low graft as a seedling and it flowered at five year's old from sowing the seed.

"Both plants flower profusely each year, but I am afraid I have had the same trouble of buds aborting. I cannot find any reason for this - my friend in Napier grows a plant of the same age, also grafted, which never does this; the only thing we can think of is that her glass house being on a hill receives the sun for a longer period than mine does, so her plant would have a longer period in the sun. Also, while the temperature in my glasshouse starts to drop at around 4.30 p.m. it would be nearer to 5.30 p.m. before the cooling started in hers. I have now acquired her plant and will grow them side by side and see what happens. I shall keep a few notes and also try for seed. I have not bothered to pollinate my plant before, not having a true mate. Now I have a mate for both species, so here's hoping!"

.... from R. Alabaster

"My efforts at Oroya seed have so far been discouraging with poor germination followed by very straggly growth - what is the secret, must they be grown cold and hard; if so, how long before a representative plant can be expected?"

OROYA LAXIAREOLATA Rauh & Backeberg sp. nov. by Prof. Werner Rauh

(Translated from "A contribution to the knowledge of Peruvian Cactus Vegetation" by H. Middleditch)

Plantae primum complanato-globosae, postea breviter columniformes, usque 15 cm altae, 10 cm. in diam., singulae vel pluricapitatas turmas formantes, proprio colore cano-olivaceo; costae 24-30 angustissimae planae, inter areoles profunde constrictae; mamillae inter se non seperatae et in

vertice non gibboso-tumidae; areolae amplissime inter se distantes (usque 4 cm), angustissimae et et porrectae, usque 1.2 cm latae flavo-tomentosae; aculei marginales utrimque 8-12 conspicue verticiformiter partiti, transverse patentes sed caulem non appressi, leniter erecto-curvati, 1.5-2 cm longi, basali-medius saepe brevior, superiori-medius interdum porrectus, basi ruber vel atrofuscus, apice pallide flavus; aculeus centralis plerumque deest, si adest rigide patens basi modice incrassata; flores et fructus ignoti.

Body initially depressed-globular, later elongated short columnar, up to 15 cm high and 10 cm in diameter, growing solitary or forming clumps of several heads, of unusual grey olive-green colour, ribs 24-30, very narrow, low, markedly constricted between the areoles; tubercles confluent and not arched up in humps in the crown; areoles well apart (up to 4 cm), very narrow and elongated, up to 1.2 cm long and 2 mm broad, yellow felted; radial spines 8-12 both sides, distinctly pectinate, horizontally projecting, not adpressed, slightly curved upwards, 1.5 - 2 cm long, the lower third often shorter, the middle third now and then longer, at the foot red to brownish black, at the tip pale yellowish; central spines usually absent, when present then rigidly outstanding with slightly thickened base. Flowers and fruit unknown.

Growing place: Mantaro terraces, 15 Km southwards from Oroya, at 3,600 m: Field collection number K4 (collected 1956).

Despite the absence of flowers, the plants are without doubt members of the genus Oroya; they are, however, divergent from the rest, so they would be better considered as a separate species. They have now been almost a year in cultivation, their root growth being active and the spination of the species has been retained.

We found this Oroya growing between boulders in company with Tephrocactus atroviridis. The name is selected on the basis of the widely separated areoles.

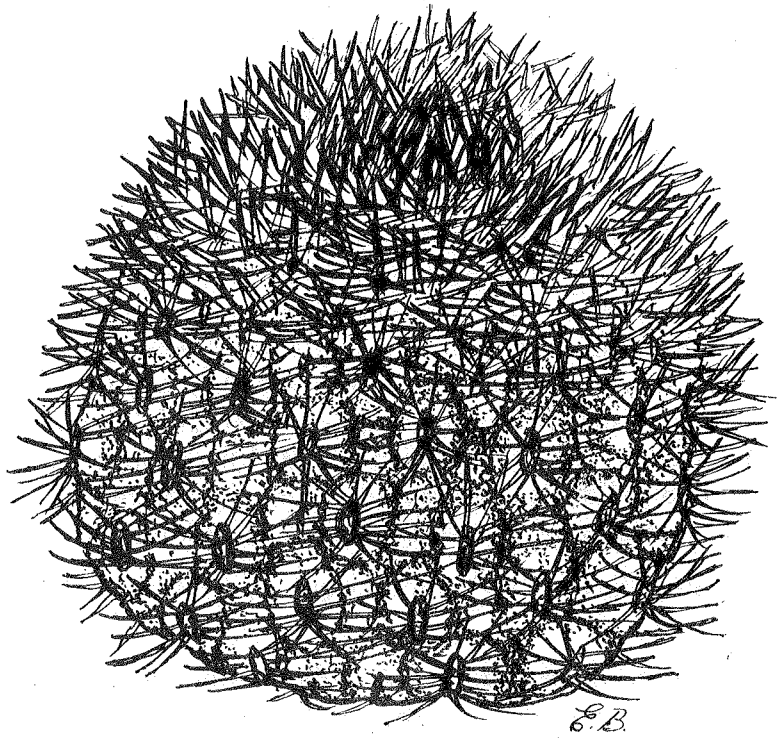
OROYA SUBOCCULTA Rauh & Backeberg spec. nov. by Prof. Werner Rauh (Ibid.)

Planta complanato-globosa, senectute interdum brevi-cylindrica, raro ramosa, usque 20 cm in diam. et 15 cm alta, 20-30 costata basim versus se angustans et in radicem rapiformem transiens; aculei areolae numerosi tenues inter se implectentes et caulem onmivo involventes; flores miniacei cel punicei, 2.3 - 3 cm longi.

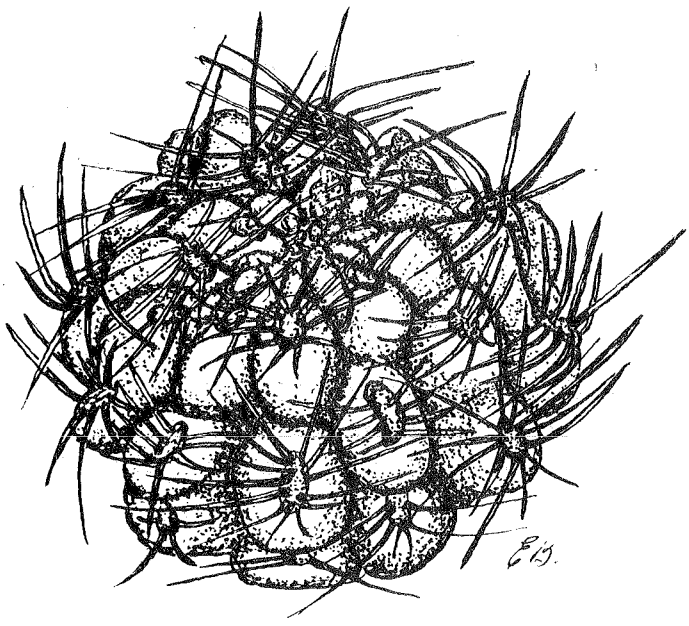
Body depressed-globular, in old age occasionally short-cylindrical, rarely branching, up to 20 cm in diameter and 15 cm high, 20-30 ribs, narrowed downwards from the base and then changing into a carrot-like primary root; numerous spines, thin, mutually interlaced and entirely enveloping the body; flowers vermilion to carmine, 2.5 - 3.0 cm long.

This species is to be found in boulder terraces about 20-25 Km south of Oroya in large numbers. It can be distinguished not only from O. peruviana but also from O. neo-peruviana because their depressed-globular and densely spined bodies are embedded deep in the ground and furnished with carrot-like roots. As in the rest of the genus, the spine colour of this species is variable, and varies from white to reddish brown. The name is selected on account of the flattened body shape; collected by us in 1954 as K 82.

Oroya subocculta, although free flowering in the wild, appears not to be very happy in cultivation, like O. neoperuviana.

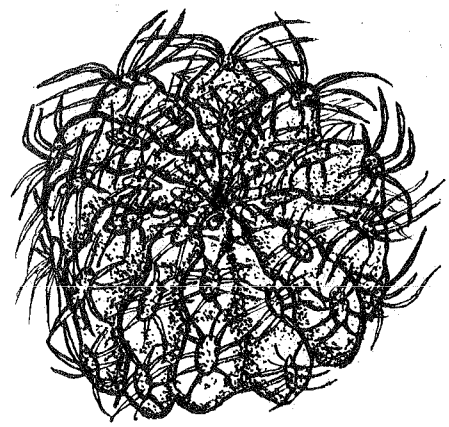


OROYA LAXIAREOLATA Half full size



OROYA PERUVIANA var. DEPRESSA
SH 131
Andahualas Peru

Collection -E.W.Barnes.



OROYA SUBOCCULTA
SH 130
South Oroya

Oroya subboculta var. typica (Synonym Oroya subocculta v. subocculta Backeberg in 'Descriptiones Cactacearum').

Planta plane globosa vertice excavatissimo, usque 30 costata; costae ca. 1 cm latae; mamillae parum tumidae, inter se non seperatae, inter areolas parum constrictae; areolae conferte porrectae angustae; aculei marginales verticiformiter partiti, utrimque ± 10, cumillis areolarum proximarum se implectentes, 1-1.5 cm longi, basi rubescente ceterum flavescentes; aculei centrales plerumque adsunt, solidi usque 1 cm longi oblique erecti; flores numerosi dense circa verticem inserti usque 2 cm longi; tubus floralis squamis bracteaneis laxe obtectus, in axillis earum pili lanei pauci; phylla perigonii exteriora paullum reclinata pallide punicea basi aurantiaca, interiora eodum colore, 1 cm longa, 0.4 cm lata lanceolata acuminata; cavum ovarii late globosa; nectarium magnum, circulo staminum interiore incomplete clausum; stylus 1.9 cm longus stigmatibus 4; funiculi placentales parum ramosi.

Body flattened-globular, with markedly depressed crown, up to 30 ribs; ribs about 1 cm wide; tubercles confluent and not markedly humped; areoles closely spaced, elongated, narrow, radial spines pectinate, ± 10 both sides, interwoven with those of the adjacent areoles, 1-1.5 cm long, with reddish base, remainder yellowish; central spine usually projecting, strong, up to 2 cm long, curved upwards, flowers numerous, standing in rings around the crown, 2.0 to 2.5 cm long; tube loosely furnished with sepals (= scale leaves), with but a few woolly hairs in their axils; outer petals (= perianth leaves) only slightly reflexed, pale carmine red with orange yellow base, the inner petals of a similar colour, 10 mm long, 4 mm broad, lanceolate, drawn out to a point; ovary broad-globular; nectar chamber relatively large, only imperfectly closed by the filaments of the inner stamens, style 1.9 cm long with 4 stigma lobes; seed strings slightly ramified.

Collection number K 26 (1956), K 82b (1954): the most abundant form.

(Also described were var. albispina and var. fusca.)

Comments on Two Oroya

.... from H Middleditch

"Students of Arabic numerals who have, like myself, but a passing acquaintance with Latin, may have observed that in the Latin diagnosis of Oroya laxiareolata the areoles are quoted as 1.2 cm long and 2 cm wide, whereas the German diagnosis gives the areoles as 1.2 cm long and 2 mm wide. As the very beginner is aware, the pectinate areoles on Oroya are long and narrow, so we can deduce that the misprint is in the Latin version in Rauh's book. However, in accordance with the rules for botanic nomenclature, this is the correct official description."

TWENTY YEARS WITHOUT SOIL by Dr Bohumil Schutz.

(Translated from Succulenta for May 1970 by J. Chapman).

It is now approximately twenty years since my plants were first potted into tile-grit (gravel). I first used as guinea pigs those cacti that did not grow very well in my soil mixture - Astrophytum, Thelocactus, Echinofossulocactus, etc., all shrivelled, rootless and almost dead, which had remained for many years in these somewhat inferior conditions. I planted them in tin boxes of tile grit and returned them to the place where they had previously stood, after which I treated them the same as the other plants in my collection.

Obviously, I awaited the results of this experiment tensely. After about two weeks, some plants began to swell and shortly after all the plants were growing; a few even produced buds and later flowered. During the following years I gradually planted my whole collection into tile grit - I no

longer use conventional soil mixtures. I have plants which have grown for many years without soil and a large part of my plants have never been in contact with any soil mixture - with the exception of very tiny seedlings, which get 15% of leafmould added to the grit, which was in this case pure "Antuka" (gravel) such as is used on tennis courts.

Many imports too grow perfectly, such as Echinocactus grusonii of half a meter in diameter, and large Ferocacti. With this method many of my cactus friends here have had much success, having been prompted to change to soil-less culture through my many years' experience.

As opposed to the traditional soil mixtures, sterile substrata have many advantages. Every cactus compost must fulfil two basic tasks. It must provide a suitable environment for the roots (physical properties) and it must be a source of nourishment (chemical properties). However, these functions are in conflict with each other. A highly nutritious soil must first be "improved" by adding sand or such like, and so each cactus soil is but a compromise. With the modern method of cultivation both these tasks are separately attended to. For the choice of the substratum only the physical properties are the determining factors. It should offer the most suitable conditions possible for the roots. The nourishment which has to be provided is administered in the form of a liquid solution. The physical and chemical properties can therefore be provided completely independently of each other. Thus we have a solution - and not a compromise as with every imaginable soil mixture.

But this is not all. Each soil mixture has optimum qualities at the moment of planting the cacti therein. Even with the first watering, it settles and becomes less well-aired. The physical value then progressively deteriorates. With soil-less culture the substratum stays - even after years - without any change worth mentioning.

At the moment of planting most of the nourishment is present. But the newly repotted plant cannot use this because it must first produce roots once again. In the meantime many of the nutriments will flow out through the drainage hole at the hottom, and when the roots have at last developed, the quality of the soil will be considerably less than at the beginning. On the other hand, with the "gravel" culture, the food administration is controlled by us. Initially only pure water is given which promotes a strong root formation; then when there is a well developed root system present, the feeding solution is given and is absorbed by the many fibrous roots. The concentration can be strengthened or weakened within certain limits, and the composition can be altered at will and so on.

It is of advantage that the substratum is sterile, for it is thus free from pests or weed seeds and no organic substance is present to form a feeding ground for fungus.

The "gravel" I use as a substratum with a grain size of 6 mm diameter, is very satisfactory and suitable for all genera and species. Similar results were achieved by my friends here with slag, coke, quartz sand, granite gravel, charcoal, etc. Very light substrata which are easily washed away are on practical grounds not very desirable.

I do not use peat for two reasons. It is chemically very active and in the course of time changes its pH very considerably. Rather rapid physical changes also occur in it. Peat mixtures are preferable only when one has to transplant frequently. In a permanent substratum like "gravel" one can leave the repotting for years. Plants in peat based substrata shrivel in the resting period much worse than those in "gravel" or such like. The substratum can be reused if washed and then boiled or sterilised.

I have small cacti in flat trays; apart from these, I plant all the others in plastic pots and water by soaking from below. For this purpose the trays and also the pots stand in larger lids from tins. I pour into these lids the water or food solution to a depth of 3 cm. In high summer I leave this fluid until it is used up or evaporated but at other times I pour the remainder away after some hours so as to let the air reach the roots.

Frequently in nurseries cacti are planted out in deep beds. Such beds however remain damp for long periods which, especially in the spring and autumn, is very dangerous for sensitive species.

Cultivation in pots has proved to be more favourable for sensitive plants.

The substratum must be as free of dust as possible. It must be thoroughly washed several times. We must always plant into a dry substance. A further advantage is that we are not bound to repot only in the spring. When transplanting from a soil mixture we should superficially clean the roots with a small brush. Washing is unnecessary but the neck of the roots must certainly be thoroughly cleansed of all earth.

The feed solution I make from one or other of the complete artificial fertilisers containing trace elements. I want to know exactly what food I give my plants. Therefore I never use a product of which the composition is not stated. Especially important is that they should not contain any calcium compound. It is particularly favourable that the trace elements be in gelatine form. With soil-less cultivation the cacti use far more nitrogen than is advised in books. The theoretical assertion is in practice not correct i.e. that cacti must not be allowed to have much nitrogen.

Frequently I hear the reproach that this culture is somewhat unnatural. Quite right, but isn't the cultivation of cacti by us somewhat unnatural? Is a flat pan or a greenhouse natural, and the soil that we mix natural? Apart from that it appears from descriptions of the growing places of cacti, that a purely mineral substratum is much more like the "soil" wherein the plants grow in their native land, than the soil mixtures mostly employed here. Others are of the opinion that soil bacteria do not develop in this mineral soil. This is also correct, but I have been growing several thousands of cacti for many years without soil bacteria and they grow very well. Indeed I don't know if such things exist in habitat.

In our cultivation the plants have barely the necessary conditions to survive, and therefore they speedily die - of this I am convinced. The soil bacteria have, for that matter, no purpose in life on their own. Their function consists merely to produce the nutriments, which are already provided by us in artificial food solutions, leaving the bacteria superfluous. My twenty years experience must be convincing proof.

The soil-less cultivation is not a substitute for the traditional soil mixtures, for that would have little value. Those who do adopt the gravel culture can, without difficulty, cultivate cacti formerly considered to be tender, such as: Astrophytum, Ariocarpus, Thelocactus, Echinofossulocactus, etc., which can be grown well on their own roots for years and adorn the collection. Losses with other species will also be far less. Moreover, with rarities from the deserts of the U.S.A. one should study unconventional methods - but that is already another subject !

Comments on "Twenty years without soil"

.... from H. Middleditch.

"On our 1969 Cactus Tour we were able to pay a visit to the collection of Dr Schutz at Brno in Czechoslovakia. At the time of our visit we were told that all the plants were being grown in broken brick but we were not aware of the background to this method of cultivation. There is no doubt that the plants were well suited by it, as evidenced by their strong spination and by the plumpness of the Gymnocalyciums - plump as opposed to bloated. Some were many years old and around or in excess of 6" in body diameter.

"One imagines that this article was first written in Czech and it is not impossible that it could have suffered slightly from a double translation. For example, most of Dr.Schutz's plants were grown in tins, not in plastic pots as one reads in the article; the "gelatine" form for the trace elements is also a little puzzling.

"It is perhaps also as well to bear in mind that conditions for growing cacti in Czechoslovakia are not quite the same as in the U.K. Although the all-pervading influence of maritime air in the

U.K. restricts the extent of blue skies and frizzling sunny days in summer, it also ameliorates the winter. In Brno there will be rather more hot, dry, summer days but the winter is rather more intense with fewer of the mild breaks common in the U.K. - and less mild when they do arrive. The winter climate at Brno will have a temperature transitional between the milder Atlantic coast of Europe and typical continental interiors of temperate latitudes, coupled with a higher humidity than a typical continental interior due to the easterly flow of humid Atlantic air.

"We all know it is not the dry cold that brings problems with cacti but rather cool damp days. These, coupled with the very high cost of heating in Czechoslovakia (a country with very little indigenous fuel) perhaps explains why Dr.Schutz might refer to Astrophytum etc.as tender sorts, a view which may not be echoed in the U.K.

"Some collectors in the U.K. find that even plants which have had no water for months in winter retain a moist compost when in plastic pots; no doubt Dr. Schutz's grit "compost" will be especially suitable for avoiding this particular problem as it will dry out fairly quickly when watering ceases at the onset of the resting period. Collectors who have comparable conditions may find it equally suitable."

.... from D. Angus

"In general I find myself in almost complete agreement with the views expressed by Dr.Schutz. However, I fail to see why plants grown in peat should shrink more than those grown in gravel.

"I have grown a substantial number of plants in a peat-sand mix for two summers now and I have had excellent results where the peat I used was acid. During the first season, the experiment was limited to plants which would have been no great cause for concern if I had lost them. Having tried this compost on even more plants over the second summer - with some really excellent results - I had a blitz early in 1971, repotting a considerable number of plants into this compost.

"Previously I had used an old bale of peat which had stood out of doors, weathering for almost two years, but when I undertook this extensive repotting early in 1971 I was only able to obtain a brand new bale of sphagnum moss peat. It was well into the growing season when it became increasingly obvious that these newly repotted plants were just not growing at all. I took a few of them out of their pots to try and ascertain the cause of the trouble and found that they had produced no new roots. Some of the roots which, when repotting, had been new, white, turgid, and growing well now showed evidence of browning and shrivelling at the tip, where they had been surrounded by the new compost.

"It was quite easy to soak a spot of the sphagnum moss in some water and then take a rough pH check with some litmus paper. The result of this test showed that the sphagnum moss peat was barely on the acid side of neutral - I suppose that it would be about pH 6.5. A similar test on the sedge peat showed a very acidic reaction indeed. This evidence led me to obtain some sedge peat very promptly and to make up a sedge/sphagnum moss peat mix which I think is around pH 4 or 5. Plants taken out of the sphagnum moss compost and repotted in this acid compost threw out strong new roots within two weeks.

"It was interesting to see that not all the plants were equally adversely affected by the neutral peat. On one hand, a Noto. buiningii in the acid peat grew well whilst the same species in the neutral peat merely stood still. On the other hand, an imported Oroya subocculta grew on well in the neutral peat. A Matucana herzogiana v. perplexa and a Submatucana pujapatii just stood still in the neutral peat but once I had repotted them again, this time into the acid peat mix, they got going quite well. Of my two plants of Submatucana madisoniorum, one grew well in the acid peat whilst the other would not move in either mixture - this might well have been accounted for more by that particular plant than by the compost.

"As the acidity of the growing medium is of such importance to cacti, it should be added that when using a neutral compost, the feed solution should be checked for pH and acidified if necessary."

.... From A.W. Craig

"For several years I found that I had the greatest of difficulty in growing Gymnocalyciums. They would shrink so badly over the course of the winter that they hardly recovered in sufficient time to produce any growth during what remained of the following summer, before they started shrinking again. One or two even had to be repotted - into smaller pots.

"In desperation I tried using some acidified water on these particular plants before they disappeared altogether; this was getting on into the autumn but I found that the plants did come through that winter in visibly better condition. Some of them even grew larger during the following summer, so I decided to give them some of this acidified water once or twice in the season and I also tried it out on some of my Notocacti, too. All the Gymnos now came through the winter in a great deal better condition and started growing larger during the summer like most of my other plants. Four different plants of Gymnocalycium did not show any signs of new growth during the early summer - which was not really surprising when I discovered that they had no roots. These went into some new compost and after treatment with acidified water they rooted up nicely before the autumn. When my Arthrocereus campo-portoi lost its roots, it received the same treatment in an endeavour to re-establish it.

"For two or three years I had had a seedling of Notocactus rutilans which was very small and showed very little sign of growth. After a period of treatment with acidified water it put on a very much improved rate of growth and it has continued to grow well since. A plant of Noto. scopa has also responded well to the acidified water treatment and grown much better. Everyone used to tell me that Noto. ottonis was an easy plant to grow - but it would not grow for me; now I am using acidified water on it, it is romping away.

"Having observed the improvement affected on my Gymnos and Notos, I decided during 1971 to extend the use of acidified water to the rest of my South American cacti; I even used it on some of the so-called "lime-loving" cacti from North and Central America, such as Thelocacti, with remarkably good results.

"Amongst the plants which were given the acidified water treatment during that season were my various plants of Melocactus. I had some seedlings of Melocactus, about 2" in diameter, which did not seem to be growing very well and one or two looked as though they were on their way out. There were also two imported plants of Melocactus matanzensis - which had good roots when they were received - but failed to show signs of becoming established. These were all unpotted and showed a lack of vigorous root growth; they were repotted in practically the same compost and then watered regularly with dilute nitric acid solution. This resulted in a quite definite improvement in root growth and in the appearance of the plants. I also had a Melocactus HU 122 which I obtained from Su-ka-flor as a seedling; it almost grew more in three months of treatment with acidified water than in the previous four years - it is now about 5" across. My imported plant of HU 214 Melocactus seabrensis not only flowered but also set fruit at the end of 1970, following the same treatment. I removed the seeds and sowed them and they germinated very well.

"The water I use on the plants is acidified with nitric acid, which I purchase as a concentrate and dilute to 10% acid for storage in a polythene container in the greenhouse. This strong solution is added at the rate of about two eggcupfulls to every two gallons of water. I do not have any special frequency or number of waterings with added acid during the season, but I suppose that it will amount to three or four times during the summer.

"I have not tried out any soil testing to find out the effect on the pH of the compost, but I rely rather on observing the results which the treatment produces on the growth of my plants.

"I removed some soil from an imported Acanthocalycium which had obviously been on the plant when it was collected, and when tested it had a pH of 5.5; my soil mixture contains a good proportion of peat and particularly for my Notocactus my mixture has a pH reading of 6."

.... from E.W. Bentley.

"The water here is very alkaline and about five years ago I was persuaded by a friend to make up bottles of an evil potion consisting of dilute nitric acid plus a lot of potash to maintain a good K/N ratio and to add this to the water I use in the greenhouse. I add sufficient acid to give the resulting liquid a yellow-orange reaction with BDH's soil testing kit. This means that it is "slightly acid".

"The results were spectacular - the first year I used it the plants looked to be positively exploding ! Fortunately for my peace of mind the growth that has taken place since - though it perhaps could be described by the (to a cactus grower dirty) word "lush", is also being accompanied by the appearance of spines that are bigger and thicker than the plants previously produced ! Another noticeable thing is the amount of bright red at the base of the new spines of several plants of quite different genera.

"I do not think that pH measurement of cactus soils in habitat is always significant. In the first place, many plants are tolerant of a wide range of pH and probably grow in a certain place because other quite different environmental conditions suit them and do not suit other sorts of plants other than the ones found with them. Secondly, soil pH is probably more limiting where the soil is damp for a considerable period during the year. Many desert plants that rely on dew or light rain and an extensive superficial root system can probably get away with a murderous soil pH in habitat.

"Conversely, in our greenhouses where we slosh water about, I think that pH does make a difference and it pays to pick the right level. But here again, I do not know how far the extra wool and spines that changing over from rain water has caused many of my plants to produce, is due to the potassium/nitrogen feeding that they get."

.... further from H. Middleditch.

"In the Sunday Observer for August 30th 1964, Richard Fitter, writing about the fine flora on Ben Lawers in Scotland, observed that "the main reason for this profusion of rare plants is the basic (alkaline) nature of the underlying mica-schist rock, in strong contrast to the acid rocks of the greater part of Scotland. Here lies the most important site of lime-loving alpine plants in Scotland. These mica-schist hills look much greener and grassier than the heather moors typical of the acid Aberdeenshire and Cairngorm granites. Yet the actual soil and vegetation clothing them may be just as acidic, with such lime-haters as mat-grass, heath rush and bracken. It is only on the high ledges, often just below the summit, that the basic rocks break through their acid skin, to make hanging gardens gay with colourful flowers.

"This might suggest that any soil samples taken in a cacti habitat would only be of real value if they were taken from around the roots of the plants and not from the general locality."

.... and a P.S. from D. Angus.

"Even an extensive repotting of a great many of my plants into a mix with a different quality of peat failed to encourage a large number of plants to grow at all - they just sat and sulked ! I suppose I must have taken dozens of plants out of their pots just to see what the roots were doing - or not doing - and all to no avail; and then one day this spring I happened to lift out a plant which shed most of its soil, leaving the roots pretty well exposed, when I suddenly saw some very tiny brown spots glinting slightly in the sharp sunlight. Hoping to get a closer look at these spots, I took the plant into the house under a good strong light, but peer as I might there was no sign of any brown spots.

"Somewhat puzzled I took the plant back into the greenhouse and lo ! and behold once the sunlight fell on to the roots again - there were those spots. It proved rather difficult to view them with a hand lens but eventually I made out that they were not spots, but were an actual bump on the roots of about largish red spider size, with a tiny nipple at one side.

"A few enquiries revealed that these were eelworm cysts - the actual eelworm is apparently even smaller than the cyst - almost microscopic - and so it is only in this stage of their existence that they can be observed. I found a good article on the subject by D.J. Lewis in the N.C. & S.S. Journal for March 1971, which led to another upheaval in the greenhouse. Practically every plant pot was stood in its own saucer and also slightly apart from its neighbour to eliminate the passage of pests between pots - apparently they need a track of damp material to spread from an affected pot. I was also more particular in watering, not slopping water round quite as cheerfully as usual. All sad-looking plants were unpotted and the compost in which they were existing was thrown away; the shelves and the table in the kitchen were littered for a week or two with numerous plants having their roots cut off, drying aday or two, and being thoroughly washed with very hot water.

"I am now left wondering whether there really was anything the matter with my unweathered peat, after all! "

.... addendum from H. Middleditch.

"Would this last comment perhaps explain why so many continental growers put plants on grafts that would not really seem to require this treatment - Neochilenias and Gymnos for example - so that they circumvent problems with eelworms?"

A SURVEY OF LOBIVIA FLOWERS by J. Hopkins

It is unfortunate that many of the early plant descriptions - and a few of the recent ones - are singularly lacking in details of flower form and, in many cases, the fruit and seed are not mentioned at all. In view of this, perhaps our readers will be encouraged by this discussion to observe how their own plants compare with the various flower forms described below and anh observations or comments will be welcomed by the author.

The variation in size and form of the Lobivia flowers may be used to divide the numerous species into groups as has already been done by Backeberg. This review summarises the major flower forms and discusses a few other variables such as degree of hairiness of the flower tube, shape of petals, etc., as far as they are known.

Perhaps the most common Lobivia in collections is L. densispina and its variety L. rebutioides, both of which exist in a multitude of flower colours, with the result that many superfluous names adorn the literature. The L. densispina flower is some 5-6 cms long and of similar diameter, funnel shaped with a densely hairy tube. The developing bud appears as a bundle of hairs until the outer petals develop. The numerous petals are broad, rounded and often slightly serrated at the ends with a small cusp at the tip. The outer filaments are normally the same colour as the petals, usually paler below if the hymen is paler. The throat is greenish to slightly pinkish, depending upon the colour of the lower stamens. L. drijveriana is of the same form but, having somewhat fewer petals, it has a looser looking flower.

L. kuehnrichii and its variety pencapoma, L. pseudocachensis and L. cintiensis with its variety elongata, all have flowers of similar form. A minor variation is found in L. amblayensis which has an 8 cm long red flower with an orange hymen; the upper filaments are completely orange. L. aurea has an even longer flower - ca. 10 cm long and was placed under Pseudolobivia by Backeberg.

The flower of L. haageana sometimes seems reluctant to open fully so that a wider range of outline is seen, viz: bell to funnel shaped. A wider range of dimensions occurs as a result, the length being between 5 and 7 cm and the diameter between 3 and 5 cm. Numerous colour forms exist but the hymen and throat are nearly always a shade darker than the petals, ranging from red to

black. The outer filaments are usually the same colour as the hymen. The petals are very broad and rounded and the tube is rather wider and not quite as hairy as in L. densispina. L. rubescens, L. muhriae, L. chrysantha, L. uitwaaleana and L. jajoiana all have the same flower form, as do L. stilowiana and L. schreiteri, but on a slightly smaller scale. Lobivia Lau 459, from Portrero, has a white hymen but is in this group.

Funnel shaped flowers are also found in L. pentlandii, L. incaica, L. cinnabarina and L. acanthoplegma, but there is sufficient variation in form to separate them. In L. pentlandii the flower is 5-6 cm long, gradually tapering outwards like L. densispina, but is not as broad as the latter, being usually 4-5 cm in diameter. The petals are narrower than in the preceding two groups, rounded to slightly pointed, the outer petals being narrower still, lanceolate and brownish green in colour. The tube exterior is also brownish green, somewhat shiny with a loose spiral of narrow triangular scales bearing a few brown or blackish axillary hairs.

A wide range of colour is found in the similar species L. argentea (silvery white), L. johnsoniana (deep violet), L. schneideriana (pinkish), L. titicacensis (red), L. varians (orange). The outer stamens are usually whitish-yellow-orange arising from a similarly coloured hymen. The petals are usually paler basally merging into the hymen colour.

Rausch has suggested that about 16 'species' should be reduced to synonymity with L. pentlandii as the only differences are in flower colour. L. wrightiana possesses a flower of similar form except for the looser rather broader petals. L. backebergii on the other hand has a shorter, wider tubed flower and in shape is rather reminiscent of a small L. cinnabarina flower. A couple of fairly recent discoveries - L. quiabayensis and L. leptacantha (= L. multicolor n.n. R 422) having yellow to orange to red flowers, seem to belong to the L. pentlandii group, as do the better known species L. boliviensis, L. weghiana, L. hastifera, L. chrysochete, L. culpinensis etc.

The species around L. incaica e.g. L. allegraiana, L. hertrichiana, L. minuta, L. huilcanota, L. binghamiana and L. lauii all possess red flowers, sometimes yellow or orange at the throat. They are about 4 cm long and of similar diameter, rather longer in the cases of L. hertrichiana and L. binghamiana. The petals are more or less lanceolate and the outer petals are a pale pinkish colour, merging into the narrow, pale pinkish or pale greenish, sparsely hairy tube. A few - as yet unpublished - Lau collected plants belong to this group, viz: Lau 154a, 155 and 156. In the case of 154a the flower is a pinky-orange colour. A wholly yellow flowered L. incaica was found by Lau (Lau 147) and this increases the colour range of this group so that Lau 154a can be accommodated comfortably.

There appears to be confusion over the exact nature of L. cinnabarina. Some authors give it a large flower (7-8 cm long) and the original description, although vague, seems to endorse this, yet Backeberg includes it in his "breviflora" group, along with L. acanthoplegma, L. oligotricha, L. neocinnabarina, L. pseudocinnabarina, etc., with flowers only 3 or 4 cm long and a scaly, almost hairless tube. On the other hand, L. draxleriana and L. prestoana, reputedly forms of L. cinnabarina, possess broad funnel-shaped flowers, some 6-8 cm long, both with a short, slightly hairy tube.

The short, urn-shaped, relatively wide tubed flower of L. maximiliana is quite different from flower forms so far discussed. The perianth scarcely opens and only the outer petals become somewhat reflexed onto the moderately scaly, moderately hairy tube. The petal colours are quite outstanding, being red with a blue sheen at the edges of the petals, followed by red and a basal yellow zone. L. corbula and L. pseudocariquiensis are similar and possibly varieties of L. maximiliana. The same coloration is also evident in L. sicuaniensis, but the flower tends to open more widely.

An outstanding flower is that of L. westii which is some 8 or 9 cm long, 5 or 6 cm of which consists of a green, moderately scaly and hairy and sometimes bristly parallel-sided tube. The perianth then opens abruptly, the outer orange-red petals reflexed somewhat with the inner orange petals rather loosely arrayed which gives a ragged appearance to the flower. Notable is the tight bunching of the stamens around the style. This feature is also present in the flower of L. intermedia which is red with an orange centre, not quite as long as the L. westii flower. Knize's description

of L. cruciaureispina is very brief but the flower is as large as that of L. westii and may be identical with it. Ritter's L. winteriana may also belong here, the flower is large, but there are some minor differences.

Another longish tubed group is found in the species L. mistiensis, L. caespitosa, L. lauramarca, L. pampana, L. charazanensis and L. hermanniana, the flowers being some 6 cm long, two thirds of this being a moderately broad, scaly, sparsely hairy tube. The petals do not open widely and all are narrow lanceolate and sharply pointed. The stamens radiate and do not cluster about the style as in the previous group. Lobivia Lau 962 and L. miniatiflora seem to belong with L. mistiensis etc., but represent the extremes of the group. Lobivia Lau 962 has a naked scaly tube, almost covered by scales, whereas L. miniatiflora is much less scaly and has a few hairs; it tends more towards L. pentlandii in external appearance, except for the only partly open flower.

The small flowered Acantholobivia were separated from Lobivia by Backeberg on account of their night flowering, self-fertile characteristics and also by virtue of the areoles on the tube and ovary. The latter feature does not appear to be constant as it has been reported that L. tegeleriana has been found with and without such areoles. Also L. oyonica n.n. does not seem to have this feature. The flowers are about 4 cm long and 1-2 cm diameter, orange and with a densely woolly tube and with areoles bearing a few short spines in some cases. The plants would need to be self fertile, as such insignificant flowers would not be noticed by any pollinating insect even assuming they would be active in the night temperatures of the altitudes at which these plants grow.

In order to keep this survey general, many well known plants and several very distinctive new discoveries have been omitted, but as the seed study progresses these will all be discussed in more detail than has been possible here.

Comments on Lobivia flowers

.... from H. Middleditch.

"One often finds that any meaningful grouping of species based on observed characteristics, also reflects geographical distribution. With this in mind, I listed the various groups and sections discussed by John Hopkins and the following appeared:-

Densispina group - long, broad, flowers

All three sections confined to N.W. Argentina and immediately adjacent part of Bolivia.

Pentlandii group - long flower but rather narrower than the foregoing acanthoplegma section ("breviflora")

Bolivia, area round Rio Caine & Rio Mizque.

incaica section: Peru, NW of Lake Titicaca.

pentlandii section: Bolivia, S of Lake Titicaca. Except: L. wrightiana, from central Peru; L. hastifera & chrysochete, N. Argentina.

Westii group - long flower, even narrower tube.

mistiensis section: S. Peru (misti) to La Paz.

westii section: Mid Peru.

To judge by this evidence, (based on type locations quoted in the Kakteenlexikon), there would appear to be strong support for the groupings discussed by John Hopkins.

"In looking up this information I find that there is almost a column of discussion under the heading of "L. cinnabarina" which in itself means that there is probably a story attached to this

particular species. In consequence, I am not unduly surprised that John Hopkins observes that there would appear to be some confusion over this species.

"The accompanying illustrations of Lobivia flowers depict three of the various different flower types to be found in Lobivia. The upper photograph is one of the Densispina group, in which the broad mouth of the flower and the ring of filaments at the base of the petals may both be seen. The sketch at the bottom is of a flower apparently from the Pentlandii group which has a narrower throat than the flowers in the Densispina group; according to Buxbaum, the interwebbing of the filament bases as shown on his sketch does not constitute a hymen, of the type found in many of the Densispina group flowers. He states that in those flowers which do have a hymen, the perianth leaves (petals) spread from their bases, and the throat circle or upper ring of filaments is therefore visible - but that in the hymenless flowers (as sketched) the perianth leaves stand upright for a distance of about 1 cm from their bases as if they were a prolongation of the flower tube, thus hiding the throat-circle.

"The centre illustration is of the maximiliana type flower; owing to its inner petals being hardly opened, it would appear to me to have some similarity in external form to a Neoporteria flower.

"The short life of a Lobivia flower does make it rather difficult to make floral observations; in this connection, the suggestion made at our 1972 Brooksby Gathering for preserving flowers in cold setting resin would appear to have great value in this field".

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

"In the Kakteenlexikon, Backeberg divides into 15 groups the "about 106" so-called species of Lobivia. This is almost certainly too many groups and too many species, so any attempt to reduce the complexity by means of a simpler classification and the elimination of unnecessary 'species' is very welcome. The study of flower form through the various species may be very revealing, both shape and petal form showing considerable variation. But it must be borne in mind that Lobivia flowers, with few exceptions, tend to open more widely in strong sunshine, many of the more open funnel-shaped ones opening out almost flat from the end of the tube.

"Lobivia pentlandii is at one extreme in flower shape, almost straight-tapered from petal tips to ovary and with very delicate petal substance. It shows great variation in colour and round it might be grouped several other 'species'. I would place L. wrightiana at the other extreme, with long narrow-tubed flowers opening widely. This may explain the anomaly found by H. Middleditch in geographical distribution of this group.

"Petal shape varies from the very wide roundish-tipped L. jajoiana to the long-pointed L. tiegeliana and L. westii, the latter being one of the few Lobivias with flowers that last more than a day. Other interesting variations are colour and placement of the stigma - in some species it is almost at the bottom of the tube - and the hairiness, or otherwise, of the tube.

"The night flowering Lobivias (or Acantholobivias) are quite distinct in their flowers, but could be variations of one species.

"In my opinion, some Lobivias, such as westii, schieliana, tiegeliana, aracnacantha, to name but a few, are sufficiently distinct. In any attempt at classification, it is the others, with only minor variations between any two 'species', which present all the difficulties and any studies which will help to clarify the present rather doubtful situation will be of great value."

.... further from H. Middleditch

"The argument over just what constitutes a species does not appear to be any nearer reaching a solution which satisfies most collectors. Indeed, provided an identifiable form of any plant possesses a name, it would appear to matter more to the pure botanist whether the name is a species or a variety; to the ordinary collector, the use of the term "variety" does at least tell us that it is likely to look rather similar to any other variety of the same species. It is somewhat disconcerting to lay out a princely sum on a new "species" of Lobivia only to find it looks hardly any different from a

plant already in one's collection. On this account, I find that I am becoming less concerned about whether any species should or should not be lumped in with another, and called a variety, provided I know whereabouts it stands in relation to other species - so that I can more readily conjure up a general image of the plant when I come across the name in a catalogue or an article.

"Having this objective in view, I find that to place species names in a number of groups is a great help. I could find it much easier to picture the major characteristics of typical plants from a dozen or so groups, than from 106 species. As there are five traditional groups in Gymnocalycium divided up into over a dozen sections, and nearly as many in Parodia, I would not be unduly surprised to find a similar number of groups or sections within the Lobivia.

"There are references to Lobivia in the account of Rausch's fourth collecting trip to South America (Chileans No. 19, 20 and 21) which also afford an interesting viewpoint upon species relationships within this genus."

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

"Have you any information on Lobivia minuta? My plant of Lau 156, bought as a seedling from Sargant, is columnar in habit and has just had a fine deep crimson flower, with a narrow tube. On the other hand, Lau 147 looks like a variety of L. minuta, as also does Lau 155 (L. urubambense) which the Chileans Year Book also lists as a L. minuta var. - and it is a very good one and remontant. I wonder if Lau's urubambense is the same as Ritter's FR 698?"

.... from Mrs. E. Graydon

"Lobivia wessneriana, to which I can find no reference, has an Echinopsis type flower in miniature; long narrow tube, narrow pointed petals, flower does not open far, is short lived; it is bright orange in colour, most striking. The plant has a heavy root, about thirteen ribs and a few weak spines against the body. This is definitely self fertile from the spring flowers to an odd flower in the autumn."

.... from J.D. Donald

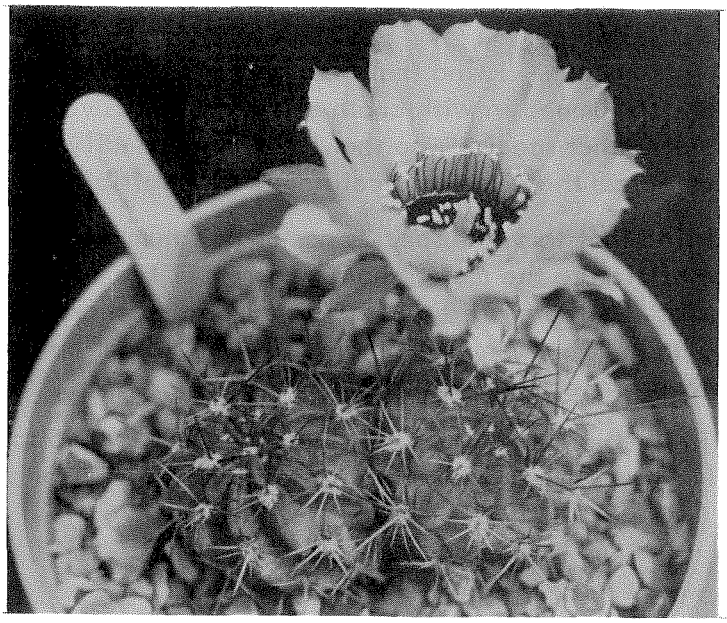
"Lobivia westii receives a brief mention in Chileans No. 22 for its flowers having areoles and spines on the tube. However, Lobivia westii Lau 146 differs from Lobivia westii Hutch. in possessing spines and areoles on the flower tube, otherwise they are absolutely identical. Lau 206 and Lau 260 are also L. westii. Apart from seed differences, L. westii is close to L. tegeleriana and L. incuiensis.

"There are many examples of Lobivias having naked tubes, especially in the cinnabarina/neocinnabarina/pseudocinnabarina/oligotricha/acanthoplegma complex i.e. close to Sulcorebutia".

.... response from J. Hopkins

"I am extremely puzzled at present over L. minuta - I have one at present fitting the description nicely except for the body colour, which is more or less blue-green instead of pale green. I also purchased a couple of FR 695 minutas from Holly Gate, but someone seems to have got their numbers wrong here as they do not fit at all and are probably the true hertrichiana - but no flowers as yet; but hertrichiana (according to Rausch) is a variety of incaica. The species Lau 154, 155, 156, 134 and 149 (and minuta) all possess straight ribs with the areole sitting on a slight hump below a more or less distinctive horizontal notch, not a diagonal notch as in pentlandii etc. There does seem to be a considerable amount of chaos amongst these numbers however; I also suspect that Dennis Sargant has got some of his labels mixed in this group.

"On Lobivia maximiliana, what about the controversial L. sicuaniensis? According to seed it belongs to the group including L. incaica, but the flower looks to me like a cross between westii and maximiliana - which brings us to John Donald's comments on that species. I cannot throw much light on this plant at this stage as I have no westii seed, nor have my plants flowered. I am most

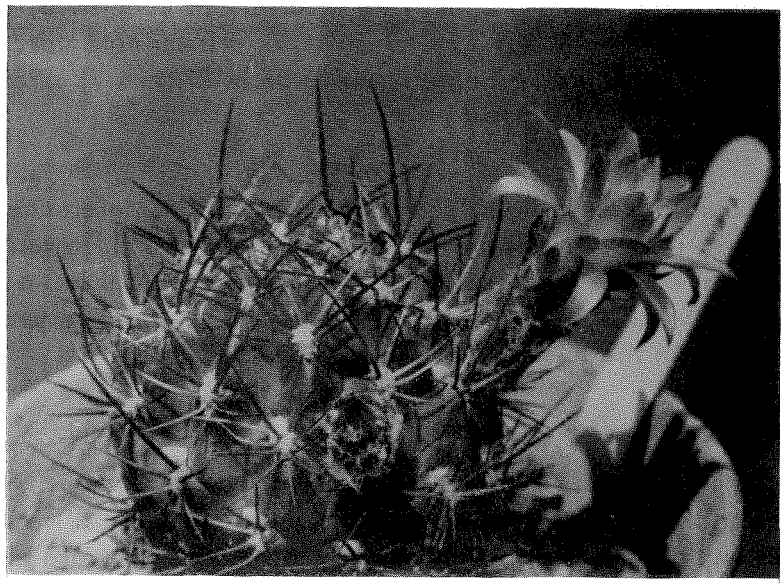


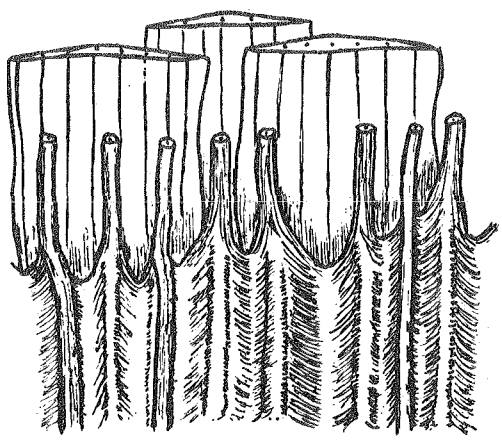
LOBIVIA
UITWAALIANA

PHOTO & COLLECTION
R.E. Hollingsbee.

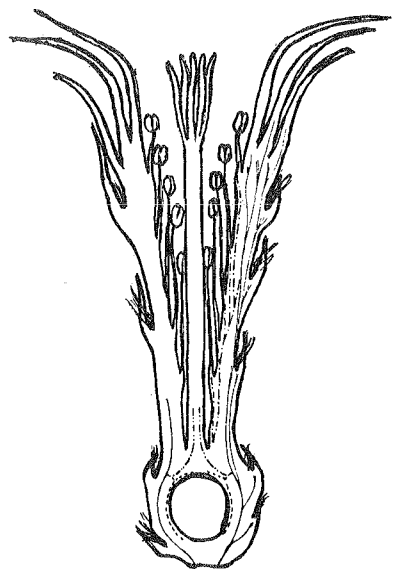
LOBIVIA
CORBULA

PHOTO & COLLECTION
R.E. Hollingsbee.





Filament bases of
Throat circle of stamens



Flower Section

LOBIVIA from the PENTLANDII GROUP - After Buxbaum

interested in the comment that Lau 146 is westii; I should have this seed very shortly, but I cannot reconcile westii with "Acantholobivia" (Lau list) - the flowers are quite different. L. westii Hutch. seems to be dark green in body with short radials. My dark green form (Lau 206?) has enormously long habitat spines (like sicuaniensis!) but much weaker spines in the new growth. My light green westii (Lau 141, labelled Lau 142 from Sargant) resemble the description of Hutchison quite closely.

"Now to L. caespitosa: having received a couple of Lau 310 not so long ago, I checked up on the description. I have not yet seen a flowering plant of this species, nor have I got a slide - or seen one for that matter. However, the flower form seems to fit in reasonably with westii and I think that mistiensis, lauramarca, miniatiflora, pampana and hermanniana all belong in this group (of which I have only mistiensis and miniatiflora Lau 307). They seem to be a widely dispersed group with westii the most northerly. I wonder if more "species" await discovery in this inaccessible area?"

PARODIA COMOSA Ritter spec. nov. by F. Ritter

(Translated by H. Middleditch from "Cactus" (France) 17.75:1962)

Caulis elongatus, reptans, 30 cm et ultra longus, 6-7 cm diam., epidermio viridi, apice lanuginosus, costis 8-12, rotundatis, 3-4 mm diam., 3-5 cm remontis, aculeis radialis 14-18, tenuissimus, albis, patulis, rectis ad leviter arcuatis, 8-15 mm longis, centralibus 6-9, brunneis, rectis, tenuibus, 1-2 cm longis; floribus 17-25 cm longis, ovario albido, sphaerico, 5-6 mm diam.; minutissime albe squamoso, albo lanuginoso, loculo nectarifero et nectare O, tubo conico apice fere cylindrico, 7-9 mm longo, 5 mm diam.; albo squamoso et brunneo rubro lanuginoso, segmentis patulis, obtuse linearibus (7-9 mm x 1.5-2 mm), basi aureis, apice luteo ochraceis, staminum filamentis luteolis, 4-7 mm longis, tubo apice 2-3 mm excepto insertis, antheribus luteolis, stylo 9-12 mm longo, luteolo, stigmatibus 8, aureis 1 mm. Fructus rubri, 2-3 cm longi, albo lanuginosi, cavi, seminibus ovatis, 0.6 mm longis, nigris, tuberculis applanatis, tenuissimus ornatis, hilo albo, elongato.

Body light green, elongated, at first erect, then procumbent, often falling with the apex erect again, length 30 cm and more, thickness 5-7 cm, solitary or caespitose, roots not enlarged, crown furnished with abundant woolly hairs, white.

Ribs 8-12, markedly projecting (1 cm and more), obtuse, quite broad, breadth of 15 mm, only just divided into tubercles, areoles inclined downwards.

Areoles markedly woolly, rounded, 3-4 mm in diameter, 3-5 mm apart.

Spines: radials 14-18, from 8-15 mm long, very slender, white, straight or weakly bent, spreading; centrals 6-9, from 1-2 cm long, thin, flexible, brown, straight.

Flowers from the apex, 18-25 mm long, 10-20 mm in diameter, odourless (description based upon two flowers observed on separate specimens).

Ovary whitish, spherical, 5-6 mm in diameter, completely covered by white woolly hairs from the apex of the plant, carrying little short scales, white to pale red, fugaceous.

Nectar chamber reduced to a barely visible ring, breadth of 1-2 mm around the base of the style, without nectar.

Tube funneliform, 7-9 mm long, 5 mm in diameter at the top, narrowing a little there; interior pale yellow, exterior yellowish-white, furnished with some scales 2-3 mm long, of similar colour or pale red.

Stamens pale yellow, filaments 4-7 mm long, inserted throughout the length of the tube up to 2-3 mm from the top; anthers introrse, oval, flattened. Pollen white.

Style 9-12 mm long, pale yellow; 8 stigma lobes, golden yellow, spreading, 1 mm long, superior to the anthers.

Perianth segments upright at the base, then funnelliform, 7-9 mm long, 1.5-2 mm broad, almost linear, narrower at the base and at the tip, there rounded, sometimes notched; lower part pale yellow, tip darker, sometimes ochre-brown.

Fruit lively red, hollow, 2-3 cm long, 7-10 mm in diameter, furnished with weak scales and little tufts of woolly hair, white, 3-5 mm apart; funicles very short, threadlike, clumped in bundles, which are placed in vertical lines.

Seeds, length and breadth of 0.6 mm, thickness of 1-2 mm, tapering towards the base, testa black, dull, covered with very delicate tubercles, round, flattened. Hilum basal, white, projecting, elongated.

Type locality. Gorge of the River of La Paz at the boundary of the Provinces of Loayza and Yungas-Sud, Department of La Paz, Bolivia.

This species is close to Parodia ayopayana Card.

Species discovered in 1953 by F. Ritter and catalogued under the number FR 111.

Holotype deposited in the Herbarium of the Museum of Utrecht.

Comments on Parodia comosa

.... from H. Middleditch.

"Whether or not it is changes in fashion or some other cause, I note with interest the use of the term "conico" in the Latin diagnosis and "infundibuliformis" in the French diagnosis, to describe the funnel shape of the tube. One usually tends to find the term "infundibuliformis" used for this purpose in a Latin diagnosis. The original article tells us that the Latin translation of the diagnosis was by Father A. Guillaumin. Was this a translation done on the basis of Classical Latin, one wonders, rather than Botanical Latin? Or have we the interesting situation of having not just Classical and Botanical Latin, but also French Botanical Latin, German Botanical Latin and English Botanical Latin?

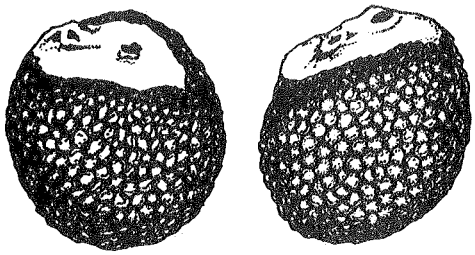
"I do not understand how the seed can be about 0.6 mm tall and broad and yet between 1 and 2 mm thick (vernacular diagnosis). A misprint, perhaps?

"Under the title of "Searching for Parodia echinus" (Chileans No.19) comments were made regarding the apparent similarity of P. echinus and P. comosa. I am now able to compare the habitat photograph of P. comosa taken by Ritter with my 2" import of Parodia ayopayana; the tall, sharply topped ribs about a dozen in number and the long, prominent centrals readily distinguishable from the radials, are remarkably alike on both examples. It would appear that I can hardly apply the name comosa to my 6" Parodia with between 17 and 21 ribs and central spine (s) readily distinguishable neither in length, disposition, or colour from the radials; should this be called echinus?

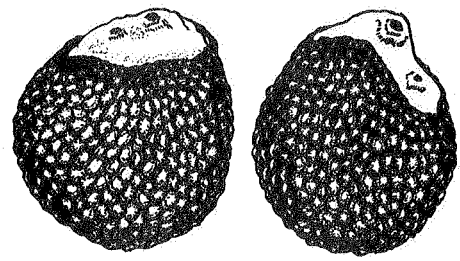
"Perhaps we may have a few examples of these closely-related species at our 1973 National Gathering, when further comparisons can be made.

"The accompanying illustration of P. comosa is a habitat photograph taken by F. Ritter which shows the head of an elongated specimen, the almost spineless lower procumbent part of the body being visible in the top right of the photograph.

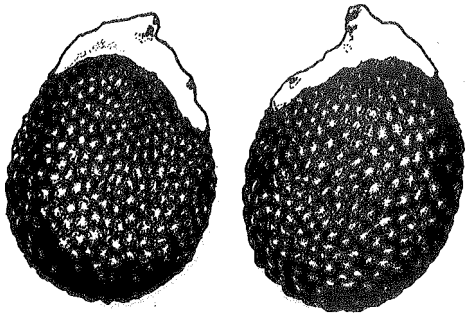
The word "introrse" which appears in the diagnosis in the detailed description of the anthers, is a new terminology to me. Indeed, it was a stumbling block in the translation until I turned to Marshall & Woods "Glossary of Succulent plant terms", which told me that this term means "Facing



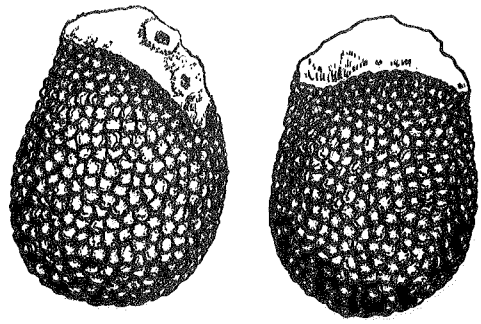
Parodia borealis



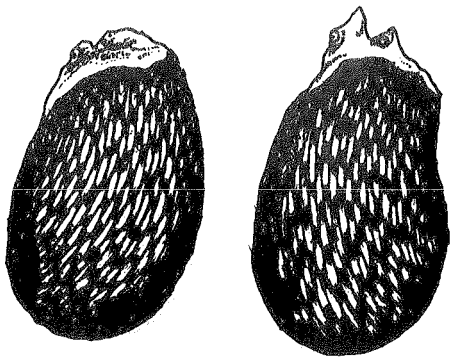
Parodia comosa



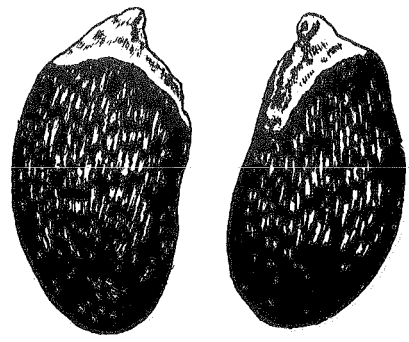
Parodia miguillensis



Parodia ayopayana .

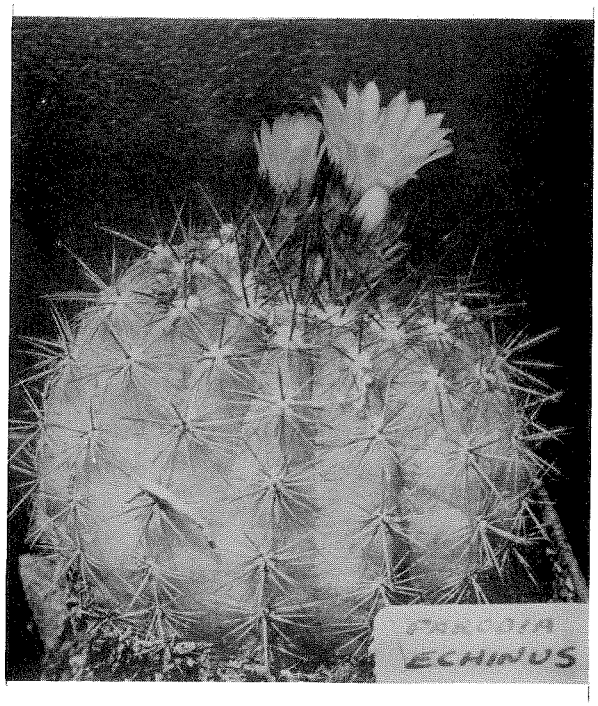


Parodia comarapana



Parodia hausteiniana

PARODIA SEED - F. H. Brandt

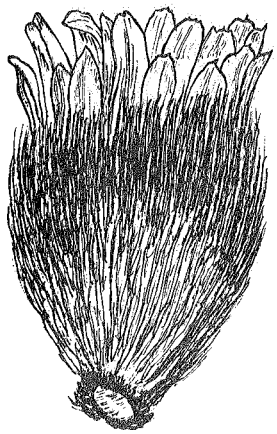


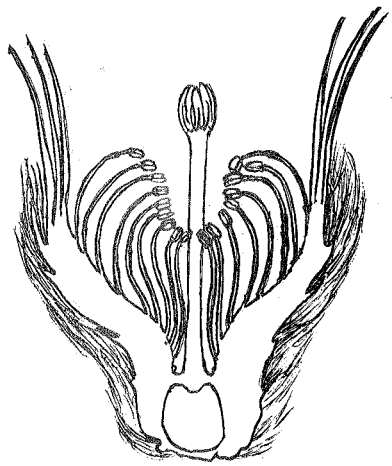
PARODIA

ECHINUS

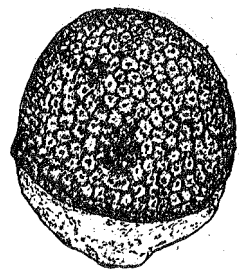
Collection & Photograph

R.Zahra





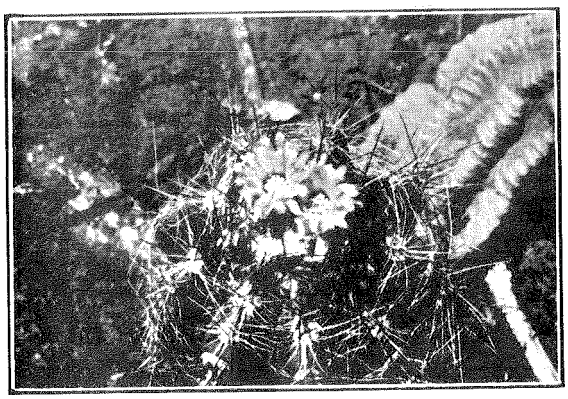
PARODIA AYOPAYANA



Seed

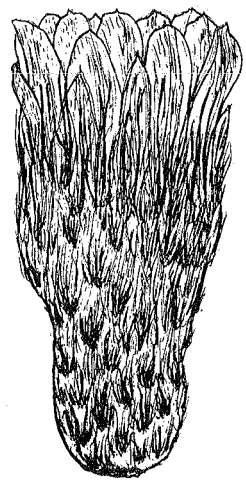
Buxbaum - Krainz

Die Kakteen



PARODIA COMOSA

PHOTO: F. RITTER - in habitat.



Parodia
comarapana.

inwards, or towards the axis of growth". However, this leaves me very little wiser, for I still wonder if this means that the filaments are curved so that the tip with the anther faces the style, rather than point upwards?"

.... from G.J. Swales

"The term introrse means that the anther lobes split on the side facing the centre of the flower (as opposed to extrose where the anther lobes split on the side facing away from the centre of the flower). The pollen, of course, is contained within the anther sac and the anther must split open before the pollen is exposed. If the filament is standing vertical to the axis of the flower, then with introrse anthers the chances are increased of the pollen tending to fall towards or on to the stigma lobes of its own flower".

.... further from H. Middleditch

"Does this mean that we might expect self-fertile flowers to have introrse anthers and plants with extrose anthers are unlikely to be self-fertile? So should Gymnocalyciums have extrose anthers? And do cactus flowers which lack nectar (like this P. comosa) and thus lack any inducement for visiting insects, normally have introrse anthers to induce self-pollination? Can we deduce from the absence of nectar in a flower that it will probably be self-fertile?"

THE GENUS PARODIA Speg. by F.H.Brandt Pt.2

(Translated by R. Moreton).

1. Parodia borealis Ritt. is found about 350 Km northwest of Cochabamba town. Almost exactly the same distance away from the habitat of P. borealis is found P. ayopayana Card. which Cardenas once regarded as the most northerly Parodia. Thus the range of the genus Parodia has been extended a full 300 Km further to the northwest and it is still not certain that this is the northernmost limit of the genus. They may be found even further to the northwest, as far as the Province of Saavedra and the western border of Bolivia.

Parodia borealis grows at its habitat in the stony slopes of the Rio Consata ravine, on such rock faces that any other vegetation would be destroyed by desiccation. P. borealis however remains there, undisturbed by any more luxuriant vegetation. It grows slenderly erect and has small whitish to brown spines, all erect, straight, unhooked. The flowers are small and yellow.

Seed ca. 0.6 mm diam., almost round. Testa brownish-black, with smaller and larger, round to oval tubercles, these dull and rough. Hilum almost flat, brownish.

2. Parodia echinus Ritt. This species is very close to P. borealis but is easily distinguished and is a well-founded separate species. Moreover it grows in a completely different river system, so that there is no point of contact between them. Parodia echinus likewise grows upright and slender, has similar short, straight spines and a light green body. The flowers are also small and yellow.

Habitat - north of La Paz in the ravine of the river La Paz. This species grows in similar places to the last mentioned species, except that it is at home in another river system.

3. Parodia comosa Ritt. This species is much more heavily spined and the wool on the areoles is thick and long. The spines are a much darker brown. It grows to 30 cm high and ca. 11 cm across. The flowers are equally small, but much darker yellow. It also grows in the rocky ravine of the La Paz river, but further up the river, about 100 Km away from P. echinus.

Seed about 0.6 mm diam., nearly round, slightly lengthened to oval. Testa brownish-black, with round to elongated oval tubercles, these rough and dull. Hilum cushion-shaped, brownish.

4. Parodia miguillensis Card. Adult plants of this species are completely unknown in collections; but, although completely unknown, it still belongs with the previous three species. It is more club-shaped in growth and does not become very tall. The flowers are yellow.

This species grows in the Rio Miguillo ravine, a tributary of the Rio La Paz.

Seed about 0.6 mm in diam., almost round. Testa glossy brown, with round to elongated tubercles, these rough, dull. Hilum cushion shaped, pale brownish.

5. Parodia ayopayana Card. Cardenas, when he discovered this species, named it as the most northerly member of the genus. Since then Fr. Ritter has found P. borealis almost 300 Km further northwest. Parodia ayopayana is a very beautiful flowering species, with its large yellow flowers is markedly differentiated from the foregoing species.

It is found in the Province Ayopaya, near Puente Pilatus. These species has a thick white wool trimming on the areoles and crown of the plant, which disintegrates under the strong sunshine of its habitat.

Seed ca. 0.7 mm long, 0.5 mm broad, oval. Testa black, dull, with round to oval tubercles which carry here and there remnants of the arillus membrane. Hilum cushion-shaped, brownish-creamy white in colour.

Comments on the above Parodia group

.... from R. Moreton

"Elongated fruits have appeared on both Parodia comosa and Parodia ayopayana, up to about 5 cm long (about 2") and more or less 8 mm in diameter. (This compares with normal Parodia fruits of about 5 mm diameter). The first elongated fruits I found contained only unfertilized seed, but later similar fruits contained normal viable seed. These fruits are of similar construction to those of Islaya, in having an inner capsule like a "fruit within a fruit", then the inner capsule bursts and the seeds become distributed in the outer fruit".

.... from A. Johnston

"You may be interested to know that the fruits which set on my P. comosa look just like those of Neochilenia, tall and thin and full of air. I visited another local collector who had the same sort of fruit on his P. ayopayana."

.... from R. Zahra.

"I have seedling plants of P. comosa, borealis and comarapana which are still too young to flower. Parodia ayopayana is a large plant and has been flowering every year for the last four years. These flowers and those on P. echinus are indeed very similar; they are smaller than the normal Parodia flowers and never seem to open as fully as other species of Parodia. This might be due to the large number of buds close together - there are 20 at this time of writing on P. ayopayana.

"The spines of all five species are certainly similar - but there are noticeable differences, although they all turn white with age. Parodia echinus has strong spines but there are fewer radials than in the other species. Parodia ayopayana has also got strong spines but the radials do not grow so close to the body of this plant as they do on P. echinus. Parodia comosa has finer spines than the other two species and also the body of the plant is flatter. This is similar to P. comarapana, which has less spines per areole of a red-brown colour while all the other species in this group have spines of a rather dull brown colour.

"As seedlings one could group together P. ayopayana, borealis and echinus which have globular to short columnar bodies, and P. comosa with P. comarapana which have finer spines and flat bodies."

.... further from A. Johnston

"I would agree that P. ayopayana has smallish flowers, probably not as small as P. echinus which do tend to open only partly. They are certainly nothing of the size of P. mutabilis, for instance. Parodia comosa however does have small flowers similar to other straight spined plants; on this the spines are all darker and denser. It grows quite well from seed for me. The centre is very depressed, so much that you have a job to get the seed out if you spill any."

.... from I. Le Page

"I have a plant of SH 1001, a Lau collected Parodia miguillensis, coming from Miguilla. The plant itself is rather columnar, 16 cms. high by $3\frac{1}{2}$ cms diameter and almost completely denuded of spines, only the top two cm or so having any. I would imagine that this has come from a caespitose plant surrounded by other vegetation, no soil or dust being visible. I would agree that it is very like comosa, although I only have a very small seedling under this name at the moment."

.... from G. Watts

"Of the plants in this group I have the following in my collection: P. ayopayana, echinus, comosa v. gigantea, comarapana, and borealis. None of these except comarapana was from Winter's seed, but the others were purchased some time ago as small imported plants; of these, all but comosa v. gigantea came from Uebelmann. Parodia comosa v. gigantea came from Stan Smith when he dealt in cacti.

Other than comarapana, none have wanted to set seed. I am afraid I am no botanist but comarapana appears to represent a different group. From my own observation its form tends towards P. chrysacanthion (round) and sets seed readily as well as growing fairly quickly from seed. It also sheds its dead flower heads quickly whereas all the others mentioned hold their dead flowers for many seasons forming rather unsightly rings around the plants. I have attempted on one plant to remove a dead flower after 3 seasons; I ended up removing a complete set of spines from an areole. I have also noticed that (comarapana excepted) they also tend to throw quite a few flower buds which never develop but remain as a tuft on the plants.

"As to the form fruit takes on these Parodias - all I have noticed are a slightly elongated fruit on some, others are more round; but none reach the elongated shape mentioned for P. ayopayana.

"Of the plants in this group, I find echinus and comosa v. gigantea very similar. Parodia echinus, however, has much stronger chestnut coloured spines which keep their colour as they age whereas I find spines of comosa less robust and tending to go grey very quickly.

"Plants not mentioned which I tentatively suggest may be within this group, showing similar characteristics, are P. columnaris and P. procera. Although P. columnaris lacks the fine radials of P. comosa, it does bear some resemblance to ayopayana with the small type of Parodia flower which the group seems to produce. Parodia procera has slightly curved twisted spines, but again exhibits all the characteristics of the other species.

" All the comosa group seem to be prone to severe marking on the body - could this be because they require a slightly higher temperature in the winter?"

.... from R. Martin

"I have two plants of Parodia ayopayana, one keeping rather squat/globose, while the other one is more globose/columnar; however the flowering performance of both these plants is identical, in as much as they are small flowers, rarely fully open, which I too believe is because there are so

many crowded closely together. The fruits are also nearly the same on these two plants except for the fact that the fruits on the columnar type always seem to be that much more covered in white wool than the other plant, whose fruit is only covered on the outside with a slight and shortish cover of woolly hair. When the flowers first open, they do seem to be dense in colour and later fading slightly, but I have not noticed the size of the flower increasing over this period. I do not know from personal experience if these peculiarities exist throughout this group as a whole, but other peoples' plants in this group that I have seen flowering do seem similar. My two plants often have more than one flowering period during the year, usually twice; by this I do not mean that one flower opens at a time from one group of buds, but two or more distinct groups of buds."

.... from H. Middleditch

"This article is the first of a series by Brandt reviewing the genus Parodia after his introductory article in Chileans No. 23; the species are discussed starting with those found at the northernmost end of the Parodia distribution area, then taking each species in turn travelling south through the Andes. The number adjacent to each species is used to identify the finding place of that species on the map received from our author and which will be on view at the 1973 Chileans National Gathering.

"The species covered in the above article all come from the Eastern Cordilleras in north and central Bolivia; all are somewhat similar in spination and body form and it would appear that the seeds are also rather alike. It would have been useful to have been able to refer to the original diagnoses of each of these species in order to ascertain precisely how their respective authors considered they may be differentiated one from the other. Thus the data on flower sizes obtainable from the Kakteen-lexikon would suggest that the flower of ayopayana is but slightly larger than those of the other species, rather than being so markedly different as our author suggests. The foregoing comments would also seem to bear this out.

"Later on in his review, F.H. Brandt deals with P. comarapana, also found in the Eastern Cordilleras, but from a locality about 150 Km southeast of Cochabamba city - apparently with no similar Parodia species being found in the intervening mountain chain. (Location noted on map of Central Bolivia in Chileans No. 18 p. 153). Parodia comarapana has straight, slender spines, similar in length and appearance to the echinus/ayopayana group, but the spination is more dense; the sketches by Buxbaum also show differences in the external appearance of the flower; it is particularly when we come to the seed that here we find a distinct difference, for P. comarapana has an elongated seed with elongated testa cells, quite different from the seeds of all other species in this group. It might appear, therefore, to be a plant all on its own. However, the recently described P. hausteiniana has been credited with seed remarkably similar to that of P. comarapana, although hausteiniana has a short, stout, hooked central spine reminiscent of the schwebsiana - mairanana group of Parodia. Does this mean that hausteiniana is a transition plant between the schwebsiana group and comarapana?

"Not too far from the location of Comarapa is the village of Perez where P. columnaris is found; this plant seems to fall into the schwebsiana body type, so it would be interesting to see what the seed looks like.

"It is perhaps unfortunate that the author of this article has not been able to indicate a scale for the excellent seed sketches. Since these seeds are not necessarily shown to the same scale, one is not able to make side-by-side comparisons quite as conveniently as with seed sketched to a common scale. Thus the seed of P. comosa and borealis are alike in size and so match the common size of 0.6 mm diameter quoted by the author; if the sketch of the ayopayana seed is indeed to the same scale as the two foregoing seeds, then it would be about 1 mm long and thus match the size quoted by De Cocker for this seed (Chileans No. 17 p. 95), but it would not match the author's own figures of 0.7 mm by 0.5 mm for size of this seed."

.... from G.J. Swales

"Having not only the sketches of the Parodia seed by Brandt before me but also those of De Cocker (Chileans No. 17) and David Lewis (Chileans No. 16), I tend to gain the impression that there are two different sorts of seeds displayed for the species ayopayana. Before discussing the differences that appear to me to exist here, perhaps a few words of explanation might be appropriate. There are a number of seeds (outside the Parodia) which exhibit the testa cells neatly arranged in lines, somewhat like those shown on the accompanying sketches of P. comosa and hausteiniana. However, I have found that on some seeds that these lines of testa cells are to be found in local areas and can be seen when that particular part of the seed is viewed, whereas another view of the same seed may give a different impression of the arrangement of the testa cells.

"Upon looking at the photographs of the seeds of P. ayopayana taken by De Cocker, lines of testa cells can be observed looping over the top of the seed which is centre right of the three in the photograph; those testa cells which can be seen to the side of the seed, within the linear loop of cells, seem to be disposed at random. The cells arranged in lines are rather like the strings of hair looped over the head of a rag doll. On the lowermost seed of the three in the photograph, the loop of lined-up testa cells can just be discerned, with those cells covering the side facing the camera being disposed at random. The accompanying sketch by Buxbaum of a seed of this species would seem to be depicting a similar view. The seed sketched by Brandt does not appear to have the same general appearance as those depicted by Buxbaum and De Cocker, but is perhaps rather closer to that sketched by D.J. Lewis.

"If the seeds photographed by De Cocker had the projecting hilum like those depicted on the examples sketched by Brandt and by Lewis, I doubt whether they would have perched upright on their hilum for photographing - unless they had been deliberately fixed in that position, such as by sticking them on sellotape. Even this would surely be very difficult with a projecting hilum, even if it only projected as far as is shown on Buxbaum's sketch.

"It would appear that there are problems with seeds in genera other than just the Gymnocalycium!"

.... from T. Lavender

"There was a plant of P. ayopayana at the recent N.C. & S.S. Judge's course which was carrying elongated fruits - this foxed quite a few people who took the plant to be a Neochilenia or Islaya, evidently being unaware that this characteristic fruit was not confined to those plants."

.... further from H. Middleditch

"The elongated fruit will be found quoted by Buxbaum as a characteristic feature for his Parodia section AAA, in Chileans No. 23 p.110.

"Perhaps I might draw a bow at venture and suggest that it would be interesting to see if a comparison of the seeds from Roy Martin's two Parodia ayopayana - the short one and the tall one - might show one sort of plant to have the Buxbaum De Cocker sort of ayopayana seed and the other sort of plant to have the Brandt/Lewis type of ayopayana seed. Any other members who have seed set on a plant of this species might care to examine it under a hand lens to ascertain whether it appears it exhibits an affinity with one or the other type of seed depicted in the pages of the Chileans. It would be very nice to be able to see any such plants and seeds at our National Gathering in autumn 1973 so that they can be compared."

.... from D.J. Lewis

"In my original notes (on Parodia seed classification) which appeared in Chileans No. 16, I did place P. ayopayana in oblongispermae, but I now believe that the seed which I had at that time was not correctly named."

PRESSING FLOWER SECTIONS

Abstracted from "How to collect and dry flowering plants and ferns" by H.S. Thompson (George Rutledge & Sons, 1926)

A collection of dried plants, usually mounted on paper, is called a Herbarium. A well-dried example of a flowering plant or fern can always be examined, identified or described with exactitude. The flowers and fruit of herbarium specimens are usually so little altered by drying that the most delicate organs can be examined. The almost morbid craving among a few field botanists to be the first to record a plant from some very confined area should diminish, and the far more serious temptation to give new names to species or varieties not worth determination, should lessen. The infinite pleasure of making a collection of flowers will grow from year to year; and in the winter months even a small herbarium will afford matter for study and comparison. A more detailed study of living plants must not only increase the love of the student for the science of botany, but it should broaden his views and enlarge his horizon.

One of the advantages of making a collection of dried flowers is the simplicity of the equipment - in fact the simpler it is the better. The selected specimens should be preserved by pressing them in unglazed paper - even old newspapers do quite well. Blotting paper should not be used for drying plants in; it is too tender, it does not last, and the plants often stick to it.

Much the best press is a pair of strong wire-work frames or lattices $16\frac{1}{2}$" by $10\frac{1}{2}$". The outer wire must form a rim strong enough to bear pressure from the straps. If a wooden press be preferred it may be made of two stout boards of the same size; they should be furnished either with strong leather straps - screws are not advisable - or the pressure can be obtained by placing weights on top. A weight of from 28 lbs to 56 lbs will be required according to the thickness of the pile. For just a few specimens, dry in paper within a couple of pieces of strong millboard.

The pressure must be merely enough to flatten out the plants without bruising them. The great idea in "pressing plants" is to dry them quickly, and thus preserve the colour as much as possible. The more paper is used and the oftener it is changed and dried, the better. At first the papers should be dried every day. In fact, the first change may be made within a few hours if possible. The pressure should be increased after the first day, although it should not be overdone. This first change is the most critical; some botanists place the specimen on thin unglazed paper, so that the whole sheet can be removed en masse and placed between newly dried paper. This is very desirable in drying some delicate ferns and extremely small tender things which will adhere to paper and are most difficult to handle. A pair of forceps and a flat paper knife, with a thin rounded top, will be found very useful in handling specimens.

Most of the very thick or fleshy portions of plants should be cut in two before placed in the press. Usually both halves are worth preserving.

Comments on preserving flowers

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

"My experience with pressing flowers is that you do not want too heavy a weight and you should change the absorbent paper every day - or just moving the flower to a different part of the paper will do. The idea is to dehydrate the flowers and the weight should only be sufficient to take up the contraction. If too heavy, it will squash the flowers and squeeze the juice out. The resultant damage will certainly attract mould I should think. A book like Kakteenlexikon should be quite sufficient, even for a fleshy flower and would be too heavy for a more flimsy one."

.... from Mrs. J. Hobart

"On consulting a library book about the preservation of flowers, I see that it advises moving the flower to another sheet, after a few days. In my experience it is not fungus as such that attacks the pressed section as simply the juices drying on to the blotting paper, which causes the anthers to stick to the paper and tear off. What looks like fungus, I am almost sure, is the white hairy surface of the blotting paper adhering to the flower section. Moving the flower, before it has dried completely, would seem to me to be the answer."

.... from J. Hopkins

"There was some talk at the Brooksby weekend of preserving flowers sections or even whole flowers in cold setting resin. There are kits available for the casting of botanical specimens in resin, at about £5. This includes all the basics and further supplies of resin are quite cheap. The resin is very clear and permits examination of specimens with a microscope or hand lens. The moulding process is such that the resin needs no polishing. It implies that for botanical processing in particular, that colours may fade and various solutions are available for preserving greens and reds, etc. Unfortunately the solutions used for one colour have adverse effects on another colour, so that they may be useless for preserving flower colours - except in the case of single coloured flowers. But presumably the usual green flower tube will suffer in any case!"

.... from G.J. Swales

"I would question whether the author's statement that "blotting paper should not be used for drying plants in" is necessarily true. The use of tender, fluffy, cheap blotting paper may well result in the problems indicated by the author, but in my experience a good quality white blotting paper that is almost as stiff as young cardboard, will answer satisfactorily. This should be obtainable from any good stationers.

"In regard to plants sticking to blotting paper, if they are very juicy - or have juicy parts like the ovary on a cactus flower - they are liable to stick to anything.

"Although old newspapers may serve well as pressing papers, some are perhaps better than others. If one reads the Times it will not be found entirely suitable for this purpose, whereas the Daily Mirror is much more satisfactory. The latter is more porous and absorbent whilst the former gives the impression of having a slightly glazed surface. Newspapers certainly can be used in a thick wad to back up the blotting paper next to the specimen, in order to economise on blotting paper.

"A standard botanical wire press is perhaps rather a luxury for a greenhouse-bound collector. The idea of the wire mesh is to allow a ready release of moisture from the press - but I must say that if two or three specimens are pressed together in layers, it is doubtful whether the middle layer will gain any advantage from a wire press. I would have thought that a perfectly serviceable method was to use a stiff board (like a baking board) over the pack to be pressed - in order to distribute the weight evenly - and to use a bucket of water as a weight. Another alternative would be to utilise one of the old fashioned trouser presses which can be found occasionally in junk shops; the two boards with four thumbscrews should be readily adaptable to a jolly good plant press.

"Changing the paper in the pack frequently is perhaps a counsel of perfection, but is to be strongly recommended - especially the thorough drying of the paper; I use the airing cupboard for this purpose. This is of particular importance where boards are used as a press. I suppose that ideally the papers should be changed every day.

"Thin cartridge paper can be used at one side of the specimen and retained there as the final mounting sheet; this avoids the need to prise a delicate specimen away from both its pressing papers and so reduces the risk of damage.

"In regard to the comments made by Mrs. J. Hobart, I have not tried to remove a pressed specimen before it is completely dried out, but I suspect that this could avoid the problems with little whiskers of adhering blotting paper, a problem with which I am unfortunately all too familiar.

"If anyone does do any pressing, I would recommend the use of a standard sheet or card for mounting specimens - a file card of about post card size (or the next larger standard size) might be a convenient size for most cactus flowers."

.... further from Mrs. J. Hobart

"I have now acquired one of the cold setting plastic resin kits and am experimenting with a few inanimate objects - like sea shells and so forth - over the winter, in preparation for next season."

.... from H. Middleditch

"It would be very nice to see further examples of pressed and preserved flower specimens at our 1973 National Gathering. I shall look forward to seeing how Joan Hobart fares in applying the cold setting resin to the rather more difficult problems posed by a cactus flower."

.... further from McMillan

"Last summer I preserved a flower of Selenicereus by the above method. As the tube and pericarpel were rather thick I sectioned the flower. It was quite dry in about 10 days and I found it well worthwhile changing the papers every day for the first few days.

"I have mounted the flower with small slips of sticky tape on a piece of melinex and covered it with another piece so that it can be viewed from both sides. When mounting botanical specimens permanently on paper in the herbarium however, it is better to fix them down with small strips of gummed paper rather than self-adhesive cellulose tape as the latter discolours and shrinks with the passage of time and the adhesive tends to ooze out."

NEOPORTERIA CLAVATA translated by H. Middleditch from "Gesamtbeschreibung der Kakteen" by K. Schumann .)

Synonym: Echinocactus clavatus Soehrens.

Columnaris vel interdum clavatus elatus; costis 10 tantum rectis sulcis transversis munitis cinereo-viridibus; aculeis radialibus 4-6 validis subulatis rectis vel curvatis horizontaliter divaricantibus, centralibus solitariis porrectis vel deflexis; floribus subtubulosis rubris, phyllis perigonii pro rata parvis angustis, ovario dissite squamosis et pilosis.

Body at first globular, then columnar, sometimes plainly clubshaped, rounded at the top, depressed in the crown, filled up with woolly hair, overtopped by the spines, in new growth pale green, very nearly grey, up to 1.50 m high. Ribs only up to 10, straight, separated by sharp grooves, divided by transverse indents, grey-green. Areoles 2.0-2.5 cm apart, very long (1.5 cm) elliptical, with copious grey felty wool. Radial spines generally 4-6, very robust, awl-like, straight or frequently curved, up to 3 cm long, spreading horizontally, central spine straight or depressed downwards, also somewhat longer, all penetratingly sharp.

Flower from close to the crown, long cylindrical, barely opened. Ovary elongated top-shaped to cylindrical, with furnished triangular scales, prominent white woolly hairs in their axils. Tube likewise scaly. Flower petals 1.5 cm long, red. Outer petals slim lanceolate, pointed, red.

Geographical distribution - in Chile, without precise location.

Comments on Neoporteria clavata

.... from H. Middleditch

" In The Chileans No. 22 various species around Neoporteria microsperma/wagenknechtii were discussed, including a brief reference to N. clavata, which would apparently fit within this species-complex. My own seedling plant of this species was obtained at a nursery in Reppenhagen in the course of our 1964 Cactus Tour to Austria, it being barely table tennis ball size on acquisition. I must admit to being somewhat puzzled by the evident tendency to produce a columnar form of growth, in comparison with the globular shape of clavata v. grandiflora. However, I found the illustration Abb. 267 in Backeberg's Kakteenlexikon, showing a plant of this species almost twice as high as it is broad, somewhat reassuring, especially when the accompanying title to the photograph includes the observation that "the shape shown is typical for this genus". (But my Neo microsperma are globular, not columnar!).

" Even more interesting was the illustration of a Neoporteria clavata in Karl Schumann's book, which depicts a plant about six or seven times as high as it is broad; despite the lack of well-defined detail on the illustration, the microsperma-like spination may be discerned on that plant. After doing a quick spot of translation I see it can even reach a yard and a half in height. However, at the present rate of growth, this is likely to take some time yet. Perhaps our readers in Australia or New Zealand may find a rather more rapid gain in height on this species?"

.... from A.W. Craig

"My plant of N. clavata is grafted but appears to be growing quite in character. It is now about eight inches high, columnar, and cylindrical with no suggestion of a club shape to the body."

CHILEANS 1973 NATIONAL GATHERING

A Chileans weekend will be held at Brooksby Agricultural College, near Melton Mowbray, on September 14th-16th 1973.

There will be a number of formal talks, including the habitat slides of Chile from our own Library, and reviews of various genera - Lobivia, Copiapoa, and others. In addition there will be various informal discussion sessions with plants, slides, distribution maps and seeds to hand, where problems and queries can be raised and discussed in detail.

All participants are asked to bring along as many plants as they can transport of any South American species, also slides and photographs, paintings or sketches. We would hope for support in this respect at least equal to the excellent response to the similar request made for our 1972 Gathering - more sectioned, pressed or preserved flowers would be very welcome. It is anticipated that Matucana/Borzicactinae will be added to the subjects discussed last year, as requested by A.J. Worrall; we gather Mrs. A. Lavender is looking forward to browsing over the Weingartia and A.W. Craig is hoping to see a nice selection of Sulcorebutia.

For requests for discussion of particular subjects, information on the course, and provisional bookings, write to the Course Secretary, Mrs. J. Hobart, 39 Woodside, Darras Hall, Ponteland, Northumberland.

1972 National Gathering - Financial Account

Receipts	41 x £7	£287.00	To Brooksby College	£208.45
	1 x £5	5.00	Cancellation Refund	5.00
			Bank charges	25
			Postage, Printing, etc.	29.67
			Visit to Brooksby (nominal cost only)	4.00
			Cash in hand	3.00
			Cash at Bank	41.63
		£292.00		£292.00

FORTHCOMING TOPICS

We should be pleased to hear from any readers who have grown any of the less-common cereiform cacti, such as Neoraimondia, Armatocereus, Corryocactus, Browningia, Azureocereus, or Leocereus. Or have observed on flowers of Gymno. denudatum, the size and shape of the flower, any variation in length in the different rows of petals, and whether the stigma was above or below the anthers. Or have a plant of Noto. orthocanthus, or have flowered Noto. buiningii, or have grown Weingartia westii, or could spare five or six seeds of W. fidaiana or W. neumanniana. Or have flowered any of the Parodia from amongst the schwebsiana group with short, stoutish, hooked centrals (yamparaezii, tuberculata, otuyensis, sotomayorensis, etc.)

H.M.

SEED POOL

The current seed list will be found accompanying this issue and I am pleased to be able to acknowledge the support given to the seed pool this season, especially by overseas members.

The new season is now upon us and I would like to request those of you who have two or more plants of the same species to attempt to set some seed. Any seed surplus to your requirements will be very welcome, especially of the less common species. We can make good use of small quantities of seed; whole fruits full of seed of almost any species will also be welcome for study purposes.

J. Hopkins

Errata No. 22

p. 37 For H. Smith read H. Mays.
p. 53 line 26 should read ".....would all be black with a....."

No. 23

p. 80 line 7 for 'keep' read 'keel'
p. 82 line 21 for 'oyoica' read 'oyonica'

FROM THE CHILEANS GYMNOCALYCIUM ROBIN

Following the comments on male and female flowers, reported from the Robin in Chileans No.17 pp 75, Mrs B.Lucas, California U.S.A., writes that "I have a male and female G.leeanum. Both have identical flowers except that the male plant produces flowers with well developed anthers loaded with pollen and an atrophied stigma, while the position is reversed for the female plant. I suspect that there are more dioiceous species of Gymnos than we realise. My G.ourselianum produces no pollen, but the stigma will accept pollen from another plant and fruits will form.

"Out here I would not dare grow my Gymnos in full sun. One plant of saglione produced a perfectly round seed pod, $\frac{1}{2}$" in diameter, colour a bright cerise pink. Another specimen produced round pods 1" in diameter shading from brownish rose at the base to pale rose at the apex. Both split horizontally.

"Attempts to cross oenanthemum with leptanthum resulted in a false pod on leptanthemum. The pod (bluish green in colour) grew to $1\frac{1}{2}$" tall and $\frac{3}{4}$" in diameter, cylindrical in shape. When plump and juicy looking it fell off. I was very disappointed to discover that it was completely hollow. G.schickendantzii forms many bright red juicy fruits (without help from me) about $\frac{1}{2}$"

in diameter but although the fruits contain much pulp, there are no seeds.

"I also note that some seed pods never split - they just partially dry up and fall off. This happens on a plant I have of denudatum which has three spines per areole; the flower is white with a red throat, the pod small, green, $\frac{1}{2}$" diameter and 1" long."

Mrs J.Deane in N.S.W., Australia, observes that "pods on Gymnos in Australia are very often red or partially red in colour. They are generally red on the sunniest side. G.saglionis is one which only just shows pink and is a very squat pod which slits vertically before it is dry. We have to watch pods carefully or the ants get away with the seed even before it is noticeable that they have split!

"I have seen a G. cardenasium in flower in another collection - it was an old plant, about 6 - 7" in diameter. It is a collected plant and goes very flat and sinks into the ground each winter."

From New Zealand Mrs L.E.McIntosh refers to the observation from Mrs B.Lucas regarding G. ourselianum producing no pollen and says "this interests me greatly for my own very large plant is the same. This plant produces large pale pink flowers in profusion, has a many-lobed stigma (the lobes are quite fluffy) and masses of stamens which all end in a point with no anthers or pollen at all.

"To get my G.anisitsii to seed I have had to cut carefully through the flower to get at the stigma, which is very large with 11 cream lobes that lie almost flat on the bottom of the flower cup, with the stamens in two rows, one row attached to the top of the tube and one half way up the flower cup. These are well above the stigma and loaded with pollen - they could not help but set seed if they were self-fertile. This is also the case with all the mihanovichii type (muscosemineae ? - H.M.) e.g. G. schikendantzii, G. michoga, G. pungens, etc. What I would like to know, what kind of insect can get past all that mass of stamens and still manage to retain foreign pollen to do the trick?

"Regarding the query on G. bruchii from Mrs Gowan, I have a pot full of G. bruchii grown from an offset from an original early collected plant. These little plants are quite pink and very compact, the flower is small and dark pink with a deeper mid stripe. I also have a collected G. lafaldense; these plants are larger, spines lighter with a long pink central, flowers also larger, narrower petals of a pale pink colour. Fruits on both plants are the same, dark green in my case.

"Like Mr.Baker I also find the mihanovichii type flowers well into winter, in fact I have had them flower right through the year, but they will not set seed in the colder weather, however, so it seems one must have warmth to ripen the pollen."

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.
Mediolobivia	J.R.Chapman, 5 The Crescent, Raunceby Hospital, Sleaford, Lincs.
Melocactus/Discocactus	Mrs.L.Teare, 7 Birkinshaw Avenue, Tranmere, Adelaide, South Australia 5073, Australia.
Neoporterianae	D.Rushforth, 80 Cheltenham Road, Gloucester GL2 0LX.
Notocactinae	K.H.Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A.Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A.W.Craig, 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.

THE CHILEANS

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