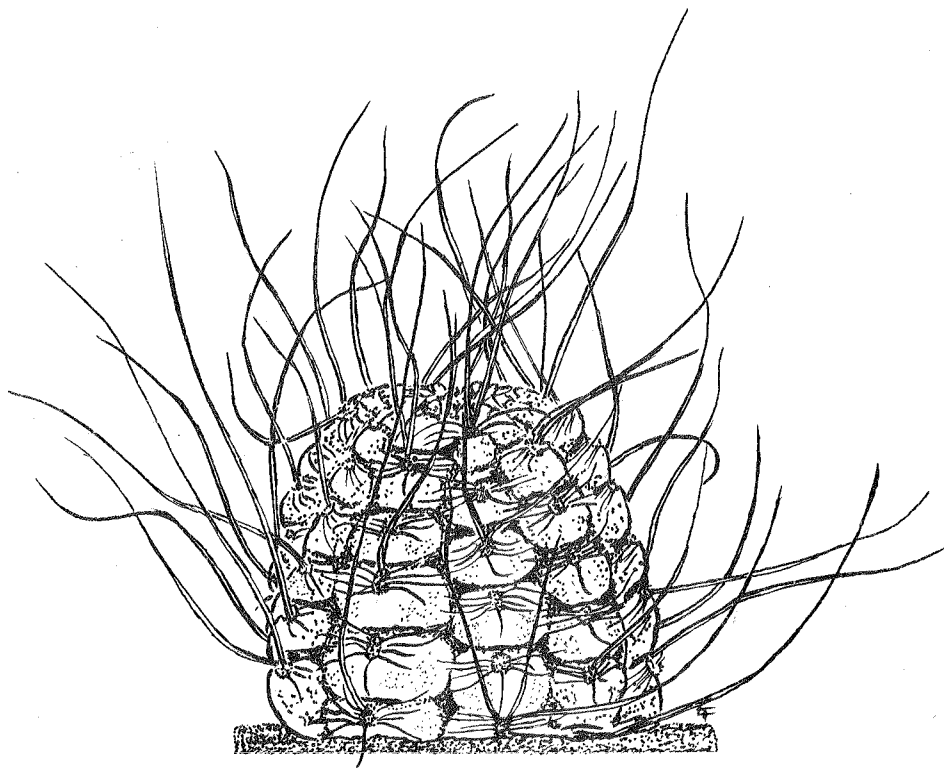


THE CHILEANS '75

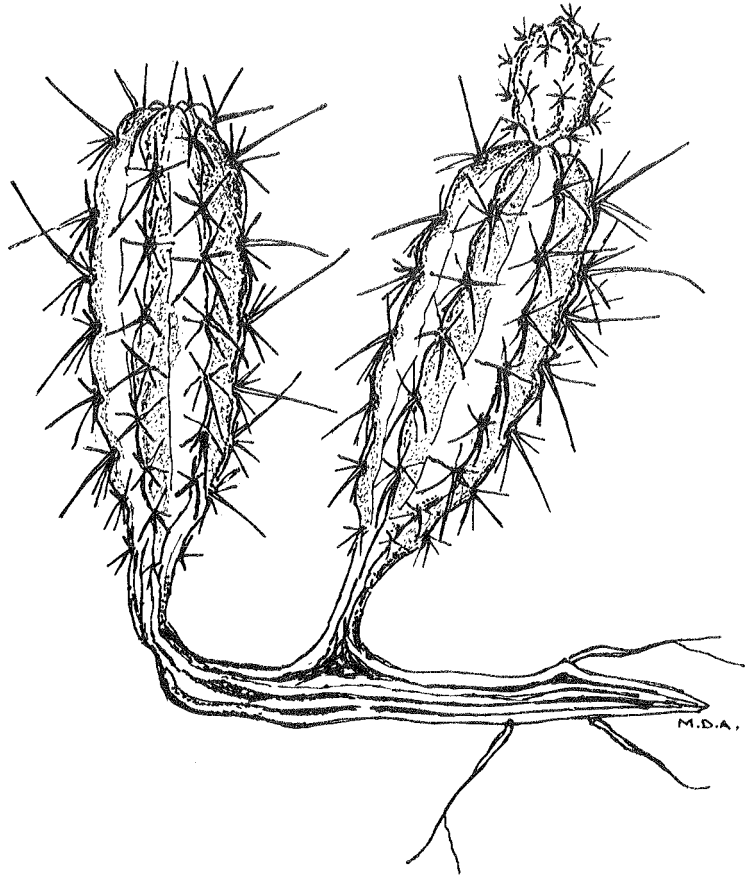
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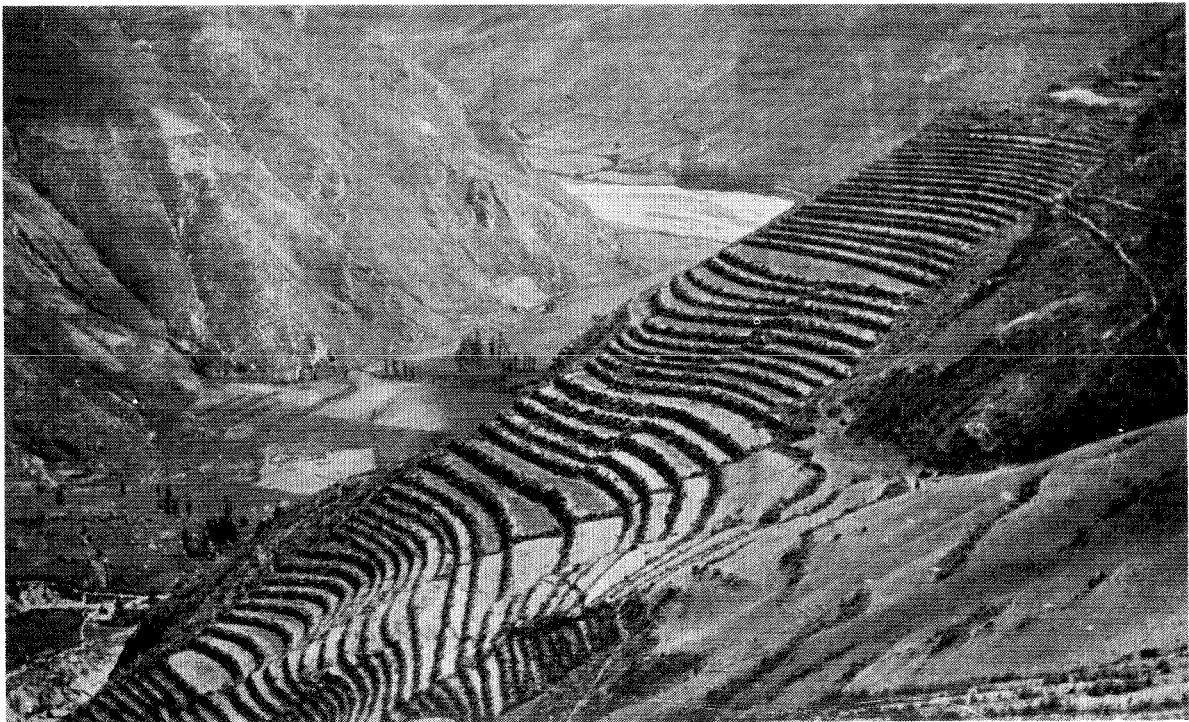
LOBIVIA WRIGHTIANA

ACTUAL SIZE

COLLECTION - H. Middle ditch



Erdisia meyenii



RIO URUBAMBA at PISAC

ERDISIA BRACHYCLADA FLOWERS From R Tyrrell

I have an *Erdisia* which has bloomed for the last 3 or 4 years and a more neglected plant it would be hard to find. When I built my 50ft greenhouse, fourteen or fifteen years ago, I really did grow plants. Coke was then about £5 a ton — I used a ton every three weeks and maintained about 50° over the winter. Despite all the experts with "maintain 40° and keep dry all winter" my plants were a real joy to see. Now I use 30-40 gallons of paraffin a week and the plants are not doing quite so well as they used to.

About this time I had a lot of seed from Winters including *Erdisia brachyclada* which was listed under FR 657. It grew into a 7" pot and it has remained staked by a 5 ft sweet pea cane but it has grown well above the top of that. Six years ago when Ron Ginns and Gordon Rowley paid a visit, it had developed four basal shoots about 3" long emerging from the soil about 1" away from the main stem and Ron passed a remark about this being typical of *Erdisias*. These shoots did not develop and have since died back; but I am convinced that if it had been potted on into a 10" pot they would have grown on — the speed of growth of the main stem starved them out.

I have a rooted cutting of this *Erdisia* in a 3" pot, about 12" in height; it was a side shoot that I knocked off when watering. It is five angled, reverts to four for a couple of inches and then back to five again. The main stem is five or six angled and about as thick as my thumb. There is a distinct faint line running the whole height of the plant at the bottom of the grooves between the ribs.

The parent plant blooms over a period of six or eight weeks and all the flowers are on the top 12" of growth. They are deep orange yellow with a reddish reverse and about 2½" in diameter. It has never set seed.

Comments on *Erdisia*

.....from Mrs. R. Howard

"My *Erdisia brachyclada* is grown inside the greenhouse and flowers continuously for months on end, but is very rare in New Zealand. This plant came as a seedling from a friend who seemed to get seed of Ritter's expeditions very early. I cannot remember exactly when but it could be about twelve years ago.

Erdisia brachyclada is a semi-sprawling type; the main stem is about 18" long and leans on the wall of the greenhouse as it is at the back of the staging. The new stems come from along the older stems and are not the semi-underground type like *E. squarrosa*. The newer stems vary between 15" and 24" in length, all bright mid-green with six ribs, not very deep. The areoles are very dark and well spaced out. It is these dark areoles which make the plant very attractive. The spines are short and a pale honey colour, the central being only slightly longer than the others. The flowers are mainly clustered over a short length at the top of the stems, rich red in colour, only a bit bigger than a *Rebutia*. They stay open at night and last for at least 2 or 3 days. The flower tube is short and spiny.

"This plant needs repotting badly, but it is one of the awkward to handle type, so I suppose it will just get a liquid feed.

"*Erdisia erecta* is also attractive but not so good as *brachyclada*; it is slimmer and grows erect up to about 12 - 15 inches high. It is a mid green colour, 6-7 ribs with dark - not black - areoles. The spines are honey colour and the flowers are red also, perhaps slightly smaller than those on *brachyclada*."

.....from H. Middleditch

"Now that's a bit of a puzzle - two growers with plants from Winter's seed and one has deep orange yellow flowers and the other has red flowers. Perhaps Backeberg might give us his views on flower colour? But unfortunately this species doesn't even seem to be listed in the *Kakteenlexikon*."

.....from R. Ginns

"You will find a mention of *Erdisia brachyclada* in Backeberg's *Die Cactaceae Vol 2*, p. 862. It is quite distinct from *Corryocactus brachypetalus*."

.....further from H. Middleditch

"Armed with this information I repaired to Vol 2 of *Die Cactaceae* and under *Erdisia squarrosa* I found a footnote relating to the habitat locality of *E. squarrosa* at Tarma, Peru, as follows:-" "From this district Rauh sent me an "*Erdisia* without a number": slender column, sprawling, swollen root; flowers chocolate brown; stigma lobes yellow — Tarma, dry slope at 3,000 m. This example was a dead one; I am not able to say what exactly we had here, but in all probability it was *Erdisia brachyclada* Ritt. n. nud. FR 657".

"So I returned to the description for *E. squarrosa* which is to be found above this footnote in Die Cactaceae and discovered that there was no reference there to the flower colour. But since Backeberg quoted Britton & Rose, The Cactaceae 11:104, 1920, perhaps a flower colour was recorded there? Now here we find the flower quoted as "bright red or scarlet". This seems a far cry from the chocolate brown of Rauh's note. Again in Britton & Rose we find the habitat of Tarma quoted for this species: this place is just over the high peaks of the Andes on the Lima-Matucana - Oroya - Tarma route. However, Britton and Rose also referred to plants named as *E. squarrosa* which were found near Cuzco and near Ollantaytambo. These places are about 250 miles from Tarma as the crow flies.

"At the time of the publication of Britton and Rose's book on the named species of the Cactaceae, there was only one named species of *Erdisia* from Peru — *E. squarrosa*. So perhaps it is hardly surprising that all specimens of this genus which had been collected in Peru up to that time were included under this name. But nowadays we have a choice of nine specific names for *Erdisias* growing in Peru. Under the circumstances one may understand Backeberg saying:- "Werdermann's description in Backeberg 'Neue Kakteen' 101, 1931, is along the lines of Britton & Rose's description, not according to that of Vaupel — it gives the origin as 'from Cuzco'. The plants coming from there are different from the type species; those growing near Ollantaytambo, with more honey-yellow spination and taken by the American author to be the species *E. squarrosa*, are *Erdisia aureispina* Backbg & Jacobs.; the upright growing species from south of Cuzco, also recorded by Britton & Rose, is *E. erecta* Backbg. The species from Ollantaytambo would probably be confused with the type species of the genus as they both grow spreading and procumbent.

"So if we accept the "red flower" from Vaupel's original description, where does Rauh's chocolate brown flower fit in? Or did Backeberg deliberately omit the flower colour from his description of *Erdisia squarrosa* in Die Cactaceae because it did not appear in Vaupel's original description? Does the reference to red flowers for *E. squarrosa* appear in Britton & Rose only on the strength of the plants seen and collected near Cuzco and Ollantaytambo?

"An indication of the extent of the knowledge of Peruvian flora in comparison with that of Chile, may be gained from the record in Britton and Rose of three species of *Erdisia* found in Chile, to which no additions have subsequently been made. But as late as 1956, the exploratory trip of Rauh through Peru uncovered a northward extensions of *Erdisia meyenii* into southern Peru, and yet a further species of *Erdisia* in the Puquio valley, again in the southern quarter of Peru."

..... from E. W. Putnam

"The *Erdisias* behave for me in the same way as the closely related *Corryocactus*; with me it is almost deciduous; new stems are produced annually from ground level and the older stems rarely last as long as two years before withering. My pot of *E. erecta* is usually a mass of sparkling brand-new stems growing amid a sorry tangle of brown withered twigs."

..... from R. Moreton

"Yes, I have grown and flowered *Erdisia*. It was *E. erecta* from Ritter's seed and it flowered in its third year. Just one terminal flower, orange red and about 1 cm in diameter. I sent a slide of the plant in flower to the slide library. I have not had a flower on the plant since then on that or any other species.

"I have also noticed the apparent cessation of growth mentioned by most of the other contributors. As Roland Tyrrell's plant was in a large pot and kept warm, maybe this is the answer — more moisture in winter and a free root run. With my plant, the production of underground stolons is most marked.

"It does occur to me though that perhaps Roland Tyrrell's plant was not an *Erdisia* but a *Corryocactus*. The flower size and colour quoted seem to match better, and the size of the plant too, as *Erdisias* are mostly up to 1 m high.

"Another mystery plant is one from Knize's seed as *Bolivicereus pisancensis*. This has just the same stoloniferous habit, with dying back of stems, etc. I have felt for some time that it is more like an *Erdisia*. Perhaps it is just a seed mix-up?"

..... further from H. Middleditch

"From the Chileans '72 Year Book of Field Collection Numbers I see that Kz 354 is *Bolivicereus pisancensis* from Pisac on the Rio Urubamba. The town of Pisac lies in the Urubamba valley at the point where the Rio Urubamba passes closest to Cuzco. This place lies upstream of that part of the Rio Urubamba valley visited by Prof. Rauh, of which he gives a brief description in his "Contribution to the knowledge of the Peruvian Cactus Vegetation". The article which appears elsewhere in this issue, giving Weberbauer's account of the vegetation to be found in the valley of the upper Rio Urubamba, does not make reference to Pisac.

Thus it is not possible to suggest which of Weberbauer's vegetation zones applies to the locality of Pisac, in order to establish whether this is likely to be *Bolivocereus* or *Erdisia* growing country.

"In Britton & Rose, *The Cactaceae*, Vol II, there is a reference to *Erdisia* being collected at Ollantaytambo in the Urubamba valley (downstream of Pisac) at an altitude of 3,000. It would seem possible from the collecting place and probable from its habit of growth, that Kz 354 may well be an *Erdisia*".

..... from J. Hopkins

"Pisac is indeed slightly away from the Urubamba — on a small tributary and the place is located at 2,980 m altitude. The valley at Pisac is about 1½ km wide to the 3,000 m level and about 5 km wide to the 3,500 m level. I would think that the river below Pisac is at about 2,950 m altitude."

..... further from H. Middleditch

"Armed with this advice from J. Hopkins, it is now possible to refer to the article (in this issue) by Weberbauer, from which we find that Pisac must lie in the treeless herb-poor zone of the Urubamba valley ranging from 2,650 m up to about 3,000 m.

"Now in *Die Cactaceae*, Backeberg quotes Cardenas as having found *Bolivocereus samaipatanus* at an altitude of 1890 m on the Cordillera El Fuerte, near Samaipata; here a tributary of the Rio Piray descends the eastern flanks of the Andes in a steep-walled valley. Although this valley opens out directly onto the forest flanks of the Andes, the immediate vicinity of Samapaitana is relatively dry. The difference in latitude between Pisac and Samapaitana would hardly compensate for some 1,000 m (just over 3,000 ft.) difference in altitude and although we are without a detailed description of the characteristic vegetation around Samapaitana, the available evidence would seem to suggest that Kz 354 is more likely to be an *Erdisia* than a *Bolivocereus*. Do any of our readers possess this plant?"

..... from Dr. Hanna Rydh, "Argentine to Andes".

"We left a very sleepy Cuzco at six o'clock in the morning in cars. Our road climbed steeply from the cauldron in which Cuzco lies, at 11,000 ft. above the sea. Sometimes we travelled across deserts where a hut was a rare sight; at other times the road was edged by green fields in which potatoes or alfalfa flourished, or cattle grazed.

"At a little halt on the railway, we all crowded into two rail-cars and our progress became more rapid. The view was more restricted — huge mountains reared themselves on either side of us. We were by this time descending steadily. Vegetation increased, huts lay embedded in greenery. At last we found ourselves right down in the tropics. The dark luxuriant vegetation of the jungle spread right to the waters' edge. Bromeliads, orchids, cascades of lianas, groves of bananas, many coloured butterflies.

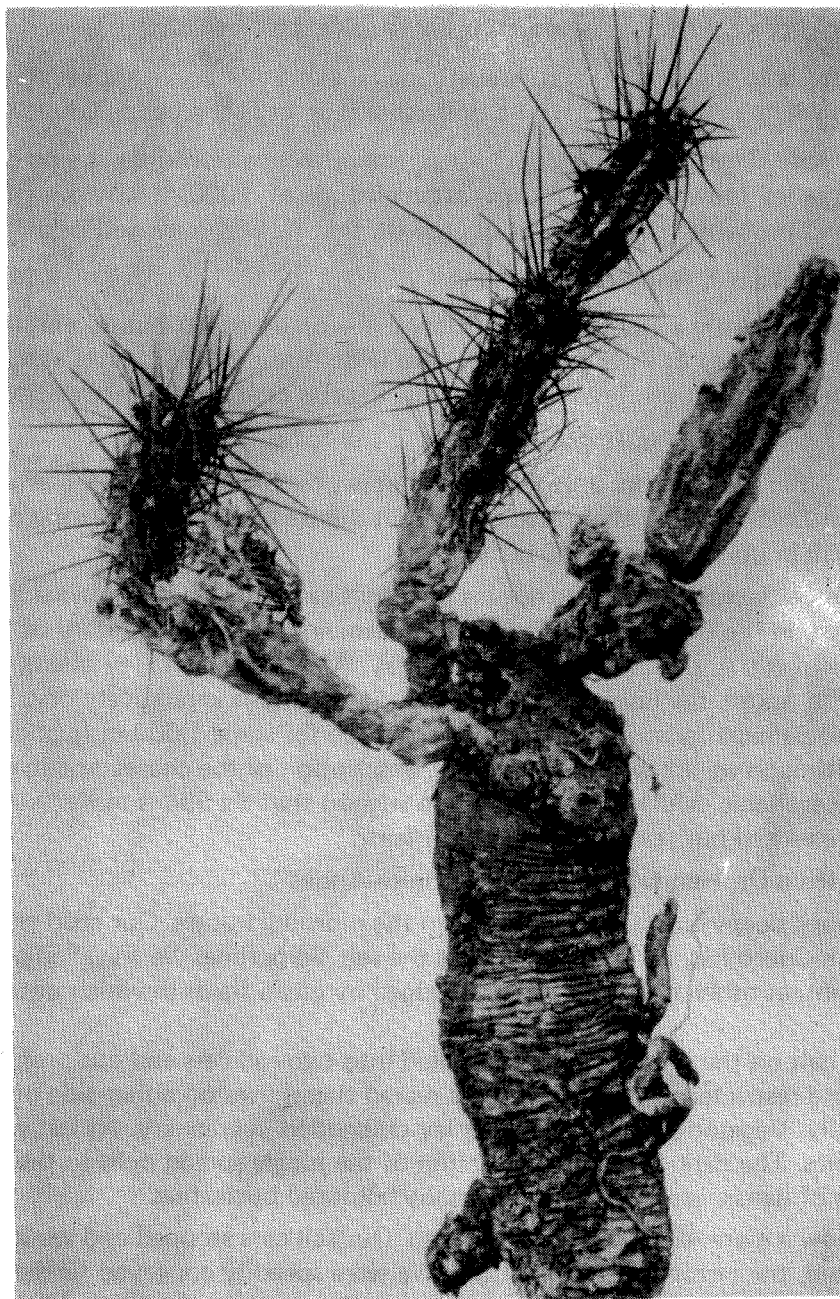
"We were now a mere 4800 feet above the sea. Our rail cars stopped and we descended at a very broken-down wooden shed, the terminus of the railway. We were speedily conveyed farther by a shaky motor vehicle and alighted again at a rather frail bridge by which we were to cross the river. A herd of braying donkeys awaited us. From it each person was expected to select the animal which attracted him most. "Follow the path as far as it goes" I heard someone shout. What an ascent it was! To get up to the outskirts of Machu Picchu was only 1500 feet, straight up, and another 1,000 feet to the citadel which guards the town. I struggled up the steep path on my donkey's back; a false step and I should have plunged down that wild slope. Far away, at the very bottom, the Urubamba flowed on its way. All the luxuriance of the tropics lay at the bottom of those steep slopes.

"At length we began to descend on foot, to return to Cuzco.

"There are other places I wanted to see — thus it was that on a fine morning I set off in a car for Pisac. Our way to the north-east ran through green avenues and across fertile fields. It followed the old Inca Road, the paving stones of which were exposed to view. On this trip, too, we came down to the banks of the Urubamba, so varied in character. We crossed by a handsome suspension bridge, and got over just in time to spend a short while among the Indians who were holding a market in front of the modest little village church.

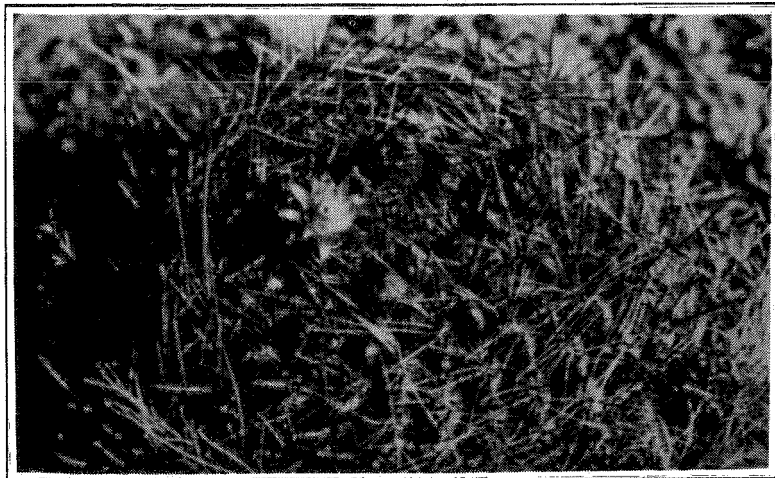
"We got hold of a little Indian porter and began the arduous ascent of the heights. We had decided to make our way up on foot this time, and after a couple of hours we reached the town which was perched on the top of a steep summit. The scenery was not so wild or grand as it had been round Machu Picchu, but it was very fine all the same, with billowing heights cut by river valleys.

"The most impressive thing was the colossal terracing. I despair of describing it. It served the needs of an agricultural system and built up to the town from the very foot of the mountain to its summit. We decided that we should save time if we made our way down by the terraces. It looked easy, but not only was the descent from terrace to terrace distinctly difficult, but small cactuses with poisonous spikes were growing everywhere. However carefully you climbed you were always in danger of missing your footing and stepping on them. Sure



Erdisia squarrosa - dry slopes near Tarma at 2,590 m

BACKEBERG DIE CACTACEAE VOL II Photo - RAUH



Oroya depressa - high puna plateau near Andahuaylas

at 3,800 m Photo - RAUH

enough, I suddenly felt an intense pain in my foot. A spike no thicker than a needle had gone right through my boot. I got it off quickly and performed a hasty operation, fortunately a successful one, for who knows what trouble that spike might have caused.

"All's well that ends well, and who cannot forget all minor irritations when the end of an eventful day is reached. Machu Picchu, Ollontaytambo, Pisac — glorious names in the book of my recollections."

..... further from H. Middleditch

"The terraces at Pisac (or Pisak) may be seen on the photograph on the inside front cover, together with a short length of the Rio Urubamba winding away in the distance. At this spot the floor of the valley seems to be only several hundred yards wide. The accounts of various travellers would suggest that the river valley retains this narrow character for some one hundred miles or more downstream from Pisac, and for many miles upstream from that spot.

"It appears to be quite likely that the terraces on the photograph were those traversed by Dr. Hanna Rydh on her descent from the old town of Pisac. One is left to wonder whether the cactus plant that caused her so much concern was *Lobivia incaica* or Knize's "*Bolivicereus*" *pisacensis*."

..... further from R. Moreton

"I was able to call and see the *Erdisia brachyclada* in Roland Tyrrell's collection a few weeks ago. I must admit that its general appearance is of an *Erdisia*, but I have never seen one go straight up like his has done."

..... from A. W. Craig

"I have an *Erdisia* which I received as a cutting from Ron Ginns. It was 6" - 8" high when I planted it up and it has not grown very much it is now branching out from the base. I have had no trouble with any of the stems wilting and drooping.

"I also had an *Erdisia erecta* which grew for some time like its name would suggest and then it started drooping over. This plant survived several winters during which the temperature in the greenhouse went down quite close to freezing point, but I finally lost it over a cold winter when the temperature in the greenhouse did drop below freezing point."

..... Postscript from H. Middleditch

"As the fortunate recipient of Roland Tyrrell's rooted cutting from his *Erdisia brachyclada*, I potted up this stem in a very generous size pot in order to give it a galloping chance of catching up with the height of its parent. However, it showed little inclination to grow in a rapid fashion. In the following summer, much to my astonishment, I discovered a bud had appeared on the stem; after growing for about a month this opened into a flower at the end of July on a day that was very warm, breezy, the sky being overcast just sufficiently to diffuse the sunlight for all but very brief periods indeed during the day.

"The ovary and tube were green, the flower petals a very deep rich yellow with flecks of red on the reverse of the outer petals. The flower was about 4.5 cm high and broad; shading the flower brought an immediate reaction, the flower closed in by about 5mm in about fifteen seconds — you could nearly see the petals move. On the ovary the scales were very small indeed and difficult to discern but appeared to have a tinge of red colour. In the axils of the scales were some fine hairs, barely 2 mm long, some white and some dark in each axil, together with a single, very slender white bristle, straight, about 5 mm long. The upper scales were cusped away from the tube, a fluted ridge tapering away below each scale, in whose axils was brown twisting wool; in the upper most scales there was no bristle and the wool was up to 7mm in length.

"Not only did the bud appear shortly after midsummer's day, but the plant set into growth at the same time. A close examination of the growing point revealed that each areole carried a vestigial leaf. These were barely 1mm high and were very difficult to see without magnification. Right at the growing point each vestigial leaf was tinged with a pinky red colour, which darkened rapidly and less than 2 cm down from the apex these vestigial leaves had dried up and become deciduous.

"Having had a good look at the vestigial leaves on this plant, it then occurred to me to take a close look at the rooted cutting of *Erdisia brachyclada* from Mrs. Howard. This was also in growth, but at first sight exhibited no sign of any red flecks around the growing point to suggest the presence of vestigial leaves. With some magnification, however, it became possible to see a small green vestigial leaf, which became deciduous within a cm below the apex. The differences in habit in the spination and areoles of the two "*Brachyclada*" became far more distinct when viewed in this way. Together with the difference in flower colour, it would suggest that we have here two different species.

"Bearing in mind that *Corryocactus* is a close relative of *Erdisia*, I went to look at my 9" high plant of *C. melanotricha* and there were certainly no obvious signs of any vestigial leaf although the plant was evidently in full growth. Just to be sure I looked at the growing point with the magnifying lens, and lo! and behold on each areole close to the growing point there was a tiny green vestigial leaf.

"Now I wonder if these vestigial leaves are a regular feature of these particular plants, as characteristic as the vestigial leaves that appear on numerous species of *Opuntia* and *Tephrocactus*, or whether they are a sport — the reappearance of a long since abandoned feature, in the same way that vestigial leaves are to be found on certain plants of *Neochilenia*, *Lobivia*, etc.?"

.....from Mrs. L. McCausland (N.Z.)

"My *Erdisia maxima* was purchased in 1959 as a 13½" tall cutting. It produced a branch from the base in the following year and on December 5th 1961 it produced a flower. My notes record a "vivid orange-red flower very much like a *Lobivia* flower in shape". As I remember, the flower was born very close to the growing tip. This plant grew rapidly and soon filled a large tin. Given garden space no doubt it would soon spread. All new branches come from the base — they are tall and slender but we never need to brace it. We gave this plant to a friend who has taken it over to Punakaiki on the west coast. Here it is sub-tropical; one can grow Bromeliads outside, for example. The *Erdisia* has been planted in the ground and is doing well."

REFLECTIONS ON THE CACTUS VEGETATION OF PERU. By Prof. Werner Rauh.

Translated by H. Middleditch from *Cactus* (France) No. 53-54 - April - May 1957 (Uned. McM)

From Arequipa we attempted to reach Cuzco with our car, going over the Altiplano towards Lake Titicaca and the valley of Vilcanota. The road appeared on the official map of Peru as a permanent main road, but as we were in the midst of the rainy season, the trip will doubtless not be a joyride. Despite the misgivings of our friends, we set off on our way, but we regretted it ere long. This outing will remain imprinted for ever in our memory. The road is full of potholes but to retrace our steps is impossible. We must try to press on at all costs.

More than once our vehicle comes to a halt bogged down up to the axles in mud. We have to wait several hours for a lorry to extricate us. We make progress at the rate of 20 Km (11 miles - H.M.) a day. Most of the time we transform ourselves into road builders, filling deep potholes with stones. This is certainly no easy job, as we find out for ourselves, at an altitude of 4,500 m! In spite of these problems, we did not lose heart and at the same time succeed in collecting some *Lobivias*, doubtless belonging to the *pentlandii* group. As they are not in flower, their identification cannot be made with any certainty. We covered the distance in eight days, although usually one day is enough to make the journey. Tired and dishevelled, as a result of two broken half-shafts, we arrive at Puno close to Lake Titicaca, where we permit ourselves a brief respite to refresh ourselves.

Afterwards we continue on our way via Ayaviri and Sicuani in the direction of Cuzco. After having surmounted the Pass of the Raya, at an altitude of 4,000 m, we find ourselves in the pleasant valley of Vilcanota, whose present appearance, at the end of the rainy season, is just like an extensive flower garden. On all sides there are flowers and greenery; species such as *Helianthus*, *Zinnia*, *Tagetes*, *Eupatorium* and *Calceolaria* brighten up the landscape with patches of yellow, red and violet. Many of our garden plants are native to this place. Isolated farmsteads are surrounded by hedges of *Trichocereus cuzcoensis*, whose columns of 3 to 4 m in height are completely enveloped with bunches of *Tillandsia virescens*, an indication of a high degree of humidity. Between the low shrubs rise up the columns of *Erdisia erecta*, completely covered at this juncture with little flowers of carmine red.

In a few days we are in Cuzco, the ancient capital of the Inca Empire, destroyed by the Spanish conquistadores. The whole of the town looks like a museum and the numerous buildings, both within the town and without — such as for example the giant fortifications of Saksayhuaman, Tampu, Machay and Kenko — recall the power and degree of civilisation of the primitive peoples of Peru. Cuzco acts as our headquarters for quite some time and from there we undertake many excursions to explore into the virgin forest of Madre de Dios and the different peaks of the elevated range of the Cordillera Vilcanota, little visited up to now from the botanical viewpoint.

On one of our trips we went off into the Rio Apurimac valley, with a view to exploring in the vicinity of the Nevada de Salcantay, 6,271 m, described by the natives under the name of "Devil's mountain". The Apurimac cuts through the Eastern Cordillera to the north-east of Cuzco in a tremendous valley, of very great depth, in the shape of a gorge wholly impassable here and there, to join up eventually in the Amazonas plain, with the Rio Urubamba and the Rio Ucayali. Between the floor of the Apurimac valley, close to the bridge at Limatambo (2,000 m) and the peaks and glaciers of the Cordillera Vilcanota, standing but 50 Km apart, there exists a difference in altitude which can reach almost 4,000 m!

On account of its isolation, the valley of the Apurimac is distinguished by a hot dry climate, with little rain. During the day, the narrow walled-in valley accumulates the heat coming from the sun's rays and each day one may see that the clouds full of moisture, coming from Salcantay, evaporate without condensing into rain. As a result of this scarcity of water, the vegetation exhibits a xerophytic character. The formation is distinguished by low shrubs, spreading, very spiny, of watery-green colour, some species of the genus *Bombax*, with succulent trunks which store up water, and by the bunches of flowers rather like roses, of the genus *Fourcroya*. One could imagine oneself to be in the desert landscape of northern Peru again. This impression is further reinforced by the presence of huge *Cereus* plants, of which the comparable gigantic species are only met with to the west of the Andes. *Azureocereus hertlingianus* predominates; with its candelabras of greenish columns of 8 - 10 m in height, it occupies the terraces on the floor of the valley. Unfortunately the very decorative flowering of this plant had already passed. No more was to be seen at the crowns of the columns other than a large number of fruits, with the dried remains of the flowers.

According to Akers, who described the characteristics of this genus, the white flowers of *Azureocereus* open at night time and the flowering stems are furnished with very dense imbricated scales. However, Akers knew only *Azureocereus nobilis*, which we had encountered in large numbers at Huanta, in the valley of the Mantaro, again very dry and desert-like. *Azureocereus nobilis* differs from *Azureocereus hertlingianus* by the handsome frosty-white colour of their columns and by their more projecting ribs. The two species have one feature in common; the spines differ according to the age of the specimen. In immature plants the areoles send out 3 - 5 central spines of a length of 5 - 7 cm whilst the areoles of older plants have as many as 30 spines of slim section and of only 2 - 3 cm in length.

The characteristics of our plants, gathered in the Apurimac valley, coincide with those of *Clistanthocereus hertlingianus*, described by Backeberg in 1937. But as our discoveries have yielded proof that our plants belong to the genus *Azureocereus*, the name of *Clistanthocereus hertlingianus* must be supplanted by *Azureocereus hertlingianus*. We have found in the dried-up area of Ayacucho one other species, reaching only 1 m 50 and doubtless belonging to the genus *Azureocereus* (collection No. K77). As we have not had an opportunity to observe either the flowers or fruits of this plant, we are again unable to identify it with certainty. The *Azureocereus* are to be found in great numbers on the less steep slopes on the floor of the valley so that one may regard the Apurimac valley as the boundary of the *Cereus* zone.

Above this valley there is to be found a xerophytic forest which extends as far as 2,200 to 2,700 m altitude and in which there predominates *Bombax ruizii*, called "Pati" by the natives. The fairly dense foliage of some trees is completely covered with *Tillandsias*. The undergrowth of the *Bombax* forests is dominated by amongst others, imposing clumps of *Cleistocactus morawetzianus*, with rising columns, and of *Opuntia pestifer*, which truly lives up to its name, for its very small offsets carry numerous spines which cling to clothes and penetrate deeply into one's skin.

At a distance of but a few kilometers as the crow flies from these tall cerei, *Tephrocactus floccosus* grows in a cushion shape in the cool region of the Puna. Within a greatly decreased span, we are able to observe in the arid valleys of the interior of the Andes, the same division of cacti into zones which we had already discerned upon the western flanks of the range, in going from the coastal desert to the higher ground.

After having completed our work in the vicinity of Salcantay, we set off once more towards the North on our return route to Lima, making use of the Carretera Central. This boldly constructed road rises by a series of hairpin bends close to Limatambo, in the valley of the Apurimac, towards the high plateau of the Puna. The view of the superb gorge of the Apurimac is breathtaking. In the space of but a few hours we are witness to a change in the vegetation which is difficult to conceive; one climbs into the frigid Puna, after having left the tropical zone, redolent with cacti, bananas, sugar cane and oranges. The road offers in consequence a continuous change of landscape and climate. By turns, we find ourselves now in parts dry and high, now in parts of cold and ice. We are compelled, in the course of a single journey, to get through a difference in altitude of 8,000 m!

In the Puna of Andahuaylas, we discovered a new species of *Oroya*, identified by Backeberg under the name of *Oroya depressa*. The reddish body, deeply embedded in the ground, could reach — in old age — a diameter of 20 cm and a height of 10 cm. It is met with now as an isolated individual, now in clumps, forming compact cushions, in the same manner as the cushions of *Tephrocactus floccosus*. The carmine red flowers are only 1.5 cm in diameter and the length of the red fruits can reach 1 cm. The habit and at the same time the colour of the flowers indicates a close relationship with *Oroya peruvianus*, but this new species differs markedly from the latter by its smaller flowers and by the fact that it grows in the extreme south of the country.

From Andahuaylas we descend towards the arid valley of the Rio Pampas. Once more, thousands of cerei in the shape of columns occupied the arid slopes and the half-deserts. Their zoning is the same as that which we have observed in the valley of the Apurimac. The road climbs once again up towards the Puna and then

descends once more towards the dry part of the valley of the Mantaro to end at the little town of Ayacucho. The landscape which surrounds this spot is characterised by chalky, yellow, or reddish mountains. These last are so heavily populated with cacti that their slopes, viewed from a distance, seem to be green.

Opuntia pachypus from Mexico is to be found there in abundance: their stems are furnished with dense clumps of cochineals. Ayacucho was at one time the centre of the cultivation of the cochineal and the *Opuntias* were doubtless imported and used for this purpose. The introduction of less costly aniline colours has completely eliminated the industry of colouring materials with a base of cochineal and the Indians prefer to have recourse to the former sort for dyeing their garments. The *Opuntias* have remained and propagate more and more over the countryside. Numerous cerei are likewise to be found in the form of columns, amongst which there doubtless exists some new varieties of the genus *Corryocactus*, *Cleistocactus*, and *Azureocereus*. As we have not been able to observe fruits and flowers, their identification has not been possible. It will be well worth while to explore this area once again at the time when the cacti are in flower.

The further we descend into the valley of the Mantaro, the more the appearance of the countryside takes on a desert-like appearance. The yellow colour of the clay sediments and the dead leaves, the yellow brown colour of the scorched herbs and the immense candelabras of *Azureocereus nobilis*, already referred to above, reminded us of the deserts on the coastal side. There, we also discovered a new variety of *Morawetzia doelziana* (*M. doelziana* v. *calva*, nov. var.) which differs from the type species by the complete absence of wool garnishing the areoles.

The road now runs along the valley of the Mantaro, narrow and hemmed in with very steep sides and we are obliged to pass through the "Majorada" a gorge which we have been told was the most formidable route — "the worst shambles of a main road in the whole of Peru". Although this road was narrow and literally walled in between the steep slopes, soft and marly, it is not dangerous in times of drought. The appearance of the Majorada would doubtless be quite different in the rainy season and the road is doubtless often cut by landslides.

At the end of the gorge, where the valley opens out, we had the opportunity to collect again the true *Morawetzia doelziana*, which forms handsome clumps on the dried up fluvial terraces. Now the valley widens out more and more and, between Huancaya and Yanya, there extends up to an altitude of 3,000 m a monotonous cultivated countryside. As the harvesting had finished in the fields and as the spring flowers had passed, this area exhibited an aura of desolation. The countryside became more alive from some kilometres to the south of Oroya, where limestone hills again come closer to the course of the river. On the gravel terraces, we once more harvested a new variety of Oroya, whose flattened body, of 15 cm in diameter, was deeply embedded in the pebbles. The colour of the slim spines radiating from the areoles, markedly incurved and interwoven, vary from white, through yellow, to reddish. The little flowers are carmine red. We did not have any opportunity to see fruits on them.

With our return to Oroya, we have achieved the first part of our extensive exploration of Peru. Having been on the move for five months, we have seen many interesting times and we can be pleased with our harvesting.

Comments

..... from H. Middleditch

"I am rather puzzled by the reference to *Opuntia pachypus* imported into Peru "from Mexico". From all accounts this species is indigenous to lower valley of the Eulalia, above Lima, and the adjacent Lurin valley. It is not a tremendous distance from that region over the top of the western range of Andean peaks to the site at Ayacucho."

..... from Prof. W. Rauh

"You are quite right that *Opuntia pachypus* grows only in Central Peru and not in Mexico. I had overlooked this mistake and am glad that you have cleared it up."

..... from G.J. Swales

"In describing the "Majoranda" gorge, Prof. Rauh observes that the steep walls were "molle et marneuse" - that is, soft and marly. Marl is defined by A. Geike as 'an accumulation in lakes of remains of crustaceans and of fresh water algae, or in salt water of shells as in oyster banks, which subsequently become a white chalky deposit of a crumbly nature'. It would appear that the implication is that the marl is slippery when wet.

"When iron is present in marl the colour becomes red. We find H.B. Woodward stating that "red marl

is used for brickmaking in Leicestershire and Derbyshire," thus indicating that red marl is a mixture of chalk and clay.

"The reference to the marly slopes at Majorada is shortly followed by the observation that "limestone hills again come closer to the river". This would suggest that it may be limestone marl at the Majorada gorge, not red marl."

..... from R.H. Kirkpatrick

"With reference to the comments on *Opuntia pachypus* seedlings (above and Chileans Vol. 5 No. 19 p. 237), I would like to give you the following information. As opuntias are very unpopular types for pot cultivation, apparently very little information has been printed about their reproductive methods. *Opuntia pachypus* may be one of the few types of opuntia that do not use seeds as a method of propagation. Some of the opuntia spp here in the U.S. are odd in that they produce fruit with partially matured seed in them but the seed pod never fully matures to the point of producing viable seed, nor do they ever release them. These seed pods, whole, are the only method of reproduction.

"They usually remain on the branch, unripened, and eventually either turn into another branch of the plant or get knocked off to the ground. There they strike roots and become another plant. Of course many of these fruit are eaten by the animals and thereby restricting the number that could produce new propagation. We grow *O. pachypus* here but so far have never had a seed pod on them to establish whether they do this or not. Perhaps another Chilean member may be able to clear this up if they have grown it.

"*Opuntia fulgida* and *O. bigelovii* are two examples of this type of behaviour.

"Do you know of anyone ever having actually seen a seedling of *O. pachypus*?"

..... from T. Lavender

"Some years ago we purchased three plants of *Opuntia pachypus* from John Cox's Seacroft nursery, near Scarborough; he grew most of his plants with a free root run but without any winter heating and his stock was pretty well wiped out over one cold winter. He told us that these three plants were grown from seed - from Winter's seed. I remember seeing the Winter catalogue of about 1958 or 1959 which listed this seed.

"The imported plants of *O. pachypus* which I have seen have been more strongly spined."

FLORAL GEOGRAPHY of the PERUVIAN ANDES - 3: The inter-Andean Valleys. By A. Weberbauer. (From J.F. McBride "Flora of Peru" Field Museum of Natural History - Botany, Vol. X111)

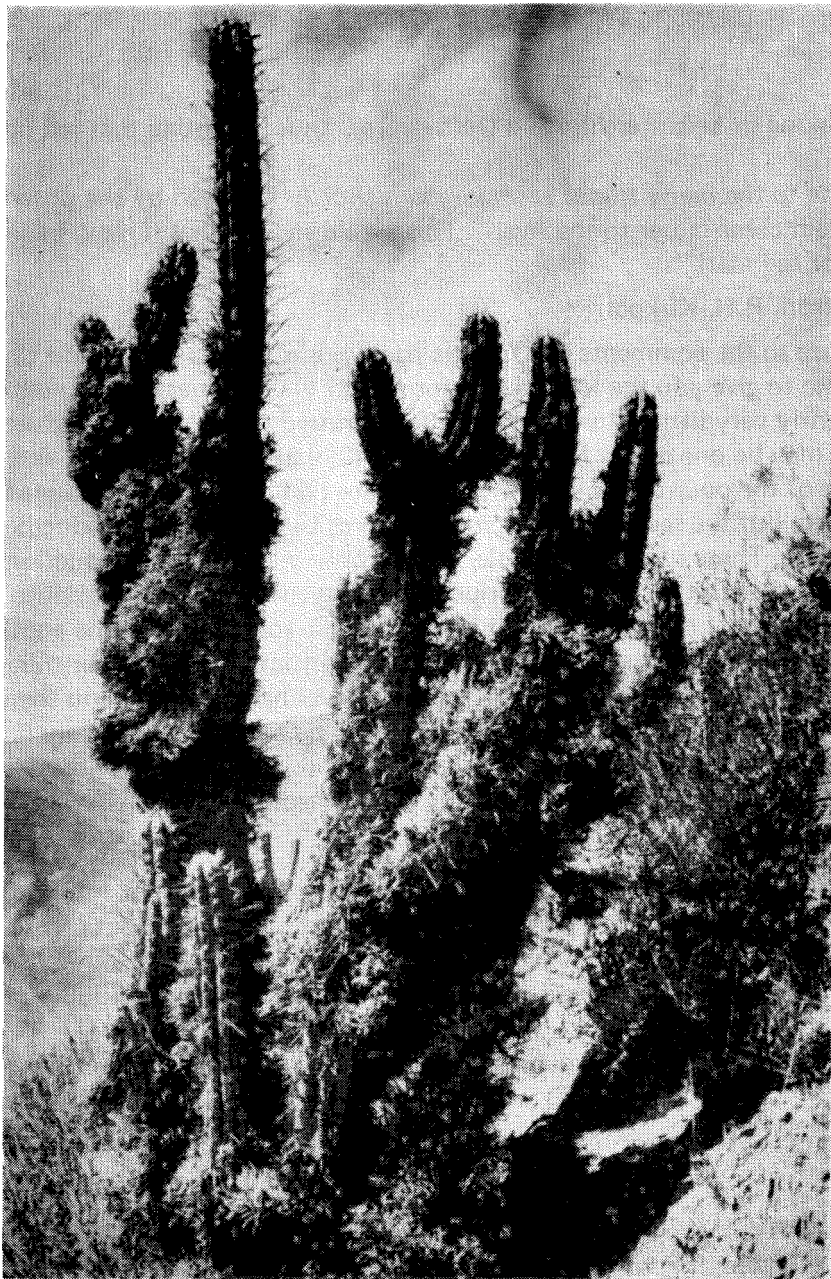
The inter-Andean valleys of central and southern Peru resemble floristically the west of central Peru, but are poorer in species. They are better watered and in higher regions perhaps have also a moister climate than the plateaux.

While the wide flat valleys differ but little from the plateaux in their vegetative conditions, the narrow, deep, canyons, enclosed between steep walls, show some remarkable peculiarities. To be sure, the columnar cacti, rainy-green shrubs, and short-lived herbs are characteristic formation elements here also, but the flora is richer in species than on the plateaux and has great similarity to that of the central Peruvian west. The woody plants develop more vigorously. The evergreen *Schinus molle* occurs much more oftener and sometimes becomes a tree. The genus *Puya* becomes very striking by its larger number of individuals. The gigantic, succulent leaf clusters of the genus *Fourcroya*, which, however, reaches its southern limit in the valley of Cotahuasi, and the tall thick-stemmed shrub *Carica candicans* constitute important elements of the xerophytic vegetation of these valleys, while on the plateau they are missing.

Certain frequent species of the plateaux are represented only by scattered individuals in the valleys or are entirely wanting. On the upper border of the region, besides the annual herbs, bulbous and tuber-bearing plants and perennials with rhizomes become important. On the whole, we may say that the vegetation of the canyons is less xerophytic than that of the plateaux.

In the high valleys of tall shrub-like *Opuntia* related to *O. subulata* is a common plant. Although *Lepidophyllum quadrangulare* extends regularly over the plateaux, it is less developed or entirely wanting in the valleys and it seems to grow by preference on dry, sterile soil.

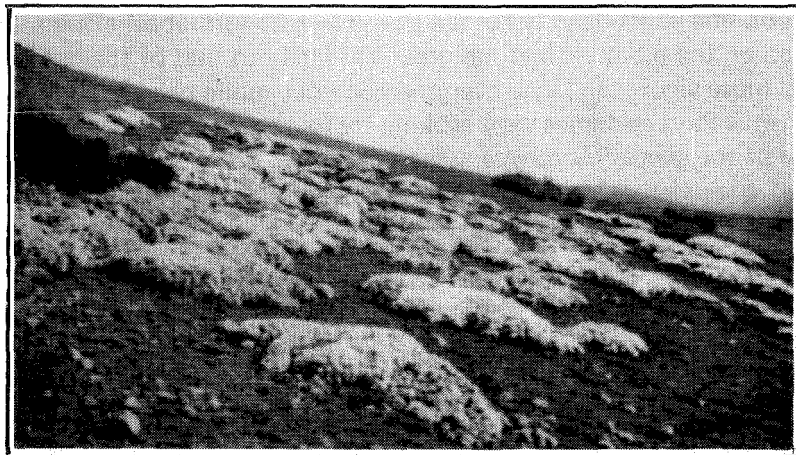
The grass steppe with scattered shrubs is found both on plateaux and also in some valleys. Its composition is not the same in both cases, especially as regards the shrubs. In the valleys, in the place of



TRICHOCEREUS TARMAENSIS from above Tarma at
at 2,500 m - overgrown with *Tillandsia virescens*.

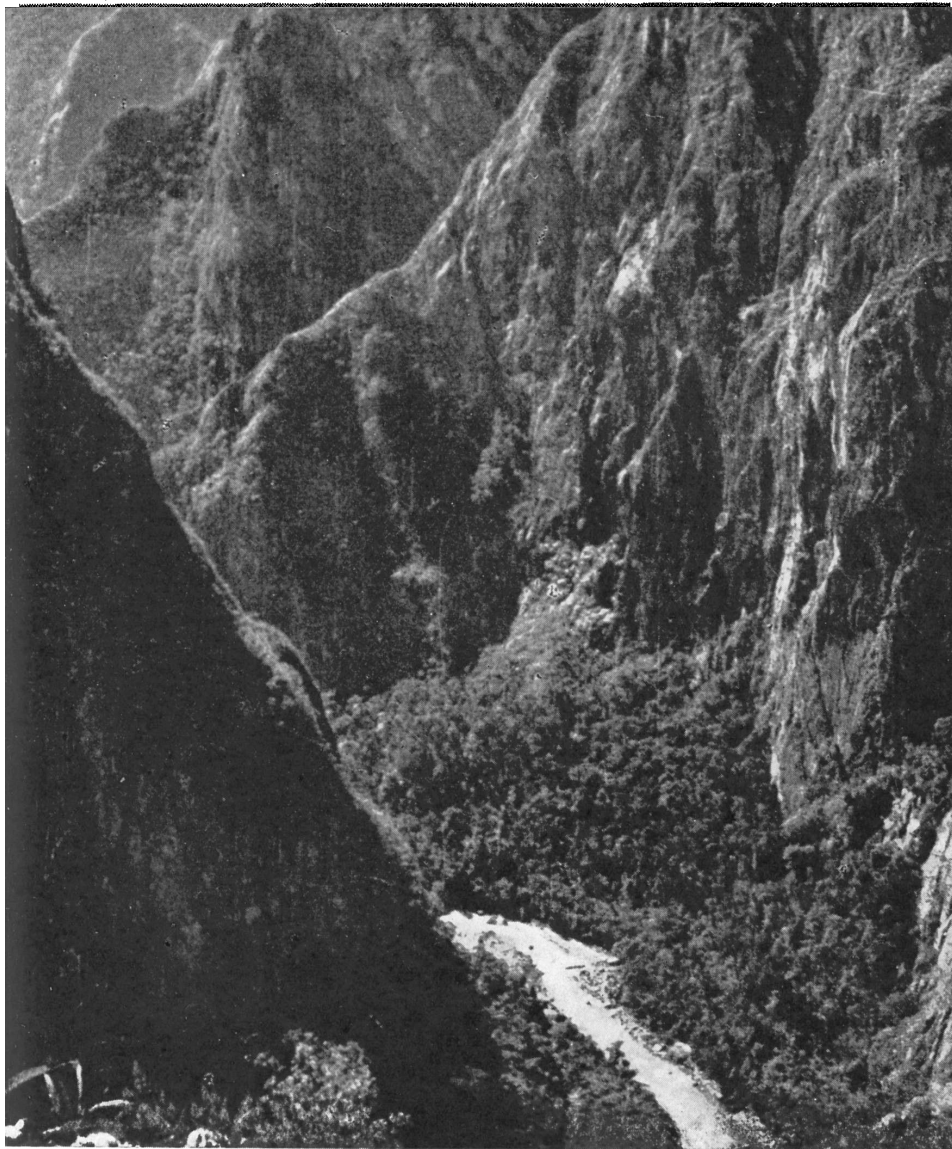
BACKEBERG - DIE CACTACEAE VOL II

Photo - RAUH



TEPHROCACTUS FLOCCOSUS on high puna plateau
near Oroya at 3,800 m CACTUS (FRANCE) 11, 50 : 1956

Photo - RAUH



The lower reaches of the Rio Urubamba valley.

Photo - GOODSPEED PLANT HUNTERS in the ANDES



Deep, steep-walled
gorges of
the inter-Andean
river valleys

Valley of the Rio Apurimac

PHOTO - RAUH

Lepidophyllum quadrangulare and other species, there occur many shrubs that recall the flora of central Peru, such as *Mutisia viciaefolia*, *Barnadesia dombeyana*, *Hesperomeles pernettyoides*, and *Monnina crotalarioides*. Often there are vigorous dicotyledonous herbs growing among the grasses.

Descending the rivers in these inter-Andean valleys, there are changes in the vegetation, which depend partly on the moister climate and partly on the increasing depth of the valleys. Near the western cordillera below the Puna where these rivers rise, there is usually a section of valley whose vegetation is about the same as that in the highest region of the western slopes of central Peru. Rainy-green grass steppe with scattered shrubs is the predominant formation. Along the brooks there are narrow strips of woody plants. In some valleys in the south the tola heath penetrates from the western Cordillera.

At greater depth in the valleys there appear on their floors and on the lower part of their walls xerophytic formations in which columnar cacti are conspicuous, with herbs and woody plants that have green leaves only during the short rainy season. At first these cactus formations are like those of the western Andean slopes, but further down the valley they assume a different, savanna-like character because of the greater amount of grasses and the appearance of small trees. On the higher elevations of the valley walls one notices, approaching the eastern margin of the Andes, that the periodicity of the vegetation disappears more and more. The shrubs in the grass steppe become more numerous, until at last they unite in evergreen stands that are independent of the watercourses and alternate with patches of grass steppe. The shrubs here are partly elements of the east-Andean flora which we shall find in the ceja de la montana. Thus in deeply cut valleys there is a strong contrast between the higher and lower parts of the valley walls; above the vegetation is hygrophilous, below it is xerophilous.

THE APURIMAC & TRIBUTARY VALLEYS

In the valley system of the rivers Apurimac, Pachachaca, and Pampas, the floral geography of the Apurimac valley downward from the mouth of the river Pampas does not belong to the inter-Andean, but to eastern Peru. Therefore that part will not be considered here.

I travelled along the valley of Chalhuanca from its beginning to the place where it meets the valley of Antabamba. By the confluence of the two rivers the Pachachaca is formed. In places the tola heath of the western cordillera penetrates into this valley, as above Sanaica, where it descends to 3,700 meters. Then grass steppe with scattered shrubs becomes the dominant formation. After this, at 3,300 to 3,400 meters, follows the same treeless, herb-poor cactus vegetation which we have found on the western slopes of the Andes. In this, at 3,100 meters, we also find *Fourcroya*.

At 2,700 meters the character of the cactus formation changes by the appearance of thick-stemmed, small trees of *Carica lanceolata*, which have a height of as much as ten meters, and are called here *jalasacha* ("naked tree") because they have leaves only during a short period. This plant becomes very frequent. At 2,500 meters the columnar cacti disappear, except a few isolated individuals, and the first low *Bombax* trees are seen. Shrubwoods in which, besides rainy-green types, the evergreen xerophyte *Dodonea viscosa* takes prominent part, then becomes the main formation down to about 2,400 meters, where columnar cacti, probably of different species than those above, again appear as characteristic plants and, together with *Bombax*, etc., grow on grassy soil. Here begins the savanna-like xerophytic formation which we shall find in the valleys of the Pachachaca, Pampas, and Apurimac.

The valley of the Pampachiri, a river tributary to the Pampas, I saw only in its extreme upper part, where I observed that the tola heath descended to 3,600 meters. Another tributary of the Pampas, draining the valley of Aucara, I explored, descending from the western cordillera down to a ford called Vado de Collay, which lies at 2,850 meters. From the western cordillera onward the tola heath extends down to 3,600 meters. Farther north, at the same altitude, grass steppe with scattered shrubs takes its place. Below, the tola heath is succeeded by the treeless herb-poor cactus vegetation of the west. I did not reach its lower limit.

The lower valley sections of the Pachachaca, Pampas and inter-Andean Apurimac are a region of savanna-like xerophytic formations. Where the Apurimac cuts through the eastern cordillera and finds an outlet to the tropical forest land, it meets with the Pachachaca, Pampas, and smaller rivers. Spreading out from this territory, savannah-like xerophyte formations are the prevailing vegetation on the valley floors and the lower part of the valley walls. In the valley of the Apurimac they probably reach nearly to Cotabambas. They accompany the whole Pachachaca and border the lowest parts of the Rio de Chalhuanca and of the Rio de Antabamba, by whose union the first stream is formed. How far this vegetation extends in the valley of the Pampas is still uncertain. I studied it only in the valley of a tributary whose source lies southeast of Andahuaylas. The upper limit lies lower where the rivers approach the humid forest region of

the east. At 13° 20' it lies at 1,800 meters altitude in the Apurimac valley; further south it is located at 2,400 meters in the same valley as well as in that of the Pachachaca.

The most characteristic plants are the columnar cacti (*Cereus*), *Fourcroya*, *Puya*, *Pitcairnia*, and small trees of *Bombax luizii*, which the inhabitants call *pati*. Another low tree of this formation is *Piptadenia colubrina*. Species sometimes tree-like and at other times shrubby are *Acacia macracantha*, a *Prosopis* related to *P. chilensis*, *Cercidium praecox*, and *Aralia weberbaueri* (*halhuinco*). Of frequent shrubs there may be mentioned *Kageneckia* species, *Jatropha* species, and an erect-growing *Ipomoea* with great white flowers and cordate leaves that is known by the people as *jemanta*. On branches and rocks the grey *Tillandsias* grow exuberantly, for instance, *Tillandsia usneoides*. One of the main elements of the grass field, that is looser and lower than in the real savannas, is a *Bouteloua*, which is perhaps *B. curtispindula*. During the dry season most of the trees and shrubs lose their foliage, and the grasses and other herbs dry up. Only a few woody plants have evergreen foliage. Among them is *Schinus molle*, which, however, is scarce or entirely wanting in the proximity of the tropical forest region. *Caesalpinia tinctoria* also shuns this territory.

At some places, especially where the gently slopes or small depressions favour the gathering of rain water, the trees and shrubs of the savanna-like formation form loose rainy-green brushwood.

In some places the lateral valleys of the Apurimac have broad, flat, and gently inclined floors. In such localities the rivers are accompanied by tall evergreen woods, containing shrubs and trees that may be called, according to the smaller or larger proportion of trees, bushwood or bush forest. Such evergreen bushwood and bush forests of the river banks are found, for instance, below Abancay at 2,200 to 2,300 meters, and especially below Limatambo at 2,300 to 2,600 meters. The tallest tree is *Erythrina falcata*, called *pisonay* by the people, and often planted in the villages of the departments of Cuzco and Apurimac. *Salix chilensis*, *Sapindus saponaria*, and a *Ficus* also develop into stately trees. *Escallonia pendula* (*pauca*), *Schinus molle*, *Alnus jorullensis*, and *Acacia macracantha* are sometimes trees and sometimes shrubs. As genuine shrubs may be named *Piper* and *Croton* species, *Stenolobium molle*, *Caesalpinia tinctoria*, and the naturalised *Spartium junceum*.

The vegetation of the upper regions of the high valley walls, lying between the xerophytic region and the Puna, shows plainly that the humidity of the climate increases as we approach the tropical forest region, that is, going toward the north or northwest along the rivers Pachachaca and Apurimac, or toward the east following the Pampas. In place of the grass steppe which contains only scattered shrubs, there gradually appears stands of shrubs in which periodicity diminishes more and more until at last the evergreen type predominates. Between this hygrophilous vegetation and the savanna-like xerophytic formation lies a narrow, preponderantly rainy-green belt, in which bushwoods and shrubwoods alternate with grass steppes, while the cacti are scarce or entirely wanting.

THE URUBAMBA VALLEY

The inter-Andean part of the Urubamba valley breaks through the snow-covered eastern cordillera in a deep gorge between Torontoy and Colpani. Here, above Machu Picchu, ends the inter-Andean section of the valley. It presents in its vegetation and flora a great resemblance to the western Andean slopes of Central Peru, except in its lowest part, where the influence of the moist eastern climate becomes evident. From the puna, where the Vilcanota (the uppermost part of the Urubamba) rises, the grass steppe with scattered shrubs extends down to 3,100 or 3,000 meters. Between 3,600 and 3,400 meters more or less from Sicuani to Checcacupe the grasses and other herbs often become scarce or are even wanting, and thus the ground between the shrubs is bare. The cause of these local anomalies is unknown. In some places the columnar *Cereus cuzcoensis* ascends to 3,500 meters. It grows chiefly on rocks and stone fields, also near houses and cultivated ground where it is planted for hedges, and occasionally becomes wild. The upper limit of *Schinus molle* lies comparatively high in this region, at 3,400 meters.

Between 3,100 and 3,000 meters a treeless, mostly herb-poor cactus formation begins whose characteristic plants are columnar *Cereus* species, *Puya*, *Pitcairnia*, *Fourcroya*, and rainy-green shrubs. *Tillandsia usneoides* and other *Tillandsias* live on rocks and as epiphytes. Near the lower limit, which lies at 2,650 meters between Tanccac and Torontoy, the herb growth becomes denser and the number of shrubs increases.

The transitional region between the inter-Andean and east-Andean vegetation reaches from 2,650 meters down to 2,350 meters (Quellumayo). Grass steppe and loose thickets, often independent of watercourses, prevail here. The cacti become scarce and at last disappear. *Schinus molle* and *Caesalpinia tinctoria* cease

being characteristic plants and retire to the floor of the valley, avoiding the moist air at the heights. At 2,350 meters some east-Andean types appear, such as *Bejaria*, *Clusia*, and *Oreopanax*.

THE PAUCARTAMBO VALLEY

Much shorter than the inter-Andean course of the Urubamba is the corresponding section of the river Paucartambo. Here again we find the uppermost and the lowest of the three regions of the inter-Andean Urubamba, but the middle one, that is, the cactus region, is almost completely suppressed. Only small remnants are recognisable near the town of Paucartambo, at 3,000 meters. A little below Challabamba the east-Andean vegetation may take the place of the inter-Andean one.

THE MANTARO VALLEY

The valley of the river Mantaro has a strangely tortuous course. At first it runs southeast, then northwest, afterwards north-northwest, and at last it is directed towards east-northeast. It flows into the Apurimac on the eastern side of the Andes at 400 meters. At the mouth of the Rio San Bernardo, the inter-Andean part of the Mantaro valley ends. In the valley floor and on the lower part of the valley walls, there are three sections distinguishable.

Firstly, from the puna (somewhat above Oroya) to Ingahuasi. The elevation of the valley floor is 3,900 to 3,150 meters. The prevailing formation is grass steppe with scattered shrubs, in composition and life conditions similar to the corresponding vegetation of the western Andean slopes. Near Huancayo the valley has a broad, flat floor utilised almost wholly for agriculture, consequently it is only on the valley walls that there are patches of natural vegetation. Somewhat above Ingahuasi the valley becomes very narrow.

Secondly, from Ingahuasi down below Tablachaca, where the elevation of the valley floor is 3,150 meters down to 2,700 meters. Grass steppes alternate with shrubwoods. These are often independent of the watercourses and consist chiefly of rainy-green types, but they contain also some evergreen xerophytes. With diminishing altitude the periodicity of the vegetation increases. Fourcroya and columnar *Cereus* species grow here. *Tillandsia usneoides* grows on branches, and on the rocks are often found *Tillandsias* with broad green, not grey, leaves. As examples of frequent shrubs may be mentioned *Piqueria peruviana*, *Jacobinin sericea*, *Pineda incana*, *Dodonea viscosa*, *Maytenus andicola* (evergreen), *Cantua pyrifolia*, *Kageneckia glutinosa*, *Schinus molle* (evergreen), *Caesalpinia tinctoria*, *Durnate triacantha*, *Colletia spinosa*, and *Stenolobium sambucifolium*. Restricted to moist brook ravines, there are evergreen bushwoods remarkable for their *Cedrela* and *Weinmannia* trees.

Thirdly, from Tablachaca to the mouth of the Rio San Bernardo, the elevation of the valley floor is 2,700 down to 1,100 meters. This section is characterised by its savanna-like xerophyte formations. The columnar *Cerei* and other cacti are represented by a larger number of species and individuals than in the foregoing part of the valley.

Above 2,300 meters the monotypic *Haplorhus peruviana* is the most important tree. It extends also into the preceding section. This evergreen xerophyte, which grows to about six meters and resembles a weeping willow, had not been found previously in any other part of Peru. With it are associated several decidedly rainy-green woody plants which become still more frequent further down, for example, the small tree *Carica lanceolata* and isolated individuals of *Bombax ruizii*; the either tree-like or shrub-like *Aralia weberbaueri*; and the shrubby *Iponoea* known as *jemanta*.

About Mayoc, at 2,250 meters, where the Mantaro turns back towards the north-west, is the driest part of the valley. Trees, apart from those on the river bank, are hardly to be found, and the growth of herbs is so sparse that there are large naked patches of soil. Thus the vegetation exhibits here about the same aspect as in the cactus regions of the western Andean slopes of central and southern Peru. How far this extremely dry part of the Mantaro valley extends downward is not yet known. The same vegetation conditions exist in the valley of a tributary that comes from Ayacucho and empties near Mayoc.

I could examine the Mantaro valley more carefully from the bridge of Huayo, which lies below Colcabamba at 1,500 meters, down to the mouth of the tributary San Bernardo. Here again the savanna-like xerophyte formation is typically developed and has a richer flora than in the preceding section. The characteristic plants are largely such as exist also in the inter-Andean valley system of the Apurimac. Among the small trees are *Bombax ruizii*, first in abundance, *Piptadenia colubrina* (*huilco*), and *Acacia macracantha*. Species that are either trees or shrubs are *Caesalpinia corymbosa*, *Prosopis* species (closely related to *p. chilensis*), *Aralia weberbaueri*, *Jacaranda acutifolia*, and *Cercidium praecox*. Of the many true shrubs there may be mentioned the *jemanta* (*Ipomoea* sp.), *Stenolobium* sp. (*S. arequipensis?*), *Bursera gravolens* (*huancor*), *Jatropha longipedunculata*, and *Jatropha* sp. (*Cnidoscyles*). Except *Prosopis* and *Acacia*, perhaps also

Stenolobium sp., the woody plants mentioned are rainy-green. *Schinus molle* and especially *Caesalpinia tinctoria* are much rarer than in the higher parts of the Mantaro valley. Besides the dicotyledonous woody plants, the columnar *Cerei*, *Fourcroya*, *Puya*, and perhaps also *Pitcairnia*, are important elements of this formation, as in other places. Of the grasses, *Bouteloua curtipendula* is the more abundant, but other common ones are *Heteropogon contortus*, *Nazia aliena*, *Papophorum alopecuroideum*, and *Cottea pappophroides*. In the herb fields there are many annual Dicotyledoneae and some tuber-bearing plants. *Tillandsia usneoides* and other grey-leaved *Tillandsias* grow as epiphytes. In depressions and along some watercourses the trees and shrubs of the savanna-like formation unite to form a preponderantly rainy-green bushwood.

As in the Apurimac system, here also the upper limit of the savanna-like formation lowers as we descend the river. This line runs at 2,800 meters along the upper part of the valley and at 1,800 meters in the lower part.

On the upper regions of the high valley walls, the relation between the distribution of climatic humidity and the character of the vegetation is clearly visible. This changes in the same manner as in the corresponding regions of the Apurimac system. In the west there prevails the distinctly periodic formation of the grass steppe with scattered shrubs. It is especially well developed in some lateral valleys, as about Acobamba and Ayacucho. Toward the east the periodicity diminishes and the number of shrubs increases. At last evergreen woodlands alternate with slightly changing grass steppes.

Between this vegetation and the extremely xerophilous one there lies, as along the Apurimac, a transition belt, preponderantly rainy-green but poor in cacti, formed sometimes of grass steppes, sometimes of woody plants. Among the latter *Dodonea viscosa* and *Adenaria floribunda* are frequent shrubs.

THE TARMA VALLEY

The valley of Tarma is drained by one of the rivers tributary to the Perene, which empties into the Apurimac. In the part which is to be considered here the valley floor occupies an elevation between 2,700 and 3,800 meters. The lower region is distinguished by a treeless herb-poor vegetation of cacti and rainy-green shrubs whose upper limit lies rather high, at 3,300 meters. Above this succeeds the rainy-green formation of the grass steppe with scattered shrubs. At 3,800 meters the transition to the puna takes place. Below 2,700 meters the grass steppe and shrubwood, both rainy-green, provide a transition between the dry Tarma valley, that reminds one of the western slopes, and the moist evergreen regions of the east, which we shall consider later.

Comments

..... from H. Middleditch

"Of the river valleys named in the foregoing article by Weberbauer, the greater number can be located on the map which appears on p. 140 of *Chilensis* No. 24. The changing nature of the valleys from the broad floor depicted in the photographs of *Azureocereus* to the narrow, steep-walled canyon, may both be seen from the photographs taken by Rauh which accompany the preceding article in this issue".

AZUREOCEREUS Akers & Johns. C. & S. J. (US.) XXI:5. 133. 1949
(Originally "*Clistanthocereus*" pro parte, in *Backeberg*, J. DKG., (II), May 1937, 24)
(Translated by E.W. Bentley from C. Backeberg "*Die Cactaceae*" Vol. II)

A genus of gigantic columnar cacti from inner Peru which was unknown for a long time. It was certainly first described in 1949 but its type had been known for 18 years. During my Peru expedition of 1931 my collaborator of that time, Hertling, visited the Tio Mantaro and Tio Huanta districts for me and took photographs, including the first shots of the two large *Azureocereus* species. One of them was published in J. DKG, May 1937, 24, as *Clistanthocereus hertlingianus* and it is remarkable that Akers and Johnson overlooked this annual publication which was at that time fairly widely distributed.

Hertling arrived at about fruit-ripening time and saw only one flower, high up, that he could not reach because he had no suitable implement. He saw however that it was a cylindrical flower, and since similar humped cereoids with cylindrical flowers grow in the Huaraz district, and the fruit resembled the drawing of Britton & Rose (*The Cactaceae* IV, 278. 1923), I could do nothing else than place the species in the genus

Clistanthocereus (day bloomer) set up by me at that time for cylindrical, slender and short-brimmed flowers and plant bodies with strong ribs made up of humps. In regard to the two Hertling cereus pictures, (*A. hertlingianus* was pictured first in 1937 in the above mentioned journal issue, and *A. viridis* n. sp. previously in Backeberg: *Kakteen-Index*, 49, 1936, without a name), I was of the opinion that they were of one and the same species, for Hertling produced only the pictures and no supporting data. Then when I was again in the Mantaro area in 1936 I decided that searching the Rio Huanta region was unnecessary and I searched through the zone north of Mariscal Caceres. It was left to Professor Rauh through a further search of the Huanta district to throw light on the *Azureocereus* species after Akers and Johnson had already set out the characteristics of the separate genus *Azureocereus* with the criteria: "Night bloomer, somewhat more oblique flower rim, roof-tile-like scaled, soon dry fruits; flower tube cylindrical, lightly curved". Here belongs also *C. hertlingianus*, placed at one time by me in *Clistanthocereus*. As to which of the two species this is - either that chosen by Akers and Johnson as the type of their genus - or the second species now put forward by Rauh, is proved by the habitat shots.

Akers and Johnson's type, *A. nobilis* according to their photos (in *C. & S. J. (US)*, 133, 135, 1949) is the long-spined species. With this coincides exactly my photo in *J. DKG.*, May 1937, 24 in illustration of my description of "*Clistanthoc. hertlingianus*". Since this is put forward as an *Azureocereus*, the type of the genus must be re-named as *Azureocereus hertlingianus* (Backbg.) Backbg. (Syn.: *Azureocereus nobilis* Akers & Johns.). It is the intensely blue-ish coloured species. With this new combination of "*Clistanthocereus hertlingianus*" not only is clarity brought to the species concerned but by it also there is retained a tribute to the first discoverer, 18 years before Akers and Johnson. The second species was characterised by Rauh as "green branches, up to 10 m. high"; the photos show that it is fairly short, and also less fiercely spined than *A. hertlingianus*, the fruit scales are drawn out into a point and the point clearly standing out (which is not the case in Fig. 90 of Akers and Johnson. l.c.). Rauh could not give flower details in 1954; but the otherwise great similarity of the plants shows that both belong to the same genus; *A. viridis* however grown taller and the ribs on old branches are more humped. For details of where Hertling and Rauh found the plants, see under the species descriptions. Since the plant pictured by me without a name in *Kakteen-Index* 49, 1936 is fairly short-spined, this second of the species photographed by Hertling is the new species *A. viridis*; the name indicates that this cereoid is green as opposed to the blue-green type of the genus. Hertling, for his part, had not mentioned this difference and perhaps assumed that these so similar columnar plants were variable in spination and branch colour. I could not decide at first whether one should regard *A. viridis* only as a variety of *A. hertlingianus* or as a separate species. Since however *A. viridis* grows taller and there are important differences in branch colour and spination, it seems to me that the preference should be for separate species ranking, especially as also the shape of the fruit scales is different and also therefore probably that of the scales on the tube.

Type: *Azureocereus hertlingianus* (BACKBG.) BACKBG. (Syn: *A. nobilis* Akers and Johns.). - Type habitat: On the Rio Mantaro, south of La Megorada, Peru, fairly distant from the mouth of the Rio Huanta and the Hertling discovery places (see under the species).

Occurrence: Middle Peru (Mantaro district and on Rio Huanta) at ca. 1800-2200 m. (according to Rauh).

Key to the species:

Columns up to 5-8 m. high, epidermis blue-green to blue, spines fairly long, 1 clearly bent down, fruit scales not sharply pointed and standing out 1: *A. hertlingianus* (BACKBG.) BACKBG.

Columns up to 10 m., epidermis dark green, spines fairly short, without a longer down-bent one, up to 2 cm. long: fruit scales widely triangular, sharply pointed and standing out 2: *A. viridis* RAUH & BACKBG.

Comments on *Azureocereus*

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

"In 1964 I bought a seedling from Johnson, labelled *A. hertlingianus*. It was 2½ cm in diameter and 5½ cm high, and had a fluffy fibrous root about 4 cm long. It is now 4½ cm x 19 cm high; a clear light green at the base, with the top 6 cm just barely covered with a film of blue. It has 9 ribs; 6 to 9 radial spines, straw color with a dark tip; central spines 1 to 2, golden brown with chestnut tip. The longest central spine is 4½ cm.

"In 1967 I found an *Azureocereus nobilis*, 6 cm in diameter x 17 cm high. It is now 6½ cm in diameter by 50 cm high. The stem is dull yellow green at the base, but is covered with a thick mat bloom in a marvelous shade of periwinkle blue, shading down to almost violet-blue. Some of the lower areoles have lost

the bloom just above the areole, and show the yellow-green. It is difficult to tell the radial spines from the central spines, but there are approximately 8 to 10 radials and 2 - 4 centrals, all about the same shade of goldenbrown, except that the centrals have a darker tip the longest central is 3½ cm. Plant has 9 ribs. If this plant were unmarked, it would be exquisite, but I was in Japan for 2 months and it got scale. The scale is purple, but that doesn't endear it to me."

..... from B. Chudleigh

"Our *A. hertlingianus* is 8 ft. tall, unbranched, raised from seed, planted in the ground about 5½ years ago when something well under a foot high, was very slow at first but must be putting on a good 2 feet per year now - it has less than 2 feet to go to reach the glass. Epidermis is a glorious pale blue-green varying on different parts of the stem according to age. From the photo in Backeberg's Lexikon the branches appear at about 5-6 feet above ground possibly only when the plant is 15 feet in height and after it has flowered, which mine has not."

..... from P. H. Sherville

"With regard to *Azureocereus*, my seedlings of *A. hertlingianus* germinated readily and grew at a steady rate throughout the season reaching 1½" high and about ½" diameter in the twelve months. They are fiercely spined and because of this seem to harbour mealybugs rather readily. They are also not resistant to Dimethoate, a number of my seedlings succumbed to normal dosages of this insecticide, as also did some of the *Echinocereus* seedlings. The other representative of the genus that I have is a plant purchased as *Cephalocereus nobilis* which I have seen lately as *Azureocereus nobilis*. This again is no bother to grow - it is steady and consistent and seems to be fairly hardy. Our contributor to the Chileans who produced the recent maps has a plant of this species which is growing beautifully, being kept in a temperature of around 40°F, compared with my own temperature of 60°F. This is surprising because in the March-April issue of the American Journal (Vol XLIII No. 2 p. 89) the I.S.I. offered four year old seedlings of *Browningia hertlingianus* from FR 149 seed with the comment that 'it is a tender species' (I.S.I. No. 664)".

..... from Am. Cactus & Succ. Journal Vo. XLIV. 1972

"*Azureocereus hertlingianus* - a pretty mess, taxonomically speaking! In 1949 Johnson & Akers proposed the new genus *Azureocereus* for their supposedly new species *nobilis* from Peru. Backeberg proclaimed, that (in so many words) this is nothing more than my species *Clistanthocereus hertlingianus*, described in 1937! I don't know how - he said - they could have overlooked it. Indeed, Backeberg had described a new species of *Clistanthocereus* from a black and white photograph taken by Hertling in 1931. He described the flowers as orange on wonder Johnson & Akers overlooked it! The flowers are actually black (dark brownish purple). Anyhow, apparently Backeberg's photograph was of the same species and the correct name has to consist of Backeberg's genus name and Johnson & Akers' species name. Back to the plant, its a beauty, with thick sky blue stems and long, yellowish, toothpick-like spines."

..... from Mrs. L. Teare

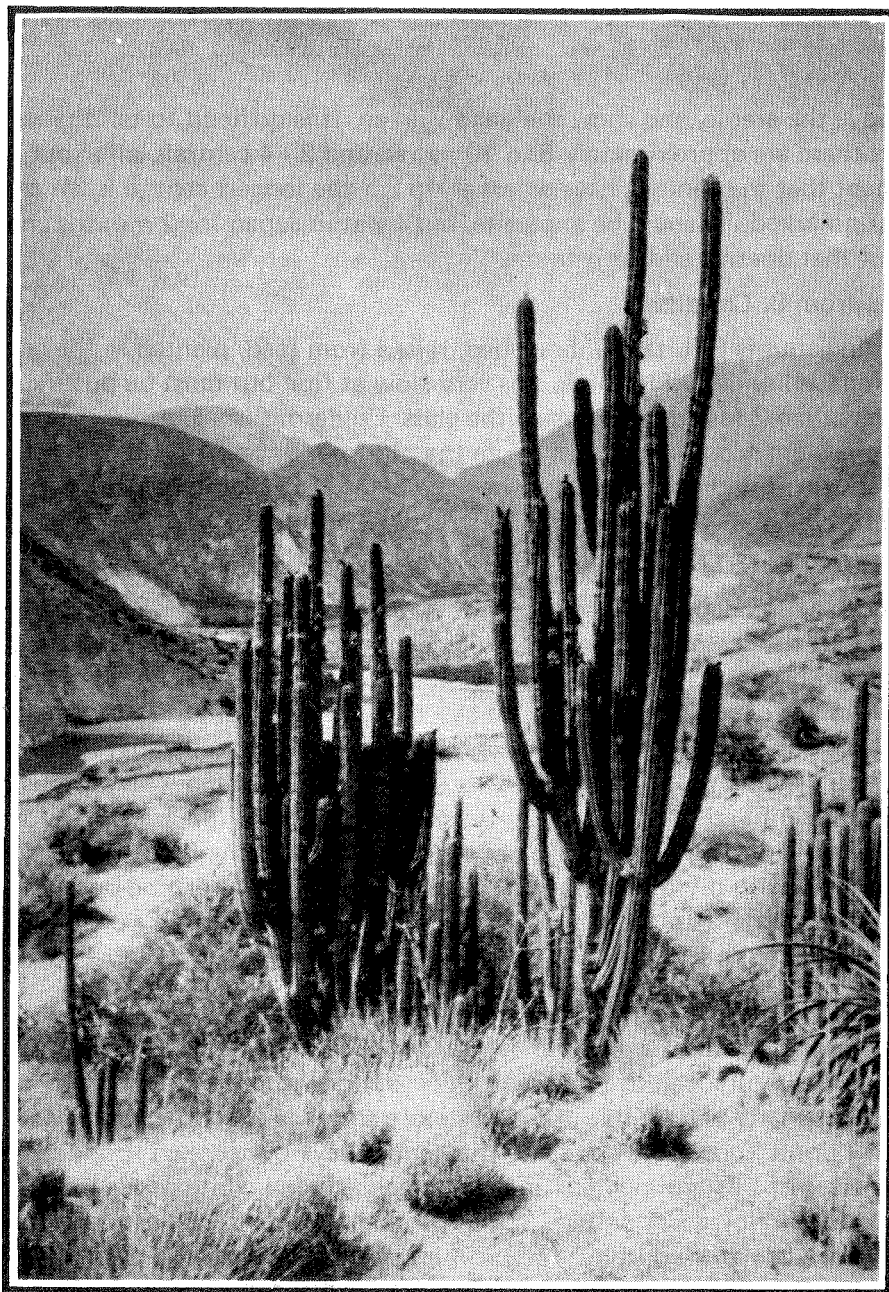
"Regarding *Azureocereus hertlingianus*, I have seen several growing in gardens, in tubs, and in glasshouses. Like all *Cereus*, they grow better outside; grown in tubs out of doors, they never seem to grow more than 3 to 4 ft. high. They have 8 or 9 ribs, the spines being golden brown to about half way up shading into reddish brown near to the top, with a narrow band of white near the areole on the top spines and in the apex only. The spines get longer according to the age of the plant; there are 9 radials and 1 central, all straight. The areoles are woolly near the apex, beige in colour, about 1¼" apart. When planted out in the garden they grow 6 ft. tall and flower at about 5 ft in height, with a small white nocturnal flower.

"Unfortunately the floods of the winter have destroyed many tall cerei. A 14 ft high *Neobuxbaumia* started rotting from the base, *Cereus* and *Cleistocacti* have collapsed. The Field collection in Victoria, started 40 years ago, was very badly affected. For many collectors plants have not flowered so well, owing to the poor winter and spring."

..... from H. Middleditch

"The extract quoted above from the American Cactus & Succulent Journal indicates that Hertling originally described the flowers of *Azureocereus* as orange and then goes on to state that the flowers are "actually black (dark brownish-purple)". From Mrs. Teare we hear that they are white. If nothing else, this provides a fair variety of colour, but it hardly seems likely that all these comments could be correct. In particular, I would be intrigued to see a black flower on any living plant.

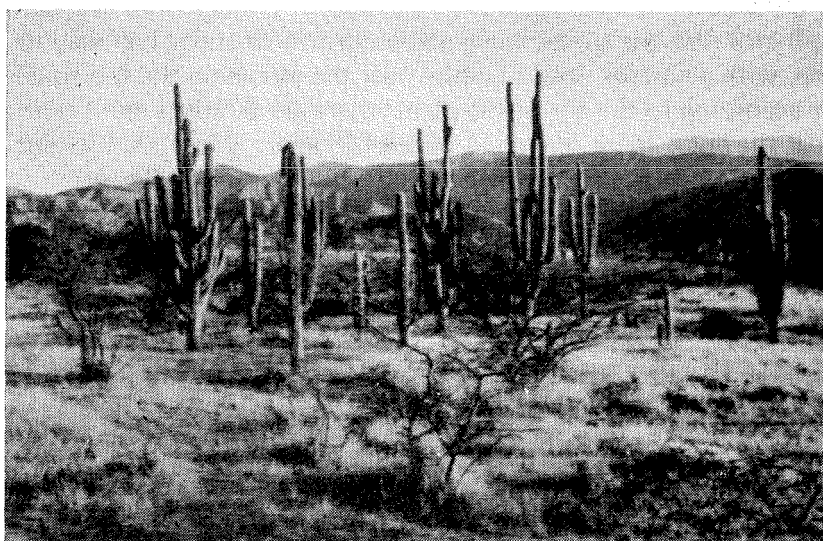
"In Backeberg's *Die Cactaceae* Vol II, the flower of *Azureocereus viridis* is given as white; the flower



AZUREOCEREUS VIRIDIS Rio Apurimac valley at 2,000 m

Photo - RAUH

CACTUS (France) 11.51:1956



AZUREOCEREUS NOBILIS Rio Mantaro valley near Huanta.

Photo - RAUH

PERUVIAN CACTUS VEGETATION - RAUH

of *Azureocereus hertlingianus* is described " according to Akers" as having white petals and brownish-purple sepals. Presumably this is where the writer in the *Am. Cac. & Succ. Journal* obtained his idea of the flower colour. It would be very nice to have a grower's description of a flower produced in cultivation, since the literature does not appear to be in complete harmony on this point."

..... from S.G. Laurence

"About four or five years ago I acquired a couple of seedling plants of *Azureocereus* which would then be somewhere about 2½" high. The *Azureocereus viridis* seems to have grown rather slowly and is now about 5" high, but *Azureocereus hertlingianus* has grown more rapidly, comparatively speaking, and is now about 10" or 11" in height. The epidermis is a lovely blue colour, especially when the plant is in active growth.

"I keep these plants adjacent to the back wall in my lean-to greenhouse. Although it is only heated with a paraffin burner and the overnight temperature does go down to the 40 mark or even below during the winter, I think that the thick back stone wall retains some of the daytime heat and the plants gain a benefit from this."

..... further from Mrs. L. Teare

"I enquired from my friend who grows and flowers *Azureocereus* and after seeing the flowers of *Backebergia militaris* he comments that they were remarkably similar to those on *Azureocereus*. The flower opens at night on *Azureocereus* and only stays open for a short period. The flower is nearly two inches long but the opening is small. The tube is very scaly and the scales are nearly black. The very short petals are whitish and reflexed, the anthers are also white. I shall be able to send you some buds by air mail; one or two buds have aborted instead of opening into flowers due to a cloudy spell."

..... further from H. Middleditch

"The three mature buds of *Azureocereus* were naturally darkened and dried on arrival in the U.K., but appeared to have retained their natural shape. They were 1½" long and just over ½" thick right from the base for most of their length, the petals opening out to about ¾" broad. The tube was completely covered with overlapping scales, about 3 mm broad by 5 mm high, all having a very finely toothed margin with serrations less than 1 mm high. If these scales are a very dark colour (deep purple or dark bottle green) it explains why the flowers were described as being "black", since only the petals at the very mouth of the flower appear to be white."

..... from F. Borg

"We are blessed here in Malta with a very good climate which makes of seed-raising child's play. The *Azureocereus* I have were raised from seed four years ago; having grown some 3" in two years, they stopped growing some two years ago. This has happened to other genera such as *Corryocactus* and *Eulychnia*. Well, this year I decided to take them all out of the greenhouse and I have put them out in the sun. The change has resulted in a phenomenal growth, and it is obvious that these plants need a lot of sun. As you can see, my *Azureocereus* are still too small to flower".

..... response from H. Middleditch

"The photographs of *Azureocereus* in habitat, two of those taken by Rauh being reproduced here, indicate that both grasses and low bushes are to be found growing in association with the *Azureocereus*. Is it likely that seeds which fall from the nature *Azureocereus* and come to rest within a bunch of grass, or under the shelter of a bush, will germinate and thrive better than those which fall on to bare ground and remain there? And if the seedling grows within the microclimate provided by this low vegetation for a couple of years, does it only then begin to face the glare and the dry heat of the unobscured sunlight? Is this why the two-year old seedlings of *Azureocereus* responded to their changed growing conditions?"

ABSTRACTS from TSCHIFFELY'S RIDE (1933) by A.F. Tschiffely

When the low houses of Puno, to the west of Lake Titicaca, had faded away in the distance, we came to a range of hills and after descending the other side we found ourselves on a plain where short, coarse grass grew. Much to my surprise the ground became boggy, but wishing to save time and distance I continued straight towards a cut in the mountains far ahead of us. I knew that this was the way we had to go towards Cuzco.

We were caught in several storms, but luckily these never lasted long, and the warm sunshine soon dried my dripping clothes. In the high parts of Peru it often happened that we were in glorious sunshine whilst only a few miles away a terrific storm was raging, and the thunder sounded as if we were in the midst of this heavenly bombardment, which made the ground quiver and tremble.

In a valley, situated at the foot of a high, steep cliff, Cuzco came in sight. On the hill, to the north-east of the town, is the old Inca fortress Sacsayhuaman and in the vicinity there are several other important ruins. Enormous boulders form the walls of the fortress. But few of these high blocks were cut square, and yet all were made to fit into each other. There are other important ruins in the close vicinity of Cuzco, the most interesting being those of Ollantaytambo and Pisac.

I was going to continue my ride towards the Pacific Ocean. We traversed a long and monotonous plain, and towards evening reached a high loma. The road now changed into a rough and winding trail, and when we came to the top of the loma an almost breathtaking view opened before our eyes. Far to the west, ranges and ranges of high peaks rose out of the tropical mists below. With the approach of late evening it was already getting chilly where we were, and I commenced the descent of the steep trail we had to follow down into the valley.

The further down we went the warmer it became, and after a while we were among semi-tropical vegetation, where numerous little green parrots screeched at our approach. Down and down we stumbled and slid, and presently mosquitoes and sand flies began to worry us. The rushing of wild waters could be heard, the atmosphere became damp and sticky and I knew that we were near the bottom. It was already dark when we arrived at a little place called Limantambo.

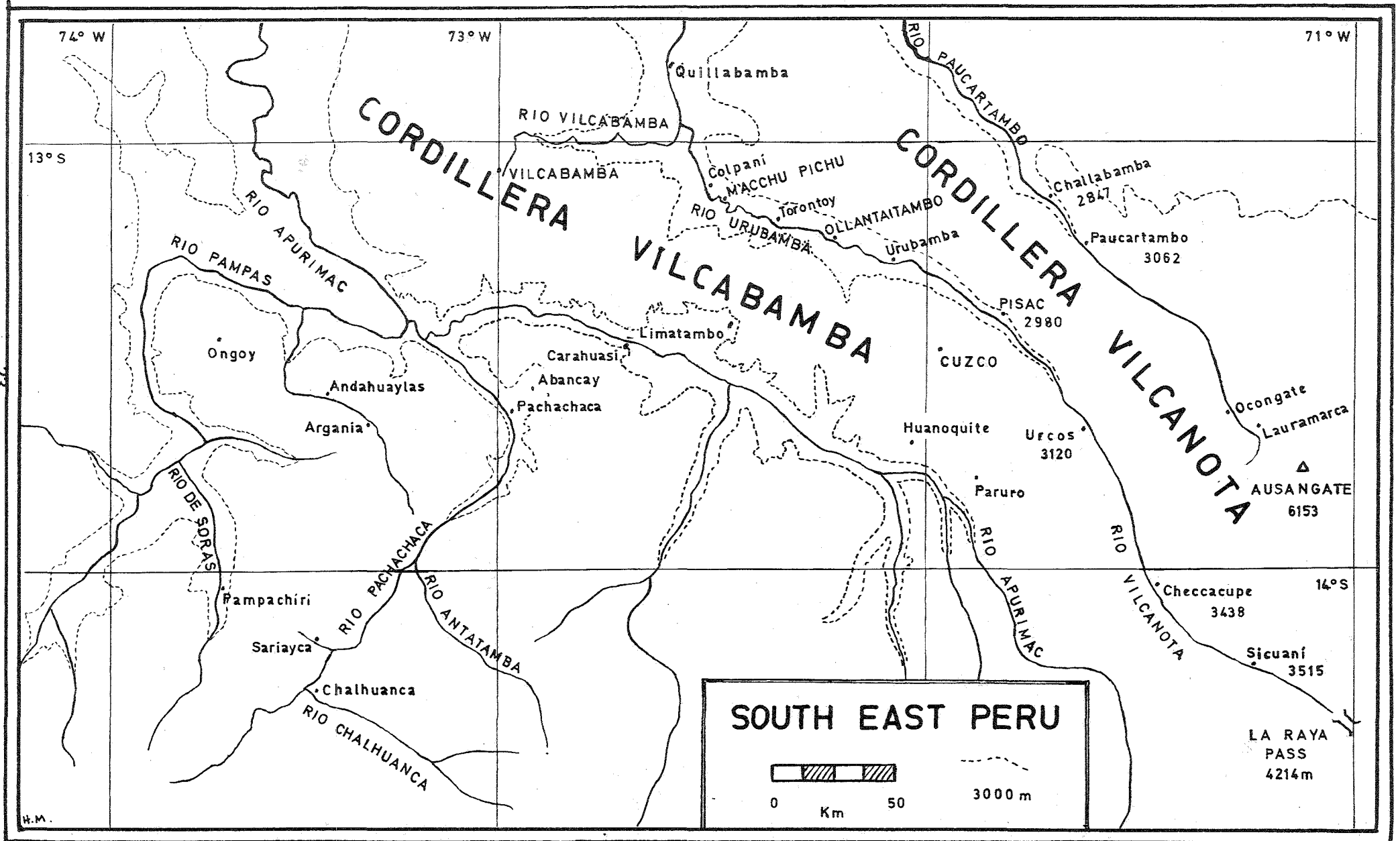
After Limantambo our way lay through beautiful wooded valleys with marvellous and exuberant vegetation, veritable paradises for naturalists. The trail passed under enormous trees or through regular forests of bamboo, and the rocks along the rushing streams were overhung with delicate ferns. Swarms of mosquitoes and gnats were tantalising us; the horses were frantically swishing their tails in vain attempts to free themselves from the masses of insects which had settled on them. The heat was considerable, and when I looked for the candles at night I found that they had melted into a soft, pasty mass.

Sometimes we were winding our way through narrow and deep valleys with walls of rock that seemed to reach the clouds on either side, and then again we had to zig-zag up a rough trail, scrambling and slipping. Man and beasts were dripping with perspiration, and every now and again we had to halt to recover our breath, and so we slowly climbed higher and higher. Often the track was cut out of a perpendicular mountain wall, with a giddy fall down to a river, which from above looked like a winding streak of silver. In some places these trails are so narrow that the pack animals have to walk near the edge to avoid bumping against the rocky wall, and it would be impossible to cross animals coming in the opposite direction.

After crossing the Apurimac river we come to the roughest and most broken country imaginable. Little bridges spanned deep canyons and ravines and the trail led over high passes and through deep gorges and winding valleys. Some of the inclines we had to climb were almost heartbreaking, and we had to be very cautious not to overstrain the animals. Our weary procession moved over high mountains where the climate was raw and cold, and again we came to valleys exuberant with tropical vegetation, where brightly coloured humming birds darted from flower to flower.

At Ayacucho the second main range of the Andes was behind us and the horses were in excellent condition; I had no doubt that only an accident could prevent us reaching Lima and the Pacific Ocean. But landslides and swollen rivers made it impossible to follow the road and compelled me to make a larger detour over the mountains to the west. Torrential rains began to pour down, and the mountain trails were soon converted into rushing streams that carried earth and loose stones with them, and often we had to wait until the downpour ceased before we could proceed.

The guide pointed towards a mountain side that towered up into the sky like a wall; we would have to climb up there, but this looked like an impossibility to me. Much to my surprise our path led straight towards this formidable mountainside, and presently we started up a neck-breaking path which had been partly hewn and partly worn out of the rocky wall. It was so steep and slippery that at first I considered it an impossibility for horses to climb up there, and when we finally came to the top I saw that another similar obstacle was ahead of us. A traveller soon gets used to such disappointments in the Andes for frequently one has by no means finished with the eternal zig-zags even when the second long and weary climb has been surmounted.



We spread our blankets under a low shelter; when one is tired and the nights are cold, one is satisfied with any kind of protection. When daylight permitted we were glad to be off again, for it was bitterly cold and my fingers were stiff and aching.

Below us the valleys and hollows were still wrapped in inky darkness, whilst the first rays of the sun gave the highest peaks the appearance of glowing heaps of charcoal. By degrees, as the sun rose higher, the light crept further and further down the slopes, until it shone on the heavy mists below. After some time, the sea of mist began to heave and roll, and here and there we could see the valley through an opening. Every now and again a heavy mass of white would gather and rise above the rest. Slowly the mists rose until they reached us; then for a while the sun looked like a grey disc until it disappeared completely behind a thick curtain, and the damp chill began to penetrate through our clothes. As time went on it became darker and darker. Towards evening thunder began to rumble in the distance, and suddenly a furious storm began to rage around us. When we found an overhanging rock we took shelter under it.

In the morning I made ready to start and by the evening I sighted a small settlement on a slope and when I arrived there I was told it was Paucara. At sunrise on the next day the Alcade put me on a trail for the Megorada, the terminus of the Central Peruvian Rail road. More than once I thought I must have gone the wrong way but rounding a bend as evening approached I saw, far below us, in a green valley, a thin line like a black thread that wound and twisted along the foot of the mountain. At the top of a steep zig-zag, I halted to resaddle before starting the descent.

From the railroad terminus, the going was easy to Huancayo. The horses enjoyed their stay there and I was sorry when I had to take them out of their alfalfa field. Luckily a fair trail led towards Tarma, a little town in a beautifully fertile valley where the climate is one of eternal spring. I followed a very good road connecting Tarma with Oroya. The following day we crossed over Ticlio, the highest point we reached in the third Andean range, some 16,500 ft above the sea. I was happy and proud when we came to the top of the last climb, for from there on travelling would be all on a steep down grade until we reached Lima, the Capital of Peru.

Comments

..... From H. Middleditch

"The basic line of the route taken by Tschiffely in his crossing of the inter-Andean valleys may be discerned from the map on p. 140 of Chileans No. 24. From this it may be seen that this traveller gives us his impression of the self-same valleys, for which Weberbauer affords a botanical appreciation in the article above, and in which Rauh collected as described in the article (above) in this issue."

SOUTH EAST PERU - THE LAND OF THE INCAS

The territory occupied by the Incas stretched from Lima to Cuzco and beyond, but their stronghold was the Urubamba valley. Above this valley lay their capital city, Cuzco, with the fortress of Sacsahuana to the west. Ruins of other Inca townships remain today at Pisac, at Ollantaytambo, and at Macchu Pichu - the Lost City of the Incas which was rediscovered by Hiram Bingham and the Yale Peruvian Expedition of 1911-1912. This expedition also reported another Inca town buried in the dense jungle at Vilcabamba and this last city of the Incas was rediscovered fifty years later.

At many places the Incas terraced the valley sides for the cultivation of wheat, barley, and vegetables; a typical series of Inca terraces may be seen in the illustration on the inside front cover. This also gives an impression of the deep, steep-sided nature of the valleys. The extraordinary climbs and descents involved in traversing this countryside are graphically described both by Rauh and by Tschiffely in the extracts from their publications which appear in this issue.

From the basin of Lake Titicaca, both Rauh and Tschiffely (like Dr. Rose before them) entered the territory displayed on the accompanying map by the Pass of La Raya (near the bottom right hand corner of the map). Approaching Cuzco from that direction, there are to be found (some miles from the city) plants of *Erdisia squarrosa*: this was the first cactus to be collected and described from the land of the Incas. It was described by Vaupel in 1913 and again collected by Dr. Rose (of Britton & Rose) in 1914. *Erdisia erecta* is also found in these parts. From Pisac comes Kz 354, described by Knize as a *Bolivicereus* but which may be an *Erdisia*. Further downstream, at Ollantaytambo, *Erdisia aureispina* was first collected by Cook and Gilbert in 1915.

On the floor of the Apurimac valley, especially on the trail from Limatambo, grows *Azoreocereus* which was first discovered by Hertling in 1931. Further up the valley walls grows *Cleistocactus morawetzianus*. This distribution pattern is repeated where the Lima-Cuzco route crosses both the Rio Pachachaca and the Rio Pampas valleys.

The first plant of *Lobivia westii* was found by James West in 1935 between Andahuaylas and Argania; from Chalhuanca comes Lau 146, identical to Rausch's *Lobivia intermedia* (discussed in *Chileans* No. 27, p. 130 et seq.) Some thirty miles to the west of La Raya pass is Sicuani, where Rausch discovered *L. sicuaniensis*. From near Ocongate, at the head of the Paucartambo valley, comes *Lob. lauramarca* and at Urcos we find *L. huilcanota*, both discovered by Rauh in 1954. At Pisac we reach the habitat of *Lob. incaica*, which brings us into the area where other *Lobivias* of the Incaica group were discovered in the 1930's (this group is discussed elsewhere in this issue).

Travelling towards Lima from Cuzco, Rauh discovered *Oroya depressa* near Andahuaylas in 1954, thereby appreciably extending to the south-east the known distribution area for *Oroya*.

It will be evident from the accounts of Tschiffley and Rauh that the area covered by the accompanying map is fairly difficult to traverse. In consequence, it is hardly surprising that no cacti at all were recorded from this region before 1913, when collection commenced on the trail out of Bolivia to the Inca city of Cuzco and the ruins of Ollantaytambo. Further collecting work was done by Hertling, Backeberg, Blossfeld, and West in the 1930's. After the second world war Ritter collected in these parts and in 1954 and again in 1956, Rauh made a well documented collecting trip to the Land of the Incas. Ten years later, Rausch was seeking *Lobivias* in this region, to be followed in turn by Lau. Each collector in turn appears to have combed a new patch of this difficult terrain.

Not for nothing did the Incas pick this location for their homeland. The terrain deterred their would-be enemies and gave them the security which enabled them to prosper and expand over their less fortunate neighbours. In just the same way, the terrain deterred cactus hunters in South America for a hundred years, while the more readily accessible parts of the continent were traversed. The Land of the Incas was the last major region of the continent to be entered by cactus collectors.

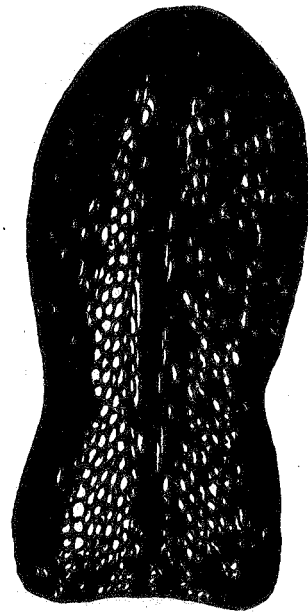
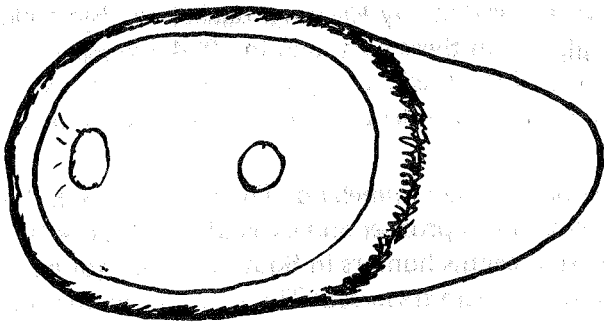
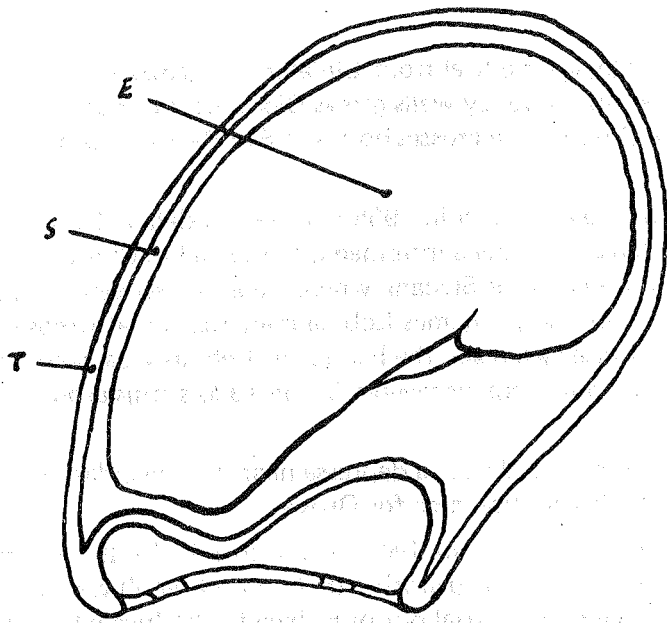
THE PERUVIAN LOBIVIAS - A SEED STUDY (Continued). By John Hopkins

Those *Lobivias* which fall within my seed group 4 appear to be confined entirely to Peru and the distribution is centred on the Urubamba valley, extending north-westwards into the Mantaro valley and south-eastwards along the Apurimac and Vilcanota valleys, the last-mentioned being a continuation of the Urubamba valley.

A substantial increase in the number of available seed samples relevant to my seed group 4 necessitates a revision of the seed diagnosis given in the *Chileans* No. 23 p. 74. The diagnosis is now as follows:-

Testa dull, black, usually rough in appearance, but sometimes with a more or less distinctly cellular structure. Immediately round the hilum, the testa cells are usually smaller. A light brown arillus layer is often present to a greater or lesser degree and can fairly easily be rubbed off fresh seed. The hilum is about one half of the seed in width, round to slightly elongated. It consists of a deep cavity which is either lined, filled, or covered by a lid or membrane, of creamy cells of spongy appearance. There is usually a slight constriction above the hilum giving a waist to the seeds which are relatively large, from 1.2 to 2.0 mm high and wide and 0.7 - 1.1 mm thick (taking the hilum as the base of the seed). A more or less distinct dorsal ridge or keel extends from slightly above the hilum to about the top of the seed.

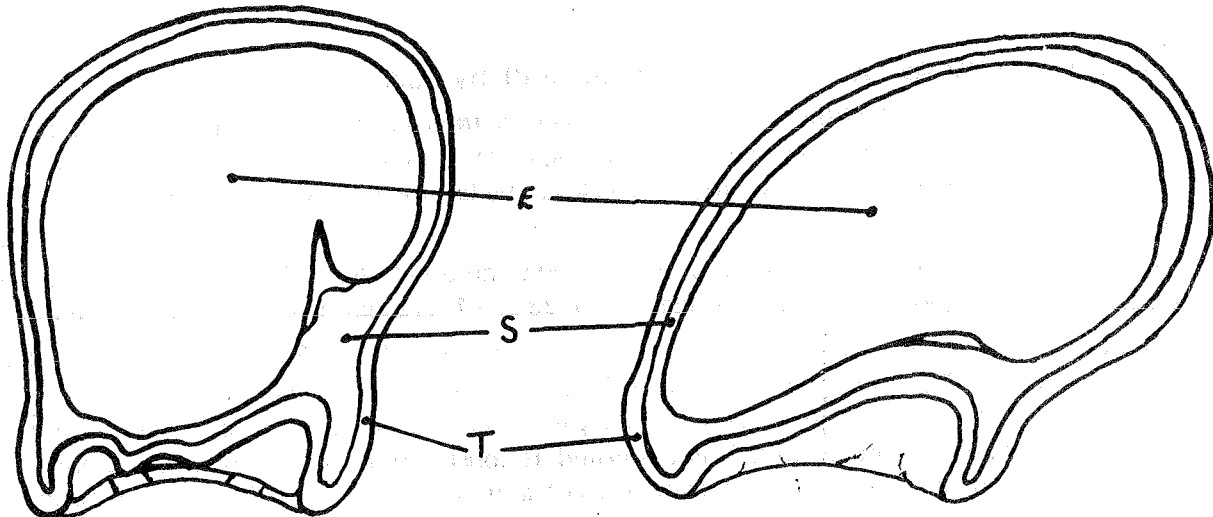
The sketch included with the original diagnosis is now less representative of the group and some new sketches are appended.



1mm.

E - Embryo T - Testa
S - Spongy cellular tissue

Typical Seed of Lobivia from South-east Peru - Lobivia Lau 154a



L. winteriana FR 1312

L. wrightiana R 396

Lobivia from South-east Peru - Range of seed shape

The following species are now included in this group:

<i>L. allegraiana</i> Backbg.	Lau 149	S.E. Peru 3,000 m (Pisac?)
<i>L. binghamiana</i> Backbg.		S.E. Cuzco 3,000 m
<i>L. divaricata</i> Rausch n.n.	R 421	Department Cuzco
<i>L. echinata</i> Rausch	R 416	Ollantaytambo
<i>L. hertrichiana</i> Backbg.		S.E. Peru 3,000 m (Rio Urubamba?)
<i>L. huilcanota</i> Rauh et Backbg.	R 425	Urcos 3,200 m
<i>L. incaica</i> Backbg.		Pisac 3,000 m
<i>L. larabei</i> Johns. n.n.	(syn. <i>minuta</i> ?)	Rio Urubamba
<i>L. lauii</i> Don.	Lau 138	Urubamba 3,000 m
<i>L. minuta</i> Ritter	R 414, Lau 148	Ollantaytambo
<i>L. planiceps</i> Backbg.		S.E. Peru (Urcos?)
<i>L. sicuaniensis</i> Rausch	R 426	Sicuani 3,500 m
<i>L. vilcabambae</i> Vilcabamba mountains		3,500 m. (nr Urubamba)
<i>L. winteriana</i> Ritter	FR 1312	Huancavelica.
<i>L. wrightiana</i> Backbg.	R 396	Mantaro valley, La Mejorada.
<i>L. zecheri</i> Rausch	R 407	Huanta-Ayacucho 2,400 m.
<i>L. sp.</i> Lau 134 (<i>incaica</i> ?)		Urubamba
<i>L. sp.</i> Lau 147 (?)		
<i>L. sp.</i> Lau 149		Urcos
<i>L. sp.</i> Lau 154 a		Huanoquite
<i>L. sp.</i> Lau 155 (<i>echinata</i> form?)		Urubamba
<i>L. sp.</i> Lau 156 (<i>echinata</i> ?)		Ollantaytambo
<i>L. sp.</i> KK 645		

(The suggestion that *L. winteriana* may belong to the *L. westii* group, made in Chileans No. 24 p. 159, does not seem to be correct).

As can be seen, the majority of these species are to be found in the Rio Urubamba / Huilcanota and Rio Apurimac valleys, at elevations of around 3,000 - 3,300 meters i.e. on the valley bottoms and lower slopes. The remainder, with the exception of *L. vilcabambae* found in more mountainous terrain, are in similar situations but in other more widespread valleys; viz: *L. winteriana* and *L. wrightiana* in the Rio Mantaro valley and *L. zecheri* in the Rio Huarpa valley. *Lobivia sp.* KK 645 is presumably found in the rather isolated Rio Sangaban valley near Ollachea, which is some 150 Km east of the Urubamba area. *Lobivia sicuaniensis* occurs further upstream at 3,500 m in the Rio Huilcanota valley. Some of these habitats can be found on the map in the Chileans No. 24 p. 140. Pisac and Urcos are in the Urubamba valley at the bottom right hand corner of the map, near Cuzco. Huanoquite is in the Apurimac valley close to Paruro (the Rio Urubamba becomes the Rio Huilcanota near Urcos).

Imported plants of some of the above species which are in my collection have flowered and set fruit and the information gleaned from them and from correspondence with other collectors possessing established imported plants, suggests that both body and flower morphology support to some extent the grouping arrived at by examination of the seed.

Taking body morphology first, many of the species are freely caespitose quickly producing large mounds, but some offset more slowly and the odd few only in age or not at all. *Lobivia winteriana*, *wrightiana*, *zecheri* and *sicuaniensis* are solitary. The description of *L. allegraiana* and *L. planiceps* give them as being simple though this is certainly not true of Lau's *allegraiana* 149 for Urcos. It is possible that Backeberg was describing immature plants - however it is interesting to note that the generally non-caespitose plants are those outside the main distribution area.

In the mature plants which I have seen, the ribs are continuous, vertical or slightly spiral and scarcely to quite deeply crenate. Juvenile plants often exhibit the *Lobivia pentlandii* characteristic of oblique notches and areoles, so the ribs are often discontinuous and scarcely recognisable as such. The areole siting is not a very reliable guide in this plant group as it can vary from being squarely situated on the rib (as in *L. minuta*, Lau 155) to skew in oblique notches in the rib (as featured in *L. incaica* and in Backeberg's description of this species). Indeed the siting can vary somewhat in a single population of plants of some species and so it is not a practical proposition to try to subdivide the group into a section comprising plants with straight ribs with squarely situated areoles and a second section with spiral or crenate ribs carrying skew areoles, for there is no clear dividing line: some young plants even show them both! Nonetheless, quite a lot of the plants would fit into one or the other of these categories; the species with the skew areoles are in a minority.

Regrettably several of the species from this area were only briefly described by Backeberg and no specific habitat data were given. It is difficult to judge now whether the plants he described are truly distinctive species or just the more outstanding variants in a large population. My experience with the Lau and Knize imports

suggests the latter is true. With the Lau imports in particular there seem to be far more forms in terms of spination and colour of epidermis than there are field collection numbers - implying a considerable variation in habitat populations. Most of the flowers in the group, however, have quite a distinctive form, i.e. a continuously tapering widely opening funneliform merging into a short, narrow tube and ovary, often only 3 mm thick.

To take a typical example, the flowers of *L. incaica* are about 3-5 cm long and diameter dependant upon the degree to which they are open. When in full sun, the flowers often open very widely becoming rotate or nearly so. The ovary and tube are short and narrow in proportion to the size of the flower, being about 3-5 mm thick compared with the 6-7 mm normal in other *Lobivia* groups and 15 to 20 mm long. These proportions make the flower type easily separable from other *Lobivia* groups and most plants in this group have flowers of similar proportions, with hairs nearly lacking in the scale axils. The degree of hairiness of the tube is variable, almost absent in *L. hertichiana* and *L. urubambensis* n.n. (Lau 155) to moderately hairy in *L. incaica* and *L. binghamia*.

The tube colour is often pinkish and the outer petals are almost always pale brownish edged pinkish or reddish. The flower colour varies from blue-red (*L. binghamia*) through red (*L. minuta*, *L. incaica*), orange (Lau 154a) to yellow (Lau 147). The red coloured flowers generally have red upper stamens, a white or yellow tube interior with lower stamens which are white or pale yellow below and red above. This stamen coloration combined with the greenish stigma and style and the thin tube is usually sufficient to identify any of the red-flowered *Lobivia* as belonging to the *L. incaica* complex.

The plants having flowers deviating in colour, size and, to a lesser extent, form are the aforementioned outliers of this group. *Lobivia zecheri* has a red flower with a red stigma and style and is rather small (3 cm long and diam.). The tube is somewhat woolly on the outside and light green inside. The flowers of *L. wrightiana* and *L. winteriana* are the only pink ones within the group so far, but the flower form is the same, funnel shaped with a thin tube. The flower of *L. wrightiana* is some 6 cm long whilst that of *L. winteriana* is considerably larger and rather floppy in appearance, 6-9 cm long and 7-9 cm wide. In *L. sicuaniensis*, the flower form and coloration is rather different again. It is rather like a larger version of the flowers found in plants with the names "*L. maximiliana*" and "*L. corbula*" attached to them (of which more later) which have tricoloured flowers somewhat tubular in shape, the perianth not opening very widely. In *L. sicuaniensis* the flower is 4 cm long and diameter and hence opens fairly widely, but some of the inner petals tend to continue the line of the tube. The petal tips are blue-red followed by a red zone and are yellow or orange basally, but much more orange flowers have been seen by Rausch. Indeed the flower colour and its variability and the different shape make this plant somewhat of an alien in the *L. incaica* complex; it is not unreasonable to suggest that it may be a natural hybrid inheriting the seed (and maybe other characteristics) from a parent in the *L. incaica* group and flower coloration and form from a parent like Lau 254 from Macusani. The habitat of *L. sicuaniensis* is in the right area for such a hybrid to be possible.

Within the main complex, there appears to be a few distinctive plant forms but in many cases plants exist to 'bridge the gap' from one form to the next. The recently described *L. echinata* is perhaps one of the more distinctive forms bearing long, straight golden yellow spines contrasting very nicely with the relatively pale green epidermis. The stems become somewhat elongated as do the plants distributed as Lau 155 and 156. As in *L. echinata*, the ribs of the later two plants are straight, and vertical, only slightly crenate with non-skew, closely set areoles. Lau 156 has similar sized flowers to *L. echinata* (50 mm long and diam.) but are deeper red, rather than orange red. The only real differences between the two are the flower colour and the shorter spination of Lau 156. Lau 155 has still shorter spines and a paler green epidermis, but the flowers are smaller (3 cm long and diam.) and are scarlet with a more prominent white throat than in the other two types.

Another plant from Lau (no number as far as I know) is also short columnar with stout black spines and a blue tinge to the epidermis, but with a shining blue-red flower (3 cm long, 4 cm diameter). *Lobivia minuta* (and *L. larabei* n.n.) seems to be the diminutive form of this subgroup having similar characteristics i.e. straight ribs, non-skew areoles, matt pale green epidermis and large flowers (with a short throat). Although Ritter's description quotes *L. minuta* as having non-crenate ribs, some of the Lau collected plants (Lau 148) have definite notches, the ribs appearing somewhat humped and the epidermis slightly shiny. These particular plants seem to lead to the *L. lauii* (Lau 138) with somewhat larger bodies and stronger spination but having the freely caespitose characteristic of *L. minuta*. *Lobivia lauii* appears to be very variable, some examples have smooth, rounded ribs while others have more acute, undulating ribs. The flowers vary from 40-50 mm long and 40-65 mm wide and are orange-red to red. Considering the proximity of the habitats of all these species and the range of variability which is further extended by the as yet undescribed Lau 155 and 156, it seems likely that when a thorough knowledge of the populations is gained, a number of these species could well be reduced to varietal status.

Moving slightly south east from the Urubamba area, we reach the habitats of plants, some of which possess more tuberculate ribs with a varying degree of rib crenation and areole obliqueness than in plants discussed above. They include *L. hertrichiana*, *incaica*, *binghamia*, *huilcanota*, *allegraiana*, and sp KK 645, the order of mention reflecting the deepening green of the epidermis from light to dark. A number of 'different' mid-to dark-green

plants have been available from Knize recently, variously labelled as *L. binghamia*, *L. huilcanota*, etc. They may possible be all the same species, possible with confused numbers; they have a distinctly laterally pectinate, adpressed spination which is unusual in this group of plants, the spines on the majority are radiating, though the bulbous spine bases often appear to form neat rows on the areoles, e.g. some forms of *L. lauii* and some other unnumbered plants from Lau (*L. binghamiana* perhaps with yellow spines and *L. vilcabambae* perhaps with orange-brown spines).

It is this section of the group which is lacking descriptive detail and positive identification can be very difficult as there are probably far more intermediate forms than Backeberg found which are only now coming to the attention of collectors exploring the more remote areas of south-east Peru. Thus it is perhaps better to leave a more detailed discussion of these plants until more data is available and until I can gain more information from my plants, many of which have yet to flower.

Some seed cross section diagrams are included to demonstrate the similarity of the seeds of two of the outlying species with one of the plants in the main complex. The seed of *L. Lau 154a* is taken as being typical and *L. winteriana* is very similar except for the more blunt apex of the embryo. The general seed form is the same, the hilum depression being a prominent feature though variable in external appearance.

To sum up, the flowers, although showing variability in size are all of more or less the same form with the exception of *L. sicuaniensis* which appears to a natural hybrid. Furthermore, all of the plants with the exception of the latter species, have continuous ribs: the ribs of some species, however, are more deeply and obliquely crenate than others, but this is hardly surprising if the main group is rapidly evolving as appears to be the case when the variability of these species is considered.

The fruits examined so far have all been of the same form, viz: a small berry, usually green, 5 to 10 mm in diameter, containing seeds in a non-sticky pulp, which dries almost to nothing when the fruit is ripe.

To conclude, the plants included in seed group 4 seem to be fairly clearly defined geographically and other characteristics besides seed give an appreciable measure of support to the grouping arrived at by the study of the seeds.

Comments on Peruvian *Lobivia*

..... from A. W. Craig

"Among my *Lobivia* I have a plant which is especially distinguished by its long spines, which twist about in all directions. It is under the label *L. allegraiana* but I gather from John Hopkins that I should call it *L. wrightiana*."

..... from H. Middleditch

"One of my *Lobivias* is *L. wrightiana*, which flowered very well this year, although it is just over two inches high. The flowers were very slim-tubed indeed, not the sort of thing I would have expected to see on a *Lobivia* at all, and a pretty uniform rich pink colour all over the petals and tube. I did slice a couple of the flowers but there was no sign of any nectar. The flowers appeared in May and then the plant started to grow in June, putting out new spines of a pale lime-greenish yellow colour with dark tips. The long spines twist all over the place.

"If the cycle of resting, flowering, growing is a repetition of what takes place in habitat, then one might imagine that this is intended for the flower to set fruit, disperse the seeds and allow them to germinate early in the growing (rainy) season, in order to give the young seedlings a chance to reach a size which will enable them to survive their first dry season.

"My own plants of *hertrichiana*, *binghamia*, and *incaica* flower fairly regularly but have never set fruit."

..... from C. J. Swales

"The only *Lobivia* which has flowered in my collection which appears in the list of species in John Hopkins' article, is *L. binghamiana*. I have a slide of the flower on this plant, but it does not seem to have a green stigma - just clear yellow. The red flower petals have a rather bluish sheen to them, somewhat like the bluish sheen in the flower petals of some red-flowering *Epiphyllum* hybrids. In comparison with other *Lobivia* flowers which I have seen, I find this blue sheen a rather unusual feature.

"I see that the sketch of *L. hertrichiana* displays a more or less spineless crown; this is just like my own plant of *L. binghamiana*."

..... from J. R. Gooch

"My *Lobivia incaica* flowers regularly for me with a succession of red, white-throated blooms through the summer. On a fine morning the buds open very quickly when the sun hits the greenhouse and on a sunny day the petals lay back to horizontal. By noon the flower is closing up again as it fades. If the weather is warm but fairly overcast, as when thundery, then the flowers only partly open, but are still over the same day. Bright sun

in the afternoon will not cause them to open. This plant and *L. minuta* show a dramatic reduction in the length and strength of spines under our cultivation compared to that exhibited when first imported - much more so than with most other varieties. They also tend to proliferate freely and these two things suggest their natural habitat is very harsh.

"*Lobivia zecheri*, which only came to my notice 18 months or so ago has since turned up under several names. I purchased three plants named *zecheri* and two of its variety *fungiflora*, when offered by S.P.I. last year. *Lobivia zecheri* itself tends to be a rather columnar plant with 2 to 5 cm long brown radial spines and no centrals. On *v. fungiflora* the spines are shorter, weaker and more pectinate. The flower on all specimens are red to cerise with a distinct white throat. The slender flower tube has only slight wool on it.

"I have also flowered *L. mentosa* and *L. ferruginea* from Uhlig and these are both *L. zecheri*. Two other plants obtained from Knize in Peru, *L. ayacuchensis* and *L. recondita*, have yet to flower but look very like *L. zecheri* in body and spines.

"*Lobivia larabei* stays globular with me, or at most short columnar. I believe that my example emanated from Roanoke some years ago, and being very prolific with its offsets it has been split up and just a young portion repotted, on at least two occasions. It flowers all summer - in fact some buds are visible even now (November 4th - H.M.) though growth has ceased for the season.

"More recent imports of *L. minuta* bear considerable resemblance to *L. larabei* but are much more columnar in growth. Lau's 148, 155 and 156 appear to be all forms of *minuta* and have the smooth straight ribs with small close-set areoles reminiscent of some *Trichocereus* sp. My Lau 155 from Urubamba had central spines 5 cm in length when first imported and these are unusual in two ways; they were of a uniform thickness from their short point to their base and all grew perfectly straight and upright around the plant.

"With regard to some *Lobivias* having spines with a swollen base, two or three kinds come to mind very quickly as having a very pronounced thickening: *L. aurea* and varieties, *L. horrida*, *L. haageana*, *L. brunneo-rosea*, many forms of *L. chrysantha* and *L. aguilarii*. To a much lesser extent, a slight swelling or thickening at the base of the spines, especially centrals, can be observed in a great many species. I would not think we could look on this as a feature peculiar to plants from Peru."

..... from H. Middleditch

"Elsewhere in this issue will be found an account by Professor Rauh of that part of his trip to Peru which took in those inter-Andean valleys in which these *Lobivias* are to be found. I find it somewhat surprising that nowhere in his account does one come across any reference to observing or collecting *Lobivias*. Why is this, I wonder? Is it because Rauh only took notice of the larger plants and did not bother concerning himself with those less significant in size? Or were the *Lobivias* simply away from the immediate vicinity of the highway - perhaps part-way up the valley walls - where Rauh never ventured?

"In his account of the daily climate changes in the lofty Andes, Tschiffley (see 'Tschiffley's Ride,' this issue) observed the clouds rising out of the valleys below until they covered the upland and obscured the view of the sun; he does not indicate for how much of the day the sun was shining and for how long the sun was obscured by cloud, but from other sources it seems likely that the change from sunshine to overcast would occur round about midday. In an earlier part of his account of his cactus - collecting trip to Peru, in Chileans No. 24, Prof. Rauh observed that, in the summer season "thunderstorms occur daily"; and later after driving up from Lima towards Matucana "far below us is the Pacific Ocean; the tops of the glaciers are already lost in clouds; we have just enough time to appreciate the view to the east when we are shrouded in mist; the thunder is already rumbling. Towards eveningthe sky clear up."

In his account in Chileans No. 26 of the discovery of *Gymno tillianum*, much further to the south, Van Vliet said that "typical mountain climate in the summer..... the start of the morning is clear and bright. After that clouds form up on the peaks. At noon, thunder - and then it clears up."

There is a simple explanation for this daily cycle; the clear morning sky allows the sun to heat up the valley walls and this occurs rapidly due to the rarified atmosphere. The air next to the ground becomes heated in turn and starts to rise so that by noon a very sharp upvalley wind is generated - like the one which plagued Lau during his afternoon descent of the La Paz river gorge (Chileans 19 p. 229). This rapidly rising damp air will generate the thunderstorms on the mountains later in the day.

"There will be pollinating insects flying about in fair numbers in the morning whilst the sun is shining and the wind is gentle, but during the bluster and rain of the afternoon there are not likely to be many insects about. A *Lobivia* which has been programmed through hundreds of generations to this set of circumstances, will hardly bother to waste time opening its flowers outside the sunny morning hours, just as Jim Gooch observed. Nor is it likely to change its habits just because it has been transplanted into an English climate when the sun does not shine regularly each morning and the wind does not bluster regularly every afternoon.

"I must keep my eye on my *L. incaica* when it flowers next season - that plant has been with me for about seven years now, so it might have grown out of its Andean pollination ecology cycle and become acclimatised. It will be interesting to see if it is still taking no notice of the English afternoon weather.

"Jim Gooch observes that his *L. ayacuchensis* ex Lau is very like *L. zecheri*. The latter species comes from

the valley of the Rio Huarpa; Ayacucho is quite close to that valley, so the similarity would appear to be understandable."

..... from P.H. Sherville

"Regarding the Lobivias listed by John Hopkins which are in this particular group, I have had flowers on plants bearing the names binghamiana, allegraiana, planiceps, wrightiana, and hertrichiana. All these plants have flowers which open without fail before I get to the greenhouse about 0.700 hours! L. wrightiana tends to open overnight and I have found it quite well expanded at approx. 23.00 hours. All my Lobivias close (or usually wither completely) by about 11.00 - 11.30 hours but I put that down to the sudden rise in temperature when the sun really get going about that time!

"Although John Hopkins refers to "... the greenish stigma and style identify a red-flowered Lobivia as belonging to the L. incaica complex", all the above-named plants have white to cream stigmas or stigma lobes, not a vestige of green amongst them."

..... further from J. R. Gooch

"In my experience, Lobivias in the incaica group have a cream coloured stigma, rather than green, although this latter certainly does occur in some examples."

..... response from J. Hopkins

"I feel that it is a bold claim to make that the stigmas on binghamia, allegraiana, and plainiceps are white to cream! It is indeed true for wrightiana, chilensis and winteriana only. I am myself totally unable to find plants to which I could confidently give the names binghamia, allegraiana, or planiceps. They could all be hertrichiana. I have some plants which I believe to be binghamiana; bodywise they fit the description except for having 12 ribs instead of the published 22. I wonder if this could have been a misprint, as I have not yet found any member of the incaica group with more than 20 ribs.

"The flowers of all of these species all have totally inadequate descriptions to be able to make any confident approach to naming the plants. The more plants I see, the more I am convinced that there are no distinct species."

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

"Those Peruvian Lobivias which I have checked to description i.e. L. urubambense, allegraiana, echinata, and minuta, all have greenish stigmas, as does L. huanquite - which incidentally, has a very long flowering season."

..... from J. R. Gooch

"I have the drawing of Lobivia hertrichiana on the table in front of me and I have put beside it the four plants from my collection which bear this name.

"Just one of these, of nursery origin, can be likened very much to the sketch except that the straight ribs are not so distinctly divided into tubercles. The next example is a plant of Lau 149 that arrived labelled L. allegraiana. This only develops small bodies of up to 3 cm diameter, has 8 straight ribs, 10 pale radial spines about 1/2 cm long and a slightly stronger and darker central spine, curved upwards.

"The other two plants are from S.P.I. as KK 431. These have sharp ribs divided into tubercles. The ribs spiral slightly. Plants are deep shiny green, close set areoles with 8 brown radial spines 1 cm long. No centrals. One specimen has 17 ribs, the other 18. The flowers on all my "Lobivia hertrichiana's" are bright blood red, sepals are greenish and rather narrow and pointed as are the petals.

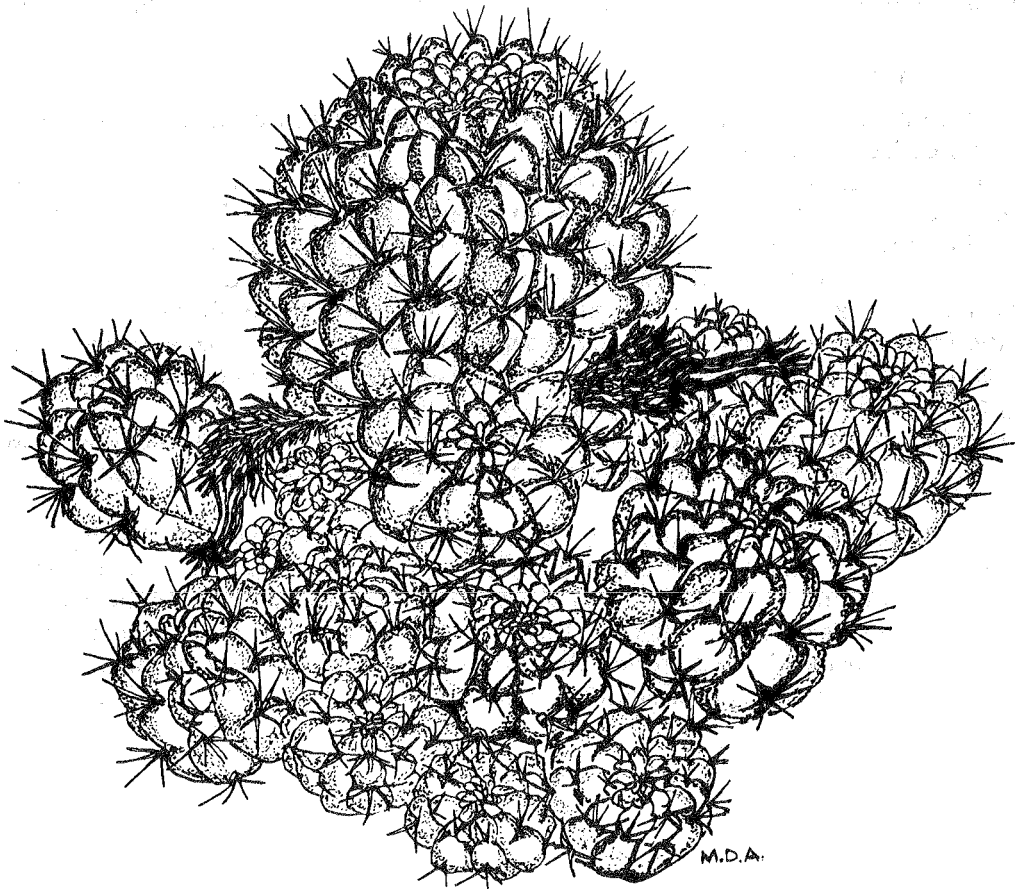
"I must admit to being rather surprised at the amount of hair shown on the dried flower remains in the sketch; I would have described L. hertrichiana as having less hair on the flower tube than most species in this genus.

"Looking at the brief description in the Lexikon, I see we can expect 11 ribs angled with transverse grooves; approximately 7 radial spines, slightly spreading, to 1.5 cm long and one upward curved central to 2.5 cm long, straw coloured to brownish. The sketch seem to show a plant with more ribs and considerably weaker spines. The spines do appear alightly spreading but it is difficult to discern any centrals. It is not unusual in my experience for many Lobivias around this group to become very soft in cultivation. With this in mind I feel inclined to accept the plant in the sketch as a fair representation of this species."



LOBIVIA HERTRICHIANA

Collection & Photo J. Hopkins



LOBIVIA HERTRICHIANA

LOBIVIA ZECHERI Rausch sp. nov. By W. Rausch
(From Succulenta 50.8, 146. 1971)

Simplex, raro proliferans, ad 7 cm alta et diametiena, caesia, velut pruinosa, saepe violaceo-suffusa, radice rapiformi longo radicans; costis 12-18, rectis vel paulum spiraliter tortis in gibberes 15-20 mm longos dissolutis; areolis ovalibus, ad 6 mm longis, albo-tomentosis.

Aculeis marginalibus 7-9-11, divaricatis, 30-50 mm longis, plerumque 6-8 et uno minore deorsum directo, aculeo centrali 0-1, ad 60 mm longo; aculeis omnibus rectis, strictis, fuscis basi incrassata flava et atro-acuminatis, postea albis.

Floribus ca. 30 mm longis et diametientibus; ovario et receptaculo lurido squamis aurantiaca et lana alba ad fusca tecto; phyllis perigonii exterioribus lanceolatis, griseo-fuscis roseo-marginatis; interioribus spathulatis, serratis, rubidis ad violaceo-rubris, faucem versus roseis imo albis; fauce laete-veridi, filamentis ochroleucis, stylo rubro, stigmatibus roseis;

Fractu globoso, ca. 12 mm diametiente, rubiginoso squamis roseis et lana alba tecto;

Seminibus orculaeformibus, 2 mm longis et 0.5 mm diametientibus, uno latere valde infractis, qua re hilo obliquo, perforata-concavo; testa nigra, veruculosa, irregulariter volvate-deformata.

Solitary, rarely offsetting, up to 7 cm high and broad, pale blue-grey pruinose coating, often tinged violet, with long thick tap-root.

Ribs 12-18, straight or slightly spiralling, set out in humps 15-20 mm long. Areoles oval, up to 6 mm long, white felted.

Radial spines 7-9-11, spreading, 30-50 mm long, usually 6-8 together with a smaller one pointing downwards. Middle spine 0-1, up to 60 mm long, all spines straight, rigid, brown with pale yellow thickened base and black tip, later white.

Flower about 30 mm in length and diameter. Ovary and tube dirty yellow-brown with orange-yellow scales and whiter to browner wool. Outer flower petals lanceolate, grey-brown with pink margin, inner flower petals spatulate, serrated, dark red to violet red, down towards the throat becoming pink above and white below, throat pale green. Stamens yellowish white, style red, stigma lobes (5) pinky-red.

Fruit spherical, about 12 mm diameter, red-brown with pink scales and white wool.

Seed barrel-shaped, 2 mm long and 1.2 mm diameter, being sharply bent to one side, from which arises the sloping hilum, which is depressed like a pocket. The testa is black, finely tubercled, irregularly misshapen on account of the swelling-like hump.

Habitat: Peru, on the road from Ayacucho to Huanta, at 2,400 m.

Type specimen Rausch 407 in Herbarium Vienna.

This species is remarkable on account of its grey epidermis, which has an appearance of a pruinose coating, on account of its red style and its red stigma lobes as well as on account of its relatively large seeds. I name this species-complex after my then-companion Ernst Zecher.

Comments on *L. zecheri*

..... from H. Middleditch

"The deep and fairly narrow valleys which are to be found cutting through the high Andes of Peru, form but a minute proportion of the whole mountainous region. One could imagine these valleys being traversed by travellers and collectors in a matter of weeks. And yet it was not until 1912 that the Inca city of Macchu Pichu was discovered by Hiram Bingham and the Yale University Expedition to Peru - and fifty years later still that the last "lost" Inca stronghold of Vilcabamba was discovered in the upper Urubamba valley.

"Although Backeberg made visits to Peru on his cactus collecting expeditions in the 1930's, it appears that he did not travel up the Huarpa valley. In Rauh's account of his trip through some of the inter-Andean valleys (appearing earlier in this issue) he refers to collecting *Morawetzia doelziana*, just as Backeberg did twenty years previously - but he, too, would seem to have paid no visit to the side valley joining the Mantaro from the direction of Ayacucho.

"In describing the vegetation of the inter-Andean valleys, Weberbauer (in the article reproduced in this issue) refers to "the same vegetation conditions exist in the valley of a tributary that comes from Ayacucho" and joins the Marañon. He also refers to "the formation of grass steppe and scattered shrubs" being "especially well developed in some lateral valleys, as about Ayacucho". This would appear to refer to the Rio Huarpa valley and suggests that it is not unduly difficult to traverse.

"Nevertheless, it appears that Lau has not collected in this particular valley, if one can judge by his list of field numbers. Seemingly Rausch was the first collector to bring some *Lobivia* from this particular valley,

which have now been named *L. zecheri*. It would appear that he has been closely followed by Knize who has produced his *Lobivia ayacuchensis*."

..... from J. R. Gooch

"The plants of *Lob. zecheri* which I have acquired certainly exhibited a frosted appearance to the body when first received, and in addition two of them had a very strong violet tint. Unfortunately under my greenhouse conditions at least, this is not maintained on the new growth which becomes a glossy dark green. Only one plant out of eight still retains a violet tint and this one does not as yet seem to be growing very well.

"Although Rausch suggests that the spines are always brown, I have a plant with fewer and black spines, (the flower conforms to the type description) and the *Lob. ayacuchensis* from Knize also has, in many areoles, two or three very short radial spines (5-10 mm) directed upwards. Although my plants are small, offsets have been produced on three of them.

"Only my *Lob. ayacuchensis* approaches anywhere near the possible mature size of 7 cm high and wide, given in the description."

..... from R. Moreton.

"Seedlings of *Lobivia zecheri* do have what could be called a "frosted" appearance. When you used the word frosted, I thought it was rather a strange term to me, but funnily enough it appeared in the description of a new *Mammillaria* by Charles Glass recently. I think really that it means that the cells of the epidermis are rather prominent."

LOBIVIA WRIGHTIANA Backbg Sp. nov. by Curt Backeberg.
(Abstracted from B.f.K. 1937 - 12.)

Primum simplex, deinde proliferans, cylindrica, glaucescens. Costis 16-17 angustis ± spiralibus.

Aculeis ca. 10, lateralibus ad 5-7 mm longis, adpressis; 1 centrali, irregulariter divaricato, tentaculato-
elastico ad 7 cm longo.

Flore infundibuliforme, ad 6 cm longo lilacino-roseo.

Peruvia centralis, Rio Mantaro.

Solitary, later occasionally caespitose; at first clavate, with a long tap root, later slightly cylindrical, dark to grey-green.

Ribs 16-17 slightly spiral, weakly tuberculate, narrow and low.

Radial spines ca. 10, soft, spreading adpressed, ca. 5-7 mm long.

Central spine irregular, often solitary, pointing in all directions, feeler like, often compressed or curved, up to 7 cm long.

Flowers funnel shaped, slightly hairy, pale lilac pink; Fruit 6 mm across, reddish.

Comments

..... from H. Middleditch

"The English passage in this original description states that the central spine is "often compressed". I find this observation puzzling and inconclusive."

..... from J. Hopkins

"The comparable word in the passage in German is "gedrehter", presumably from the verb drehen, indicating that the central spines are twisted or else curved."

..... from H. Middleditch

"In the other passages, the equivalent word in French is vrille, meaning "tendrill-like", and in the Dutch it is gedraaide, which means "turned in all directions," or "twisted"

..... from John Hopkins

"It looks as though this particular word has been incorrectly expressed in the English version of the original description in the pages of B.f.K."

..... from Udo Kholer, K.u.a.S.8.5:1957

"A notable beauty is *Lobivia wrightiana* Backbg., which was all, only short adpressed radial spines which are directed more or less sideways from the areole, white, twisting. I have wondered whether it was correctly named."

..... from Udo Kohler, K.u.a. S.8.5: 1957

"A notable beauty is *Lobivia wrightiana* Backbg., which was described by Backeberg in the "Blattern fur Kakteenforschung" 1937.12.

"Even without flowers the globular, dark green body attracts attention with its single yellowish central spine, often 7 cm long, standing more or less vertically, which occasionally has a tip bent into a short hook. Particularly handsome however is the plant in its heyday, when it exhibits its pale lilac rose flowers (an unusual colour among *Lobivia*), which occasionally give an impression of almost pale blue. The illustration (in K.u.a.S. — H.M.) shows a black and white enlargement of an Agfacolor slide at about 4/5 natural size of the plant; also this illustration of the plant with its profuse flowers displays the beauty of this species originating from the Montaro valley (central Peru). I grew my plant from the D.K.G. 1952 seed offering. In 1955 the first flowers appeared; in 1956 there were twelve flowers altogether.

"Among the Peruvian *Lobivia*, this species collected by Harry Blossfeld is remarkably small and hence is particularly suitable for cultivation in conditions of limited space. In the winter rest the plant has a cool, dry but sunny location. During the flowering period and up to the start of further growth, the plant welcomes plentiful watering."

..... from C. Backeberg, K.u.a.S 9.4:1958

"*Lobivia wrightiana*: Herr Kohler says in his article in K.u.a.S. for 8.5:1957 that this plant had been collected by Blossfeld and that this statement originated with me.

"That is just not correct: I first discovered this plant and dedicated it to Frau Isabel Wright, on account of whose support the then Morawetz expedition took place, from which the *Lobivia* was found. Blossfeld had then followed on my trail and had also, but subsequently, collected this *Lobivia*, as well as *Morawetzia* likewise.

"That it is the northern most known *Lobivia*, I would give it its correct place of importance; formerly it has not been supposed that *Lobivia* extended so far."

.....from J. R. Gooch

"I am growing my three plants of *L. wrightiana* in a common pot. Two of these plants have very long centrals which are consistent neither in number or direction; these spines are nearly three inches long, twisting and turning up and over the crown."

.....from P. Allcock

"I have a plant labelled *L. wrightiana* which is almost three inches high, which is now surrounded by a complete ring of offsets and a second tier are beginning to form. It has no central spines at all only short adpressed radial spines which are directed more or less sideways from the areole, white, twisting. I have wondered where it was correctly named."

..... from H. Middleditch

"The plant described by Phil Allcock has the sort of spination that seems to be typical for the young specimens of *L. wrightiana*, but it is somewhat surprising to see the very large number of offsets which have grown on this plant, before any central spines have been produced."

..... From E. W. Bentley

"I have a plant of *Lobivia wrightiana* which was purchased from Uplands nursery some years ago now. It does not have any long central spines at all, just short, white, adpressed radials which twist about. It has produced a number of offsets and also several flowers."

..... from H. Middleditch

"When I saw this particular plant, two flowers seemed to have just opened, because the stigma lobes were still bunched up close together and they were bent and kinked as if they had been cramped up inside the unopened petals. The day was rather overcast, which might explain why the stigma lobes had not opened out."

..... from R. Martin

"My own plant of *L. wrightiana* will be about four or five inches high but has remained solitary. Originally it only had short (up to 4 mm) spines, some disposed radially and some standing away from the body of the plant. Later the radial spines increased in length up to 1 cm and now on the recent growth they have reached 3 cm or more. Now it is difficult to distinguish between radial and central spines; the long central spines are up to 10 cm in length, cedarwood brown in colour, standing more or less upright but twisting and turning. The newest spines growing in the crown are pale lime green in colour, tipped brown.

"The plant has flowered in previous years, having up to 7 flowers out at a time, in a beautiful shell pink colour with a long tube".

..... from A. W. Craig

"I have had a look at a pair of offsets, one from the plant described by E. W. Bentley and the other from P. Allcock. If the mother plants have the same sort of short, white, twisting, adpressed radial spines that are on these offsets, I just cannot believe that they can be *L. wrightiana*. Surely plants that sort of size would have produced the long central spines that are supposed to appear on older plants?"

LOBIVIA SICUANIENSIS Rausch Sp. nov. by W. Rausch
(From Succulenta XII 1971)

Simplex, ad 10 cm alta et diametens, atro-glaucis, radice rapiformi radicans; costis ad 19, spiraliter tortis in gibberes 20 mm longos et 5-7 mm latos, acutangulos dissolutis; areolis rotundis ad ovalibus, ca 5-7 mm longis, albo-tomentosis; aculeis marginalibus plerumque 6, 4-6 cm longis et uno minore deorsum directo, fuscis, basi incrassata clariore, subarcuatis; aculeo centrali nullo.

Floribus ca 4 cm longis et diametentibus; ovario et receptaculo subviridi (vel flavido et roseo) squamis atroviridibus (vel vinosis) et pilis albis tecto; phyllis exterioribus aurantiacis (vel roseis, rubris aut violaeis), medio-fusco- viridistratis; interioribus inter se inclinatis, aurantiaco-rubris (vel luteis ad rubris), intus aurantiacis; fauce alba, filamentis luteis (vel aurantiacis ad rubris), interioribus albis; stylo et stigmatibus (5-7) viridibus; fructu globoso, ca 8 mm diametente, rubiginoso, squamis roseis ad fuscis tecto et albo pubescente; seminibus 1.5 mm longis, testa atra, verruculosa, latefoveata, hilo subobliquo subfusco.

Single, about 10 cm high and diameter, dark grey green, with thickened rootstock, ribs up to 19, spiral, divided into sharp-angled humps 20 mm long and 5-7 mm broad. Areoles round to oval, about 5-7 mm long, with white felt. Radial spines usually 6, 4-6 cm long, one smaller below, brown with pale coloured thickened base, somewhat curved; no central spine.

Flower about 4 cm long and broad. Ovary and tube greenish (or yellowish and pink) with dark green (or wine red) scales and white hairs. Outer petals orange (or pink, red or violet) with brownish-green central stripe; inner petals inclining more or less towards each other, orange-red (or yellow to red), interior orange. Throat white, filaments yellow (or orange to red) inner ones white. Style and stamens (5-7) green.

Fruit globular, about 8mm diameter, dark brown-red with pink to brown scales and white fluff. Seed elongated egg-shaped; flattened sides, 1.5 mm long and 1 mm broad, testa with fine tubercles and more or less deformed with irregular depressions. Oblique hilum. The testa is coated with remains of a membrane.

Growing place: Peru, by Sicuani at 3,500 - 3,600 m. Type plant Rausch 426 in Vienna Herbarium.

This species, with its upright innermost petals, is similar to *L. maximiliana* (Heyd), being differentiated therefrom through its more blue-grey colour (*L. maximiliana* has a more yellow-green epidermis and more

variegated spines), through the clearer colours in the flowers (*L. maximiliana* always iridescent violet, red as far as yellow). According to its growing place it would appear to have a relationship with *L. corbula* (Herrera) Br. & R.

By way of a trial we have sown seeds of *L. maximiliana* and *L. pentlandii* next to *L. sicuaniensis*. The last-named grew twice as fast as both the other two named sorts. Also the form of the seed is different.

Comments on *L. sicuaniensis*

..... from H. Middleditch

"We are told by Rausch that his new *L. sicuaniensis* is found growing at an altitude of around 3,550 metres; if it occurs at a higher altitude than either *L. maximiliana* or *L. pentlandii* then a freshly germinating seedling will encounter less warmth and somewhat harsher conditions generally, so it probably has to grow at a faster rate in order to reach a size which enables it to survive its first dry season. There appears to be no record of actual growing altitude for the other two species to be found either in Britton & Rose's book or in Schumman's *Gesamtb Beschreibung der Kakteen*."

..... from J. R. Gooch

"*Lobivia sicuaniensis* flowered this year at 4 years from seed; the seed was obtained from New Mexico Cactus Research. The bloom is funneliform and rather small, 2½ cm in diameter and about the same length. Outer petals are orange with a darker midstripe, inner petals a uniform orange red. The throat is white and the filaments red. It has a tapering tube, nothing like the short, evenly thick fleshy tube of *L. maximiliana*. I observed no yellow in the flower.

GYMNOCALYCIUM GUERKEANUM (Heese) Br. & R. By Prof. Martin Cardenas
(Translated by H. Middleditch from "The Genus *Gymnocalycium* in Bolivia" K.u.a.S 9.1: 1958)

This species was described as *Echinocactus guerkeanus* by Heese in the *Monatschrift für Kakteenkunde* 21 (9): 132, Sept. 1911 based on one specimen, which K. Fiebrig had sent to Europe from Bolivia in 1904. According to the original text the plant description ran as follows:-

"Small, 3.5 cm high, 5 cm broad, depressed crown, 9 ribs, divided into low humps. Areoles 8 mm apart, elliptical, 2 to 3 mm long, yellowish felted. Spines always 5, both upper radial spines 5 mm long, divergent, both lower radial spines 12 mm long, the central spines 10 mm long, at first upright, then becoming directed downwards and appressed like the others. All spines stout, yellowish, brownish-red at the base. Flowers from the crown, 5 cm long, 4 cm in diameter. Ovary greenish, with rounded to elongated scales of similar colour. Flower receptacle funneliform. The short greenish scales which cover the tube, step by step become similar to the petals of the perianth, which are elongated, spatulate and bright yellow. The outer petals exhibit a darker middle-stripe. Stamens numerous, of half the length of the petals. Filaments pale green. Anthers yellow. Style with nine stigma lobes."

We have found in Bolivia not one single *Gymnocalycium* with a yellow flower nor a plant which is like that portrayed in "The Cactaceae" as *Gymnocalycium guerkeanum* (Heese) Br. & R., with such a small body, furnished with so long a flower and slender spines, which clearly forms pretty narrow ribs from the wart-like tubercles. We have also followed Dr. Fiebrig's route in Bolivia, however nothing of the sort was found.

Heese stated in the original description that, before he saw the yellow flowers of the plant, he regarded this as *E. denudatus* Lk. et Otto and that, after he himself had put it out as a new species, he would have placed it under *E. netrelianus* Monv.

Backberg mentioned in "Kaktus-ABC" two species with yellow-greenish flowers: *Gymnocalycium leeanum* Br. & R. and *Gymnocalycium netrelianus* (Monv.) Br. & R., both from Uruguay, as well as *Gymnocalycium guerkeanum* (Heese) Br. & R. from Bolivia. He was in doubt about the origin of the latter, that is from Bolivia. Our current knowledge of the cactus flora of these countries brings us to a similar point of view, namely that it had been inadvertently despatched as emanating from Bolivia.

Until the future of this taxonomic complication has been cleared up, our considered assumption is that it originates from Uruguay.

Comments

..... from E. W. Putnam

"I should like to put out a query via the Chileans on *Gymno. guerkeanum*. I have a healthy plant of this species which has a number of offsets. It is low-growing, but it has been in my collection for about seven years now and so far it has never attempted to flower. It is not a species seen frequently in collections so I would be interested to know if anyone who may have it, has flowered it. It is unusual for *Gymnos.* to remain non-flowering for so long, yet there seems to be nothing wrong with the plant."

..... from G. J. Swales

"I have consulted the original description of this species which was based on one specimen only. That article is illustrated with a photograph of the type specimen, which is grafted on to a long columnar stock. There is a further drawing of this species in *Bluhende Kakteen*, which is reproduced by Britton & Rose in *The Cactaceae*. There appears to be distinct differences between the plants shown in these two illustrations; do we accept that the illustration accompanying the original diagnosis is the correct one?

"I would accept the explanation that this plant does not occur in Bolivia at all, but must come from Uruguay, along with the other yellow flowering *Gymnocalycium*. However, I am not too happy with the identity of this plant as it would appear to be merely within the wide range represented by the yellow-flowering Uruguayan *Gymnos*. I would be interested to learn how certain Bill Putnam is of the ancestry of his plant. I have not seen any imported *G. guerkeanum* offered commercially in recent years - so presumably a plant to be correctly named must be a vegetative propagation from the one original specimen.

"Certainly I would have expected that a yellow-flowering *Gymno* from Uruguay would normally produce blooms from a fairly small plant. Britton & Rose quote 2" for the size of the flowering *G. guerkeanum* which they knew, but other species in this group can usually be expected to flower at 1" across.

..... further from E. W. Putnam

"Thank you for sight of the translation of Cardenas' article. Comparing my own plant with Heese's description, I note the following:

	Heese	EWP-1187
Ribs	9	7
Areoles	Elliptical, Long, yellow. Felted	Elliptical, long, yellow, Felted
Spines	Always 5 Yellowish, brownish-red at base Central at first upright	Always 5 Yellowish, brownish-red at base. Not observed. (Possibly would occur with seedlings?) But, crown is so depressed that the lowermost spine of a new areole is actually pointing upwards, due to the angle of the areole on the sloping new growth. Is this what he means?

"I think I might agree with Heese about the possible confusion of this species with *G. denudatum* or some of its forms. At a casual glance, apart from the absence of the rather shiny skin, my plant would pass for a specimen of *G. denudatum* v. *backebergii* as the appressed spines lie in the same pattern against the body.

"The largest pup on my plant (there are at least nine in all) is about two-thirds of the size of the parent stem. The main stem is 3.5 cm broad and 2.0cm high. Growth has been extremely slow although this considerable number of pups has been produced.

"We can take it that Fiebrig made a mistake over the origin of *G. guerkeanum*, since it has been located on the Brazil-Uruguay border in recent years. I think it was Leopold Horst who found it - either he or Buining."

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

"I see from the Chileans Vol. I No. 7 p. 6 that Dr. Simo made reference to plants obtained under this name from Uebelmann in 1965; Dr. Simo goes on to say that they were collected on the border of Brazil and Uruguay. Would these be the collected plants to which Bill Putnam refers?"

..... from H. Middleditch

"Allowing for variations in spelling of place names, it appears that the place at which the *G. guerkeanum* was collected and then distributed by Uebelmann, is near the river Jaguaro in the north-east of Uruguay. This is not too far from the discovery locations of *Gymno. denudatum*. Was Fiebrig ever in this locality on his collecting travels, I wonder?"

"Although Dr. Simo states that this plant was distributed by Uebelmann, the HU Field-Number list published by Uebelmann does not list a *G. guerkeanum*. If the HU numbers which appear in 1965 could be identified, it might be possible to determine whether this plant subsequently appeared in the list under another name. If so, would it mean that there had been second thoughts about the identity of the plants originally believed to be *G. guerkeanum*?"

..... from Dr. H. J. Hilgert

"Whilst in Frankfurt I had the opportunity to look through the Journals of the Deutsche Kakteen-Gesellschaft of 1904 to 1911. As you know, Heese described in the September issue of the "Monatschrift für Kakteenkunde" of 1911 the cactus which he had received from Dr. Fiebrig, as an *Echinocactus guerkeanus*. However, much to my regret, I could not find anything about the route taken by Dr. Fiebrig in any of the eight volumes I went over.

"Also in connection with other cacti which were described between 1904 and 1911 in the Journal, I always found only the remark "the plants Dr. Fiebrig sent us" without further details about his itinerary.

"Thus it is not possible to say whether he ever visited the north-east part of Uruguay."

..... from R. Strong

"In searching for some information regarding Carl Hosseus, I came across a German publication which gave a short biography of Karl Fiebrig. This is the *Berichte der Deutschen Botanische Gesellschaft, Vo. LXVIIIa* for 1955. Unfortunately it tells us nothing about the localities he covered on his expedition to the south of Bolivia; it appears that he was elected as Professor of Botany at the University of Asuncion in Paraguay until his return to Germany in 1936."

THOSE NASTY BLACK PATCHES

..... from A. E. Parker

"We seem to have had an outbreak of some peculiar diseases in the shape of a black patch which is attacking one or two plants both in my collection and others round about Grimsby. At first we thought that it might be an outbreak of *Helminthosporium* and sent some examples of the affected plants to Wisley for their comments. We have tried a fungicide but it does not seem to be very successful"

..... from A. W. Craig

"Three of my plants have suddenly developed large black patches, about the size of a new penny. The body is still firm in the area of the patch, which is on the shoulder of the plant, so it does not seem to be rot. The three plants are seedlings of *Notocactus* and *Gymnocalycium* which I have had for some time. Certainly there have been plenty of imported plants through the greenhouse this year, but none of those have shown any sign of this problem. I think that disposal in the incinerator might be the best answer for the affected specimens."

..... further from A. E. Parker

"It seems that these black patches could be *Drechslera cactivora*, a parasite fungus. It would appear that weather conditions can play some part in it becoming active. It is said to be present on many South American plants, especially *Arrojadoa* and *Discocactus*. A friend and I both recently purchases plants of *Arrojadoa canudosensis*; on receipt they showed some dark patches about 6mm by 2mm on the stem. They looked to be the same as the black spots which sometimes appear on cериoid plants which we are often told is the outcome of using certain insecticides. Apparently these patches can stay dormant for years. The weather just before the time of the outbreak was very curious for August; we had two or three days with warm nights and a sharp drop in the temperature in the morning as a cold front came over. There was no heating on in the greenhouse at the time and the thermometer showed a minimum of 48°F and a maximum of 90°F.

"Apparently plants of three years or more old grown fairly hard will resist the attack and only become marked on the stem, but the fungus is still laid dormant. If the parasite does penetrate the epidermis, it seems to take about a week from the first sign of anything wrong to the black patch occupying quite a large area."

..... from P. H. Sherville

"Now for my own problem *Cleistocacti*. This year I have suffered the first occurrence of a sort of wasting disease. The first signs are a brownish blotch on the stem - the sort of thing that one does not take much notice of; this rapidly encompasses the stem and the tissue dies away to a powdery condition. The vascular bundles however appear not to be affected at this stage and the plant remains erect with a nice growing tip - the trouble usually having started about a third of the way up the stem. There is no evidence of pestilence and systemic insecticides and fungicides are ineffective in halting its progress.

"Anyway this brown area spreads both up and down the stem until there is insufficient sound tissue to support the still luxuriantly growing tip; the whole lot keels over and this is when one notices that there is something really wrong! I tried cutting off the growing tip, keeping only apparently green healthy tissue, but within a few days the remaining tissue collapses to dust in a similar manner. My best *Cleistocactus*, *C. ressinianus*, has been lost this way and another *Cleistocactus* now has the trouble.

"In a word - HELP!!"

..... from C. Partington

"My prize specimen of *Notocactus leninghausii* which will be about 18" high with several offsets round the base, is unfortunately no longer very much use as a display plant, for it has developed a large black patch only a few inches below the crown. For one reason or another I have had some serious losses this recent winter more plants have been badly marked, or else have rotted off, than I can recollect losing before. But all these were either mushy or hollow from rot, or else badly marked with patches of a brown colour. This *leninghausii* is the only one with a marking which is virtually black in colour. This patch is about two inches across and it doesn't seem to be showing any particular signs of spreading. Added to this, there is no darkening of the epidermis outside the edge of this black patch and the plant is standing as upright as ever. Nor does it seem to be particularly soft under the patch, so altogether it doesn't seem to be rot. But I am not very inclined to try cutting into it to find out!"

..... from J. Hopkins

"Among my imported *Lobivia* is a small *L. haageana*, not much more than an inch across, which has a relatively large patch on one side, which is almost black in colour. Unfortunately I can't really remember if it was present when I received the plant. Many of these plants seem to have been partially buried in the ground to judge by the level where the body changes from brown to green, and this patch could have been covered by a thin layer of earth. It doesn't seem to be affecting the plant in any way at the moment.

"However, there are two of the imported *Parodia* showing some black markings and I am not too happy about their condition. *P. tarabucina* is still very flattened and far from turgid. There is a band of corky, compressed areoles round the base and where these give way to the green epidermis there is an irregular band of black, patchy in places. This black seems to be creeping upwards very gradually. But for all this the plant does seem to be starting up into growth. The other plant is a *P. schewbsiana*, which is not really well established yet, and that one has a few quite small patches of black around its waist.

"This discoloration seems to be a different colour to any other form of marking that I have come across before. I am not sure whether a fungicide would have any beneficial effect and halt the progress of the black patches.

"P.S. One of the *L. haageana* has now produced a flower from the areole in the middle of the black patch, so I assume whatever the patch is, that it can only be skin deep".

..... from Mrs. J. M. Hobart

"One of my plants which suffered from this rather tarry looking black mark was an *Acanthocalycium violaceum*. The black patch was very hard - there was no softness suggesting internal rot. I brought the plant indoors thinking that it was something to do with the conditions in the greenhouse which has caused the trouble, but unfortunately the plant passed away.

"Later on another plant showed signs of what looked like the same sort of marking. It was a *Weberbauerocereus rauhii* which I had acquired as a smallish seedling some eight years ago; it had now grown to round about a foot high. It had been fairly free of any markings on the epidermis until this year when I noticed a very dark patch about a third of the way up the stem - a patch about an inch broad and about 1/4" high, across two or three areoles.

"Remembering my *Acanthocalycium* and thinking that it must be some sort of internal rot which had set in, I felt it best to decapitate the plant in the hope that I might be able to save the upper portion for re-rooting. However, when I had cut through the stem both above and below the mark, I found that there was no sign of any rot in the vascular bundles - the dark colour seemed to be confined to the surface of the plant body. Naturally I greatly regretted having chopped into the plant and decided to try and salvage the top section by grafting it on to a stock. However, there was nothing in the greenhouse that I could use for this purpose, until I realised that the bottom part of the plant which still remained, was a suitable size. So I grafted the top section back on to the rooted base.

"Unfortunately this graft was not a success and this plant is now no longer in existence either.

"When we were looking at Rausch's plants in Vienna on our Cactus Tour to Austria, I noticed that there were a few plants which had odd black patches. The day being wet and windy and as we were without a fluent German translator among the party, we were unable to understand clearly whether Rausch was suggesting that these patches were already on the plants when he dug them up in habitat, or whether they were the result of applying some fungicide or pesticide to the plants. If the former, I cannot help thinking that it might have been preferable to have left the plants where they were, in South America. One member of our party observed that if any of his cabbages had developed marks like that, he would have thrown them on the bonfire forthwith".

..... from D. J. Lewis

"The text book by M.B. Ellis on Dermatiaceous Hypomyces covers the group of fungi to which the cactus fungus belongs. The illustration shows the spores called conidia and the stalks on which they are fixed, the conidiophores. The latter arise directly from the plants epidermis. The description is as follows:

Drechslera cactivora (Petra) M.B. Ellis comb. nov.

Synonym: *Helminthosporium cactivorum* Petra.

Conidiospores pale to mid-golden brown. Conidia, pale to mid-golden brown.

On cactaceae, Europe. No spots are formed; colonies black, velvety, or hairy. Note that it mentions colonies. This disease could very easily be seed transmitted, mainly by contamination of the seed pod.

..... from G. Raz, Vienna

"If you have got any imported plants which have this black patch, you can do nothing except to peel off the epidermis where the patch is. In one of the last numbers of our Austrian Society bulletin, I repeated a tip from Mr. Koop: he takes a "colourless merfen tincture" (that's a medicant for the mouth and throat) and plants it all over the patches. If you apply it frequently, you can stop the spread of the patch, but it is not known if any other agent can stop it or cure the plant.

"Last year I spoke to Walter Rausch about the black patches on his plants. He told me that in all his discussions he received no suggestions for curing the problem - neither in Vienna, nor in Holland, nor in any other plant protection seminar.

"Quite recently I paid a visit to Ernst Markus in Klosterneuburg - he is a friend of Rausch and has been with him once to South America. He could only say the same thing and he has also found the "merfen" seems to be the best thing he has ever heard of to deal with this problem.

"I think if you have plants with this trouble you had better try to graft the healthy parts and dispose of the remainder."

..... from H. Miller

"I will try to photograph the individual flowers on my *Gymno horstii*, assuming the plant is still with me. In October of this year the main body started to become very badly marked with a number of large black spots and, fearing the worst, I removed all the offsets and put them in the propagator to root up. To date the marks have become no worse and to all appearances the plant is still alive, but next year will tell. I cannot account for the black marks as up to then we had no really cold weather and I had not been below 48°F on any evening."

..... from R. Rolfe

"The passage in the G.O.K. bulletin to which G. Raz refers in his letter would appear to translate as follows:

"During a conversation with Herr Koop, I learnt of a new remedy for controlling fungus, which I would like to introduce to you (naturally without guarantee). Herr Koop once tried to cure his seeds of fungus at germination with clear "Merfen" tincture, evidently with great success. Daily afterwards it could be seen under a magnifying glass that with the help of the undiluted applied liquid, the point of attack on the tender seedlings was perfectly healed over. This tincture also functions as a stopper in the case of infection from the horrible black fungus, which is often introduced by imported plants. Now the cost is on average not great (about 28 Austrian schillings at the chemists): if the attack on the germinating seed is complete then it would not be effective".

"I am afraid that the description "Merfen" tincture does not convey any particular meaning to me". (We now have an offer from cycological laboratory to examine any "black patch" to ascertain whether it is a fungus, or not - H.M.)

HELMINTHOSPORIOSE among the CACTI by M. Ondrej.
(Originally in Kaktusy, Czechoslovakia, 9.6.73.)
(Translated by H. Middleditch from K.u.a.S. 25.12:74)

It would appear that the best investigated cause of fungus disease among cacti is without doubt *Drechslera cactivora* (Petraek) M.B. Ellis (syn. *Helminthosporium cactivorum* Petraek and *Helminthosporium cactacearum* Bongini). This fungus was described in the first place by Petraek in Austria (1931), later confirmed in Italy (Bongini 1932), Germany (Flachs 1935), USA (Durbin, Davis & Baker 1955) and Czechoslovakia (Prihoda 1956). According to the statements of these authors the fungus appears among different cacti, particularly *Cereus* species, previously mentioned ones being:- *Cereus peruvianus*, *C. jamacaru*, *C. collinsii*, *C. sartorianus*, *C. mexcalensis*, *Cephalocereus tetetzo*, *Lophocereus schottii*, *L. gatesii*, *Espostoa lanata*, *Selenicereus* sp., *Lemairocereus martinezii*, *L. dumortii*, *Echinopsis* sp., *Echinocactus grusonii*, *Ferocactus stainesii*, *Astrophytum ornatum* and *Epithelantha micromeris*. In contrast is the widespread view of many cactophiles that this fungus however is very rare. All investigations of examples presented proved to be caused by another fungus, *Alternaria alternata* (Fr) Keisler, (syn *Alternaria tenuis* Nees.)

In Czechoslovakia *Drechslera cactivora* was only confirmed on *Echinocereus pentallophus*. In Germany too, Prof. Dr. W. Gerlach had found the fungus only twice in ten years on cereiform plants.

The symptoms of this fungus disease conform to the original description. The lower part of young plants discolours dark brown, an indication of damp rot, that quickly spreads. Later the affected place is covered with an olivegreen coating, the fungus mycelium, from which the brown conidiophores then project with the jointed, large, dark conoidae. Within 2-4 days the infected plant completely perishes.

As a treatment Durbin, Davis and Baker (1955) recommended spraying with Captan at ten days' intervals and sterilising the compost. Dr. Michal Ondrej carried out a series of trials, to test for the susceptibility of the fungus to various fungicides. Benlate, Perozin, Heryl, Novozir, and Chinosol were investigated. The results showed that only Chinosol fully arrested the growth of the fungus, Novozir appeared to give a good result, Heryl a weaker one, and Perozin still less effective. The systemic fungicide Benlate even stimulates the fungus growth.

Comments

..... from A. W. Craig

"I have a *Cereus* which is growing with a free root rim, having two stems about 18" tall. These developed patches which I suspect to be some sort of fungus. I have painted the patches one or twice with a solution of Benlate - the patches have now gone pale brown but their growth has been completely arrested."

WEINGARTIA CUMINGII

At our '73 Brooksby weekend we screened a fairly representative selection of slides of *Weingartia* species. Among these were several examples of *Weingartia cumingii* in flower. It was noteworthy that among the slides of this particular species the flowers were often tinged an orange colour; one particular example of an imported plant ex Uhlig displayed flowers of an allover apricot colour, the flowers being a fairly narrow funnel shape with pointed petals.

Chris Webb comments that "I obtained a plant of *W. cumingii* from Clive Innes in May '67, which I believe to be an imported specimen, although its origin is unknown. It was 2.5 cm high and 4 cm diameter on receipt; it rooted readily and it is now 8 cm diam. and 5 cm high. Its fits the description of this species quite well. It flowers profusely each year, with deep orange yellow flowers."

Tom Lavenda also observes that his plant of this species produces flowers of an apricot colour. "After setting seed on this species the fruit eventually split and spilled the seeds all over the plant. We have had several imported plants of *Weingartia* from Knize; they were treated as usual with imported plants, by soaking them for an hour or so in water which is warm to the touch to which some "Clensel" has been added. We adopted this idea from reading about it in Lamb's Notes for Feb. 1962".

Paul Sherville observes that "Weingartias are one of the few groups of plants that I know of which replace spines which have broken off - even on ancient aeroles. The only other plant which I have encountered that replaces spines is *Trichocereus fulvilanus*. However, within the *Weingartia*, I have had several imports which, having plumped up after rooting, have replaced broken spines and generally "made themselves tidy" before commencing new growth. Indeed I thought one specimen was offsetting from the base but it turned out to be merely replacement spines. The new spine which you saw on my slide of *W. surensii*, which was growing from above the flower remains, might have been either a replacement spine or a later addition.

"The other thing about *Weingartia* is the fact that they flower more than once from each areole. Indeed I have had two flowers in rapid succession from the same areole and, having left last years dead flowers on, it is now evident that they flower from the same areoles again in successive seasons. Few other genera display this characteristic (the obvious one is *Myrtillocactus*). It is also possible that some cephalium bearing plants may do this as well, as my *Discocactus placentiformis* has produced three flowers this season already with no apparent increase in the cephalium (it flowered profusely last season, so this years flowers would seem to have come from the areoles which have produced flowers last year)".

From A. W. Mace we hear that he acquired a *Weingartia cumingii* from Fuge in Bristol about 15 years ago, as a small seedling. This carries orange flowers, in comparison with *pulquinensis*, which some consider to be a synonym, which has yellow flowers.

Growing an imported plant is J. R. Gooch, who observes that "this plant, which came from Uhling as *W. neocumingii* some years back, has indeed got very intense orange-yellow coloured flowers - Slide enclosed". (Slide now in Slide Library - H.M.)

WEINGARTIA CUMINGII VS. WEINGARTIA NEOCUMINGII - an explanation by P. G. Waterman

Giving a plant species its correct name is usually a straight forward affair. In some cases however, due to past errors it can become a problem of quite startling complexity. Such a case was illustrated recently in the *Chileans* with reference to the name *Echinocactus cumingii* and its ramifications.

The explanation of and solution to this nomenclatural problem were given in the translation of an article published by Dr. B. K. Boom in *Succulenta* (see *Chileans* 7, 18-20). Boom assumed, however, that the reader had some knowledge of the International Code of Botanical Nomenclature (ICBN), something which many readers of the *Chileans* will, quite naturally, not possess. It may, therefore, be useful to explain in greater detail the workings of the ICBN with respect to the problem of *E. cumingii*.

Firstly, what is the ICBN? Its purpose, to quote the preamble "..... is to put the nomenclature of the past into order and to provide for that of the future....." It is then a rule-book laying down the parameters that must be adhered to in giving the correct name to a described species and in naming new species. The rules of the ICBN take the form of a series of Articles (75 in the latest edition) accompanied by further notes and recommendations. The rules attempt to cover all aspects of plant nomenclature and are, except in special circumstances, all powerful in the sense that names published contrary to them cannot be maintained. Finally it should be stressed that the ICBN is not a static set of rules. It is constantly under review by scientists concerned with its use and they are able to make suggestions for it to be changed. Such suggestions will be discussed at the next International Botanical Congress where they will either be accepted for incorporation in the Code or rejected. Each congress is, therefore, followed by the publication of a new Code; the one now in use is that adopted by the Seattle Congress of 1969, the next will arise from the Leningrad Congress due to be held in 1975.

As you will have gathered from Boom's article the particular problem we are concerned with arose from the wish of two authors, Hopffer and Salm-Dyck, to honour the collector Cuming by naming a species of the Cactaceae after him. Both authors did this correctly in that they fulfilled the requirements of the ICBN for valid publication of new taxa at that time (as laid down by Art. 32). Unfortunately both authors chose to place their new species in the genus *Echinocactus*, giving us *E. cumingii* Hopff. (published in 1843) and *E. cummingii* (*cummingii* in error for *cumingii* - see below) Salm-Dyck, published in 1849.

As, with hindsight, we now know that those names refer to two distinct species there is, immediately, conflict with the Rules of the ICBN. The problem occurs because we now have two identical names (homonyms) referring to two different species of the same genus. This is obviously an absurd situation and one that is catered for by the ICBN which states in Art. 64:

"a name is illegitimate and must be rejected if it is a later homonym, that is, if it is spelt exactly like a name previously and validly published for a taxon of the same rank based on a different type"

This ruling holds even if the earlier homonym is not an accepted species, except under special circumstances that do not apply in this case. Therefore Art. 64 confirms the earlier name, *E. cumingii* Hopff. as a valid name and places *E. cummingii* (*cumingii*) S-D as an illegitimate name. What should have been done was, obviously, to give Salm-Dyck's species a new name; this was not done however, as nobody at the time recognised that it referred to a different species.

Before passing on to the later confusion arising from these errors it is necessary to clear up another little problem that was not discussed by Boom. G. J. Swales (Chileans 7, 22) noted that Hopffer had spelt the specific epithet of his species *cumingii* whilst Salm-Dyck had spelt it *cummingii*. If you refer back to the quote from Art. 64 you will note that they do not therefore comply with the strict definition of homonyms since they were not spelt in exactly the same way. Does this not mean that both names are acceptable? Fortunately not: there being a rider to Art. 64 that states: "mere orthographical variants of the same name are to be treated as homonyms when based on different types."

And what are orthographical variants? The Code defines them in Art. 75 as: "two or more generic names (or specific epithets within the same genus) or similar that they are likely to be confused." As the names used differ only in one letter and because both were made with reference to the same collector (namely Cuming) there is no doubt that Art. 75 confirms them as homonyms. To digress for a minute I regret to have to say that Art. 75 is not always so clear. For example in the rutaceous genus *Zanthoxylum* L. the taxa *Z. williamii* de Alb. (based on a collector christian name William) and *Z. williamsii* Standl. (based on a collector surname Williams) are, unfortunately, both to be accepted.

Another point worth noting is that the ICBN gives us recommendations on how we should cite Salm-Dyck's illegitimate name when we refer to it. It recommends (Rec. 50F) that we should continue to spell it as Salm-Dyck did when citing it as a synonym and, if we wish, add the correct spelling in brackets. Also the fact that it is a later homonym should be noted and it is recommended (Rec. 50C) that this is done by making reference to the name of the earlier author preceded by the word non and followed by the date of his publication.

When citing these names the correct wording is therefore: *Echinocactus cumingii* Hopff. Allg. Gart. 29 (1843) *Echinocactus cummingii* (in errore *cumingii*) Salm-Dyck. Hort. Dyck. (1849) non Hopff. 1843.

However when Britton and Rose were writing *The Cactaceae* they were apparently unaware of the nomenclatural duplicity that existed. At this time they were erecting the new genus *Lobivia* Br. & R. and one of the species they felt belonged there was that described by Salm-Dyck as *E. cummingii* (I shall continue to use this spelling for the sake of clarity). At least, this was apparently their feeling as they set about making the new combination *Lobivia cumingii* using Salm-Dyck's description of *E. cummingii*. However the making of a new combination is a different matter to the description of a new taxon. Giving a description is not the paramount factor, in fact it is not even necessary. What is vital is that the basionym is cited, thus giving a reference to the original description. And what is a basionym? The ICBN (Art. 33) defines it as "name-bringing or epithet-bringing synonym"; in this case the epithet brought was *E. cummingii*. The normal practice is to place the name of the authority who published the basionym directly after the new combination, (in brackets), and then to follow it with the name of the publisher(s) of the new combination. This Britton and Rose did, but unfortunately what they wrote was *Lobivia cumingii* (Hopff.) Br. & R. thereby citing *E. cumingii* Hopff, and not *E. cummingii* S-D as the basionym. Thus, although the description given by Britton and Rose did not refer to Hopffer's species but to Salm-Dyck's the citation of the incorrect basionym binds the name *L. cumingii* to *E. cumingii* Hopff.

Britton and Rose's error was not immediately realised and consequently it was repeated, firstly by Backeberg when he transferred (Hopff.) *Back.*, and then by van Osten in transferring it to *Weingartia* as *W. cumingii* (Hopff.) Werd. ex van Ost. The taxa *W. cumingii* (Hopff) Werd. ex van Ost. illustrates another of the articles of the ICBN, Art. 46 on correct author citation. In his paper in *Succulenta* van Osten actually wrote *W. cumingii* (Hopff.) Werd. under the erroneous belief that Werdermann had made that combination when erecting the genus *Weingartia*. As van Osten first fulfilled all the requirements for the making of this new combination it must be attributed to him. However Art. 46 (recommendation C) suggests that: "When an author who first validly publishes a name ascribes it to another person, the correct author citation is the name of the actual publishing author, but the name of the other person, followed by the connecting word *ex* may be inserted.. .."

Hence *W. cumingii* (Hopff.) Werd. ex van Ost.

At about the same time another new combination for *E. cumingii* was being proposed, this time in the genus *Oroya*. On this occasion, however, the author, Kreuzinger, was obviously more conversant with the possible nomenclatural pitfalls (or perhaps he was just lucky?) and wrote *Oroya cumingii* (SD) Kreuz. citing *E. cummingii* SD as basionym. You will note that Kreuzinger took the opportunity to correct Salm-Dyck's spelling error, which is quite in order under the ICBN.

An interesting point with regard to this new combination is that, as we have already established, the basionym is an illegitimate name. As, under the requirements of Art. 33, the name *O. cumingii* is validly published as a new combination there are no grounds for rejecting it. However, it must be realised that Salm-Dyck's name has no standing under the ICBN and cannot be recognised from the point of view of priority. The ICBN lays down therefore, in Art. 72, that the resulting combination should be treated as a new name and written as *O. cumingii* Kreuz. and that it be considered, for purposes of priority, to date from Kreuzinger's publication in 1935 and not from the date of the basionym, 1849.

A summary of the results of the nomenclatural contributions of the period between 1920 and 1940 shows the following:-

E. cumingii Hopff (1843) = *Lob. cumingii* (Hopff.) Br. & R. = *Speg. cumingii* (Hopff.) Backeb. = *Wein. cumingii* (Hopff.) Werd. ex van Ost.

E. cumingii (SD) (1849) non Hopff. (1843) = *O. cumingii* Kreuz (1935).

So, after all that time and effort, we are left with a species that is now thought to be a *Neoporteria* with legitimate names in *Echinocactus* and, by error, in *Lobivia* and *Weingartia*. In contrast, the taxon we now know to be a *Weingartia* has a legitimate name only in *Oroya*.

When, in 1950, Backeberg at last realised that *O. cumingii* was actually a *Weingartia* he was not therefore able to effect a direct transfer of the specific epithet to *Weingartia* as the name *W. cumingii* had already been used to reference to the plant it is now believed may be a *Neoporteria* (*Neochilenia*). As no specific epithet other than *cumingii* had ever been suggested for *O. cumingii* then Backeberg had to publish a new name e.g. *W. neocumingii* Backeb. (based on *E. cumingii* (SD)). It must be noted that Backeberg's name, although based on a species described over one hundred years before, is a new name and as such is considered, from the point of view of priority, to date from its publication, in Jan. 1950.

This then must surely be the end of the *cumingii* saga? Unfortunately not! Two further papers by Hutchison add a twist to the tail. Firstly in 1957, in a paper discussing the relative merits of *Gymnocalycium* vs *Weingartia* he made the transfer *Gymno. neocumingii* (Backeb.) Hutch. (basionym *W. neocumingii* Backeb.). Boom apparently regarded this as a correct transfer (at least he made no definite comment to the contrary.) Actually when made it was not legitimate at all as it used *W. neocumingii* Backeb. (publ. 1950) as basionym whereas *O. cumingii* Kreuz. (publ. 1935) was available (there being no epithet 'cumingii' in *Gymnocalycium*) as a legitimate name (Art 35 and 72) with priority (Art. II).

It seems likely that Hutchison realised his mistake as, two years later, he published the name *G. cumingii*. In doing so however Hutchison made yet another error. Probably confused by the description given by Britton and Rose and overlooking the basionym applied to it (see earlier) Hutchison took *Lobivia cumingii* (Hopff.) Br. & R. to refer to Salm-Dyck's species and made the new combination *Gymno cumingii* (Br. & R.) Hutch. This combination, citing *L. cumingii* as basionym, now refers to the original *Echinocactus* of Hopffer as the later was cited in basionym for *L. cumingii* by Britton and Rose.

So, in attempting to correct his original error in priority Hutchison only succeeded by referring what should have been the correct name under *Gymnocalycium* to a second species and as a result of this he inadvertently legitimised his first attempt, *G. neocumingii*, which now becomes the oldest available epithet for Salm Dyck's species in *Gymnocalycium*.

ON THE TRAIL OF ECHINOCACTUS CUMINGII Hopf.

..... from H. Middleditch.

"The original description of *Echinocactus cumingii* Hopff. was reproduced in *Chileans* No. 25, where it was suggested that this plant might perhaps be a *Neochilenia* which was collected by Thomas Bridges during his trip from Copiapo to Santiago in 1841. Reference was also made to the catalogue of those plants collected by Thomas Bridges on that expedition, covering his field numbers 1279 - 1424, held in the British Museum Natural History Library. One might perhaps hope that this would include a reference to any cacti collected at that time; in which case any description given in the catalogue could be compared with Hopffer's diagnosis of *Echinocactus cumingii*."

..... from G. J. Swales

"I have had a look at the catalogue of Bridge's plants in the British Museum, covering his field numbers 1279 - 1424. It is stored in the Herbarium at the B.M. Natural History Museum, not in the Library. It was partly burned by enemy action during the 1939-45 war but is still readable for the most part. The list of Bridge's field numbers at Kew only covers 1-857.

"Number 1279 starts between Copiapo and Huasco, but then follows no obvious sequence. A few valleys are mentioned e.g. Elqui, but the names repeat over and over again, so that it could appear that maybe material was brought to him, or he was based at one point and he did not stray very far in any one direction. I could decipher no cacti at all, but he refers once to a creeper growing over or between cacti but giving no names.

"The catalogue consists of seven or eight double foolscap size sheets held loosely in a manilla folder; they may have been bound together at one time. All the entries are hand written, but there is nothing to tell us whether the list was written out by Thomas Bridges himself, or by some other person.

"Owing to the fire damage the pages are now somewhat friable towards the edges; the odd black flake of charred paper fell off these sheets and out of the folder as I handled it. I fear that this handwritten list may eventually become worthless through handling if the pages continue to deteriorate".

..... from D. Huxtable

"I have been to the Natural History Museum and taken a look at the handwritten catalogue of Thomas Bridges's plants, which is kept in the Herbarium..... It consists of double and single foolscap sheets, originally sown together and gold edged on the outside edge. The cover is recent.

"The title "A catalogue of plants found in the Province of Coquimbo, Republik of Chile, S.L. 27-32 $\frac{0}{6}$ Collected by Thomas Bridges - 1841" was written in by J.J. Bennet, a member of the Museum staff. The list, of course, covers some ground outside the present Province of Coquimbo.

"It has certainly suffered from damage by fire - every single sheet is charred around the edges. I think several of the entries near the head of the pages can no longer be identified clearly as only a portion of the entry remains undamaged. It is just possible to make out the writing on some of the charred patches, but these will inevitably become detached with handling. However, the general body of the list appears to me to be in good condition; there is no sign of yellowing or embrittlement of the paper which has not been touched by the fire and I would expect it to remain in that condition for many years to come. The watermark on the paper "Botanica" and W.H. Fellows 1840" is contemporaneous with the time of Bridges's collecting trip so it is possible that this list was written out at about that time. If the catalogue was written out by Bridges then the writing on the cover is not his.

"Due to the damage at the top of the sheets it is difficult to identify the column headings, but the entries on the left-hand side of the page comprise:- Field number, Botanical name, Native name (then follows a column containing one symbol whose meaning is not at all clear), Size, Time of Flowers, Colour. This last entry is presumably the colour of the flowers. The right hand sheet is headed "Where Found",

"Thomas Bridges must have had a pretty comprehensive botanical knowledge to be able to identify the great variety of shrubs, bushes, and plants which are to be found named in his catalogue. However, there are one or two entries which consist of description only, without any name; most of these entries seem to be against plants of low growth - up to about 6" in height. Are these plants which Thomas Bridges could not identify? I notice that there are no entries which give the generic name only; if he only knew the generic name did he then make a blank entry under the "Botanic name" column?

"The person in charge of that particular section of the Herbarium could hardly have been more helpful and produced from the herbarium a sample of one of the plants purchased from Bridges. It was also promised to let me have a copy of the catalogue. I understand that plants from Bridges also went to Herbariums in Vienna, Berlin, Kew, and New York."

..... from H. Middleditch

"What a pity that, after all that effort, we should fail to uncover any evidence which may have helped to identify *Echinocactus cumingii* Hopffer. The copy of the catalogue was duly received and was available for examination at our Brooksby '74 weekend."

..... from G. J. Swales

"There would seem to be not a single specimen of cactus included in Bridges's catalogue. Perhaps these plants were considered impracticable to press and dry to send back as herbarium specimens?"

WEINGARTIA - Some further comments from J. D. Donald

The article in *Chileans* Vol. 7 No. 25 makes very interesting reading, The facile solution put forward by Dr. B. K. Boom on the correct name *W. cumingii* (Salm-Dyck) Werd. ex Van Osten versus *W. neocumingii* Backb. is not to be taken lightly. Since as he says Salm-Dyck's *Echinocactus cumingii* is a later homonym of *Echinocactus cumingii* Hopffer and the two plants are not the same from the original descriptions, then clearly Salm-Dyck's name for this plant is illegitimate and only the Backeberg name *neocumingii* should be used. But is this really so?

Hutchison made the mistake by adopting *Lobivia cumingii* (Hopf) Br & R. as the earliest legitimate combination using *cumingii* as a specific epithet (despite that I.C.B.N. Recommendation 72a says that 'Authors should avoid adoption of an illegitimate epithet previously published for the same taxon' - however, the Articles are the Rules, not the recommendations). However as Dr. Boom points out *Oroya cumingii* (SD) Kreuz. is valid for use (despite recommendation 72a) under article 72. If one chooses *Weingartia* as the correct genus for this

taxon then one must use the oldest legitimate epithet in the rank concerned to combine with it. This is still *cumingii*, not *neocumingii*, since *Oroya cumingii* (SD) Kreuz 1935 predates *Weingartia neocumingii* Backbg 1950. Hence in my opinion the correct name could be say "*Weingartia cumingii* (SD) Don.". However it serves no useful purpose and for all practicalities to avoid further confusion the combination *Weingartia neocumingii* Backbg. K.u.a.S. I:1950 ought to be conserved versus *Weingartia cumingii* (Hopf.) Werd ex Van Osten quoad descr. Succ 21:1939.

The use of *cumingii* rather than *cumingii* is ruled out - spelling errors do not count regarding legitimacy of homonyms.

I agree with the probably identification of *E. cumingii* Hopf. as being either *N. iquiquensis* or *N. aricensis*, now that I have flowered them, rather than *N. Santiago* No. 12 or *N. species pichindangui*.

Dr Boom could hardly have read my original article very closely otherwise he would have realised that I made the new combination because at that time, although accepting the logicity of *Weingartia* as a subgenus of *Gymnocalycium*, I preferred to keep *Weingartia* still separate, hence the new combination of *W. westii*.

The Chileans Robin for *Melocactus* and other cephalium bearing plants - A report by Mrs. L. Teare

..... from Harry Mays

"When the Robin first started, several members mentioned the success they were having by growing *Melocactus* in plastic bags. I put a few duplicates into bags to see what success I would have. I have had none. A few 2, and 3 year old seedlings rotted, a four year old *Melo. intortus* also rotted. Those that survived are no greater in size than those left out of the bags. All the plants, including those in the bags, were kept at 60°F (15.6°C). I can only assume that it is too low a temperature for plants that are kept moist."

..... from Tony Mace

"My *Melocactus* are doing well, unfortunately I lost several *Discocactus*, the only answer to keep these plants is to graft them."

..... from Brian Chudleigh

"Most of the *Discocactus* are in the seedling house, hard against the glass, on the western side, and - all the pots in plastic bags. The pots get so hot, you can hardly touch them, but the condensation seems to give enough shade to stop burning on the green bodied types. I did slightly burn two *Discocactus horstii*. One plant of *D. mosti* produced a single flower soon after Christmas. A *Disco. sp. Curvello* produced 5 flowers one night and the perfume was overpowering.

"I have a number of plants of *D. boliviensis* which seem among the easier to grow. The three large ones 5" diameter are still not mature. The pick of them is the one I grafted on a heavy *Trichocereus*, out in the garden with a plastic bag over it. It is growing at a good rate and should mature next year. Grafting seems to be the answer to overcoming cultural problems in cold climates. I find them as hardy as any plants when grafted.

"*Espostoa melanostele*, a form with little wool and no central spines, is forming a cephalium on its main branch. It will be interesting to see the difference between its cephalium and those of the *Espostoas* for it is sometimes named as *Pseudoespostoa* per Backeberg. *Espostoa lanata* and *E. ritteri* have now well formed cephalia but have not flowered, the flowers on *E. mirabilis v. primigena* and *E. hyleae* are a pallid off white, a little over 1" across, but the cephalia of the different species contrast greatly - ginger brown on *E. hyleae*, white on *E. lanata*, brownish black on *E. mirabilis v. primigena*, a dirty grey on *E. ritteri*.

"..... Charlie Lipscombe who has now moved to Australia and started collecting all over again asks a question of the botanists. Some of the *Melocactus* like *bahiensis* seem unable to produce flowers long enough to show through the cephalium. Presumably their seed is set by self-pollination as not many insects could reach the flowers. Does this imply that after umpteen generations defects will appear as a result of inbreeding? Are plants produced by self-pollination inferior in any way to those produced by cross pollination?"

..... from Louise Teare

"I have had no losses among the *Melocactus*, but like Charlie Lipscombe I found that moving to a new country with tough laws on import of plants means starting all over again. I obtained a very large specimen of *Melo. broadwayii* 7" diam and 12" high; it had a very dirty cephalium and very few roots for such a large plant; with it came a *Melo. neyri*, also with few roots. Fortunately it was very hot at the time. I put both in clay pans, in sandy soil, shady and sprayed them every day. In five weeks they were established and growing; shortly after *Melo. broadwayii* put out a very fat red pod. It has continued to do so at two month intervals since. Now, in winter time here, it is decorated with three large pods. *Melo. meyeri* did the same, with smaller fruit. They are

kept in the seedling house, 60°F minimum; most days are sunny and the temperature goes up to 70-85°F. I water them twice a week, on average, every day if we have a week of sunny weather. The seedlings of 3" or 4" size are also in the same house and growing beautiful spines. They are quite fast growers.

"Melocactus bahiensis is about to form a cephalium. This is a plant which has had a very hard life; it came originally from a cactus collection in Rio de Janeiro, settled in England for 3 years, then came to Australia, was fumigated and held for four months in quarantine. It was a sorry sight after this treatment and took a year to make up its mind to grow again. I have one *Discocactus horstii*, which I keep near the heater on a saucer of damp sand: it is never allowed to get dry.

"To answer Charlie Lipscombe's question, I have observed the same phenomena of *Melo. violaceus* - the flowers hardly reach the top of the cephalium, but if you observe your plant carefully, at one time or another the flower does push through the cephalium. Are you quite sure that your bahiensis flower did not do the same? As for insects, the proboscis of a butterfly is very long and can reach right down to the flower. There is, as far as I know, no evidence that a plant cross-pollinated would be any stronger than a self fertile one. I suppose after a very long time, a self fertile plant would become a little weaker.

"We have lost one of our members from America, H. Wise; he is away from home very often and cannot keep up with the Robin. However, I am glad to welcome to the Robin, Francis Borg from Malta."

ERRATA NO 28

p 12 Line 18 should read "called the lingua geral"

p 22 line 12 should read " north of Minas Gerais"

..... from G. J. Swales

"I feel that the long sentence from the bottom of page 9 to the top of page 10 might have been better rendered as: and until my return to France I devoted to the task of forming collections of animals all the time that it was possible for me to spare from my botanical observations, unfortunately the more onerous because of the problems of transport, the extreme humidity and a host of difficulties, the details of which would be beyond the scope of this introduction."

STUDY GROUPS/ROUND ROBINS

Cleistocacti	T. Lavender, 62 Finchdale 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, Primrose Cottage, Monks Lane, Audlem, Cheshire CW3 OHP
Matucana/Borzicactinae	W. W. Atkinson, 12 Court Road, Tunbridge Wells, Kent.
Melocactus/Discocactus	Mrs. L. Teare, 27a Maher St., Kensington Gardens, Adelaide, South Australia, 5068 Australia.
Neoporteriae	D. Rushforth, 8 Broadfield Road, Knowle, Bristol 4.
Notocactinae	K. H. Halstead, Little Firtrees, Wellington Close, Dibden Purlieu, Southampton.
Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A. W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm, Yorks.
Sulcorebutia	W. G. Sykes, 10 Ashley Close, Thornton Cleveleys, Lancs FY5 5EG.
Trichocereus	N. T. Hann, 5 Lake Road, Shirley, Croydon, Surrey CR0 8DS

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