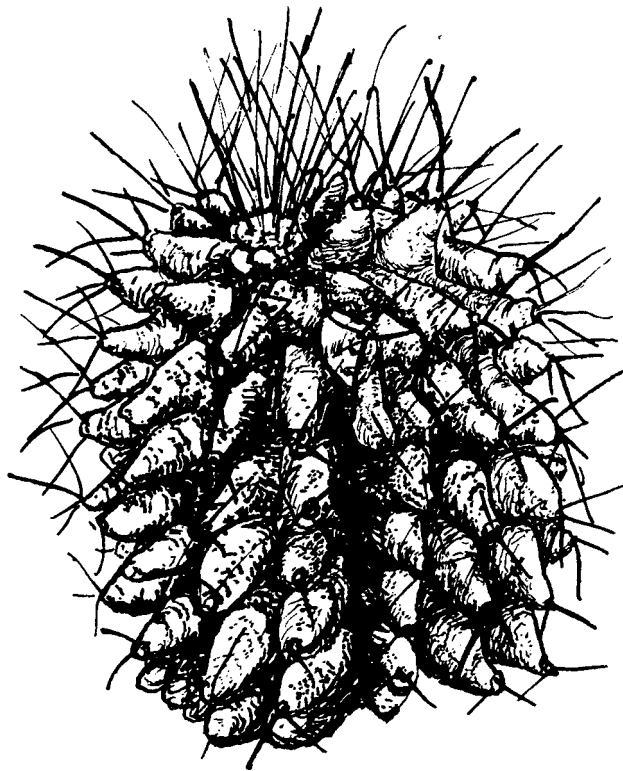


THE CHILEANS '74

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UEBELMANNIA BUININGII

HU 141

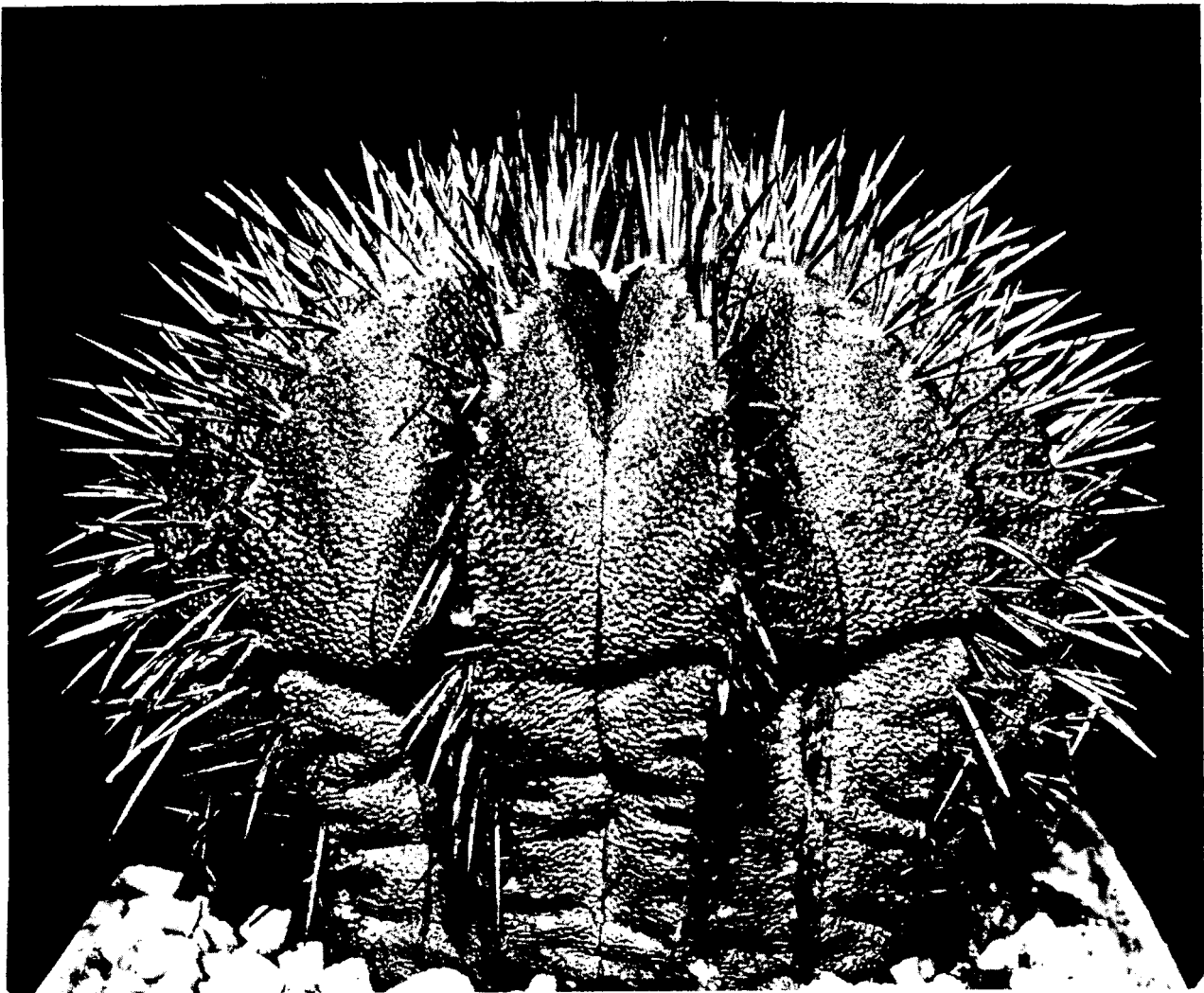
ACTUAL SIZE

Collection - E.W. BARNES



UEBELMANNIA PECTINIFERA

K.u.a.S. 21.10:70 Photo: W. ANDREAE



UEBELMANNIA PECTINIFERA

K.u.a.S. 19.11:68 Photo: Dr. M. HARTL

A SICK UEBELMANNIA SAVED. From T. Lavender

We paid a visit to Holly Gate nursery in the autumn of 1970 and found a fairly large selection of Uebelmannia available, some of which would be 10 to 12 inches high. The larger -and presumably older – plants were, not surprisingly marked in varying degrees, possibly by animals in habitat or other causes. We took a lot of trouble over selecting a plant for purchase and finally picked a fairly small plant of HU 128 which was very corky round the base but otherwise was unmarked and without any broken spines. The corkiness round the base seemed to be typical of all the plants to be seen there.

This plant was potted up at home and given all the care and attention it merited. We did not really expect much to happen over winter, but hoped that the coming of spring would bring a response. Naturally it shrank a little over the winter and with the coming of spring it seemed to shrink even more; there was no sign of it taking up water all through the summer and by the time September came it was terribly shrunken and dehydrated – in fact it seemed to be dying, if it was not already dead. As we were about to go off on our fortnight's holiday, the only alternative to throwing it on the rubbish heap when we returned, seemed to be to try and graft it.

Some years ago we paid a visit to a Mr Dougall at Snaith (not far from Goole) who may be remembered by other collectors as having an interesting collection containing many nice plants, mostly grown with free root run with little or no winter heating. He presented us with a seed pod from a plant of Trichocereus and observed at the time that it made a good grafting stock. The actual species is uncertain – it is somewhat akin to spachianus but I suspect that it is a hybrid. This seed germinated well for us and many of the seedlings are still in the original seed pan, which is left outside the greenhouse summer and winter; these seedlings are perhaps 1" or 1½" high, but examples potted up in the greenhouse are now around 4" in height. I have used quite a number of these seedlings as grafting stocks and find they are always very juicy as long as they are kept well watered.

Several seedlings had shown signs of going cristate and one of these, potted up, is now just over 4" in height; as a companion I had one of the normal seedlings which had grown on nicely and was rather larger and finer than I would normally have picked for grafting seedlings or offsets. However, on looking round it was obvious that this was the best and juiciest stock in the greenhouse – so off the top had to come for use as a stock for the sick Uebelmannia. A good inch and a half of very corky base was cut off the scion, at a less corky level; the interior of the plant felt terribly dry, rather like orange pith. A strong elastic band was wrapped tightly round the graft and the pot and the next day we were off to the Riviera, remarking that such a poor looking specimen was hardly likely to survive until our return.

On our return from holiday we looked in the greenhouse to see how this sad plant had fared. The change in its appearance was absolutely fantastic and hardly believable. It had completely filled up with water and plumped out, the body had a little green colour to it and it looked really well. This summer it is no longer being coddled in the hot box and there are signs of new growth in the grooves between the ribs just below the very woolly mass covering the crown.

Comments on Uebelmannia

..... from A.W. Craig

"Earlier this year I received a batch of imported Uebelmannia, the plants being between 1" and 2" in size, three or four specimens in each of half a dozen varieties. As usual, some were better than others – there was one plant each of U. pectinifera, pectinifera v. elegans, buiningii and the so-called warrasii which looked as though they might be especially difficult to get established. Fortunately I had a nice selection of Trichocereus bridgesii being brought along as grafting stock so the four weaklings were each grafted on to this Trichocereus stock. They all took very well and are now growing happily. The pectinifera v. elegans has plumped up nicely, the crown is full of new yellowish wool and some new spines are just beginning to

appear in it.

"Although this plant is barely 1" across it must be mature flowering size, for there were a few remains of the base of a flower present. On closer examination I found that this was part of a fruit and it was carrying seed. These seeds were sown in early winter and about ten germinated. Two or three of these very young seedlings perished over the winter".

..... from R. Sharman

"My seedling plant of *U. pectinifera* came from Uhlig, grafted on to a very robust *Echinopsis* stock. I have cut off the top of the scion and regrafted it on to a *Trichocereus* stock, which also appears to suit this plant. The residual piece of *Uebelmannia* left on the *Echinopsis* stock has thrown out pups quite readily — each of these pups is now about the size of the original plant. I have already removed one or two and grafted them, using offsets from the original *Echinopsis* stock upon which the plant came to me, as grafting stock for the *Uebelmannia* offsets".

"The *Uebelmannia* offsets must be absolutely full of sap, for it really oozes out when they are cut through for grafting. The spines are not only very short at this stage of growth — perhaps only one or two mm long — but they become detached at the slightest touch. When handling an offset during the grafting process, almost all the spines may be brushed off two or three of the ribs. For this reason I only graft fairly small pups, so that the part with the missing spines will disappear as the scion grows larger".

..... from R.F.S. Dale

"During the 1971 Cactus Tour I bought a seedling plant of *Uebelmannia pectinifera* at Uebelmann's nursery in Switzerland. This plant was quite small — barely one inch across — and was growing on its own roots. Unfortunately it proved to be a very difficult plant in cultivation and persisted in losing its roots. In consequence, it just became gradually smaller and smaller. In what was almost a final attempt to save it, the plant was grafted on to a robust *Trichocereus* stock in August 1972. By the time the following spring was in the air, it had not only shown signs of growth but had already regained its original size".

..... from A.W. Johnston

"Two years ago I bought an imported *U. pectinifera* from Clive Innes; this was rather late in the year and only a few weeks after I had potted it up, the plant put out some pink fruits from the woolly crown — but they did not contain any seed.

I also tried some mixed *Uebelmannia* seed from Clive Innes and I found these germinated quite well, but I kept on losing the odd seedling. Finally I grafted one and kept another on its own roots. Both of these are now growing well; indeed, the plant on the graft is beginning to show a rough epidermis just like the imported plant".

..... from J.R. Gooch

"I obtained some mixed *Uebelmannia* seed from Clive Innes which germinated well, but I continued to lose seedlings over the winter of '72/'73. Only two seedlings survived and these were found to be without roots in the spring. I have not done much in the way of grafting but I came to the conclusion that if I did not try something with the two remaining seedlings then I would have none left at all. I used *Cereus peruvianus* for grafting stock and one plant seems to have taken very well, the other is rather doubtful".

..... from B. Chudleigh

"We have been able to raise a few *Uebelmannia buiningii* from seed off our own plants but they grow terribly slowly. From five seeds of *U. pectinifera* which came from a friend, we raised four seedlings and these have grown much quicker. At 22 months of age they are an inch across and even taller though kept in the cooler seedling house last winter. We had them next to some seedlings of *Lobivia* hybrids and we nearly disposed of the *Uebelmannia* seedlings by mistake.

Last winter, I installed a heating cable in my lean-to frame holding all the tropical cacti which made a great difference with the condition of the plants. However we wondered after a while why we were getting a tingle out of the peat around the pots when it was wet and suddenly just after Christmas it cut right out. Emptying everything out, we found the cable had burnt right through due to overheating. Inquiring after a new one I discovered that the old one was far too powerful for the area and a much reduced 750 watt one was installed; some of the excess cable was taped round the sides to warm the air and the thermostat was reduced to 70°F. Previously it had been set full, at about 80°F; no wonder the plants were doing so well with so much heat at the roots. *Discocacti* and *Uebelmannias* in particular thrive with lots of heat".

UEBELMANNIA PECTINIFERA By W. Andreae

(Translated by H. Middleditch from K.u.a.S. for October 1970)

Uebelmannia pectinifera was described by Herr Buining in December 1967 in an English Cactus Journal. Its discovery in Brazil by L. Horst had caused an enormous sensation in the cactus world. It sparked off a great discussion – to which genus could it belong or with what plant could it be related?

That question puzzled scientists since, in spite of repeated visits to the habitat location, no flower was found. However, it has since flowered with us. The flowers are small and have a fully open diameter up to 10 mm. The columnar-growing body, which does not offset, is crammed with countless quite delicate spots. In the crown the plant has a dark brownish-red colour, which sometime later becomes white. In that way the spots bear a likeness to the felt tufts of *Astrophytum* and consequently that had first led to them being mixed up. *Uebelmannia pectinifera* has 15–18 ribs, from which the more or less 15 mm long numerous black spines are projecting comb-like in a line, the areoles running one into the other.

The illustration which accompanied the original description shows that these plants are very heavily overgrown with lichen. That and the bromeliads growing in association demonstrate that the atmospheric humidity in habitat is very high. This new discovery is not very easy to grow; one makes a good job of it by producing a mist round the body of the plant with a regular very finely atomised spray. This treatment was also tried with good effect in the cultivation of *Melocactus*.

(The colour print on our inside front cover accompanied the above article).

Comments on *Uebelmannia*

..... From E.W. Barnes

"I have had flowers on imported plants of *Uebelmannia buiningii* HU 141, *U. meninensis* form HU 284, and *U. pectinifera* var. HU 280, all of which produced diminutive blooms.

HU 280 began showing buds at the end of March but of course it was several weeks later before they opened; these flowers were the smallest of all the *Uebelmannia* and but for the long tube would have been almost non-existent! I have never seen illustrations of *Uebelmannias* in flower either and foolishly put off sketching the flower on HU 280 until the following day which was cool and overcast, consequently the flowers did not open.

Although more buds could be seen nestling amongst the spines in the crown, I do not think that they will develop now that autumn is upon us. These plants seem to like heat and this more than light induces them to flower. They seem to flower irrespective of sunshine, as long as the weather is warm".

..... from P.G. Waterman

"I was also interested in the picture of *Uebelmannia pectinifera* in K.u.a.S. for October 1970. The flower shown in that picture is most certainly considerably larger than the ones which I have so far seen on my plant. However I wonder just how significant this is when one considers that the plant has been collected, shipped to G.B. etc., in this same year. I am inclined to wait until it flowers again next summer before feeling able to make any valid comment on this.

"The spines on my plant are certainly longer than the quoted 15 mm of Andreae — mainly over 20 mm in fact. I note that Buining in his original monograph on *U. pectinifera* also states spines 12–15 mm. I see that Clive Innes is now offering some un-named *Uebelmannias* including HU 138 and HU 141 and I may have got one of the plants going under HU numbers. There are now a few fruits on the plant which are bicoloured — green and red".

..... from N.T. Hann

"Until this last summer I felt confident that one of my successes was rooting a sizeable *Uebelmannia pectinifera*. I obtained the plant in 1970 at the time the first ones became available over here. It was slow to produce roots and shrivelled quite noticeably in the winter of 1970 and early 1971, but then it started developing a fine set of roots and by the end of 1973 it had more or less recovered its former size. At the same time it had also begun to show signs of new growth. Sadly, despite every attention, it decided during the awful summer of 1974 to start shrivelling again! Knowing full well the conditions under which these plants grow in their natural habitat, I have always used a very porous soil. In this way it has of course been possible to water very freely. Fortunately it has not shrunk any further since the end of last summer and otherwise appears healthy. Even so I shall repot it again in March.

Although the plant was probably not even established at the time, it did have two or three flowers in 1970 and these set seed. I planted about a dozen of these seeds during the summer of 1971. Ten of these germinated and nine survived the following winter; I did not have to repot them until they were two years old as they were well spaced in the seed pan. I must confess that I was a little concerned during the period of electricity cuts in spring of 1972 as my alternative paraffin stove heating is far from adequate, so I brought these seedlings indoors".

..... from A.W. Mace

"I have a fair crop of *U. pectinifera* seedlings from seed collected on plants imported in 1970. These were sown in February 1971 on top of a drying oven at work. This kept a temperature of $30 \pm 5^{\circ}\text{C}$ and the seed germinated very quickly".

..... from P. Sherville

"I have never personally flowered an *Uebelmannia* yet, but on visits to both Clive Innes and Jumanery nurseries I have seen freshly imported specimens carrying fruits. The berry on *pectinifera* and *meninensis* appears to be very similar to a *mammillaria* fruit, a small red berry about 1/8" to 3/16" in diameter and some 1/2" to 3/16" in diameter and some 1/2" to 5/8" long with the flower remains still attached. Only a few seeds were visible through the wall of the berry.

"I purchased from Clive Innes a beautiful golden-spined plant designated W.R. 1 which has a completely different method of fruiting. This particular plant had no roots and while I was rooting it in perlite on the upper shelf in my greenhouse I noticed shortly after I bought it something in the crown which looked remarkably like mealy bugs, so I gave it a good forceful spray with 'Rogor' systemic. There was no change, it merely washed down between the ribs. On closer inspection this white woolly fibrous material was seen to contain 4 or 5 dark grey-brown nodules. Under the microscope these looked amazingly like seeds, complete with a pitted skin and hilum! They were sown but nothing has so far materialised. The fibre is still there on the plant; it is of considerable strength and securely fastened to the areoles, but there was no sign of a berry wall or any containing material — just this fibre-like material."

..... from H. Middleditch

"The plant referred to by P.G. Waterman had such a dense cushion of spines, wool, flowers, buds and fruits in the crown that one might almost have thought that it possessed a cephalium; apparently the plant arrived with a crown full of buds and fruit from Clive Innes. The buds, fruit, flowers and flower remains were so tightly packed near the crown that some were pressed over sideways and so filled up the space between adjacent rows of spines.

"One new bud could be distinguished by the yellow sepals just being visible above the abundant fawn wool and the few dark brown bristly hairs which surrounded it.

"I was most fortunate as there was a flower fully open at the time of my visit. Owing to the lower part of the flower being so deeply immersed in the cushion round the crown, it was difficult to say how high it was — possibly 1.5 cm high. The petals were wide open and the five-lobed stigma stood up above the rest of the flower. The scales visible through the wool round the tube were tipped red, the large uppermost scales (or lowermost perianth leaves) were also tipped red. There were only eight petals forming the flower, which was yellow in colour with a slight lime green tint. There were several fruits about 1½ cm high with the flower remains still attached; these fruits were pinkish red in colour. One fruit was apparently having some difficulty reaching an upright position for it was imprisoned amongst the spines and lying nearly flat against the body — half of it was pinkish red and the other half was still green.

"One of the fruits had been taken off the plant shortly after receipt and found to contain 8 or 9 seeds. Three of these had germinated within a space of three weeks. These seedlings were progressing well in the spring of 1972".

..... from G. Carter

"I acquired a small plant of *Uebelmannia gummifera* about a year ago and I potted it up in my usual sand/ J. Innes mix. Despite giving it careful attention and regular watering it just refused to grow. In desperation I finally replanted it in a very gritty mix which was mostly gravel with some soil compost. It is obviously enjoying this compost hugely and growing well in it. Naturally, being such a loose, gritty, mix it dries out quickly".

..... from D. Angus

"Last year I bought a small plant of *U. pectinifera*, which I potted up in a very gritty compost as I had read somewhere that these plants grew in a loose and open gravel-like "soil". However, my plant did not seem to thrive at all, despite being given copious amounts of water. This spring I took it out of that compost and put it into a much more peaty mix and now it is doing much better; it still gets watered more than any of the other plants on the bench".

..... from B. Chudleigh

“ Both *Uebelmannia gummifera* and *buiningii* have set seed for me; the fruits are very tiny and are practically immersed in the wool. When they are ripe the pods are slightly fleshy but they soon dry as they are thin walled and small. The seed seems to be loose in the pod and there are only about a dozen seeds in each pod.

“The fruit on *U. buiningii* and HU 283 *buiningii* v. are both about 4 mm (3/16”) in diameter”.

..... from T. Lavender

“We have had a plant of HU 138 which carried red fruits about 1.3 cm high; the flower remains attached to the fruit were very short indeed and there seemed to be patches of fawn wool round the fruit”.

..... from R. Moreton

“We find that the *Uebelmannias* at Holly Gate set plenty of fruits. They appear to be self fertile and the fruit appears suddenly like a *Melocactus*. The fruits are similar to *Melocactus* in size, but more cylindrical, although sometimes they are smaller and then they are more or less globular. They are bright red in colour and are packed with seed. The seed germinates very rapidly i.e. in 48–72 hours”.

INDEED – A REMARKABLE PLANT. By Heinrich Wageringel. (Translated by E.W. Barnes from K.u.a.S. for July 1969)

In December, 1967 I received a rather dehydrated imported plant. It bore the name *Uebelmannia gummifera* var. and had a diameter of 3.5 cm. It was in shape more triangular than round and it seemed to be a case of an almost dead patient. However, this only put me on my mettle.

I potted it in the well known *Chemieerde* (a soilless compost similar to ‘Levington’ – E.W.B.) and gave bottom heat and plenty of moisture, but this ‘problem child’ became even thinner. I unpotted it again in the middle of May and could discover no new roots. *Melocactus* imports obtained in March after 14 days in the same soil already had well developed root systems so that I was able to plant them in normal compost.

I did not give up however. I now planted it in a mixture of peat and sand and gave ample bottom heat and negligible ventilation. But again without result. What to do now? I decided that the ‘problem child’ should be treated like my other plants, so then I planted it in a larger (9 cm) plastic pot. After about 3 weeks I thought I noticed a change in the plant. It seemed to have become plumper! I unpotted it carefully and, oh wonder! it actually possessed a new rootlet 3 cm. long. Now quickly into new compost and a sunny place on the bench, and the plant became rounder and rounder, began to fill out; however, after some weeks it still showed no new growth and no new spines. Now I was really fed up with it and without further ado I left it to its own devices.

Soon whitish grey wool began to form in the crown which was tinged brownish, and at the beginning of September black spine tips appeared in the wool which slowly grew larger and reached a centimetre in length. In the middle of September something remarkable now occurred; I discovered in the crown a tuft of wool of matchstick size greyish-white with a brownish tinge. It grew larger daily and one morning, when it had grown to 2 cm I discovered a yellow point in the centre. After 8 days it had produced a 2.5 cm long bud. A week passed and it did not want to open. I was curious to see the interior so I brought up my ‘heavy guns’; I applied bottom heat and shone 3 electric light bulbs to force open the bud; but in

vain! I thought now no more to witness the wonder of the flower and the next day towards 1.00 p.m. went into the town. When I returned at about 4.00 p.m., to my surprise my wife greeted me with the information that the bud had opened at about 2.00 p.m. and that she had measured the diameter of the flower as 3 cm. I hastened into the greenhouse but the flower was already closed and I could only discern the white stigma and grey-white stamens within. On that day and the next 4 days I waited on the flower in vain. Then, on the sixth day and for the last time it opened again to 2.5 cm diameter. It can truly be said, a remarkable little plant.

Since no description has yet come to my notice may I give the following first description. I have foregone a Latin version since I have only one plant at my disposal.

Body globular, with about 20 ribs, divided into pronounced humps, 4 to 5mm high and 10 mm apart, spines 4, in the shape of a cross, the vertically placed ones directed upwards and downwards \pm 12 mm long, horizontals 3–5 mm long, black in new growth later going grey. Epidermis grey-green; able to flower from 3 to 3.5 cm; flowering indicated by the formation of grey-white woolly felt with brownish tinge in the crown; bud and flower deep yellow, 3 cm fully open, floral leaves about 24 in three rows, stigma circular, pure white and shining, stamens grey white.

Comments from E.W. Barnes

“Regarding the author’s observations about trying to force open the bud with artificial light, I believe that these plants respond more to heat than light and flowers seem to be produced in hot, sultry weather irrespective of sun. This has been my experience and would seem to be borne out by the comments of Herr Wageringel. I would also agree that they root better in a proper growing compost. Peat seems to retard root formation if anything: my best results come from a mixture of clay loam, gritty sand, leafmould and rotted wood which I expect will be quite an acid compost.

“The flower described in this article is much larger than any I have seen. Most plants seem to produce flowers from 20 to 25 mm in diameter at the most, whilst HU 280 *U. pectinifera* has minute flowers that are barely 10 mm in diameter with extremely thin tubes. In respect of the yellow colour, hairy tubes and white stamens, they are similar to the flower on Herr Wageringel’s *U. gummifera* variety, but there is a difference in the stigma which is in the shape of a four leafed clover – which I find an interesting and unusual feature. The fruit pods are minute, barely 5 mm in diameter, canary yellow, spherical with a few hairs, flower remains persistent, and contain only a few seeds”.

..... from J.D. Donald

“Regarding Heinrich Wageringel’s extraordinary article all I can say is that the flower of his plant represents the upper limit of size reported for this plant. The three rows of petals also seems excessive. However, the plant in question is clearly *U. meninensis* Buining. *Uebelmennia* flower spasmodically and unexpectedly but it does seem that a well established plant produces a larger flower than one flowering while still being established. *U. Buiningii* flowered for me first with a tiny flower about 14 mm across when fully open – later it produced another flower nearly 20 mm across when fully open.

“The flower bud does seem to take a long time to develop and to wait for the most favourable time. They appear to dislike full sun and open in the afternoon at first – later on they open earlier in the day”.

We have slides of *U. gummifera* and *U. pectinifera* in flower – slides of other species, plants in fruit, close-up views of the epidermis etc., would be very welcome in the slide library – A.W.C.

A SKETCH of my TRAVELS in BRAZIL and PARAGUAY. By Auguste de St. Hilaire

(Translated from the Introduction to "Account of the most remarkable plants of Brazil & Paraguay" 1824, by H. Middleditch)

I intend to describe, in this work, the most remarkable plants of Brazil and of Paraguay; I believe that it would not be inappropriate to precede their description with an account of my travels in these extensive territories, and to put forward a brief review of the vegetation.

I left France on April 1st 1816, on board the frigate *Hermione*, which carried the French Ambassador, the Duke of Luxembourg, to Rio de Janeiro.

The three calls which we made at Lisbon, Madeira and Teneriffe were unfortunately too brief to allow me much investigation, but they gave me an opportunity to notice the difference which the change of latitude brought about in the stage of development of similar vegetation. Thus at Brest we were leaving the peach trees without leaves or flowers; on the 8th of April, those at Lisbon were covered in flowers, and it was the same with *Cercis*, most species of *Lathyrus*, of *Vicia*, of *Ophris*, and *Juncus*, etc., on the 25th, at Madeira, we found the peaches already formed and the wheat with ears; on the 29th, at Teneriffe, harvesting was under way and the peaches were nearly ripe.

I remained at Rio de Janeiro all the time the Ambassador stayed there and I carefully surveyed the surroundings. The excessive humidity which prevails in this part of Brazil supports the vegetation there in continual growth; one finds plants in flower in every season of the year; summer and winter there are only distinguishable by a slight difference in the hue of the greenery of the forests; and if one excludes the high mountings of Minas Gerais province, I believe that the province of Rio de Janeiro is that part of the whole of tropical Brazil which, for a comparable extent of country, offers the most varied flora.

I commenced my travels by an excursion along the banks of the Parahyba, to about 25 or 30 leagues from Rio de Janeiro, and I remained for a month in the magnificent settlement of Uba, in the middle of the virgin forests.

The European accustomed to the depressing monotony of our forests of pine, beech or oak, will only know how to picture a rather vague idea of the virgin forest of tropical America, where nature seems to have used up all her resources to show off that which she has most magnificent and most varied. There the trees which belong to a multitude of different families crowd together and mingle their foliage; the *Mimosa* rise by the side of the *Cecropia*, the *Lacythis* and the *Vochisiae* close to the Palms and the tree ferns. Parasitic plants with brilliant flowers, such as orchids and tillandsias, clothing the dried-up trunks with a strange attire, and they themselves support other parasitic plants. The stems of the bamboo, enveloped at intervals by leaf whorls, rise up to a tremendous height and bend into elegant arbours. No less varied than the larger vegetation, the lianas, now like the roots of certain aroids, falling straight down from the crowns of the highest trees, and now like the *Bignonia*, the *Cissus* and the *Hipocratea*, twisting in the fashion of cables, hanging in festoons, describing gracious undulations, soaring from one tree to another, clasping them, encircling them, and forming masses of leaves and branches where one has difficulty in distinguishing what belongs to which plant. One must confess nevertheless that one sees in the virgin forests far less flowers than in the unwooded countryside, and that will not be a cause for surprise, since the flowering season — as one knows — puts an end to vegetative growth and as the latter is unceasingly activated by the tropical American forests by the two main agencies of heat and humidity, it must necessarily continue uninterrupted there.

I have had the disappointment of seeing M. Delalande, my companion on the outward journey, re-embark for Europe: this indefatigable naturalist may be difficult to replace; but wishing to render his departure from Brazil less obvious to zoologists, I started, during my stay at Uba, to bring together various insects, birds, and small quadrupeds, and, until my return to France, I took pains to build up the collections of animals all the time that it was possible for me to steal from my botanical observations;

too much on the other hand unfortunately by the difficulties of conveyance, the extreme humidity, and by a host of other problems of which the detail would exceed the bounds of this introduction.

I left Rio de Janeiro on December 7th 1816 to betake myself to the Captaincy of the Mines, and I devoted fifteen months to the traverse of a large part of that vast province.

I believe that, to make any account more readily understandable, it will not be inappropriate to give here a general impression of the country that I have visited. The maritime provinces of St.-Esprit, Rio de Janeiro, Sao Paulo, and Santa Catherina, are bounded on the east by a range of mountains which start in the north of Brazil, leaving no great distance between themselves and the coastline, and which, having extended as far as the Province of Rio Grande do Sul describe an arc, departing westwards and terminating in the province of Missiones. Another range (Serra do Espinhaco), pretty well parallel to the first, but higher, extends from the north-east of the province of Sao Paulo, crosses the whole of that of the Mines, dividing it into two most unequal parts, separates the waters of the Rio Doce from those of the Rio Sao Francisco, and loses itself in the north of Brazil.

The territory between these two ranges is broken up by yet other mountains, which commonly run west to east, leaving between them deep valleys. If one disregards certain less dissected areas, located in the province of Sao Paulo and the District of Minas Novas, the country which extends from a short distance from the coast to as far as the western ranges, is completely covered with forests, or was once upon a time, before the hand of man had destroyed them. To the west of the western ranges everything changes in appearance; the mountains are succeeded by rounded hills; vast grasslands present themselves before the traveller's eyes and, with a change in vegetation, other birds and new insects appear.

However, if one finds a deep and humid valley in the middle of a bare and gently undulating terrain, if there occurs some hollow in the slope of a knoll, one may be assured of finding there one of those groups of trees which the natives call capoes, where they make their plantations, and which differ singularly from the virgin forests. Nevertheless, the terrain drops as far as the Rio Sao Francisco and the vegetation undergoes the change that I will make known to the extent that I will outline for the districts that I have traversed.

To the west of the Rio Sao Francisco, the ground rises again for a second time, and little by little one reaches a plateau which separates the waters of this great river from those of the Parana. Some peaks of the plateau (Serra dos Vertentes) look like veritable mountains, such as the Serra da Canastra and the Serra dos Pyrenos; but elsewhere it is generally far too level to merit the name of a range.

When one goes to the Province of the Mines by the principal route from Rio de Janeiro to Villa Rica, one finds, in a length of more than 50 leagues, mountains frequently as escarpments, deep valleys, and always virgin woods; and as the terrain gradually increases in altitude, and as the humidity decreases in almost the same proportion, the vegetation also gradually becomes less rich and less varied.

At some leagues from the place called Mantiqueira, close to the town of Barbacena, one has already crossed the eastern range and it is then that one finds a rapid change to the immense grasslands which are called the campos. They are composed of Graminaceae intermingled with herbs, with dwarf shrubs, and some slightly taller bushes. One finds there in abundance Compositae and above all Vernonia, Myrtales, Melastomataceae with capsular fruits are much in evidence there; but one no longer sees there any Acanthaceae, a family so numerous in the virgin forests.

The grasslands which I will now describe are to be found in all the elevated and somewhat hilly territory at the centre of the Province of the Mines; they constitute a very appreciable portion of the Comarca (quarter) of Rio das Mortes and it is from there that all the animals come which serve to feed the inhabitants of Rio de Janeiro.

Whilst the scenery of Rio de Janeiro exhausts the admiration of the traveller by its magnificence, the surroundings of Villa Rica, capital of the Province of the Mines, depresses ones spirits by their rugged and wild appearance. On all sides there is to be seen only deep defiles and arid hills. On all sides the scarred earth, with excavations and tips in all directions bear witness to mining activities; the ancient forests have been consumed for fuel; the greenery of the grass has been replaced by spoil heaps, and the river waters, contaminated by washing operations, tumble along reddish and dirty.

The high mountains round about Villa Rica, which are a part of the great eastern range, usually lack vegetation, at least at their summits; they present a far greater range of vegetation than the campos of the Rio das Mortes quarter, and doubtless it will be many years before one will have completely exhausted the flora of the Serra d'Itacolumni, de Caraca, de Deos-Livre, etc. There grows principally a host of Melastomataceae with little leaves, some fine Sauvagesia plenty of Eriocaulons, some Xyridaceae, some Luxemburgia, a vast number of Compositae, of Apocynaceae, etc. Amongst the plants which characterise the high mountains of the Province of the Mines, I cannot avoid mentioning again the Vellozia (Vandelli), a genus of the Amarillidaceae; among several of its species which live in association, the branches sprawling, short, dense, thick with scales (these scales being nothing but the foot of the old leaves), and form a stunted thicket most remarkable in its appearance; these branches are topped by a bunch of glasslike leaves, and in the midst of them are borne flowers of blue or violet, sometimes white, as large as our lily.

The ironstone, so general in this eastern part of the Province of the Mines, is identified by many special plants and, between them, one should point out the three Rubiaceae with slim and aborescent trunks, tough leaves, and scented flowers, which the natives confuse under the name of quina da serra or de Remijo, and which they put to the same use as the quina of Peru. I have described them in my book under the names of Cinchona ferruginea, vellozii, and remijiana.

The countryside which extends from Villa Rica to Villa do Principe not long ago presented to view tremendous forests, of which a great proportion have been replaced by agriculture. In this country when the virgin forest is cut down and burnt, it is succeeded by enormous plants which consist of a wood formed of quite different species and much less vigorous; if this new forest is burnt several times to make some plantations in the middle of the ashes, as were originally made in these virgin forests, ere long one sees appearing there a large tree fern which looks remarkably like Pteris aquilina (it is Pteris caudata); shortly afterwards the trees and the bushes have disappeared and the ground will be found to be completely covered by a greyish grass, tough and uniflorous, which swamps nearly all other vegetation, and which is called capim melado or capim gordura (this is the grass which has been described by M. Nees under the name of Tristegis glutinosa), because it transudes a sticky and plentiful sap. Many residents rightly refer to the grasslands whose origin I have just mentioned, under the name of artificial campos, and they distinguish them in this way from those of the Rio das Mortes, which they call by comparison, natural campos.

In order to put the finishing touches here to the story of the peculiar alterations which are occasioned by the cutting and burning down of the virgin forests, I should say that if about 18 to twenty years pass by without cutting down the subsequent growth, and if at the same time cattle are not introduced to the location, the subsequent vegetation may be seen to disappear gradually, the primitive species become re-established again and, in due course, a wood is formed which is scarcely distinguishable from the true virgin forest.

Gold used to be abundant at one time round about Villa Rica, but this metal is becoming scarce or difficult to extract. The miners, in digging over a great area, have rendered it unfit for agriculture, and not being used for a long time to the plough or to grazing, cannot make the best of their fields of capim gordura (which the horses and cattle feed upon, but they gain little nourishment from it).

I was detained at Villa do Principe on account of a rather serious illness, a consequence of the hardships which I had experienced. At the end of a month I could continue my travels; but instead of continuing in a northward direction, I passed on into the dense forests which cover the eastern part of the Province of the Mines; and I arrived at Passanha, where a military detachment was stationed.

Wheat thrived very well indeed in the forests of Passanha and yielded forty fold. As one met only with impenetrable forests further on from this place, inhabited by Botocudos at war with the Portuguese, I was obliged to retrace my footsteps; but ere long I was making for the district of Minas Novas.

The broad plateaux, so common in this district, exhibit a kind of stunted woodland composed of bushes three or four feet high, bunched close together, and which, according to the locality, are remarkably dissimilar between one and another as regards genera and species. Among them, the plant which is to be found most commonly is a spiny *Mimosa* of which the dainty foliage is of an utmost elegance, whose flowers are arranged like a slim ear of corn, whose habit sometimes recalls our Genet Anglican. Outside the district of Minas Novas, I have rarely found this stunted woodland again that I have just described; it is given the name of carascos.

After travelling along a very difficult trail, I reached a place called Alto dos Boa, where the village of the Maconis is located. Almost throughout the length of Brazil, the Indians on the coast speak various dialects of the language which the Jesuits called the lingua genal (nowadays called "tupi"), to which is also allied the Guarami tongue used in Missiones & Paraguay proper; but by a most remarkable singularity, the language of the natives of the interior — the Maconis, the Coroados, the Malalis, the Monoxos, Machaculis, Bororos, Coyapos, etc., is nothing like the Guarami tongue, and likewise differ between themselves.

I arrived at Villa do Fanando, capital of the district of Minas Novas during the month of May; at that time I would find no more beetles and the flowers would become scarcer each day. At Rio de Janeiro, rain falls equally in every month of the year; but it is not the same in the Province of the Mines, of Goyaz, and in a part of that of Sao Paulo; the rains, which, in these areas, commence in February, last until March; and during the months which follow, the ground is hardly ever refreshed except by morning dews.

Further on from Villa do Fanando, the ground falls away and becomes level; the vegetation changes once again and one finds there woodlands which are intermediate between the virgin forests and the carascos. The *catingas*, as they are called, ordinarily exhibit a dense thicket of brushwood, creeping plants and shrubs with trees of medium height rising up from amongst them, like saplings. At the end of the rainy season the *catinga* plants start to lose their leaves, and by June they are leafless; at that time no more insects are to be found, and the birds themselves migrate for the most part to the borders of the rivers and to the neighbourhood of habitations. Meanwhile, a long time before the return of the summer, the buds of many species start to open; the *Bombaceae* is covered with flowers before having any leaves, and finally, when the rains begin to fall again, the grass starts to grow once more, the trees and the shrubs become clothed again with new foliage, and the insects reappear with them.

Proof that the *catinga* plants must drop their leaves in the drought, is that they retain their verdure on the edges of the rivers and springs, and often the traveller who crosses these woods has before his eyes the pleasant scene of spring and that of winter.

After travelling through the *catinga* for a long while, I saw the vegetation take on a different aspect all at once, and the magnificent forest, ornate with the most handsome verdure, succeeded the leafless woods without any transition; these often resemble our eighteen year old copses. The earth in the *catinga* is a mixture of very fine sand and humus, black and friable; on the other hand, earth from the spot where I rejoined the virgin forest is much less sandy and more substantial. Such is, I believe, the only cause of the remarkable difference that I have just indicated.

When I found myself once again in the virgin forest, I was about 50 leagues from Villa do Fanando, close to Sao Miguel da Jiquitinhonha. Numerous tribes of Botocudos wander in the forest in the neighbourhood of this hamlet. I stopped for fifteen days in the midst of these Indians and when I left the banks of the Jiquitinhonha, I was followed by a young Botocudo who, thereafter, was my constant companion in my travels and whom I sent back to his home at the time I left to re-embark for Europe.

Many scientists have thought that the native Americans do not constitute a distinct race at all; the Botocudos, often almost white, have a greater resemblance to the Mongolian race than other Indians; when the young man of that nation, who accompanied me on my travels, saw some Chinese for the first time, in Rio de Janeiro, he called them his uncles, and the cast of these latter people is indeed only that of the Botocudos greatly softened.

I returned to Villa do Fanando by another road and I passed through different villages of the district of Minas Novas, becoming rich from the cultivation of cotton, a plant that thrives particularly well in the light soils where the catinga plants grow.

Coming to Arassuahy, in the district of Minas Novas, I found myself for the second time but a short distance from the diamond district; but before visiting it, I wished to cross through that part of the Province of the Mines which is called the wilderness — or Sertao. It is a vast region, undulating and divided by some ranges which extend to the west of the Province and enclose the basin of the Rio Sao Francisco. There the catinga plants, somewhat similar to those of Minas Novas, grow in the lowest part; the useful and majestic palm, called buriti, rises up among the marshes; and finally the plateaux are covered with grassland studded with various species of trees, crooked and stunted, whose bark is corky, the leaves often hard and brittle, and which on the whole recalls pretty well the impression given by the apple trees in our orchards.

If one excludes the virgin forests, one will find among the various types of vegetation peculiar to the Province of the Mines a sort of scale where the plants reduce in stature in proportion to increasing altitude. The catingas grow in the lowest parts, above them come the campos with stunted trees, higher still are found the carascos, which resemble our immature second-growth forests; the carascos proper crown the broad plateaux and finally, upon the highest peaks, one finds only herbaceous plants there interspersed with dwarf shrubby trees. Moreover, everyone will appreciate that a classification such as this should not be taken too literally, and that there must exist a host of exceptions determined by the exposure, the greater or less humidity and, above all, by the nature of the soil.

Among the fauna in the desert, one may quote chiefly the bird called seriema (the cariana of the naturalists) which competes for swiftness with the stags, quadrupeds of which the inhabitants of this country distinguish five different species.

Cattle and horses form the principal wealth of the sertao or desert, and the salty earth which abounds in this region takes the place of the salt which has to be given to the horned beasts in the other parts of the Province of the Mines and that of Sao Paulo if one does not wish to see these animals languish and perish in a short while.

Continuing my travels towards the north-west, I eventually reached the Rio Sao Francisco, a fine river which is spoken of only with dread in the rest of the Province of the Mines, on account of the diseases which it causes. Its waters, during the rainy season, rise gradually, overflowing and flooding as far as a league or more from their normal course. At the end of December, the floods have reached their highest point; then the water gradually abates and evaporates, and in April the ground only shows a muddy silt. The air is soon tainted by the smell, animal corpses and vegetation putrifying; and this is what sets off the diseases which prevail all through the year on the banks of the Rio Sao Francisco; a fiery fever, preceded by shivers, attacks the natives of this country, and often it leaves behind after-effects which leads to the grave those who are not yet acclimatised and those individuals of a weak constitution.

The flooded areas bordering the Rio Sao Francisco carrying the name of Lagadissos and are covered with two spiny leguminous plants, a Bauhinia with little leaves and a scented Mimosa, which forms impenetrable thickets. This country ought to be delightful in the rainy season, but a continuous spring no longer holds sway here, since most of the trees drop their leaves during the drought.

It was during the months of August and September that I travelled through the deserts of the Rio Sao Francisco, so I had nothing to fear from the disease. This journey was one of the most laborious I have made in Brazil, and the excessive drought rendered it one of the least profitable for the natural historian.

The diamond district where I had come to after leaving the desert, could be a dozen Portuguese leagues in circumference. This district, perhaps the highest in the whole of the Captaincy of the Mines, exhibits little but barren ground, bare sands and rocks among which however are to be found a considerable number of rare and interesting plants. An accident of which I almost became a victim, detained me for a month at Tijuco, chief town of the district.

Not wishing to return to Villa Rica by the same road, I followed the peaks of the most elevated hills called Serra da Lapa, which are but a section of the great western chain which divides the waters of the Rio Doce and the Sao Francisco. I cannot refrain from observing in passing that the fishes of the rivers which flow towards the west of these mountains and discharge into the Rio Sao Francisco, are generally different from those of the rivers whose waters go towards the east to unite with those of the Rio Doce.

In the Serra da Lapa, I would have made the richest harvest of plants, if the rains which fell during one month hadn't obliged me to depart from these hills, where the smallest brooks turned into torrents.

I then began to find insects once again; the vegetation presented a picture of flowers and the finest foliage; but it would be difficult to give an impression of the time which is consumed and the pains which have to be taken whilst travelling in these parts during the rainy season with collected material which one wishes to preserve.

Before returning to Villa Rica, I passed through Sabara and in the vicinity of this town, on the hill called Serra da Piedade, I had the opportunity to observe an extraordinary catalepsy which had attracted attention from all over the Province of the Mines.

Sabara is one of the places in this province where the vine is planted with considerable success. As at Villa Boa and elsewhere, it yields excellent fruits twice a year, the first during the rainy season and the second during the drought.

After having reached Villa Rica, I passed through the town of Sao Joao del Rey, and at last I arrived at Rio de Janeiro in March 1818, full of gratitude for a people among whom I had found the friendliest hospitality, whom nature had endowed with a charming and open character and affection for the arts, of a singular intellect and an uncommon ability for comprehending what one is teaching them and who, if they have any faults, perhaps owe them largely to the system of government which had preceded the arrival of Jean VI at Rio de Janeiro.

I utilised the short time which I passed away in this capital to put into order my notes and my collected material, and I sent some chests of birds and animals to the Natural History Museum in Paris. I applied myself energetically to my paper — "A geographical account of the vegetation in the Captaincy of the Mines" for delivery to the Academy of Sciences.

Comments

..... from H. Middleditch

"I actually purchased the particular book containing this account by St. Hilaire of his collecting trip to Brazil, in order to read the part covering his journey through Paraguay. It came as rather a disappointment to find that St. Hilaire never even entered the territory of Paraguay during this sojourn in South America. So this book went back on to my bookshelf, until the time came to search out information on eastern Brazil.

"Brazil was part of the Portuguese Empire for almost three hundred years; the Portuguese were only a little less strict than the Spanish about allowing foreigners into their South American domains, but it does seem that some information about the natural history of Brazil had filtered into Europe prior to the Napoleonic Wars. The Portuguese Royal Court emigrated to Brazil in 1808 and was still in residence there at the time of St. Hilaire's visit; the stable political climate in Brazil at that period compared very favourably with that in the ex-Spanish colonies outside Chile. As a result, Brazil received visits from quite a number of European natural historians shortly after the close of the Napoleonic wars: one of these travellers was St. Hilaire.

"During his stay in Brazil, which lasted from 1816 to 1822, St. Hilaire made a number of journeys along the coast of Brazil and into the interior. The above account covers only one of his journeys, the particular one that traversed parts of Minas Gerais, in the course of which St. Hilaire would pass close to the Serra Negra, the home of Uebelmannia.

"This account was accompanied by a map depicting the routes taken by St. Hilaire on his travels and identifying various places along those routes. I brought out my 1:1,000,000 scale maps of Brazil with a view to following the route taken by St. Hilaire through Minas Gerais by means of the place names, in order to compare his account of the countryside with known locations of various cacti. However, this proved to be rather difficult as very few of the place names recorded by St. Hilaire along his route could be found on a modern map. At least the line of the route from Rio De Janeiro to Villa Rica (Oruro Preto) and onwards to Jequitinhonha could be determined fairly readily and it appeared that perhaps several place names could have been changed during the intervening 150 years. But it was quite impossible to ascertain the route taken by St. Hilaire when he "wished to cross through the Sertao" as far as the Rio San Francisco.

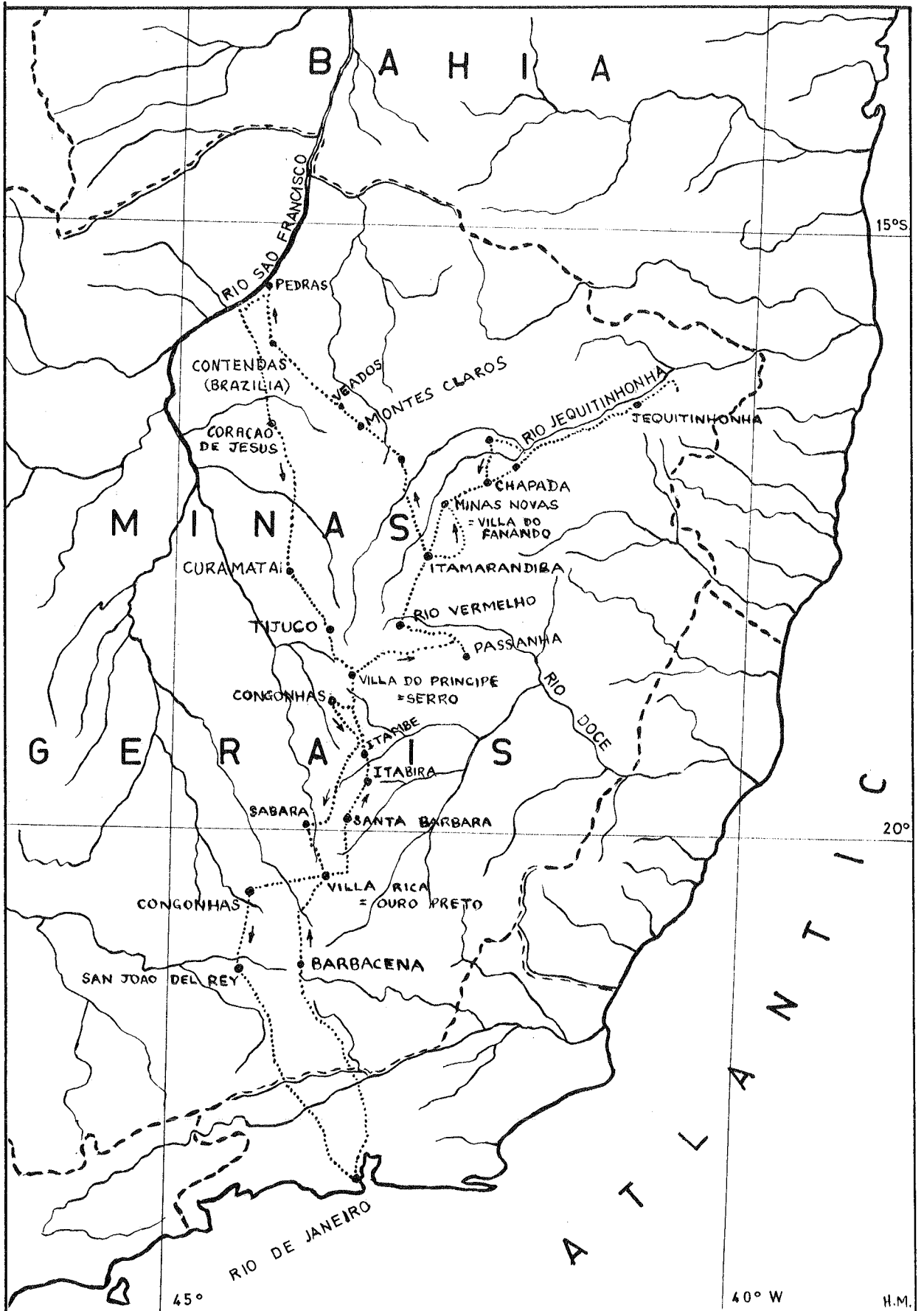
"One place name was identified for me from D.C. Money "South America", and that was Tijuco, "now called Diamantina" which St. Hilaire describes as the then principal town of the district."

..... from E. Waras, Sao Paulo.

"With respect to place names in Minas Gerais, my information is incomplete, but I have ascertained: Villa do Principe = Serro (south of Diamantina).

"I have received further information from Dr. Guido Pabst, an executive in our national airline and a keen amateur botanist; from "Essays on the History of Neotropical Dipterology" we find:
Villa do Fanado = Minas Novas
Contendas = Brasilia de Minas.

"The enclosed map was drawn by the author of the book, and covers the various trips made by St. Hilaire".



<p>Scale kms</p>	<h2>MINAS GERAIS</h2>	<p>..... Route taken by St. Hilaire 1816 - 1818</p>
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..... further from H. Middleditch

"It is most interesting to compare the map of St. Hilaire's route which appears in *Chronica Botanica* X:1 and which accompanies the article reproduced above, with the map received from Sao Paulo. The former map is stated to be a "simplified draft". Unfortunately it has not been drawn too accurately, for several place names are not in their correct relative positions and the lines of longitude have been incorrectly numbered. In addition, that part of the journey lying between Villa do Principe and Villa do Fanando does not seem to match the recorded itinerary. This map does not appear to be a very reliable indication of St. Hilaire's route through Minas Gerais.

"The map prepared by Nelson for his "Essays on the History of Neotropical Dipterology" also appears to contain errors. The track of St. Hilaire's route to and from the Rio Sao Francisco quite fails to match the recorded itinerary. There is also some doubt concerning the section of the route between Minas Novas and Itamarandiba which loops out eastwards through Capelinha, which would take St. Hilaire very close to Uebelmannia country, if not actually into it.

"The itinerary followed by St. Hilaire is given in more detail in Nelson's work and from this we find a further correlation between old and new place names; the town now known as Itamarandiba was previously called Sao Joao Batista.

"From this same work we also find that St. Hilaire started on this particular trip in the company of two other naturalists, A.I. Gomes and Baron von Langsdorff. However, Gomes left the party at Villa Rica on the outward journey and Baron von Langsdorff a short while later at Itabira, leaving St. Hilaire to carry on alone.

"A sight of St. Hilaire's own map in his "Voyage at Rio Grande do Sul" would be of great value in determining the actual line of the traveller's route with rather more accuracy. It may indicate more clearly which sections of the route pass through countryside where cacti or caudiciform succulents occur. It would then be of interest to examine St. Hilaire's full description of the vegetation at those particular localities".

..... from Dr. G. Buchheim, Hunt Botanical Library

"I am sending you copies of the pages from Urban's account of the travels of Auguste de Saint-Hilaire in Minas Gerais, taken from Urban's account in *Flora Brasiliensis*.

From Villa Rica his itinerary was as follows:- Ouro Preto, Passagem, Marianna, Camargos, Bento Rodrigues, Inficionado, Catas Altas de Mato dentro, S. Miguel, Itajura to Rio Piracicaba, upper S. Barbara, S. Quiteria, Brumado, Serra Caraca, Itajuru, Talho Alberto, Jacuhy, Rib. Santa Barbara, As Bicas, Itabira de Mato dentro, Rib. Santa Anna, Rio de Peixe, Serra Piriquito, Serra Itabira, Girao, Faz. Escadinha, Itambe, Venda Ponte Alta, Rio Preto, Rio Picao, Morro Gaspar Soares, Venda Sumidouro, Conceicao do Mato dentro, Venda Bandeirana, Rancho Toporooca, Tapanhuacanga, Serra da Candonga, Rio de Pedras, Rib. dos Porcos, Rio de Peixe, Rancho Ouro Fino, Villa do Principe, Rib. Guahaens, Faz. Temerao, Morro Pellado, Turvo pequeno, Rio Sussuhy, Faz. Cana Brava, Aldea de S. Nicolao, Faz. de Luiz da Mota, Passanha, Serra de S. Joao, Aldea S. Antonio, Faz. Luiz da Mota, Aldea S. Nicolao, Faz. S. Roberto, Cana Brava, Ponte das Paulistas, Rio Vermelho, Faz. Mundo novo, Faz. Cachoeira, Morrór Andaia, Penha, Faz. Itangua, Penha, Faz. Itacarambi, S. Joao Baptista, Faz. Jose Caetano de Mello, Rib. Itamarandiba, Chapada do Mato de Mandru, Capelinha, Faz. Antao Soares, Aldea Alto dos Bois, Villa do Fanado, Rib. Bom Sucesso, Chapada, Sucuriu, Rio Arassuahy, Rio Jequitinhonha, S. Miguel, Rio Arassuahy, Agua Suja, Chapada, Villa Fanado, Piedade, Vareda, Faz. Culao, S. Joao, Rib. Itacarambi pequeno, Faz. das Gangoras, Sobrado, Arassuahy, Bom Fim, Faz. Roca do Contrato, Faz. Brabados, Pe de Morro, upper Jequitinhonha, thence into the Sertao; upper Taiba, Faz. Ribeirao, Faz. S. Eloi, Bom Fim, Pindaiba, Formigas, Veados, Caicara, Riachao, Riacho S. Lourenco, Contendas, Tamandua, Tapera, Faz.

Capao do Cleto, across Rio S. Francisco, Pedras de Baixo, Salgado, Riachao de Cana Brava, Pedras dos Angicos, Mocambo, Faz. Logrador, Canoas, Macauba, Faz. Rancharia, Rib. Pacuhy, Santa Clara, Coracao de Jesus, Faz. S. Bento, Buraco, Rib. S. Lamberto, Rib. Trairas, Retiro Boa Vista, Faz. de Negro, Rib. Jaganipan, Sucuriu, Faz. Catonio, Curimatahy, Corrego Novo, Rio Pardo, Chapada, Pinheiro, Tijuco, Bandeirinha, Corrego Douro, Mendanha, As Barbas, Rio das Pedras, Vao, Milho Verde, Tres Barras, Villa do Principe, Tapanhuacanga, Tapera, Serra de S. Antonio, Congonhas da Serra, Casa do Barreto, Serra da Lapa, Rancho do Meio da Serra, Faz. Ocubas, Mata Cavallos, Gaspar Soares, Ponte Alta, Itambe, Faz. Conto, Duas Pontes, Rib. Tanguí, Faz. Domingos Affronso, Ponte do Machado, Serra de Cocaes, Rib. Una Cocaes, Santa Barbara”.

..... further from H. Middleditch

“Armed with the above very detailed itinerary I once again repaired to my 1: 1,000,000 maps of Minas Gerais. Although I was able to locate only every second or third place name from this list, this was quite sufficient to enable me to plot the route taken by St. Hilaire with a fair degree of precision, except for the section between Itamarandiba and Montes Claros.

“Having got this far, it is now proving most difficult to try and establish just what cacti grow where in this part of Minas Gerais; for example, *Arthrocerus* are to be found in this Province, but their actual growing area is very poorly defined indeed. And this also seems to apply to many other cacti, too, which emanate from Eastern Brazil”.

THE CACTI OF THE BRAZILIAN STATE OF BAHIA By E. Ule.

(Translated by E. W. Bentley from M.F.K. 18.2.1908)

In the year 1900 in this monthly magazine I gave a description of the cactus flora of South Brazil, in which I also mentioned the northern region. Soon after this I was given the opportunity in the space of nearly three years to get to know the extensive area of the Amazon River, which, apart from on its boundaries, is very poor in cactus species, although it contains some interesting forms, like *Cereus wittii* K. Schum. and *Wittia amazonica* K. Schum.

From August, 1906 to February, 1907 I was in another part of Brazil, namely in the state of Bahia and Piauí, where there are many cacti which often give character to the landscape. Unfortunately on this journey, which primarily had a practical object, I was not able to busy myself much with botany, so that I brought back only thirteen species of which, however, twelve were new to science. In addition a number of photographs were taken, and Herr Witt received some small parcels of living cacti, but only a few of these survived.

The state of Bahia is about 4/5 the size of Germany and extends from 9 to 18 degrees south. On the coast there is a moist-hot climate since it belongs to the region of winter rainfall. Originally there were probably extensive forests here which were later destroyed to make the land suitable for agriculture. Only in the south of the state extensive rain forests are found and these are mostly still unexplored. The cacti of these forests and on the coast correspond in general with those of South Brazil, where, along with *Phyllocactus*, *Nopalea*, *Opuntia brasiliensis* Haw., *Rhipsalis* species occur. On the coast near Bahia are found the same *Cereus macrogonus* Salm-Dyck and *C. Pitahaya* P. DC with which we are already familiar in the Restinga near Rio de Janeiro.

Almost the whole interior of the state of Bahia is covered, not with forest, but only with mostly scattered trees and thick bushes, or with more open spaces. Here and there the region is interspersed with ‘campos’, which occurs over the whole of warm South America, also expanses grown over with grasses and a few herbs and harbouring scattered, distorted trees. Cacti are almost completely

lacking here and appear first in the mountain ranges associated with the campos.

While in the southern part of Mid-Brazil, also in Minas Geraes, Goyaz and Matto Grosso, only the campos known as 'orchard-grasslands' occur, there suddenly begins in South Bahia another steppe form which is called 'catinga'. Shrubs and low to medium height trees, here packed tightly close together, there form larger or smaller groups that are separated from each other by open spaces. In the thick scrub one finds numerous thorn-bearing and spiny plants: whence one may also call this catinga 'thorn bush steppe'.

This formation is restricted to a dry climate, where in the cooler part of the year it hardly rains and in summer precipitation is mostly only sparse. In the dry season, specifically from April to October, most of the woody plants lose their foliage so that everything looks bare and arid as in a northern winter landscape. When the first rains fall in October, trees and shrubs are covered with flowers and a green shimmer suddenly spreads over nature, which is soon clothed in fresh green foliage.

Grasses grow only sparsely in the catinga and so small shrubs and herbs occupy the ground, beneath which low growing bromeliads occur. Here and there also one sees trees laden with epiphytes, such as *Tillandsia usneoides* L. which often hangs down in thick veils. Cacti are also found singly or in groups on the ground, and snake through the bush or develop into impressive cereus species clambering over shrubs and trees. There are catinga areas where these cerei predominate, so that one sees the rigid crowns towering everywhere over the shrub vegetation.

Perhaps the largest of the cereus is one that is known as Mandacaru dos bois, which unfortunately I have not collected. It has fairly long spines, large, white, funnel-like flowers and with a stem so thick that often a man cannot span it, it grows over 10 metres high. From the wood of this and some other species even boards are cut and small boxes made. Near dwellings one mostly sees very mutilated specimens of these species because in the drought cattle gnaw the branches after breaking off the strong spines with their hooves.

Characteristic of the true catinga, especially in sandy areas, is another columnar cactus of somewhat less robust form, namely *Cereus catingicola* Gurke. Like the former, it forms a branching tree of 2 to 8 metres height; the branches are mostly four angled short-spined and on the flower bearing areoles furnished with short wool; the flowers are like small bells and of a whitish colour.

I have met a similar species, but with somewhat thinner branches and with a more spreadout growth in North Bahia in the catinga near Cipo. Mostly in the border area of the catinga, especially in the transition zone to campos is found a taller and more slender cereus, which is distinguished by its sea-green colour and forms only a few branches. Here and there in the catinga grows *Cereus phaeacantha* Gurke: this species favours a thick bush vegetation at higher levels which is known as Carrasco. This species has more rounded limbs, covered thickly with brown thorns.

Both in the true catinga, especially in rocky places and also on rocks themselves, one frequently meets *Cereus setosus* Gurke, a very characteristic species that does not grow very high but is thickly branched candelabra-wise above so that the lowest 'storey' comes to lie on the ground; the thick branches are set with long, strong spines, between which, on one side, wool occurs somewhat as in *Pilocereus*; the insignificant flowers resemble those of *Cereus catingicola*. *Cereus setosus* is known everywhere by the local inhabitants under the name 'Chique chique' and, because of the strong spines which can give rise to nasty wounds, is given a wide berth.

Other cereus species are shorter or assume the form of climbing plants.

In the south of the catinga the solitary branches, less than 1 metre high, of *Cereus leucostele* Gurke stand out on account of their almost white colour. These white round branches are jointed and mostly unbranched, or in old age are divided into a few branches; the thick, soft spines at the end of the

branch shape marked by bristles is also exhibited by a small climbing cereus that bears a crown of purple flowers between the bristles at the tip of the end-limb. Among others may be mentioned the somewhat more robust *Cereus rhodanthus* Gurke, the thinner *Cereus penicillatus* Gurke and a third whose slender stems are only as thick as string.

Here and there also one meets *Cereus triangularis* Vell. and a few epiphytic cacti. Reminiscent of the latter is *Cereus adscendens* Gurke that grows mostly in the catinga lowlands, has an upright limp growth form and has more rounded limbs. Often in the early morning I saw this covered with large funneliform white flowers.

Under the cacti and growing next to each other in groups on the ground are about three opuntias that should be mentioned, notable for larger or smaller, long or roundish stems and which produce yellow or orange/red flowers. Distributed everywhere on the ground also is a head-size spherical cactus, a species of melocactus, which bears a wooly cushion and is known as *Cabeça de Frade* (i.e. 'monkshead').

To be mentioned here is a cactus-resmbling plant is *Euphorbia phosphorea* Mart, which bears small leaves and develops square stems of the thickness of coarse string. It makes thick branching bushes often several metres high and reminds one of the euphorbis of Africa, which replace cacti there.

In the catinga, however, there is also a cactus in the form of a spiny, leaf-bearing tree or shrub, namely *Peireskia bahiensis* Gurke. In the dry season also it loses its foliage and often develops its purple flowers before the unfolding of the leaves.

As in the cacti, there occurs a thickening of the axial structure in other plant families as, for example, in the Bombaceae where particularly *Cavanillesia arborea* K. Schum. forms a paunch-like swollen stem that tapers above and below and in the middle often attains a diameter of several metres. These constructions serve for the concentration of reserve materials and are a peculiarity of plants of the dry catinga.

This formation is most characteristic of the south-east of Bahia, but it is still fairly rich in cacti to the north. Only to the west beyond the Rio Sao Francisco does the catinga alter and resembles more the campos or tree-steppes. Here many of the above cacti no longer occur, or they have become rarer, and only *Cereus setosus* is still noticeably numerous.

On a two-day train journey from Bahia to Joazeiro on the Rio Sao Francisco I was well able to observe the catinga areas. Near Serrinha the catinga begins and shows a bush-like form which is interspersed with tree-like cacti, particularly *Cereus catingicola*. On the last stretch between Villa Nova and Joazeiro the landscape is quite peculiar. Between high mountain ranges only sparsely covered with vegetation there are plains covered with widely separated catinga shrubbery. Among the various columnar cacti first *Cereus catingicola* and some others are noticeable, until they are displaced by the whitish columnar bushes of another cactus. Everywhere one sees dense groups of arm-thick unbranched 1 to 3 m high columns, which are mostly grey-white, but at the tips become almost snow-white. Besides this, the column is covered with numerous bristles and a dense white felt and on the side facing west bear a felt-like brush and longer, whiter woolly hair and thus announce themselves as belonging to the genus *cephalocereus*. In some respects this *cephalocereus* is reminiscent of the above mentioned *Cereus leucostele* which, however, mostly exhibits single standing columns. Actually, the impression given by the landscape through the numerous occurrences of this *cephalocereus* is a peculiar one and the cactus itself belongs to the most remarkable structures that I met on the whole of my travels. Unfortunately I could not break my journey and had no opportunity therefore to collect material of this interesting *cephalocereus*.

Close to the catinga cacti occur on isolated rocks and in the Bahia ranges. Of the high ranges I have only visited the Serra do Sincora, which has a height of 1600 m. It lies in a damper region and thus the flora approaches that of the campos. In the higher situated Capoes, which are small forests, some

rhipsalis species and *Hariota salicornioides* P.DC occur but on the cliffs only a single cactus, namely the small *Cephalocereus purpureus* Gurke with purple flowers is found. It has an upright growth form and becomes only slightly over one metre high.

The rocky areas that are surrounded by the catinga or related formation are richer in cacti. On such rocks one sees bromeliads like the aloe-like *Encholirion spectabile* Mart. and between them also columnar cacti like *Cereus setosus* and *C. phaeacanthus*, and sometimes also a cephalocereus with unbranched study limbs that cling to the rock walls.

Where larger stony areas open out vellozias that look like branching *Dracaena* are found which bear large blue or white lily flowers. Where the soil disappears and only bare rock is left only orchids grow and a melocactus, the spiny crowns of which can be seen everywhere in quantity.

Certain species of cacti occur also in the various dry mountain ranges in inner and north-west Bahia. Often in these mountains columnar cacti form the striking shrub-like vegetation that gives a peculiar impression by its rigid appearance.

I have got to know two such ranges, namely the Serra Branca on the left bank of the Rio Sao Francisco somewhat further away in the state of Piauhy and the Serra do Sao Ignacio, not far from the right bank of that river. The Serra Branca is a sandstone range that at its highest has an elevation of a few hundred metres, but its rock formation is peculiar — like a group of skittles. On these rocks are found the cerei that grow some metres high, namely *Cereus squamosus* Gurke and *C. piauhyensis* Gurke. The former has somewhat thinner members and flowers with a scaly calyx, while in the latter the calyx is smooth.

The Serra do Sao Ignacio, also only about 700m above sea level consists of rocks composed of micaceous schists and forms extensive rocky landscapes in which, under other woody plants and small india-rubber trees, grow the characteristic *Encholirion spectabile* Mart. and columnar cacti. One of these is a cereus that develops into strong trees and shrubs up to 10 m high and is very reminiscent of *Cereus catingicola*, but the limbs are far more robust and squarer. The other is *Cephalocereus ulei* Gurke which has slenderer limbs than the former but also attains several metres: the branches, on the side on which the sun sets, bear a dense brown felty brush from which the scaly flowers appear. The upright species of cephalocereus seem to develop flower bearing brushes only on the west side: they are therefore true compass plants.

Presumably the other ranges that run through Bahia also have particular cactus species to exhibit.

As far as I know the area, various cacti extend to the west and north and some are also found in the more northerly states, in which the same, if not an even drier climate prevails and a similar type of vegetation exists. However, many other species of cacti may occur there that are mostly, like those of Bahia, still undescribed.

Bahia itself, where I have encountered over 30 different cacti species certainly rates a total number of 60, so that this area is perhaps one of the richest in Brazil. The genera cereus and cephalocereus seem to be particularly numerous. Almost half the cactus species in Bahia belong to the genus cereus which is particularly characteristic of the physiognomy of the landscape.

Of cephalocereus up to now only *C. melocactus* K. Schum. has been described from Brazil and now a second species has been found by me. As four species are known from Mexico, Bahia with just as many species becomes a second distribution zone of this genus.

That the cactus enthusiast has only a few cacti from Bahia available has an explanation. Many of these cereus and cephalocereus are large so that they can scarcely be brought to full development even in larger greenhouses, other cacti possess insignificant flowers, and melocactus does not do well in

cultivation.

Only some of the smaller cerei, such as *Cereus adscendens*, *C. penicillatus*, *C. rhodanthus* and others are worth considering. However, the true cactus enthusiast turns his interest not only to the few smaller species that he can manage to grow undercover, but will gladly hear about the natural conditions in which grow his darlings and their relatives in their often gigantic and bizarre forms. In this sense I have tried to unfold for the reader a picture of the so rich cactus flora of the interior of Bahia.

Comments

..... from H. Middleditch

“Although the gold and diamond bearing rocks of Minas Gerais had attracted sufficient settlement to permit a fairly comprehensive botanical survey to be made there by Auguste de St. Hilaire in 1817, it would appear that Ule must have been a pioneer cactus collector in the territory to the north of Minas Gerais. He was the first to bring back to Europe the plants we now call *Arrojadoa*, *Brasilicereus*, and *Coleocephalocereus*; he was also the first to report upon *Austrocephalocereus*, as *A. dybowskii* – although he must have been followed closely by another collector since this species was published in 1908.

“In this article by Ule, reference is made to “small climbing cereus, that bears a crown of purple flowers between the bristles at the tip of the terminal joint”. We would now regard such plants as *Arrojadoa*. It would seem that this is the very first published reference to *Arrojadoa*-type plants and possibly the first occasion on which they were consciously recorded.

“The grey-white to snow-white arm-thick ten foot high columnar cactus which Ule saw from the train but was unable to collect, was most probably *Austrocephalocereus dybowskii*. The plant described as *Cereus phaecanthus* Gurke will now be met with as *Brasilicereus phaecanthus* (Gurke) Backbg; a specimen in my own collection is not exactly trouble-free in cultivation, but much less of a problem than *A. dybowskii*.

“*Cereus setosus* was ranked as a synonym of *Pilosocereus gounellei* by Britton and Rose; *Cereus catingicola* will also be found nowadays under the same genus as *Pilosocereus catingicolus*. The *Cereus leucostele* is now known as *Stephanocereus leucostele* which is discussed in more detail elsewhere in this issue. It would seem that *Cereus triangularis* mentioned by Ule is most likely to be the widespread *Hylocereus undatus* (Haworth) BR. & R.

“*Cereus adscendens* was placed under *Harrisia* by Britton & Rose and under *Eriocereus* by Berger; it would appear that the division between these two genera is based upon the method of seed release from the fruit (=dehiscence). In *Eriocereus* the fruit splits to release the seeds; although Backeberg states in *Die Cactaceae* that the *Harrisia* fruits do not split, I am unable to find any explanation of the method by which the seed is released from the fruit – e.g. by gradual drying-up of the fruit wall until it becomes paper-thin (as in *Rebutia*) or by the dried flower remains lifting off like a lid (as in *Copiapoa*) or by some other method.

“*Cavanillesia arborea* is described in more detail elsewhere in this issue.

“The complex history of *Cephalocereus purpureus* Gurke was dealt with in an article by Friedrich Ritter in *Chileans* No. 11 and by Buining in *Chileans* No. 21. Friedrich Ritter was the first to note that the so-called *C. purpureus* of Britton and Rose and that of Werdermann were indeed no such thing, but were *Cephalocereus goebelianus* Vaupel, which we now meet as *Coleocephalocereus*

goebelianus (Vpl) Ritt.

“*Cereus piauhyensis* will now be found under the name of *Pilosocereus piauhyensis*; but since Britton & Rose made reference to *Cereus squamosus* under the new genus *Zehntnerella*, this latter name has dropped out of the literature.”

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

“In regard to the query from H. Middleditch regarding the method by which the seeds are released from fruits of *Harrisia*, I have in my collection a plant labelled *Harrisia martinii* which now carries three bright pink fruits. These fruits are retained on the plant for a considerable length of time and in my experience do not normally split. After having one previous fruit on the plant for a whole year, I removed it from the plant and sliced it in half. The fruit walls were still crisp and juicy and the inside of the fruit was pretty well full of white pulp, which showed no signs of going rotten. It was still in the same condition as a ripe edible fruit that we would purchase at a grocers — except that a number of the seeds had already germinated inside the fruit, in the manner which Buxbaum describes as endogenous vivipary. There was, however, no sign of the fruit tending to develop a split.

“A fruit was formed again in the same season that this last one was removed, but this time it remained on the plant for almost two whole years. Eventually I decided to take that one off the plant in case it started to rot away and allowed the rot to spread down the plant itself. As I said above, there are now three fruits on the plant, but at no time have I tried to carry out any hand pollination and there were no other *Harrisia* flowers open at the same time as those which set fruit.

“If Backeberg is correct in stating that the fruits on *Harrisia* do not split, it would seem that they must be eaten by animals who will not digest the seeds, which will then pass through the animal. The bright red colour of the fruit will attract the attention of animals who would not eat the fruit if it did not remain in a ripe and edible condition. If the fruit does not get eaten, the presence of germinated seeds within the fruit could well be a last resort to obtain reproduction. If the fruit does eventually go rotten and fall off, do these young plants ever establish themselves?”

..... from H. Middleditch

“If the fruit was left undisturbed on the plant for a sufficient length of time, would these young plants manage to push their way through the wall of the fruit? How was it, I wonder, that seeds germinated in a fruit one year old, but there were no signs of germinated seeds in a fruit two years old?”

..... from A.W. Craig

“About four or five years ago I sowed some seed of *Harrisia bonplandii*; owing to moving house and all the work involved with the new greenhouse, these have not been grown in a rush and were about 12” high when they flowered for the first time last year — each plant produced the single flower. This year they both flowered again, one bloom on one plant, and two on the other. This year there were three flowers between the two plants.

“As far as I can recall, the flowers are quite short lived, but I think that they remain open rather longer than just one night. I have certainly seen them open in daylight, so they probably stayed open for two nights and the intervening day. The flower is about 4” across and about 6” long, the tube furnished with areoles having both spines and scales.

“During these two seasons, four fruits have set out of five flowers; the two plants are in different sections of the greenhouse and flowered at different times, so I feel sure that they are self-fertile. The fruits become very large, about 1½' in diameter; when first set, they are a dark glossy green colour, somewhat similar in colour to that of the stem of the plant. I seem to recollect that they take quite a few weeks to turn into a dark red colour, with the dead flower remains still attached. After several weeks the fruit will split, in late Spring, exposing the whitish pulp which filled the interior of the fruit and the dark seeds sprinkled inside it. Finally the fruit fell off, about a year after flowering time. The pulp then starts going mouldy, with the grey sort of mould that one gets in a damp atmosphere. The whole pod gradually goes brown and shrivels up; at about 18 months from flowering, the fruit is almost dry — not paper dry like a ripe rebutia fruit but more like a dried date, tough and almost pliable. The seeds are still retained inside this dried up fruit and I find it difficult to imagine how they can be extracted.

“How is the seed spread in habitat? I cannot see the seed being spread like it is on rebutia, weingartia, sulcorebutia, or matucana, where the fruit dries up completely and finally allows the seeds to roll away freely. But there are some gymnocalycium species which retain their seed in a pulp inside the fruit, like G. multiflorum. If the seed of harrisia is not allowed to run clear of the dried fruit, do the birds eat the pulp and seed? Does the seed pass through the birds digestive system unharmed?

“I see from Vol IV of Backeberg's Die Cactaceae that he lists this species not as *Harrisia bonplandii*, but as *Eriocereus bonplandii*; he also illustrates the splitting fruit typical of *eriocereus*. However, he also describes *E. bonplandii* as having canted-ribs (like the species *jusbertii*) whereas I would not regard this as a description of the ribs on my plant. The illustration of *E. tortuosus* looks more like my specimens; and this species is described as having flowers 16 cm long, a closer match for my flowers than the 25 cm length given for the flowers of *E. bonplandii*”.

..... from T. Lavender

“Many years ago we bought a small plant of *Eriocereus martinii* on a visit to Sir Oliver Leese's garden. It was then only about 6" high but it grew well and eventually reached a height of about 4 ft. It flowered for the first time over ten years ago, on the single stem; further branches then grew out from near the base and it flowered pretty regularly each season for several years. Eventually we had to cut it down but unfortunately the base of the stem refused to grow offsets and eventually it just passed away.

“On one occasion we brought the plant up to the house when the flower looked as though it was about to open and sat round it in the evening. It opened at round about ten o'clock in the evening — you could almost see the petals moving as the flower opened. It had a beautiful perfume; the flower was dead by midday the next day. All the flowers opened at night in this fashion — always one flower at a time.

“We tried to set fruit on one of the flowers by dusting it with pollen from an *Echinopsis* which was out at the same time, but it did not take; the last time it flowered, however, it set fruit itself. The fruit turned a bright glossy blood red colour. It was really quite large — about 1½ inches in diameter, smooth except where it was slightly puckered in folds under the elongated flower remains. Well spaced out on the fruit were some shallow but steep sided tubercles each carrying an areole with cream felt and some spines. There was one long spine nearly as long and strong as the spines on the stem of the plant, also the same pale colour with a dark tip, together with about six or seven quite short spines of a dark brown colour.

“The fruit remained on the plant until the start of the following growing season before it split vertically, exposing the black seeds in a moist whitish pulp .

..... from A.W. Mace

"I have a *Harrisia bonplandii* which flowers and sets seed regularly. The fruits indeed go red and usually last into the following Spring, before splitting and going mouldy".

..... from P.H. Sherville

"With regard to the flowering and fruiting habits of my *Harisias*, the flowers always open irrespective of weather or temperature or time of year between 21.45 and 22.15 hours; very rarely is expansion incomplete by 22.30. I have flowered and set fruit on both *H. martinii* and *H. tortuosus*, both fruits have split and eventually rot and drop off.

"The two slides (now in the slide library H.M.) show fruits on each plant but although the fruit on *H. tortuosus* is not shown to be split, it did split before rotting and falling off. These fruits always contain vast quantities of seeds and invariably quite a few well developed seedlings. Incidentally, the flowers die during the morning and the duration of the flower seems to be entirely a function of sunlight as on dull days even though they may be cold or warm, the flower will often last almost to midday; but on bright sunny mornings be they again frosty or warm, the flower would die by 07.00 to 08.00 at the latest.

"I see that Backeberg lists these two species that I call *Harrisia*, under *Eriocereus*; however, I would not say that the fruit stayed on for long – only about 6 weeks to ripen and at the best another two to split and go rotten!".

..... from R. Strong

"In the above article, Ule makes reference to vellozias. It seems that this genus *Vellozia* Vand was described in the *Flora Lusitania* 32 t.2 in 1788 and belongs to the family *Velloziaceae*, which are monocotyledons. They are shrubs or subshrubs with the leaves crowded at the top of a usually branching stem, the old leaf-base being persistent and clothing the stem. The flowers are more or less typical of the *Liliaceae*.

"The *Velloziaceae* is a small family with about 200 species, indigenous to tropical South America, tropical and South Africa, Madagascar and Arabia; occurring mostly in warm, dry places. Only two genera are at present recognised – *Vellozia* and *Barbacenia*, the latter being confined to South America.

"The *Velloziaceae* are mostly probably closely related to the *Liliaceae* (including the *Amaryllidaceae*) and *Agavaceae* and resemble the latter in gross morphological appearance. They differ from these however in the following:

- a) vessels are distributed throughout all vegetative organs and not chiefly confined to the roots.
- b) the perianth and ovary are almost always conspicuously hairy or glandular, a characteristic that is rare in both *Agavaceae* and *Liliaceae*.
- c) the stomates possess two distinct subsidiary cells whilst in the *Liliaceae* and *Agavaceae* the stomates typically lack any subsidiary cells".



CAVANILLESIA ARBOREA

Photos: Buining

Near Rio de Pires

Succulenta 46.6:67

K.u.a.S. 20.5:69

CAVANILLASIA ARBOREA

(Translated from Succulenta 46.6:67 by H. Middleditch)

"Cavanillesia arborea, or in the Brazilian "Barrigudas" which means "tubby", also gets aptly called a bottle tree on account of the characteristically shaped trunk, which is very soft. It comes from the northerly part of Minas Gerais and the southerly part of Bahia, in Brazil.

The number of these more or less succulent like giants is diminishing very quickly through burning and clearing, especially very old specimens like these, which was photographed in the north of Minas Gerais.

The habit and the structure of the trees strikes one as prehistoric".

Comments

..... from H. Middleditch

"The above caption relates to the accompanying photograph of this species taken by Mr Buining in Brazil. One gains the impression that the illustration from Ku.a.S shows the plant in the dry season when it has shed its leaves, whilst that from Succulenta appears to show the plant in flower (or is it in leaf?)"

..... from R. Strong

"I find that Cavanillesia is in the family Bombaceae and was first discovered by Ruiz & Pavon and named by them in their Flora Peruviana & Chilensis, Madrid, 1794. The genus was named in honour of Antonio Joseph Cavanilles. The habitat of their particular species was at Huancabamba in northern Peru.

"Cavanillesia arborea was first described by Karl Schumann in Martius' Flora Brasiliensis of 1886, with a synonym Pourretia tuberculata Mart. & Zucc.

"Apparently the wood of this tree weighs only 6¼ lbs. per cubic foot, this being lighter than Balsa ochroma which has a weight of 7½-12 lbs per cubic foot, this is also one of the Bombaceae".

..... from A.F.H. Buining

"Indeed I saw in several places Cavanillesia arborea, such as in northern Minas Gerais, in western Bahia and also in the Gran Chaco — at least in the more western and central areas of the Paraguayan part.

"In the dry season the leaves do fall off. In general the dry season is in the wintertime, from about April/May till September/October. But often the dry season lasts longer or shorter.

"During my first trip from November/December 1966 I was in northern Minas Gerais on December 15th & 16th and the trees had their leaves. I can confirm this from the colour-slides I made of single trees and groups of them at Francisco Sa and between Guanambi and Caitite in southern Bahia. On 19.6.1968 I made a slide of a completely leafless tree about 30 km west of Jacobina in Bahia.

"On my trip in 1972 I also saw this tree in several places and this time also on the western side of the Rio Sao Francisco. While these trees are worthless as wood, they disappear very quickly and it will be necessary to have them saved by law.

"I also took some pictures for Prof. Rauh of the bare catinga, or sertao. The Acaciae in particular became leafless in the dry season. The catinga in Bahia, Pernambuco and Piauhy is terrible and the further one goes west the dryer it gets.

"One hardly ever finds young plants of this *Cavanillesia*. I know Horst found one once and he planted it somewhere in the Rio Grande do Sul".

..... further from H. Middleditch

"Out of curiosity I dipped into Jacobsen's "Handbook of Succulent Plants" where I discovered this species is indeed listed as a succulent plant".

TROPICAL DISTRICTS WITH PRONOUNCED DRY SEASONS

(Abstracted from Plant Geography, by A.F.W. Schimper, 1903)

The vegetation in periodically dry districts is quite different from that in constantly humid ones, especially if we consider those districts which have a scanty rainfall and show xerophilous vegetation at all seasons of the year. Here, the danger of desiccation, especially threatening to tall plants, has led to the evolution of highly xerophilous trees, forming an extremely peculiar tree type which, in particular, shows its characteristic features in savannah and thorn forest.

Xerophilous trees of the tropics are mostly bare during dry weather; their foliage, although present only during the rainy season, is unusually firm and provided with elaborate protective devices against transpiration. Pinnate leaves are especially frequent, and by their mobility, which permits them to assume the best position for the time being, they are thoroughly in harmony with the climatic conditions. Evergreen trees, on the other hand, usually have simple, often very hairy, leaves, which in many cases contain so much silica that they assume a consistency resembling sheet metal, and, in the wind, rattle with a metallic sound. The foliage buds are provided with a coating of protective scales as thick as, or even thicker than, that of the trees of the temperate zone. Examples from the Brazilian campos — *Myrcia longipes*, *Eugenia jaboticaba*, *Eugenia dysenterica*. Only the flowers dispense with a corresponding protection, and even frequently possess large delicate corollas, although they often open at the height of the dry season, and therefore demand large quantities of water for transpiration.

The volume of wood in comparison with that of foliage is greater than in hygrophilous trees, and the cortex is frequently covered by a massive scaly bark, as in *Sweetia dasycarpa*. Besides the protective devices against drought which occur and are similarly differentiated in xerophytes of higher latitudes, there are among the tropical woody plants cases of special and very peculiar adaptation. Thus many tropical trees owe the faculty not only of growing in very dry regions, but also of attaining large and even gigantic dimensions, to the fact that they store up large supplies of water for the dry season. Amongst these is the wonderful bottle-tree *Cavanillesia arborea* (Willd.) K. Schum., and other *Bombaceae* of the open thorn bush of Central Brazil, the trunks of which, swollen like a cask up to a thickness of five metres, serve as water reservoirs; also, in the same forest, *Spondias tuberosa* (*Anacardiaceae*), the tuberous swellings of whose roots become filled with water.

Finally, in contrast with rain forest and monsoon forest, xerophilous woodland, especially in the thorn forest, contains aborescent succulents, particularly species of *Cereus* in tropical America.

The shrubs of the savannah are not less xerophilous than the trees. Their hypogeous parts are

very strongly developed as compared with their epigeous parts, and often form such a massive system of thick lignified axes, that we may describe some of them, such as those of *Andira laurifolia* and *Anacardium humile* of the campos, as hypogeous trees. In *Andira*, for instance, the system of rhizomes, consisting of branches as thick as one's arm, frequently covers an area ten metres in diameter, whereas the epigeous foliage shoots are thin and never more than a meter in height. Such hypogeous axes appear to serve as water reservoirs, as also do the tuberous woody rhizomes that occur on numerous small shrubs and bushes in the campos.

Thin woody lianas occur in xerophilous woodland, in particular in thorn-forest, but disappear in the savannah; but in the savannah, for instance in the Brazilian campos, there are found erect shrubs belonging to families and genera that, with these exceptions, include only climbing forms. Schenk considers that many of these shrubs have been derived from lianas and are to be considered as cases of reversion to an erect mode of growth.

Thorn woodland, as forest, bush, or scrub, is extensively developed in tropical America. Under the well-known and dreaded name of "caatinga", it covers extensive tracts of country with a small rainfall in Brazil, between the savannahs (campos) of the south and the rain-forests of the Amazon and its tributaries. It alternates frequently with the savannah and in this case, as in all dry districts, edaphic influences are in the first place responsible for the change in the character of the vegetation, since savannah prevails on a stiffer soil that is superficially wetted by the rain, whereas woodland occupies a sandy soil that is very permeable to water.

The caatingas exhibit thorny bushes, chiefly formed of Mimoseae, among which there rise more or less numerous trees, including the strange 'barrigudos' or barrel-tree, and columnar cacti. Thin lianas climb among the bushes; epiphytes are absent or are extremely scarce. The herbaceous vegetation is limited to prickly Bromeliaceae. The caatingas of Brazil have frequently been described, especially by Martius, Saint-Hilaire, Liais, and recently by Detmer. Martius gives the following vivid account of them:-

"It is quite different (i.e. compared with the rain forest) with the forests termed by the Brazilians caatingas or light-forests, which lose their leaves during the dry season and break out into leaf again only after persistent rain has set in with the wet season. They consist of trees of considerably more stunted growth, and, when leafless, remind the European traveller of the appearance of his native broad-leaf forests at the commencement of winter. They belong chiefly to the northern provinces of Ceara, Rio Grande do Norte, Pernambuco, Piahy, Goyaz, and Bahia, where they occupy the sandy, primary granite, or jurassic limestone soils, over immense tracts. Dry districts, poor in springs and whose rivers dry up in summer, hills or plains, are the native country of these remarkable forests. The traveller journeys across them only with fear and trembling during the dry months. Surrounding him, as far as he can see, stand the bare leafless stems, motionless, unfanned by the slightest breeze; not a green leaf, not a juicy fruit, not a verdant blade of grass, on the burning, bare soil, alone appearing to retain still a fleeting trace of life, are the strangely shapen stems of cerei, which here like huge candelabra, and there crowded together in serried ranks, stand threatening with their poisonous spines If, however, a sudden shower of rain should loosen the bonds of the vegetable kingdom then, as if by magic, a new world springs into existence. From the richly branched stems, leaves of soft green colour shoot forth, countless rarest forms of flower expand, the bare limbs of formidable thorny hedges and of climbing plants clothe themselves anew with fresh foliage"

As characteristic plants of the caatingas, Martius mentions *Spondias tuberosa* Arr., *Anona obtusifolia* DC., *Caesalpinia pubescens*, *Caesalpinia glandulosa* Bert., *Capparis lineata* Pers., *Capparis longifolia* Gw., *Capparis laevigata* Mart., *Pourretia tuberculata* Mart., *Chorisia ventricosa* Nees et Mart., *Thryallis brasiliensis*, several small species of *Bombax*, and several species of *Acacia*, of *Mimosa*, and of *Jatropha*.

The account by Liais mentions the occurrence of many forms of cacti and a great number of prickly Bromeliaceae, as terrestrial herbs.

Detmer, who saw the caatingas of the province of Bahia in September (the month of passage from the dry to the rainy season) makes the following remarks:-

“The dry soil consists of greyish-white loose sand. On it are growing everywhere thorny shrubs, for the most part quite leafless, and forming a dense undergrowth, which is impenetrable in places and here and there is slightly overtopped by isolated trees. Between the shrubs often grow a great number of “mandacuras”, trees of cereus, 20 feet high, the massive stems of which, woody at the base, give place above to a few thick 4-5 angled ramified branches, which are studded with long thorns. The soil between the shrubs is covered by very large “gravattas” — terrestrial Bromeliaceae, with half-parched, sharp-edged leaves, grouped in rosettes, above which their dried inflorescences project; in addition there are only a few other plants, some of which bear greyish-green, extremely hairy leaves. Short palms with palmate or pinnate leaves are also plentiful”.

Thorn bush similar to that of the caatingas also appears in South Brazil at Minas Gerais. According to Liais and Warming, it is there confined to rocky limestone hills, and differs from the neighbouring forests by the much more complete defoliation, by the greater abundance of shrubs between the trees, which are further apart, also by its more marked xerophilous character, and consequently by the greater abundance of thorny and succulent plants.

Comments

..... from H. Middleditch

“The first problem which I came across in the above extract was to stumble over some new words. The “hygrophilous” trees was a term which I did not recollect having met before, but it did seem to be the opposite to xerophilous. And then there appeared two words hypogeous and epigeous, where Marshall and Wood’s Glossary of Succulent Plant terms came in handy, for it told me that hypogeous referred to below ground, whilst epigeous referred to growths above ground level. In the example quoted, of *Andira laurifolia*, the main stem of the bush together with its various branches, all lie more or less horizontally at — or just below — ground level, with the twigs growing upwards in bunches at different places along the prostrate stems.

“ This mode of growth would seem to be somewhat similar to that described by Weberbauer for the Puna formations of Peru:- “In numerous species the stems ... are hidden in the soil. The larger subterranean stem portions lie more or less horizontally, slightly below the surface”. Presumably the reason for the mode of growth is basically similar in both cases, in that the harsh climate does not favour the continued existence of the more familiar type of near-vertical stems and branches with a relatively thin cover of bark.

“An illustration of *Andira humilis*, exhibiting dwarf epigeous growth, will be found in this issue on page 39 ”.

..... from G. J. Swales

“The term xerophilous would seem to be used in this extract in the manner in which we would use the term xerophytic at the present day. The term hygrophilous, queried by H. Middleditch, would indeed seem to be a plant living with a plentiful water supply”.

VEGETATION OF THE CAMPOS CERRADOS IN SOUTHERN BRAZIL By F. Rawitscher

(Abstracted from the Journal of Ecology Vol 36 No. 2 1948)

Very vast areas of southern and central Brazil are covered with a vegetation of savanna-like aspect, the "Campos Cerrados". These were first described by Eugen Warming who spent nearly three years (1863-6) in Lagoa Santa (near Belo Horizonte — H.M.), as an assistant of the famous Danish explorer, zoologist and palaeontologist, P.W. Lund.

The most outstanding features of the Campos Cerrados are the peculiar aspect, and the floristic composition of the vegetation. Small trees, 5-8 m high, often with contorted and gnarled stems, are scattered over the land, permitting sunlight to reach the ground. This in the rainy season is covered by a great many lower (as a rule perennial) plants, part of which disappear from the surface in the dry winter period. The majority of the trees and shrubs may persist with their foliage until the next spring time. Shedding of leaves, when it occurs, is not quite regular; there are cases when the trees and shrubs, of nearly all of them, are bare of leaves at the end of the dry period. In other years, or in the same years but in other habitats, most of them may retain their leaves the year round. Of special importance is the observation by Warming that sprouting and unfolding of the leaves occur at the end of the dry season, independently of precipitation. Often the trees and shrubs produce flowers and new leaves before the first rains.

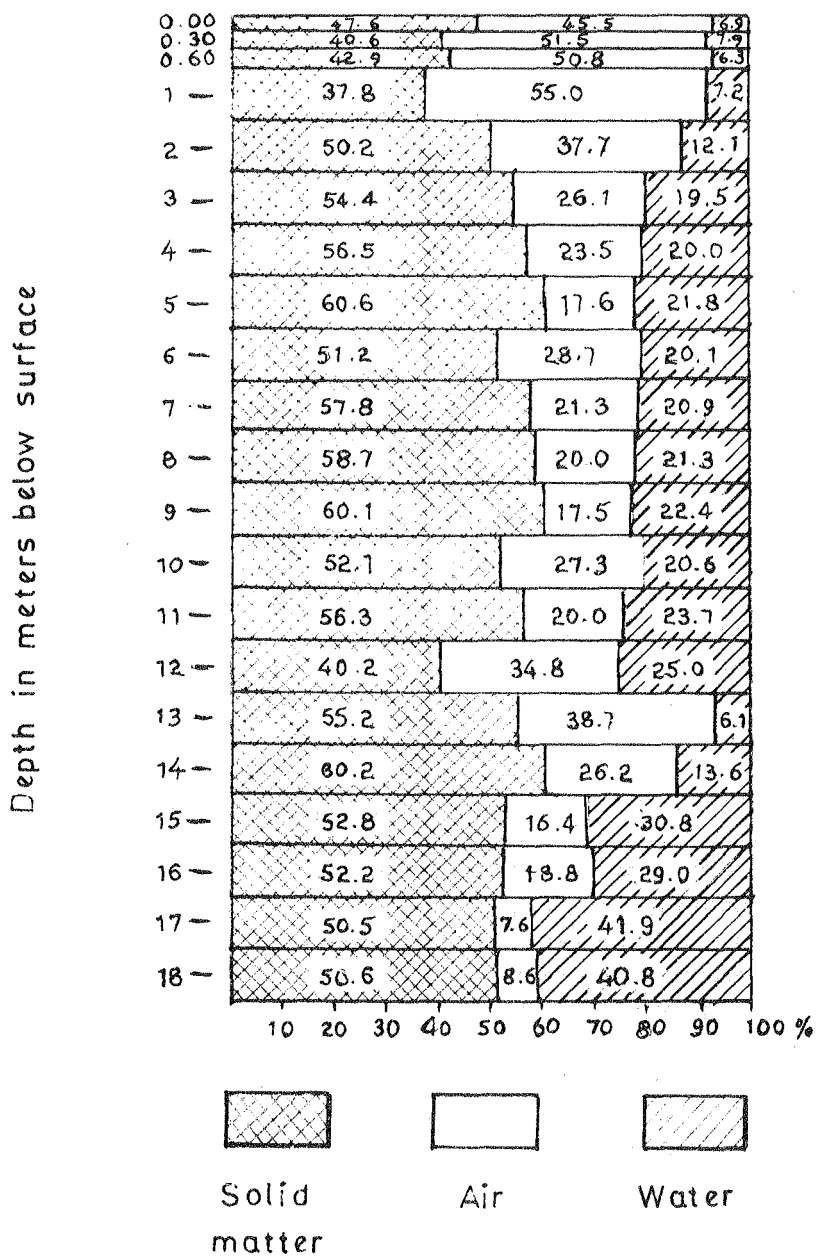
The existence of such extensive savanna-like vegetation is generally supposed to be due to the dryness of the climate. There are, however, contrary opinions. Thus Lund was convinced that the Cerrados of Lagoa Santa did not represent the natural vegetation, or as we should call it today, the climax. In his opinion, under undisturbed conditions, we should have here forests of a certain dry forest type, and the existence of the Cerrados is attributed by him to human interference, especially by fire. It is true that annually the regions of the Cerrados are burned intentionally in order to clean the fields and to promote a better and earlier sprouting of the grasses and herbs.

The studies here described were made at Pirassununga (app. 120 miles north of Sao Paulo — H.M.); Lagoa Santa, studied by Warming, lies more to the north but the conditions and vegetation there are rather similar. The mean temperatures and precipitation from Ribeira Preto, near Pirassununga, average:-

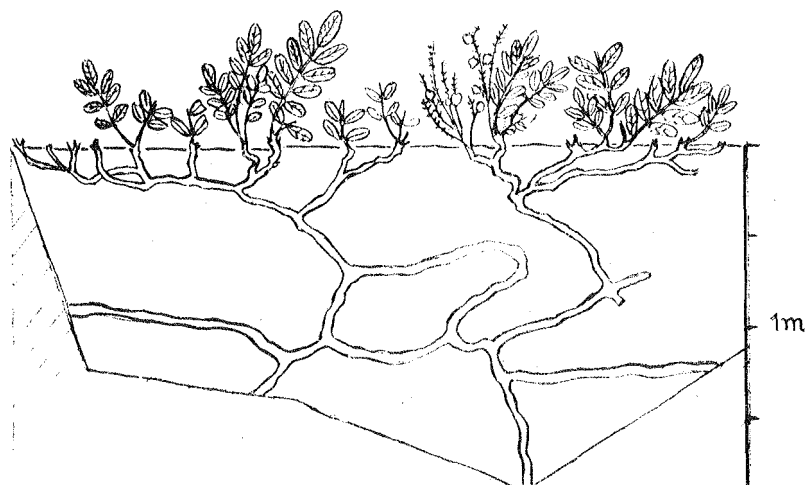
	J	F	M	A	M	J	J	A	S	O	N	D
Mean Temp °C	23	24	23	22	19	17	17	17	21	22	23	23
Rainfall mm	284	186	160	78	38	49	16	32	56	114	172	221

Average values, however, are not sufficient for ecological purposes. The temperature maxima in winter are not much inferior to those in summer; the minima, however, are much lower and sometimes freezing point is reached. These low winter temperatures are characteristic of the south. At Lagoa Santa temperatures below 0°C are not recorded.

Rainfall in the winter or dry season in these parts is very infrequent, but when it occurs it may be heavy. The driest months are May-August, generally with fair, cloudless weather. Evaporation in this period is great, and relative humidity in the noon-time hours can be very low (20%). Under such conditions a month with less than 60 mm precipitation is regarded as arid. It is true, however, that the daily evaporation is lowered by the short duration of the day. The thirteen day hours with heavy radiation lower the temperature during the night and bring relative humidity values to 100%. Thus, at sunrise, the fields — at least in May, June and July — are generally covered with dense mist. Thus evaporation is insignificant or absent during a greater part of the night. Dew begins to fall as early as 8 p.m. and evaporation begins only



SOIL PROFILE IN PERCENTAGES BY VOLUME
Pirassununga - Sao Paulo



Andira humilis

after the fog has dissipated, at 9 or 10 a.m. Near the end of the dry period, however, the air is drier, relative humidity reaches low values, and fogs are rare; the mornings begin with positive evaporation values.

The soil maps of our region that exist are, ecologically speaking, of little use. In addition to this, soil investigations often restrict examination to the top 1.5 m. In this instance, however, the deeper layer are of great importance.

The most important fact for our studies is the great depth of rock decomposition in all the humid tropical regions. Here the bedrock often cannot be found at less depth than 20 m. Above, the soil is a homogenous reddish loamy earth without stones or pebbles. We have no detailed analysis, but the pH was near 5.0.

Since it was necessary to know the water content in the different layers we opened three wells reaching the ground water table at 17-18 m. As the wells were drilled at the highest levels of the rolling land, ground water here could not be conducted from elsewhere and must have been derived from the excess of summer rains in situ. The ground water table is continuous and the many wells that exist in the region for household purposes indicate, in comparable cases, similar depths of the same continuous ground water. The accompanying sketch shows the distribution of water, air, and solid matter determined in such an excavation.

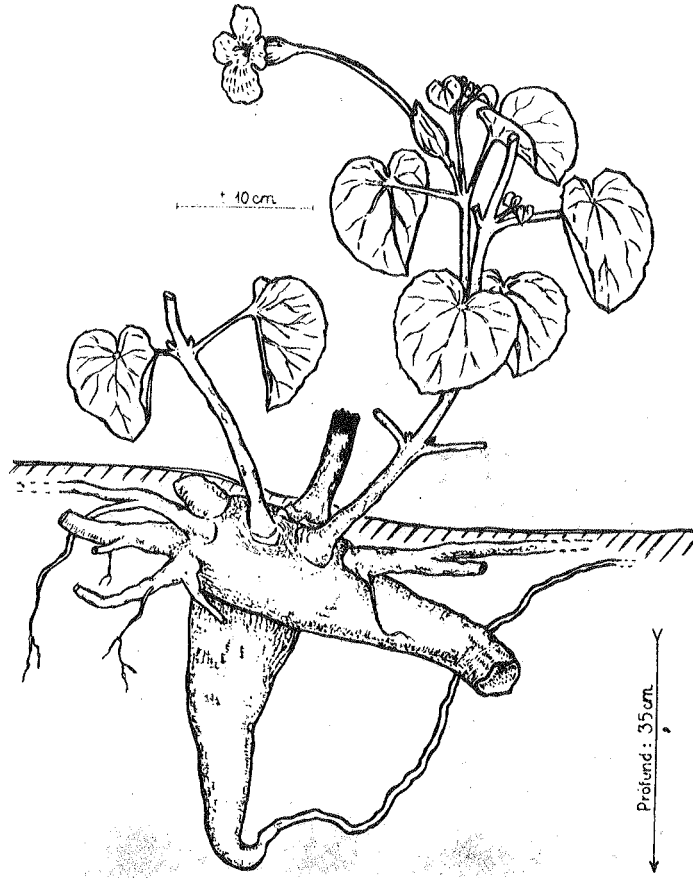
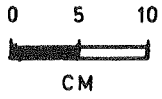
From this ground water there drains off throughout the year, even at the end of the driest period, water that feeds springs and streams. In the drier state of Minas Gerais there are regions where in the dry season streams and rivers are dry. This significantly is the case only under forest cover. In the Campos Cerrados of Pirassununga there is no superficial erosion, and this is so over the greater part of our region except where the ground has been artificially cleared of vegetation. Even during the heaviest rain, no puddles form and no water flows over the surface of the soil. Only where the soils are sunbaked and hard do we find sheet erosion or formation of gullies.

Fires are intentionally started every year in the middle or end of the dry period in order to promote an earlier and better sprouting of the grasses. The scattered aboriginal Indians set light to the dry grass to signal their approach and for pure fun. The ranchers burn to destroy the roughage and encourage young tender growth for their stock.

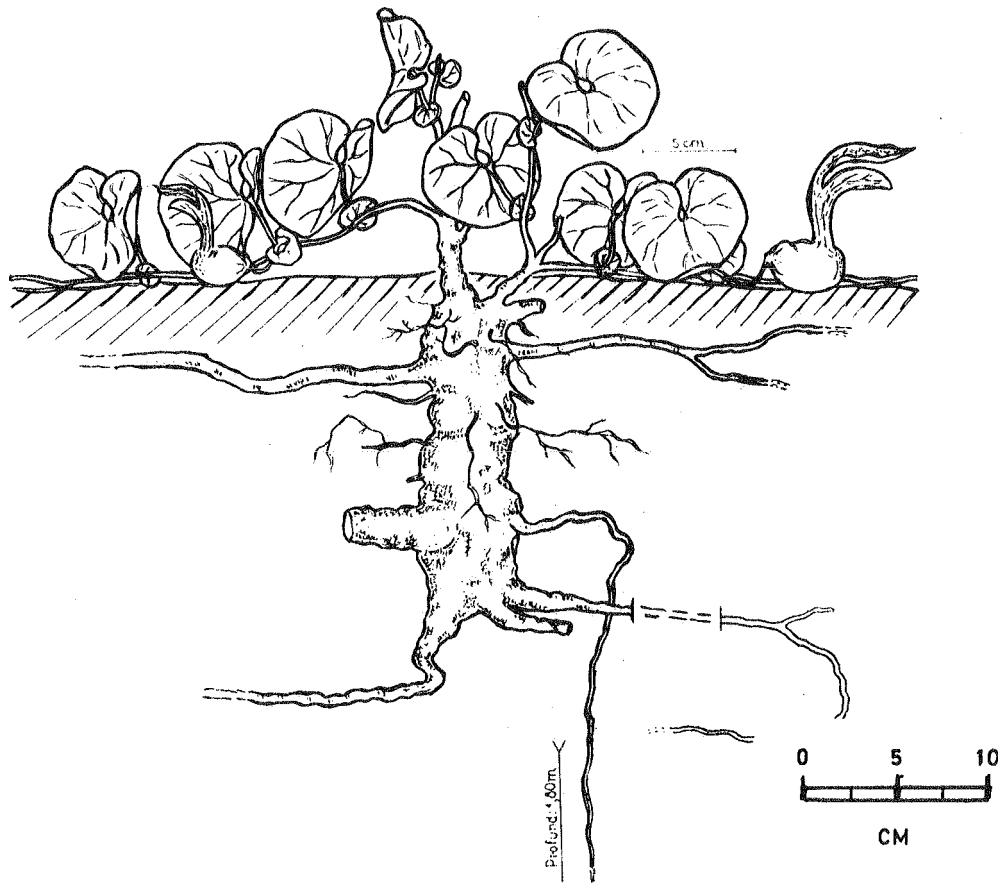
The vegetation is made up by small trees, tree-like shrubs, small shrubs, herbs, climbing plants and very few epiphytes. A good many of the species appear, depending on the conditions, sometimes as herbs or shrubs, sometimes even as trees. *Caryocar brasiliensis* in many regions is a beautiful shade tree. In Pirassununga, where fire is an annual phenomena, *Caryocar* does not differ much from an annual herb, or a very low shrub, with most of the ligneous, permanent parts in the soil. Some of these, like *Andira humilis*, *Anacardium pumilium*, *Jacaranda decurrens*, and certain *Anona* species, pertain to genera of which other species are high trees or shrubs. They have been spoken of as "subterranean trees" in reference to the often enormous development of their subterranean, ligneous parts.

The best basis for determining ecological groups seem to be the nature of the root system. If these go deep enough to reach the permanently wet lower soils, plant transpiration will be relatively unrestricted. These plants can retain their foliage through the dry season and they can develop, where other conditions such as fire, grazing, and so on, allow this, into trees or shrubs. On the other hand there are plants with shallow root systems which cannot show a greater development above ground, even if protected against human and animal interference. They must shed their leaves in the dry period and often only their subterranean parts survive. We can present here a preliminary list of the plants of Pirassununga, which are found to belong to

- (a) Deep rooted, evergreen or nearly so.
- (b) Shallow-rooted, summer-green.
- (c) Grasses.



Craniolaria integrifolia



Aristolochia giberti

The deep-rooted plants under the conditions at Pirassununga, generally do not suffer from lack of water; on the contrary, their leaves are adapted to the free use of it. Under test, the stomata were very slow to close when the water supply was cut off from the leaf.

Wide opening stomata constitutes a danger for plants exposed to rapidly changing water conditions. *Aristolochia giberti* Hook. vegetates in the rainy season, when there is no severe drying of the superficial soil layers. It has rather deep roots, and maintains water reserves in its big "xylopodium" as Lindman (1906) has called the subterranean intumescences so characteristic and frequent in the vegetation of the Campos Cerrados.

Digging in the soil we always find, besides the voluminous storing roots of the deep-rooted vegetation, the ample root-systems of the grasses and the many xylopodia of the summer-green plants. The water content of xylopodia, even during the dry period, is considerable. In *Aristolochia giberti*, M. Raschid found 55.3% water in September, but the big xylopodia of *Craniolaria* were found to have a water content at the rainy season of about 90% and at the end of the winter, approximately 78%. This permits sprouting in the spring, before the first rains fall.

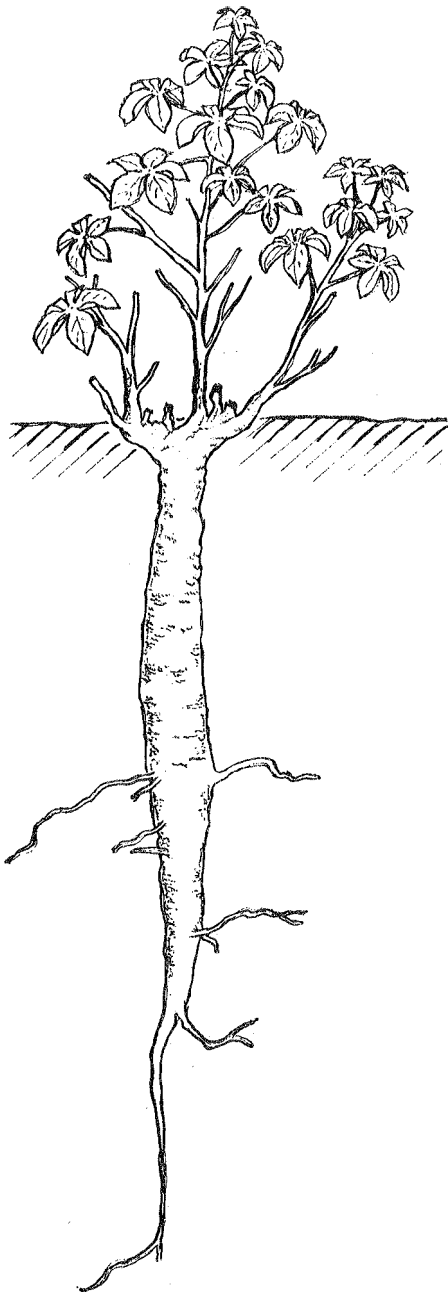
Craniolaria has its roots in the upper 30 cm and vegetates only in the summer. Then it generally finds much humidity as a consequence of the frequent and heavy summer rains, and the water of the xylopodium constitutes a reserve for the rainless days or weeks that may always occur. Nevertheless, the stomatal closing mechanism is much more sensitive and efficient than that of the deep-rooted plants. The same is true for nearly all the summer-green plants with shallow root systems.

The really deep-rooted plants seem nearly all to belong to the associations of the drier north, as we may conclude from the lists given by explorers. Further detailed investigations perhaps will show that the more drought-adapted shallow-rooted plants originally belonged to the more xerophilous associations, whereas the less-protected come from more humid regions.

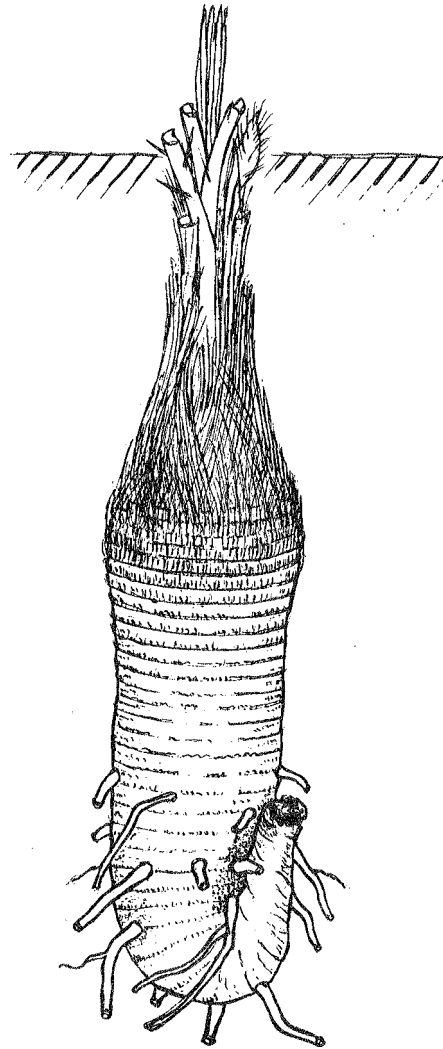
One feature, however, they must all have in common, the capacity to survive the drought. Such subterranean organs as xylopodia are very frequent in the plants of the open campos throughout Brazil, but in the Cerrado they display unusual dimensions. The accompanying sketch shows the subterranean trunk of *Cochlospermum insigne*, a low shrub with conspicuous yellow flowers that appear in June in the dry season, when the plant is leafless. *Cochlospermum* seems to be a genuine inhabitant of the dryer north-east (Goyaz, Pernambuco). At the southern limit of the area (Sao Paulo State), it seems to be progressing towards the south.

Often it is not easy to say if the xylopodia originate from roots or stems; in the *Craniolaria* they seem to derive from both, but in *Cochlospermum* the main root seems to be principally involved. Determination of the water content in the latter gave 78% in January and 75% in September at the end of the dry period. Protection against loss of water in the dry soil seems to be very good.

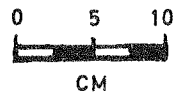
Very interesting are the subterranean trunks of certain stemless plants; their existence is known already for *Attalea exigua* (on the accompanying sketch) frequent in pastures and range lands, and not characteristic of the Campo Cerrado. In this M. Raschid found another species of the genus *Acanthococos*. The accompanying figure shows how the growth of the stem after germination is directed at first vertically downwards; only the leaves show negative geotropism. When a depth of 50-60 cm is reached, the growing point initiates a 180° curvature. The early stages of the stem disappear and only the thicker, upward growing part of the trunk is left. This takes several years, and only now the palm produces its inflorescences just above the ground. The roots, which derive from the subterranean stem, were generally found, like those in *Cochlospermum*, in the upper 2 m. A similar case has been described and figured for *Sabal mexicana* by Martius (1823-50).



Cochlospermum insigna



Acanthococos sp.



See RAWITSCHER "VEGETATION of the CAMPOS CERRADOS"

We may add that as a rule Cerrado land permeability to water is extremely great. Even the heaviest tropical rains are absorbed immediately, without formation of puddles or a superficial overflow of water.

In summary, the Campos Cerrados of a savanna-like aspect cover extensive areas of central and southern Brazil. The depth of the soils is very great; a continuous underground water level occurs at 17-18 m. Drought at the rainless period enters only the top layers 2-2½ m. Beneath, the soil contains the humidity stored from the rainy period.

The behaviour of the vegetation depends on whether the roots reach the always humid part of the soil or not. The first is the case with the majority of the small trees and shrubs. They have no xerophytic character. The shallow-rooted part of the vegetation is composed of grasses which wilt when the drought reaches the depth of their root system; or summer-green plants, that are generally perennial, but survive in the dry season only in the form of subterranean bulbs, xylopodia or even the very great root or stem formations, such as the subterranean trunks of *Cochlospermum*. In the wet season the top layers of the soil are generally humid, so that these plants too transpire rather freely. The stomatal reactions are more active than those of the deep-rooted plants. The summer-green part of the vegetation may be compared in this respect with the tropophytic, mesophytic plants of temperate climates.

Comments

..... from H. Middleditch

"The illustrations accompanying this article took my eye somewhat reminiscent of caudiciform succulents; but as none of them were listed in Jacobsen, I presumed that they were not succulent plants — in which case one might expect there to be some difference distinguishing the caudiciform plants classed as succulents from the caudiciform plants which are not classed as succulents. So I re-read Rawitscher's article, and then read that part of the introduction to Vol I of Jacobsen's "Handbook of Succulent Plants" which deals with their form and mode of life - but I failed to find any definition of what constituted a succulent plant.

"There are a large number of deep-rooted plants to which Rawitscher makes reference, whose roots descend to the permanent underground water and could hardly be considered to be succulent. But how do the *Aristolochia* and *Craniolaria* fail to qualify as succulent plants? They put out non-succulent green leaves for part of the year, like *Testudinaria*, *Jatropha*, and many other caudiciform plants which are classed as succulents. It appears that the methods used for testing the rate at which the stomata react after a leaf has been deprived of water by detaching it from the plant, are a relatively recent development. Under the circumstances, it appears unlikely that a rapid stomata reaction rate has been a recognised criterion for qualifying a plant as 'succulent'. But perhaps there is a definition somewhere of what constitutes a succulent plant?

"In his talk to the Austrian Cactus Society in Vienna (reported in this issue) Leopold Horst refers to pulling *Uebelmannia* plants up out of the ground by hand, because of their sparsity of roots — aided no doubt by the friable nature of the earth. Does their habitat on the Sierra Negra also receive the dense winter morning mists and regular nightly dews that Rawitscher records as occurring at Pirassununga? The town of Ribiera Preto, not far from Pirassununga, is at 556 m altitude; the Serra Negra, habitat of *Uebelmannia*, peaks at about 850 m so the increased altitude may compensate for the reduced latitude and morning mist may also occur there. Elsewhere in this issue, St. Hilaire refers to the winter-dry regions of Minas Gerais being "refreshed by morning dews". Although the mist-zone on the Chile-Peru coast has received frequent mention, I do not seem to recall having seen much in the way of reference to dew or mist in Brazilian cactus country. The extremely porous nature of the ground in which the *Uebelmannia*

grow will retain very little of the heavy but irregular summer rainfall, whereas shallow surface roots could make good use of dew.

"Most literature dealing with the cultivation of cacti will sooner or later come round to making reference to a "porous" compost; growers who have succeeded in blending a well-drained compost are usually satisfied that they have achieved the porosity desired. But just how much air space i.e. total voids, should there be in a porous compost? Perhaps we can now essay an answer to that question, for the table giving the analysis at various soil levels into earth, air, and moisture, shows that in the first meter of depth below the slightly compacted surface, there was actually more air space than solid matter. Thus a pot full of dry "porous" compost equivalent to that found in habitat would accept a pot full of water without overflowing.

"And how convenient it is to find a term for those swollen roots (or buried stems!) on Chileorebutia, Pygmaeocereus, Pterocactus, and the southernmost Weingartias – we can now call these "xylopodia", I suppose. That's another nice new word that I hadn't come across before. Is a beetroot a xylopodium too?"

..... from A.F.H. Buining

"I certainly know the region of Sao Paulo, Minas Gerais, and Bahia from both summer and wintertime and I know when the mist is there. The region where Uebelmannia grows gets lots of rain in the summertime, and some parts of the mountains which go up to 1200 to 1500 m get these mists also in the wintertime.

"I am flying out on June 3rd for my 4th expedition to Brazil, where my principal study-object lies. This time my travels in Bahia will be more detailed being wintertime, for in summertime you often have heavy rains and then the soft roads are too muddy to drive.

"When I come to the Chileans National Gathering in September 1975 I will tell you more about this".

..... from G. Rowley

"Xylopodium" is a new one on me; the only dictionary in which I can trace it (Jackson B.D. A glossary of botanic terms 1953) defines it as "a fruit like a nutlet, but wanting a cupule, and borne upon a fleshy support" !!

"Looking at the Rawitsher pictures, four of the seven look no different from the profile of several common British plants with tuberous underground storage organs – Tamus communis, Bryonia dioica, and the like, and my garden is full of blackberry shoots behaving just like the Attalea exigua. Even if one were to accept such things in their plumper form as succulents, their cultivation appeal is limited since it is difficult to enthuse over something which is permanently underground! My experiments with trying to grow the native black and white Bryony as caudiciforms i.e. in pots with the caudex above the soil – were total failures: the caudex lost water rapidly and was finished off by the first frosts.

"Doubtless you will have read Len Newton's stimulating article on caudiciforms in the March 1974 N.C. & S.S. Journal. I don't agree with everything unreservedly, but it is the most worthwhile attempt I have seen so far to define the undefinable and put the subject on a basis of observation and deduction. The great advantage, to me, of the caudex-caudiciform terminology is that it is independent of whether the organ involved is a stem or a root or a bit of both (which can only be shown by serial

sectionology), and whether it grows above soil, below, or half and half”.

..... from L.E. Newton (N.C.S. Jnl 29, 1:1974)

“Many of the plants are geophytes, i.e. the perennating organ is completely underground examples are species of *Brachystelma* and *Raphionacme*. In *Euphorbia бага*, a plant with an underground tuber, there is no sign of the plant above ground in the dry season”.

..... further from H. Middleditch

“Prompted by Gordon Rowley, I did indeed read the above article written by Len Newton. This produced another new word – a geophyte, which apparently describes a plant with a perennial underground swollen root or stem. Does the geophyte have a xylopodium?”

“A further perusal of Jacobsen’s Handbook of Succulent Plants has led to the conclusion that all the caudiciform plants which are illustrated in those pages seem to have a caudex above ground level. On the other hand many of the newer caudiciform succulents – such as the *Raphionacme* and the *Brachystelma* species mentioned by Len Newton – have a buried caudex. Perhaps Gordon Rowley’s Bryony may be in the running for the succulent stakes yet?”

..... from G.J. Swales

“Gordon Rowley’s white bryony, *Tamis communis*, is in the *Dioscoreaceae* family, along with *Dioscorea*, a caudiciform plant. The members of this family are monocotyledons, although the leaf formation is somewhat reminiscent of the dicotyledons, being relatively broad and short. The black bryony, *Bryonia dioica*, is one of the *Cucurbitaceae* and is a dicotyledon. Despite the wide separation of their respective classifications, the two bryonies do have a somewhat similar habit.

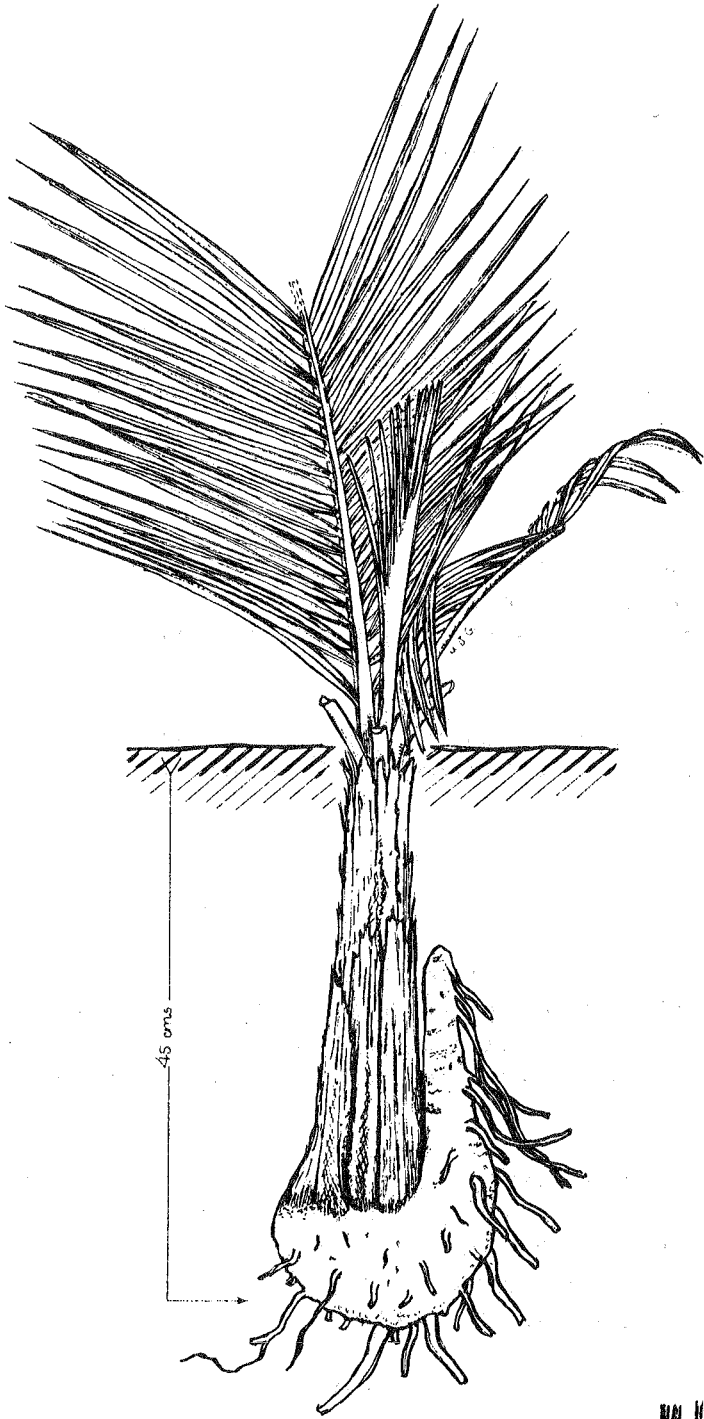
“The xylopodium is also a new term to me and there appears to be some conflict between the meaning of the term as used by Rawitscher and the definition quoted by Gordon Rowley”.

..... from R.J.A. Goodland “Plants of the cerrado vegetation of Brazil”
(*Phytologia* 2:1970)

“*Aristolochia* and *Cayaponia* are vines or trailers, a life form uncommon in cerrado. Both have enormous woody underground organs.

“ The second largest cerrado genus, *Vernonia*, is the largest genus of angiosperms in Brazil. At least 14 species occur in the cerrado, with a great variety of habit; few are small herbaceous perennials. Most *Vernonia* species are robust woody herbs or subshrubs up to 1 m in height. Some are delicate sub-autotomous and broom-like above ground with large woody organs beneath e.g. *V. brevifolia*, *V. grandiflora*. This xeromorphic, oligotrophiomorphic or pyromorphic life-form is characteristic of the cerrado, giving rise to subterranean trees and xylopodia etc.

“Cerrado is the Brazilian name given to a floristically fairly uniform vegetational gradient ranging from grassy scrub through ‘orchard savanna’ almost to forest. This physiognomic gradient is arbitrarily divided into four intergrading kinds called:



Attalea exigua



Vernonia desertorum

SCHIMPER

"PLANT GEOGRAPHY"



DOWNWARD MODE OF
GROWTH OF YOUNG
ACANTHOCOCOS SP.
AND OF ATTALEA
EXIGUA TO FORM
SUBTERRANEAN STEM

- Campo sujo (mainly herbaceous vegetation with scattered shrubs)
- Campo cerrado (sparse 'orchard' vegetation)
- Cerrado (dense 'orchard' vegetation)
- Cerradao (almost forest).

"Cerrado is arguably the most widespread vegetation in Brazil — from north of the Amazon to south of the southern tropic — yet its flora is poorly known. Due to its curious ecological conditions, its vast agricultural potential and its enormity, there is increasing interest in the cerrado".

..... further from H. Middleditch

"This preceding extract contains one or two words that are not only new to me but are also a bit of a mouthful, especially the oligotrophiomorphic one. On the other hand, we now seem to have two people who have stolen a march on Gordon Rowley and talk about swollen underground organs as xylopodia.

"The cerrado seems to be happy home for geophytes with xylopodia; to Vernonia, Aristolchia, Craniolaria, and Cochlospermum it would seem we may now add Cayaponia. And are these all "new succulents"?"

..... from L.E. Newton

"Many geophytes have a xylopodium, but such plants are not 'caudiciforms'. A xylopodium, literally "woody-foot", is a hard, woody, perennial, subterranean stock. It does not have the extensive starch-storage parenchyma which is found in the underground tubers of the "caudiciform" plants. Therefore xylopodia and tubers are two different kinds of perennating organs, as are bulbs and corns. All four are typical of geophytes.

"I have no personal knowledge of the Brazilian plants of which you sent illustrations, though there are similar geophytic species of Cochlosperma and other genera in the West African savanna, but from the illustrations I should think that only the Vernonia has anything like a tuber. However, there is no clear-cut division between a xylopodium and a tuber, and there are undoubtedly numerous borderline cases, where a woody root or stem has a small amount of starch-filled cortex.

"You mention that the caudiciform plants in Jacobsen's Handbook seem all to have above-ground caudices. The illustrations could certainly give such an impression, because many are of cultivated plants, with the tuber grown on the soil surface, or are of plants which have been dug out of the ground (e.g. Dolichos and the Brachystelma drawings). One photograph which is frequently misinterpreted is that of the Acanthosicyos (fig.35); the round structures in the photograph are actually fruits, and the tuber is underground and hence not visible in the picture!"

..... from G.J. Swales

"Within the genus Aristolochia there are to be found some climbing plants with rather woody stems; these fall into the class of plant commonly described as lianas. These twine up trees, hang down from tree branches, and droop from one tree to another where they swing in the wind. In order to be able to do this their stems must be quite flexible and this attribute is gained from the arrangement of the vascular bundles of the stems.

"In most other plants the vascular bundles are arranged in a cylinder which later becomes a solid column, which conveys considerable stiffness to the stem of the plant or trees. In the liana, on the other hand, the vascular bundles are arranged in a series of strands which are of "raindrop" shape when examined in a cross section of the stem, each strand having the pointed end of the section facing into the centre of the stem and the rounded end facing outwards. These strands do not run straight along the stem but instead follow something of a slow spiral path.

"The genus *Aristolochia* falls within the *Aristolochiaceae* and this family includes many lianas, although there are other plants outside this particular family which also grow in the manner of the lianas, and have a basically similar vascular structure. Apart from these twining lianas, other lianas grow and climb by means of tendrils – such as the *Cucurbitaceae*. There are other plants such as the homely ivy which climb by producing adventitious roots with which to attach themselves to a suitable support. Some plants also climb by means of grappling hooks such as our blackberry and possibly *peireskia*. On the latter one will find the longest spines tend to grow from an areole in a somewhat downward direction, so that once the plant has pushed its way up through surrounding shrubs or trees, it cannot fall back to the ground as these downward pointing spines tend to hook on to the other vegetation".

..... from A. Hart

"Early in 1973 I sowed some seeds of *Aristolochia chilensis* which had been collected by Cheese and Watson; germination was good and the seedlings produced some little root tubers in their first season".

..... further from H. Middleditch

"Does this mean that *Aristolochia* with xylopodium are to be found in Chile as well as in Brazil?

"The area covered by the Brazilian Cerrado and Catinga is one having a lengthy dry season during which there is very little rainfall. It would be difficult to imagine any seedling plant, which germinated at the start of the dry season, being able to survive until the onset of the next rainy season; even one which germinated part-way through the wet season might have difficulty in reaching a size which enables it to avoid desiccation and death during the subsequent dry season. A seed which germinates just at the start of the wet season would be expected to have the best chance of growing into a condition which would enable the seedling to survive the full length of the dry part of the year, up to the following rainy season.

"A plant which produces its leaves and flowers during the wet season could also be expected to set fruit before the onset of the dry season. If the fruit ripens and spills out of the seeds before the dry season commences, then it is very likely that the seed would germinate and the resultant seedlings could hardly be expected to have much chance of survival over the dry season. It would therefore seem unlikely that plants and trees growing in the Cerrado, or any succulent plant come to that, are likely to follow this particular reproduction cycle.

"It would seem more likely that a plant which puts out leaves and flowers in the wet season and sets fruit, has one of two choices: either to bear a fruit which ripens slowly and does not dehisce until the onset of the dry season, or to bear a fruit which remains turgid all through the dry season and does not disperse its seeds until the very end of the dry season. An individual seed is perfectly capable of surviving drought or cold for a lengthy period: but, as Buining tells us in connection with *Stephanocereus* (this issue) the ants are very partial to seeds. The longer a seed lies on the ground, the less chance of being overlooked by scavenging ants. But a turgid fruit on the plant makes a good meal for a bird. Either system is likely to result in some seed surviving to the end of the dry season. The

The long-lasting fruits on *Neochilenia* and *Islaya* could be an example of carrying the seeds in the fruit over the full length of the dry season.

“ Yet another alternative is for the plant to flower and set fruit just before the onset of the wet season; Rawitscher states that various Cerrado plants do follow this pattern. The seeds, either in the fruit or free of it, will only be exposed to the deprivations of the local fauna for a short period and so more of them will have a chance of actually germinating. The young seedling will have the whole of the wet season to establish itself, and A. Hart quotes us one example of a Cerrado plant which does produce its water-storage organ during that very first growing season, as a defence against the subsequent season of drought”.

..... from Arid Zone Research XVI: Relations between root and aerial growth of certain xerophytes and their resistance to drought – By H. Birand.

It has long been known that some steppe plants have roots running so deep that they can reach the moist layers of soil and sometimes even the actual water table; it is because of this peculiarity in fact that the plants in question manage to maintain their hydrological balance.

The author feels, however, that more needs to be known of how, and at what stage in the growing cycle, xerophytes develop roots thus adapted to the conditions under which they live.

In almost all arid or semi-arid regions, there is a short, damp period favouring vegetation, as against a long period of drought. It is after they have developed their roots that xerophytes manage to resist aridity and to survive despite adverse conditions. Hence the process and rate of root growth are of vital importance for them.

To arrive at a better understanding of how growth takes place, the author raised from seed a number of Central Anatolian steppe plants of which ecological studies had already been made. The seed was sown in the autumn in the Ankara Botanical Institute's experimental gardens.

The author studied the development of the roots and aerial organs at close intervals after the emergence of the shoots in the spring and found that the length of the roots increased at a very rapid rate whereas the aerial organs remained relatively stunted.

This disparity between the rapid and vigorous development of the root system during the first vegetative season and the relatively minor development of the aerial organs tallies with the requirements of hydrological equilibrium.

From the observations made it might be inferred that xerophytes use the bulk of their assimilation products for their roots, but this is not borne out by the facts. A determination of the respective dry weights of roots and aerial organs shows that the plant uses as much, if not more, of the assimilation products for the development of the aerial organs as for that of the roots.

The conclusion which would therefore seem to emerge is that the structure of desert plants is deliberately designed to secure maximum root development for a minimum expenditure of assimilation products.

..... from Arid Zone Research XVI: The means of survival of some Desert Summer Annuals. By Negbi & Evenari

Throughout the Mediterranean region the summer annuals present a fascinating problem. Their rhythm of life seems to be out of gear with the seasonal cycle of climate and rainfall to which the life cycle of the great majority of the other plants of the region is perfectly adapted. An even greater discrepancy, however, seems to exist between the life rhythm of the summer annuals of the Middle East deserts and their desert surroundings. The peak of their development and their principal growing season coincide with the peak of the dry season, when all "normal" winter annuals have long since died and many perennials have begun their full or partial dormancy.

The dispersal units of *Salsola inermis*, consisting of a one-seeded fruit enclosed in a winged perianth, germinate immediately after the first rains. At the time of the first germinations the ripening of the dispersal units still continues on the mother plant. The dispersal units germinate under the mother plants in a layer (sometimes 4-5 cm high) composed of old dry leaves and dispersal units. The germination period extends from November to the beginning of February. The first leaves form small rosettes and this type of growth continues until the end of February. Only then do erect stems begin to grow out from the rosettes.

From March to September stems grow continuously until the plant reaches a height of about 40 cm and a width of about 60 cm. There is a clear leaf dimorphism. The long winter leaves are formed until the end of March, the much shorter summer leaves from April until the end of the growing season. The plants shed their winter leaves during the summer.

Flowering begins in June and continues until October. Growth of the perianth wings begins in August or September and the first ripe dispersal units are shed in October.

With *Salsola volkensis* the discovery was made, in the mass of dispersal units and collected litter inside which germination takes place after the first rains, of many dried-up seedlings. They had germinated and the hypocotyl and the rootlet had developed and penetrated the coats of the dispersal units, whereas the cotyledons were often still inside the dispersal units. The rootlet had not yet succeeded in entering the soil. The first rain was followed by a dry period during which the seedlings had dried out. These dry seedlings could often be revived by putting them into water, when they developed into normal plants.

The roots of only a restricted number of dispersal units will reach the soil when germinating after the first rain. Those which germinated but whose roots did not reach the soil would die in the interval between first and second rains if they could not withstand desiccation.

..... further from H. Middleditch

"The observations made by Birland would seem to support the idea that a succulent seedling must develop a root system, during the rainy period, which is sufficient either to store enough water to keep the seedling alive until the next rainy season, or to tap available water well below the surface. To do this, it must surely have to germinate at the start of the rainy season. Is the example quoted by Negbi and Evenari of germination occurring during the rainy season merely the exception that proves the rule? After all, they do distinguish between their subject plants and almost all others, which behave "normally".

..... from R. Strong

"In answer to your question, whether *Aristolochia* are to be found in Chile, the description of *Aristolochia chilensis* appeared at first to be a slight problem. The reference given in the Index Kewensis proved to be a nomen nudum, but I finally ran to earth the following: *Aristolochia chilensis* Bridges ex Lindley, Botanical Register, 20 tab 1680 (1834). Chile — Valparaiso and Quillota; collected by Thomas Bridges and others. You ask if the plant possesses a swollen rootstock. In Gay, Flora Chile 5:329 (1849) is quoted 'Aureja de Zorra, Yerba de la Virgen Maria' for the common name, then the description commences "Raiz vivaz, fusiforme, clorosa, dando salida a varios tallos delgados"

..... from H. Middleditch

"Which would appear to translate thus: "Quick root," and then my dictionary fails me".

..... from E.W. Bentley

"I am not surprised that your dictionary does not quote *fusiforme* since this is usually a botanical term. Most glossaries translate it as "spindle-shaped" or "pointed at both ends like a spindle". So your sentence reads "Root vigorous, fusiform, odoriferous, sending down several slender shoots".

BUINING and HORST REPORT on BRAZIL

Translated by E.W. Bentley from the G.O.K. Bulletin for June 1971).

The club meeting on May 13th in Vienna Station had a sensation in store for us: the well known cactus collector Horst making his visit to Europe, together with Herr Buining from Holland.

First, Herr Buining, by means of some clear maps, surveyed the distribution of the cactus genera in Brazil.

The genus *Notocactus* covers a vast area — it reaches far to the south and in the north stretches to Curitiba. Northwards from the *Notocactus* area, *Uebelmannia* occupies a comparatively small area. North of this the only globular cacti are more *Melocactus* and *Discocactus*. *Melocactus* occurs on the coast and inland, a wide area stretching from Peru to Mexico. Undoubtedly *Melocactus* is the link between North and South America.

The genus *Frailea* begins near Montevideo (Fric found *F. dadakii* there) to end in the north near Porto Alegre. It goes inland through Misiones in N. Argentina into E. Paraguay, where 7 good species occur. No *Fraileas* have been discovered west of the R. Parana. Further north, Father Hammerschmid has found *Frailea pilispina*. The genus was probably artificially introduced into Columbia.

In the north of the Brazilian highlands there are exclusively columnar cacti. Of these Herr Buining showed us a series of excellent photos which ranged from habitat shots, cephalium pictures and sections to flower sections and cross sections of fruits to explain relationships. From a large number, a few can be mentioned:

The genus *Coleocephalocereus* is today even recognised by Buxbaum. *C. fluminensis* stretches from Rio de Janeiro further northwards; the still unpublished *C. pluricostatus* is distinguished by its numerous ribs (34 ribs — *C. fluminensis* has only 12–13); its cephalium varies from yellow to brown; it has a short flower; a striking picture in terribly steep terrain shows *Coleo. decumbens* which sprawls over bare rock.

The genus *Austrocephalocerus* was erected by Backeberg on the “false *purpureus*” which in reality is *Coleocephalocereus goebelianus* (4–5 m high), the flower is a typical *Coleocephalocereus* with the constriction above the ovary. The flower of *A. purpureus* presents essentially a purple appearance (white within) and the fruit is also purple. *A. lehmannianus* is perhaps only a form of *A. purpureus*. It attains 2 m and in damper, higher situated habitats thicker specimens grow. It is a night bloomer, as are all those mentioned up to now and has a fine white cephalium. *A. dybowski* was photographed in one habitat location in the north of Bahia with very many handsome examples. It is to be found in few other places. The largest cephalium measured 2 m! (In cultivation it grows weakly and stays thin).

Arrojadoa penicillata and *A. aurea*, together with bromeliads and tillandsias, present a colourful picture in the catinga. *Austrocephalocereus*, *Coleocephalocereus*, and *Arrojadoa* form a naked fruit which, on ripening, is forced out of the cephalium and falls to the ground. Doubtless there exists a relationship but at present the genera continue in their own right.

In order to get on to the track of errors in the literature, one must dip back into the data of the original describer and go into the problem at the habitat site. This is not always easy. As an example, the habitat location of *Facheiroa ulei* is given as the Sierra de Sao Ignacio. But which? — there are five in Brazil! Now Herr Buining has found the sought-after plant in the Sierra di Sao Ignacio at Rio Sao Francisco in Bahia, in a rocky landscape at 900 m. *Facheiroa ulei* is a beautiful plant with interesting white flowers, again a night-bloomer. A section through the body shows a cephalium that is not very deep but which is still distinct. It is related to *Zehntnerella*, which however does not form a cephalium (perhaps cephalium formation is not quite of such definite taxonomic value?) Near Pernambuco, *Zehntnerella squamulosa* was photographed, with its ramifying growth and towering branches.

Leocereus bahiensis from the north of Bahia develops long thin branches with long delicate spines, fine green flowers and stiff spined fruits. Another *Leocereus* from Bahia is less spiny; it still has to be studied.

Naturally the genus *Uebelmannia* must not be overlooked. Herr Buining showed excellent habitat shots of *U. pectinifera*, *U. gummifera* (near Penya Franco) and *U. buiningii*. In the same habitat locality as *U. buiningii* also grows *Pseudopilocereus densilanatus* v. *saxatile*. HU 224 from Minas Gerais is a fine blue *Pseudopilocereus*. On steep rocks near the coast, part of a rich flora, there grows an interesting *Pseudopilocereus* with 4, rarely 5, ribs which develop little wool; its white flowers open out from a blue-black bud. *Pseudopilocereus tuberculatus* forms a tree-like candelabrum, its distribution is extensive, as Werdermann has supposed.

At the Rio Sao Francisco: bizarre rocky landscape with sharp-edged scraps of iron ore — on these crags grows an unknown *Pseudopilocereus* together with *Quiabentia zehntneri*. A very fine and interesting new discovery is HU 111; it must be related to *Pseudopilocereus minensis*, its tube-like flower (red below, yellowish above) has however a striking resemblance to a cleistocactus flower. At Mont Chapeu, which is repeatedly mentioned as the home of interesting cacti, was photographed *Pseudopilo. luetzelbergii*, the so-called “Chianti flask”. Its body, thick below, becomes tapering and slimmer upwards to the flowering region. It is questionable whether it is a *Pseudopilocereus*; the fruit splits lengthwise and, in particular, the flower section appears to be different.

A new *Cereus* — with the typical long nectar chamber — grows in pure quartzite. It raises the question “perhaps there is soil beneath them?” It has been looked for but at 70 cm down there was still quartzite and nothing else! Another interesting, unknown plant with bluish, lightly spined branches (the photo recalled somewhat a *Trichocereus macrogonus*) develops deep-blue fruit, while the flowers, white within, are deep blue on the outside.

Quite exceptionally fine were the shots of plants of the genus *Micranthocereus* in which grow flower upon flower in the thick areole wool of the none too obvious cephalium. At the quoted habitat site for *Micranthocereus polyanthus*, all specimens have been eliminated. Horst has discovered another spot east of Caetite, where the plants grow in quartzite strata which, from a distance, shine like snow fields. The sumptuous red flower heads of *M. polyanthus* are astonishing. In another *Micranthocereus* the red and yellow flowers drew attention. *Micranthocereus violaceiflorus* presented a fabulous spectacle growing on cliffs. Its outer red and inner white flowers have a bluish margin and do not occur together in a head but are distributed in small groups over the plant body.

In *Brasilicereus* (perhaps *B. markgrafii*) the fruit formation was interesting: the fruits, first quadrangular, become rounded on ripening. A *Monvillea* from Bahia stood out through its fine blue branches. *Arthrocareus* often gets burnt down at its discovery site, but its stumps survive and branch out again.

In conclusion Herr Buining produced more globular forms, particularly *Gymno. horstii* with pink flowers, *Discocactus* sp., *Melocactus azureus* (HU 219) with a fine blue body, which has just been described, the long-spined *Melocactus* sp. (HU 223) with a red-brown cephalium, *Melocactus* sp. HU 217 closely related to *M. bahiensis*, and *Notocactus horstii*, exceptionally with pink flowers (from a sowing of 30,000 seeds one seedling flowered pink).

Then followed Herr Horst, who brought us greetings from Brazil with his colourful series of pictures. He explained to us how he came to be a cactus hunter whose sensational new discoveries have made him known throughout the world. He told of the difficulties and danger that accompany so many journeys, and he described with vivid pictures the land and people in his Brazilian homeland and the beauties of its landscape.

Already as a youngster, Herr Horst grew a few cacti — which is fairly unusual for a Brazilian. It happened for the first time in his thirties that he went searching for cacti: Herr Blossfeld wanted to find the habitat location of *Eriocactus haselbergii* and *Brasilicactus leninghausii*. He took companions with him and Herr Horst was one of the party. During 1958-60 he travelled on behalf of his firm in the mountains of Rio Grande do Sul. Looking at a steep rock face in a mountain chain, he remembered his adventure with Blossfeld and asked a local inhabitant — “Are there cacti there? How can one get there?”

Without more ado he engaged a pair of men, took ropes along and was lowered down the face. The result: *Notocactus horstii* and *Eriocactus claviceps*. His business led Herr Horst into other regions, he found other plants and, as it turned out, further new discoveries (the collection numbers HU 1 — 20 are all new without exception). In 1963 Ritter visited Horst. The yield from their progress through Rio Grande do Sul: *Notocactus purpureus*, *Eriocactus magnificus*. The locating of such interesting new discoveries was naturally attractive to him. Subsequently — through his connections with Uebelmann the name of Horst has been well known for some time — Herr Buining wrote from Europe, would Herr Horst please rediscover the missing *Uebelmannia gummifera* (at that time it was still called *Parodia*) in the Sierra de Ambrosia in Minas Gerais. He succeeded and he also found there *Uebelmannia meninensis*, *U. pectinifera* and had now become a real cactus hunter.

In Minas Gerais — that is easily said. But one should indicate it in terms of distance in Brazil. From Rio Grande do Sul in the south of the country where Herr Horst lives, he has to drive about 2,500 Km (app 1,450 miles — H.M.) before reaching Minas Gerais; only in a few places is the

route asphalted off the main roads. Inland the route passes through huge dust clouds or, in the rainy weather, through deep mud, that even a station wagon with four-wheel drive will bog down into and must be dragged out by 8 to 10 men. "But when the sun shines again next day, and new cacti are again to be found, one forgets all this and all is well once more!"

Oh yes, we can well understand this when Herr Horst turns to his vivid portrayal, without pause, of pictures of the occasionally ludicrous Brazilian landscape with its marvellous cacti flora; for example, the "Grand Canyon of Brazil" with its 400 m high rock faces; the famous waterfall of Ignacu; from Bahia HU 182, a *Melocactus* with up to 20 cm long spines! Huge bottle trees with up to 2 m thick soft wood trunks and grotesque small leaves in the crown. *Uebelmannia pectinifera* was photographed together with the negro whom Herr Horst had brought on the trail of this sensational discovery. At the discovery site one can take the plants from the soil by hand alone — so few roots have they. *Uebelmannia gummifera* was shown at its growing place in pure quartzite. *Coleocephalocereus azureus* and *Coleo. densilanatus* likewise grow in quartzite. An incredibly rich stand of the latter was shown, containing innumerable specimens. Other pictures seen were of *Notocactus buiningii*, *Brasilicactus haselbergii* and *Cereus peruvianus* f. *monstrosus* in full bloom. *Notocactus uebelmannianus* grows on the plateaux of a peculiar shaped square table mountain (up to 10% flower yellow). *Eriocactus magnificus* occurs in quartz rocks. The pipe-like *Eriocactus claviceps* on a steep rock face presents an artistic picture. The type locality of *Eriocactus leninghausii* can only be reached by rope! We saw a 175 cm long mighty specimen of *Eriocactus schumannianus*.

Herr Horst showed us also his home in the Rio Grande do Sul, that lies in the middle of a lovely, fruitful agricultural landscape surrounded by wooded hills. Here wait, stored in fresh air, lightly shaded, the cacti collected with so much trouble for onward transport to Europe, where Herr Horst has seen them again, lovingly grown, on his visit to the collections of many enthusiastic cactophiles.

Comments

..... from H. Middleditch

"In his description of a cactus collecting trip to Brazil in *Chileans* No. 7, A.F.H. Buining refers to the habitat of *Uebelmannia* in the Serra Ambrosio, Serra Negra and the Serra Noruega. These are clearly marked on my 1:1,000,000 map of Minas Gerais as an extension of the Serra da Penha which runs north-eastwards from Diamantina (named on the map in this issue as Tijuco). This range would be crossed by St. Hilaire when travelling between Rio Vermelho and Itamarandiba. About twelve miles before reaching Itamarandiba, St. Hilaire passed through Penha, now called Penha do Franca. This place name is rendered as Penya Franca in the above report on the Buining-Horst lecture, designated as the finding place of *Uebelmannia gummifera*. I am not able to locate on my maps the name Pedra Menina, quoted in *Chileans* No. 13 as the finding place of *Uebelmannia meninensis*. However, it would seem that it could be worth while to read the description of this particular section of his trip through Minas Gerais in St. Hilaire's full account of his journey, in order to gain a better idea of the climate and vegetation in the area where *Uebelmannia* grow.

"Buining refers to the difficulty of deciding which of the various Sierra de Sao Ignacio in Brazil, was the particular one in which *Facheiroa ulei* was to be found. In the article by Ule, elsewhere in this issue, there is to be found the first recorded reference to this plant and its finding place".

DISCOCACTUS BOOMANIANUS Buining et Brederoo sp. nov. By A.F.H. Buining.

(Translated from Succulenta 50.2:1971 by H. Middleditch)

Corpora caespitosa, ad 100 mm diam., ad 60 mm alta con radicibus ramosis; costae 16.-20, in tubercula solutae; spinae 12 (-13) radiales utrimque 5, pectinatae, incurvatae, praeterea altera reclinata altera proclinata, centrales plerumque absentes raro una; cephalium ad 45 latum et altum; flos 70 mm longus, 40 mm diam; pericarpellum globosum, 2.5 mm diam; receptaculum glabrum, superne squamulo lanceolato vel lineari ornatum; stamina de 20 mm super pericarpellum ad limbum inserta, filamenta 1-2 mm longa, antherae ad filum tenuissimum pendentes; stylus 23 mm longus; tepala lanceolata, alba; bacca oblongoides, rubescens; semina globosa, 1.4 mm diam, nitido-nigra; testa tenuissime tuberculata.

Flattened globular, strongly offsetting from around the base, up to 100 mm diam. and up to 60 mm high, green to dark green, with branched roots.

Ribs 16-20, arranged in spirals, almost completely divided up into teat-like humps, those beneath are ca. 10 mm diam. at the base and the tips are about 12-15 mm apart; on the tip of the tubercle is the areole, at first with a little creamy white wool, quickly becoming bare, slightly oblong, ca. 3 mm long and ca. 1.5 mm broad.

Spines 12(-13) in the crown and the cephalium, yellow to light brown with dark tip, soon greyish-white with dark tip, rough, as if coated with a greyish-white crust; radial spines five pairs at each side \pm pectinate disposition, curved against the plant, the lowermost pair directed somewhat obliquely downwards, the uppermost pair slanting upwards, in addition, usually one spine pointing downwards and one pointing upwards, all up to 30 mm long. If one central spine is present, then this is situated at the top of the areole and stands nearly vertically upwards, somewhat stronger and up to 35 mm long.

Cephalium up to 45 mm diam. and of similar height, loose white woolly, the wool up to 35 mm long, interwoven with vertically upward pointing, bristle-like, straight spines sticking up to 20 mm out of the wool; around the cephalium, especially when the central spine is present, the spines stand stiff vertically upwards and fencing in the cephalium as it were; through this tangle of spines the flower frequently has difficulty in unfolding itself completely.

The flower is up to 70 mm long in the closed state, up to 90 mm diameter when opened; the slender receptacle sits up to 35 mm deep in the silk-like wool.

Pericarpellum small, globular, 2.5 mm diam., naked, running to a point towards the areole.

Receptacle bare, not or scarcely reduced in diameter immediately above the pericarpellum, at the base up to 4 mm diam., slowly widening upwards up to 5 mm diam., and from the level where the stamens are inserted, up to the margin, up to 6 mm diam; at first up to about 25 mm height comes a single lanceolate to linear shaped white scale with green tip of ca. 1 mm breadth, the scales occurring further above gradually increase in length, especially the green tip and are from 5 to 20/25 mm long and from 2 to 3/4 mm broad, terminating in a long, sharp, point. The strongly scented flower opens towards the evening and closes up early the following morning for good.

Floral leaves (petals) lanceolate, running to a point, 20-22 mm long, up to 6mm (text states 60 mm - H.M.) pure white.

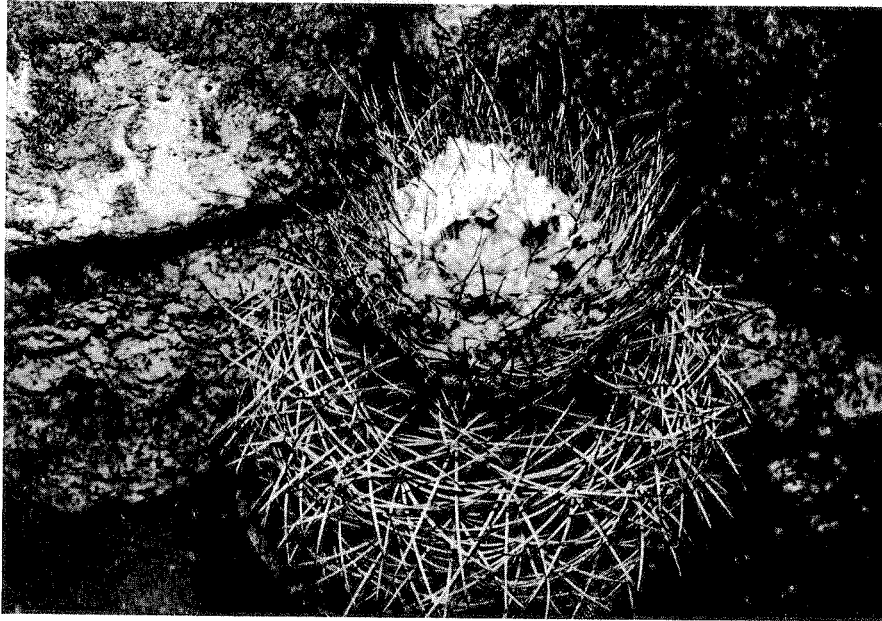


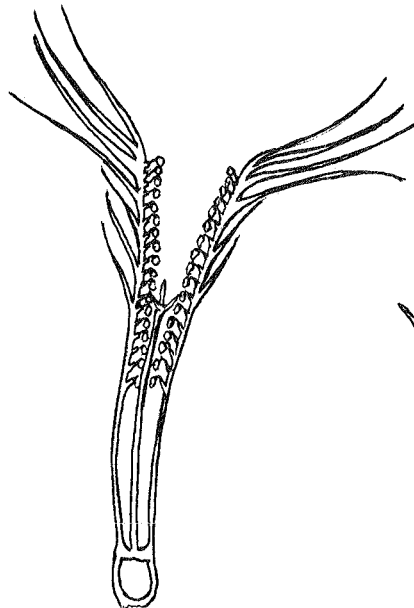
Photo - Buining



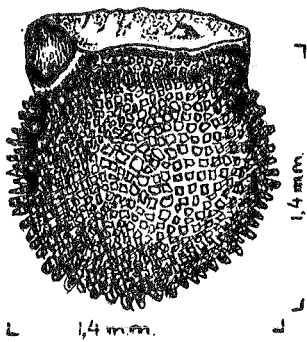
Fruit



Stamen



Flower



L 1,4 mm.

L 1,4 mm.



Seed

DISCOCACTUS BOOMIANUS

Succulenta 50.2:71

The stamens inserted in the receptacle pretty well from about 20 mm above the pericarpellum up to about the margin over a length of 20 mm; over this distance the space is filled with yellow anthers, the lowermost filaments 1 mm long, towards the top somewhat shorter, inclined towards the style and tapering into a thread-like little stalk on which the anther hangs downwards swinging freely; with the anthers included, the stamens are 1-2 mm long.

Style 23 mm long, semi-transparent white, the white stigma located 10-20 mm below the uppermost anthers.

Fruit an oblong berry, becoming rose-pink to red, 18-25 mm long and at the thickest part 8-9 mm diameter, provided with a little cap of ca. 5 mm diam. with the flower remains attached.

Seed globular, ca. 1.4 mm diam, glossy black; testa constructed from cells which are extended into a distinct tubercle, only along the outside of the depressed hilum are they flat; the inside of the hilum covered with a sponge-like tissue, ochre-coloured; micropyle wart-shaped, clearly visible, funicular opening well above surface, because the funiculus was broken there; arillus sometimes present as small remnants on the seed hull; embryo shows no signs of the cotyledons, perisperm missing.

Habitat and distribution on the Sierra do Espinhaco, middle Bahia, Brazil, at ca. 900 m altitude, between cracks and along the edges of flat rocks, in some places between pieces of white stone, along with 2 species of *Melocactus*, an unknown species of *Micranthocereus*, *Leocereus bahiensis*, *Pseudopilocereus glaucescens*, a *Euphorbia* species, here and there a bromeliad and the odd xerophytic shrub. A soil sample examined at this spot appeared to have a pH of 7.

The holotype of this plant is deposited under the collection number HU 222 in the herbarium of the State University of Utrecht. It was first discovered by Horst and Uebelmann during their expedition of 1967/68.

During my second trip through — amongst other places - Bahia, collecting with Leopold Horst, we had ample opportunity to study this interesting *Discocactus* thoroughly in this locality. It appeared that its distribution area is more extensive than was assumed by Horst and Uebelmann during their flying visit to the place of discovery. Neither on the outgoing or the return journey westwards, on the 29/30 June and on the 3 July 1968 respectively, could we discover a fruit on a single plant.

With a further study of *Discocactus zehntneri* and *bahiensis* which also originated from Bahia and which were both described by Britton and Rose in the "Cactaceae" III p. 218/219 Plate XXIV and p.220, it soon emerged that the *Discocactus boomianus* deviates considerably from the very poor summary descriptions of the aforementioned species. A comparison between these descriptions and with the *Discocactus bahiensis* portrayed in the colour plate, shows these differences very clearly.

	<u>zehntneri</u>	<u>bahiensis</u>	<u>boomianus</u>
Size:	50-70 mm diam.	60 mm dia., pretty flat	100 mm diam., 60 mm high.
Ribs:	unknown	ca. 10	16-20
Spines:	12-14, grey then later practically white, curved back against the plant 15-25 mm long, middle spines as a rule 1, like radial spines.	7-9, somewhat flat, slightly curved back towards the plant, pinky-rose, 15-30 mm long.	12(-13), yellow to light brown, shortly becoming grey-white with darker tip, 30 mm long, curved back towards plant, seldom 1 central spine, 35 mm long.

	Zehntneri	Bahiensis	Boomianus
Cephalium:	Small, of soft wool, with a pair of bristles, sometimes none.	striking, with much wool, practically without bristles.	up to 45 mm high and broad, white wool, with bristle-like spines.
Flower:	ca. 30 mm long 40 mm broad, white.	40 - 55 mm long, slender receptacle, white with a little yellow.	70 mm long, 40 mm broad, slender receptacles, white.
Fruit:	Bare red club-shaped berry, 25 mm long.	small bare berry.	bare rose-pink to red oblong berry, 18-25 mm long.
Seed:	Globular, knobbly.	globular, knobbly.	Globular, with elongated tubercles.

In addition it can also be observed that if *Discocactus boomianus* had already been discovered and described earlier, the very striking *Micranthocereus* and both *Melocactus* species would then most certainly have been found. Furthermore it seems improbable that this plant occurs outside the discovered distribution area.

I think therefore that I can with justification describe this plant as a new species and here gladly name it after my friend Dr. B.K. Boom, Secretary of the I.o.S., who always gladly gives me advice on botanical matters.

THE CEPHALIUM-BEARING CACTI of Brazil. By Friedrich Ritter

(Translated by R. Moreton from K.u.a.s 19.6.68)

Stephanocereus leucostele:-

Habit:	Several meters high, solitary columns with terminal cephalia, soft fleshed.
Ribs:	Numerous, low, crenate, rounded.
Cephalium:	Terminal, fineness and thickness of wool as in <i>Micranthocereus</i> , but white; bristles numerous, fine; cephalium often grown through by new growth.
Areoles:	Thick.
Spines:	Numerous, needlelike, straight, less flexible.
Flower:	Nocturnal, medium size, with kink towards the outside half way along.
Ovary:	Roundish, without constriction above, scaleless.
Nectar Chamber:	Long.
Tube:	Funneliform, longer than nectary, naked, with small unthickened scales.
Stamens:	Basal stamens thickly arranged, thickened and forming a diaphragm; ends bent backwards with the anthers against the wall; above this a gap; upper stamens shortened and forming a wall covering.
Petals:	Rather short, rotate, white, thin.
Fruit:	Roundish, blue-green, somewhat wrinkled; receptacle about twice as thick as in <i>Arrojadoa</i> ; the area covered by the flower remains as small as in <i>Pilosocereus</i> ; wall thick, skin refractive to light.

Seeds: Matt, heavily tubercled, thinning out behind the oval slanting hilum.
Distribution: Central and northern Bahia. Only one species.

STEPHANOCEREUS LEUCOSTELE (Guerke) Berger. By A.F.H. Buining

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

It is remarkable that this plant, rarely encountered in our European collections, is to be seen growing in such masses in the Brazilian state of Bahia. Masses there are but over a very large area, for they were found nowhere in clumps or crowded together.

This plant originated as a single specimen, that Ernst Ule sent in his time as herbarium material to Prof. Guerke in Berlin, who described it on the basis of the material partly dried, partly preserved in alcohol.

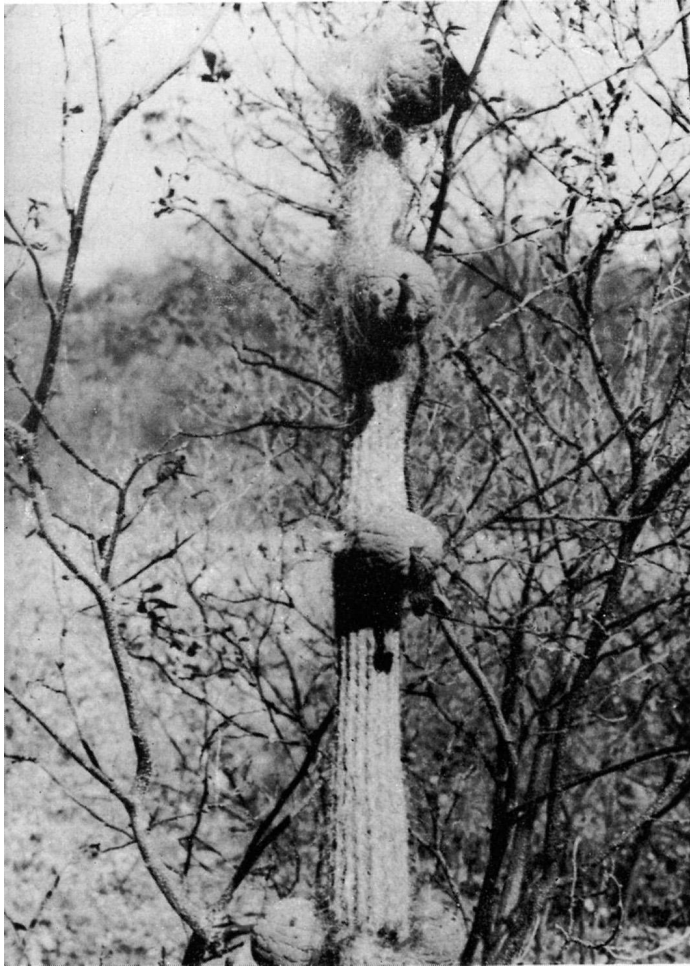
Ule found these plants by Calderao in the south of Bahia when undertaking an investigation into rubber trees. Werdermann also found them here and as he wrote in "Brazil and its Columnar Cacti", they are found mostly growing solitarily. Its growing area is however much more extensive than Werdermann reported. Backeberg was never in Bahia. Horst and I found them as magnificent examples, up in the north of Bahia between Xique-Xique and Juazeiro.

We found only single specimens in flower, nevertheless most of them had many fruits, occasionally as many as 25 fruits on one plant. In view of this large number of fruits one would imagine them to be found in dense groups, however the seeds were being carried away from the juicy fruits by all kinds of ant species. One also found that there was no fruit to be seen under the long slender stems. The birds treat themselves readily to the colourful fruits as well, removing the seed.

It is a remarkable plant, for under favourable circumstances the growing stem terminates each year with the formation of a woolly and bristly cephalium, from which the plant flowers. The following year the stem grows through, and away from this cephalium, like the Arrojadoas, terminating once again with another. As shown in the photograph which I took in Bahia, this plant flowers every time from these different cephalia. Naturally the fruits are also formed there, and they become a blue-green colour on ripening. This species, although supposed to occur only occasionally with branches, was discovered by us in various places to be more branched and frequently much longer than the officially quoted length of 3 metres; especially was this the case in the so-called "sertao" or "catinga", the widespread steppes in the north-east of Brazil which are overgrown with shrubs and short trees, where they frequently grow above these xerophytic plants. On the recurring barren stretches of these steppes we met up with variously branched specimens.

Unfortunately this handsome and interesting white-spined plant is very difficult to grow, especially the imported stems that have a cephalium. At the moment there is still much seed of this sort on the wholesale market, so it should not be too difficult to obtain seedlings in the coming years. Nevertheless, the problem lies towards the chilly autumn and winter. Like so many other plants from Brazil, they must be grown somewhat warmer in the greenhouse for the best results from our efforts.

Up to the present time *S. leucostele* is the only species of the genus.



STEPHANOCEREUS
LEUCOSTELE
in habitat: Bahia Brazil

KuaS 20-4-69

Succulenta 49.2:70

Photo: A.F.H. Buining



Comments

..... from A.W. Craig

“Recently I paid a visit to Gordon Foster’s nursery and acquired a specimen of *Stephanocereus leucostele*. It was about 8 inches high and had been badly marked over the winter — I gathered that this had happened owing to one or two panes of glass being lost out of the greenhouse over the winter. There had been a coachload from three separate Branches paying a visit to the nursery on the weekend before my visit, and quite a few others before then, but this particular plant had evidently been passed over by all the visitors. It certainly does not have a very prepossessing appearance, but it has already put out an inch or two of new growth in the crown.

“This new growth has a very similar appearance to that displayed by a grafted seedling which was the only one to germinate from a batch of seed which I sowed in the autumn of 1972. This seedling is now 3” high.

“Both these plants are being kept in the warm section of my greenhouse”.

..... from H. Middleditch

“On one of our Continental Cactus Tours which visited the Riviera, I acquired a grafted plant of *Stephanocereus leucostele*; it seems probable that this was the top six inches off a mature stem, for it was almost three inches thick. It was obviously not happy with my cultivation and I was only able to keep the plant for about three years before it perished over the winter. Now I find out that even Albert Buining describes this plant as “difficult to grow”!

“Like *Arrojadoa*, this plant produces a terminal cephalium which is then grown through by the subsequent season’s growth; but here all resemblance between the two genera ends, for the *Arrojadoa* possesses but a slender stem which appears to gain support from surrounding vegetation in habitat, for otherwise it would surely lie upon the ground; whereas *Stephanocereus* has a stout, self-supporting trunk. The flower and fruit on *Stephanocereus* are much larger than those on *Arrojadoa*. Somewhat similar to both these genera is the terminal cephalium to be found in *Morawetzia* which grows in the deep valleys lying within the Peruvian Andes, but on *Morawetzia* it appears that stem growth normally ceases with the formation of the terminal cephalium.

“There is an excellent illustration of the flower and fruit of *Stephanocereus* to be found in Britton & Rose’s “*The Cactaceae*”; this illustration shows a flower tube with very few scales which lack both bristles or hair in the axils. The fruit is shown as a shiny naked, ellipsoid berry, matching the shape to be seen in the photographs by Buining accompanying this article”.

..... from A.W. Mace

“I still have my original *Stephanocereus leucostele* — it has been with me for about four years now. It is well rooted into the sandbed beneath the pot but still refusing to put on any new growth. Seedlings both grafted and on their own roots are doing much better. I find the growing season very late in the year — in fact they are growing at the present time (December)”.

..... further from H. Middleditch

“In habitat this plant is likely to grow in the rainy season, that is between October and April. At that time the sun is overhead in the southern tropics. One would, therefore, have expected it to grow in cultivation in the warm, long-day season, rather than stick to the calendar”.

..... from N.T. Hann

"I am relieved to hear that I am not the only one to experience some difficulties in attempting to root this plant. I bought a specimen of about 12" in height from Clive Innes under the name *Pilocereus leucostele*. Sad to say this only survived 12 months, finally giving up the ghost during its first winter with me. It did produce two roots but these were quite inadequate. I must say I had great difficulty in convincing myself it really was dead as it possessed a magnificent dense covering of white wool. I would dearly love to establish a specimen plant but begin to wonder if this is possible. Even a recent attempt to establish a seedling seems doomed to failure — the plant has an unhealthy look about it just now and is clearly affected by any drop in temperature. I take pains to ensure a minimum of 45°F but even this seems to be insufficient!"

STEPHANOCEREUS GEN. NOV. Berger. By Alwin Berger

(Translated by G.J. Swales from *Die Entwicklungslinien der Kakteen* 1926)

Caulis columnaris, erectus, pseudocephalia dense spinosa et villosa primum apicalia, postea persistentia et caulem crescentum annulariter cingentia gerens; costae 13–18, areolis approximatis aculeatis et pilis albis longis intricatis vestitae. Flores plures ex pseudocephalio nocturni, ovario et tubo brevi subcurvo subnudis, petalis albis recurvis stamina numerosa superantibus; filamenta biserialia, superiora numerosiora breviora, inferiora pauciora longiora basi genuflexa et stylum tangentia superne incurva; stigmata brevia conniventia luteola stamina superantia. Fructus oblongus subnudus virid-glaucus, flore desiccato coronatus.

Species adhuc unica: *S. leucostele* (Guerke) Berger. Bahia australis.

Stem columnar, erect, pseudocephalia densely spined and hairy, at first at the stem apex later persisting and the growing stem bearing annular girdles; ribs 13–18, with areoles close together, spiny, and bearing long white tangled hair. Flowers numerous from the pseudocephalium, night-flowering, with ovary and tube somewhat curved, almost bare, with white recurved petals exceeding in length the numerous stamens; filaments in two series, the upper one more numerous, shorter in length, the lower one fewer in number, longer, bent like a knee at the base and incurving above to touch the style; stigma lobes short, connivent, pale yellow, raised above the stamens. Fruit oblong, almost bare, glaucous-green, bearing the dried flower on top.

So far only one species, *S. leucostele* (Gurke) Berger. Southern Bahia.

Comments on *Stephanocereus leucostele*

..... from G.J. Swales

"In describing the stigma lobes as connivent, I take it this must mean 'converging, having a gradual inward direction' in accordance with W.T. Stearn — Botanical Latin: that is, curving inwards and upwards. As to the fruit, oblong seems to be a rather uncommon sort of shape for a fruit, but again Stearn helps here by defining oblong as 'elliptical, obtuse at each end, the sides almost parallel, ratio of length to breadth between 2:1 and 3:2'.

..... from H. Middleditch

"It is quite interesting to see Berger's use of the term pseudo-cephalium for the growth which we would now have no hesitation in describing as a cephalium. It would appear that there have

been appreciable differences of opinion between writers, regarding the proper use of these two terms. However, the article on this subject by Buxbaum which was reproduced in Chileans Nos. 19, 20, 21 & 22 would appear to afford a satisfactory basis for the application of these two terms.

“ This diagnosis quotes the plants as growing in southern Bahia, whereas Buining in the accompanying article says that he and Horst found them growing near Juazeiro and Xique-Xique, which are well to the north in Bahia. This would appear to substantiate Buining’s statement that they are more widespread than was first reported. This distribution would suggest that they are plants of the caatinga”.

TURNING SPARE SEED INTO REFERENCE PLANTS. From J. Hopkins

Cactus collectors probably have a wider choice of habitat collected plants today than ever before, for there are considerable numbers of imported plants being made available to growers through commercial channels at the present time.

However, this situation may well not continue indefinitely; quite a number of collectors from Britain have now had an opportunity to see the staging of Uhlig’s Uebelmann’s, De Herdt’s, or S.P.I. completely covered with plants uprooted from habitat. One of our members, returning from just such a visit, commented that from the numbers to be seen, there must be considerable habitat stripping taking place. From the occasional reference by knowledgeable field collectors to “practically no more plants to be seen on that site” it does appear that certain plants may now be markedly reduced in numbers in the wild. The inevitable result of a continuation of this train of events will be to deprive collectors of any future supplies, even if conservation control does not affect the supply at an earlier date.

Losses at the receiving nurseries in Europe are by no means insignificant and most growers will have had experience of the loss of plants during the process of establishing them back into growth. But many imported plants are now established and thriving in European collections, where they constitute a valuable asset which does not possess an indefinite life. Could not the Chileans promote a scheme designed both to maintain the availability of plants true to type and at the same time to make them available to a greater number of our members?

In some collections various species may be found not just as single plants, but in twos and threes. Herein lies a magnificent opportunity for those fortunate members possessing two or three imports of one species, to try and set true seed. I know of several collectors who do indeed endeavour to set true seed, and I would appeal to others to do likewise.

Where members have obtained true seed from imported plants I would appeal to them to spare a portion for the benefit of other Chilean members, by sending it along to me. When such seed is sent in small amounts, it would be hardly appropriate to offer it for sale in only one or two packets. It is therefore proposed to germinate such seed and to make the resultant seedlings available to members. A proportion of these seedlings will be raised and further propagated as grafted specimens by Alan Craig, so that members will have an opportunity of acquiring these seedlings from the Chileans either on their own roots or as grafted plants.

If anyone is able to spare any seed which has been set by crossing imported plants, would they please send it to me clearly marked for the purpose outlined above, in which event it will not be used for the seed pool (unless the quantities available are sufficient to justify this).

May I also take this opportunity to thank all those members who have previously sent seed for the seed pool; we are particularly indebted to a few of our overseas members for their generous donations of seed. I would particularly ask our U.K. members to look round their plants to see if they could collect any seed for the seed pool – and I would like especially to direct this request to members who have not previously sent seed to the seed pool. Please send to me whatever you can spare; even small amounts are welcome.

THOSE KNIZE-COLLECTED "PYRRHOCACTI" from BOLIVIA

..... D.W. Whiteley

"The Bolivian Pyrrhocacti are a bit of a puzzle as yet. Whilst not wishing to doubt that Karel Knize knows a Pyrrhocactus when he sees one, one is struck by the fact that when exploring these areas in Bolivia (Tupiza, Potosi, Tarija, Cinti, — areas from where Knize's "Pyrrhocacti" were collected), and from the number of specific names of other genera embodying the above place names, it seems that these areas have been fairly well botanised. But neither Ritter, Rausch, or Lau ever found any Pyrrhocacti in Bolivia — yet Knize did. After casting a slight doubt on K. Knize therefore it is only fair to say that from what I have seen and what I have heard from others, that these plants do appear very similar to other Pyrrhocacti out of flower, though they are very much finer spined".

..... from J. Hopkins

"I believe that I have just cleared up the mystery of the Knize collected Pyrrhocacti from the Tupiza area, KK 587, 588, & 590. They turn out to be *Lobivia lateritia* and forms thereof. I have got some plants of 587 & 590 and they were in fact purchased as *Lobivias* from S.P.I. It only occurred to me some time later that I had some seed of these numbers direct from Knize, but labelled *Pyrrhocactus*. They turn out to be identical to seeds of *L. cintiensis* and are a subgroup of my *Lobivia* seed group 1.

" This in turn fills a gap between the Jujuy area where *Lobivia* of seed group 1 abounds, and Cinti in Bolivia where *L. cintiensis* was rather out on a limb, another plant in this same seed group. Rausch even suggests that we do not need a separate species for *cintiensis*, for he describes R 78 as *Lobivia lateritia* var. *cintiensis*.

" But I am still puzzled over Rausch 306, as I presumed he had found another variety like KK 587, which has roughly twice as many spines per areole as *L. lateritia*."

1974 CHILEANS NATIONAL GATHERING

On the occasion of our previous weekend gathering which was held at Brooksby in 1973, we had found the site pretty clear of builders' paraphernalia. At this 1974 gathering we found, set into the wall of the new lecture block, the plaque which commemorated its opening, so assuring us that the reconstruction work was indeed complete.

As usual, we had a cold meal on the Friday evening, to suit those travelling from a distance and likely to arrive at a later hour. Despite valiant efforts by all present, no great inroads were made on the acreage of cold ham, fish, and dishes of various sorts of salads which were spread over the long table. The Domestic Bursar later passed a comment that at our previous Gathering, we had cleared the decks on the Friday evening meal, but on this occasion we were obliged to admit defeat.

After the evening meal, a wide selection of the slides which had been donated to the slide library during the course of the year, were screened; many of these were close-up views of flowers and some were of sliced flowers. This provided an opening for discussing some aspects of flower pollination ecology, which was the background theme for one or two of the other talks over the weekend. As we had set up two projectors and screens, we were able to compare photographs of different members' plants or flowers side by side. This proved to be a far better method than shuttling the slides back and forth in the one projector.

The first talk was given by Geoff Swales, who discussed his favourite genus, *Gymnocalycium* – in particular those species which fell within the seed groups *Macrosemineae* and *Ovatisemineae*. It was suggested that these two groups, established many years ago, might more suitably be considered as a single entity seedwise, having a series of sections, with small but fairly well defined differences between the seeds in each section. The discussion on these plants had to be interrupted for coffee, and afterwards Roger Moreton discussed some further aspects of *Parodia*; on this occasion he brought along some samples of seed and an excellent monocular microscope. This enabled those present to compare actual seeds with their differing shape, colour, texture and gloss, with the adjacent sketches by David Lewis (which had been published previously in the *Chileans*). Amongst the material on the speakers' table were seeds and plants of *P. ayopayana*, *miguelliensis*, and *comosa* FR 111, discussed in *Chileans* No. 27.

After lunch the programmed talk was held back to give members an opportunity to raise their own queries on *Gymnocalycium* with Geoff Swales. We had a series of slides of imported plants cultivated and photographed by F. Fuschillo, who also showed sliced sections of flowers from most of these plants. An appreciable number of these plants did not appear to conform closely to the examples of *Gymnocalycium* commonly met with in cultivation, which prompted no little discussion.

Rather later than programmed, H. Middleditch then went on to talk about humming bird flowers, following on from the introductory talk given at the Brooksby '73 Gathering. The widespread occurrence of the humming bird in the Americas was illustrated by records of its presence as far north as Alaska and as far south as Cape Horn. Although much authoritative literature indicated that all the *Borzicactinae* were humming bird pollinated flowers, the speaker asked the question "Were all *Matucana* humming bird flowers?" Examples of *Matucana* flowers apparently lacking any clearly defined nectar chamber were shown in slides of sliced flowers from one or two members. In addition, examples of the colour print appearing in *Chileans* No. 27 of an *Arequipa* in flower were examined. The significance was discussed of those features of the flower which were associated with pollination ecology, which in this case suggested a pollination agency other than humming birds.

After a break for tea, the discussion proceeded to the relative disposition of stigma and stamens on humming bird flowers. Slides were shown of *Cleistocactus* flowers where the useful life of the stigma was apparently longer than that of the other parts of the flower – and the significance of this was discussed.

Before proceeding with the next talk, steps were taken to persuade the barman that he was mistaken in thinking that the College was not inhabited over the weekend. Mrs. J. Hobart then gave a talk about flower opening times in various genera and species of cacti. Examples were quoted of *Notocactus* flowers which opened in the morning only, others in the afternoon only, and some – like the *Eriocactus claviceps* on the speaker's table – for the whole of the day and night as well. Flower opening times on *Borzicactinae* and other genera were also discussed. It was asked whether there could be some relationship between the time of day at which the pollination agent was active and the opening time of the flower. The highlight of the talk was a set of slides recording a visit made by a hover fly to a flower of an *Eriocactus*.

Although this talk had taken us well on into the evening, John Hopkins was then given an opportunity to discuss a new classification which had been put forward in the *K.u.a.S.* journal, for *Echinopsis*, *Lobivia* and *Pseudolobivia*. He quoted examples to illustrate the apparent inconsistencies in this proposal and explained how the characteristics selected for the proposed classification cut across existing closely-associated groups of species.

This took us an hour where a late supper would have been appropriate, so we retired from the lecture block, leaving the *Eriocactus claviceps* still in full bloom, to organise a brew-up on the landing in the residential block. Seating, screen and projector having been squeezed into position, when our guest speaker arrived just as the midnight slide show was about to commence. Once he had been

received, we viewed some flowers of Bolivian Lobivias, with a commentary by John Hopkins. Having given the Eriocactus claviceps some stiff competition, we closed up in the early hours of the morning.

On Sunday morning our guest speaker, Dr. Proctor, co-author of "The Pollination of Flowers" (New Naturalist series) led off with a review of the development of flower pollination. He started with the flowerless plants identified from the fossil records and from those in existence today, going on from there to the various pollination mechanisms which can be found at present in nature. This part of his talk was accompanied by slides showing various pollinating insects on the flowers, exhibiting a standard of photography which was capable of turning most of those present green with envy. The various questions put to Dr. Proctor in the post-coffee discussion, drew in part from the previous days' discussions on humming bird flowers and on flower opening times.

Our last talk, after lunch, was from Paul Sherville, who showed several flowers which had been partially sliced without removing them from the plant, together with numerous other close-ups and slides of flowers and sliced flowers. This further extended the discussion on aspects of pollination ecology and also brought out questions of identifications and cultivation.

On display outside the lecture room was some twenty square feet of table top covered with examples of preserved flowers. Some of these had been preserved in resin, including one or two whole flowers, others had been pressed, dried, and mounted. Most of these examples had been prepared by Mrs J. Hobart, who came prepared to talk to us on the subject of flower preservation. However the time remaining to us was insufficient for her talk, which we will now look forward to hearing at our Chileans National Gathering in 1975.

It was suggested that many of our members may be especially keen to come and hear our guest speaker on that occasion, which would involve the use of the large hall. However, if the number of formal talks was restricted, then smaller numbers of members would be able to get together for informal discussions over plants and slides, in the lecture block.

..... from J.R. Gooch

"This year's Brooksby weekend I felt was extremely interesting and very well worth while. Having said that, and noting the suggestion made at the close of cutting down on the number of talks next year, I feel bound to say in my opinion that it is very desirable to have not less than six distinct subjects, rather than two or three, over the weekend. I am sure that the small discipline of restricting the speakers' time will in no way spoil the informality of the Gathering.

..... from W.W. Atkinson

"I much enjoyed the Brooksby weekend and look forward to the next. Though it was well worth whatever it cost, I fear it has created financial problems in stressing the need for a decent camera!"

ERRATA No. 27

p. 131 line 7 "..... Backeberg's genus as he published"

p. 135 line 19 "..... but also in Mexico"

p. 143 line 37 should read (Chileans No. 25)

p. 155 should read HUMMING BIRDS. The Naturalists Library 1834 (not 1934)

REPORT & ACCOUNTS for PERIOD 1.4.73 to 31.12.74

(Covering Journals Nos. 25–27 inclusive)

Income		Expenditure	
Subscriptions		Printing, Journals & Reprints	£904.27
In arrears 1972/73	£4.90	Postage, Stationery & sundry	
Period 3/73–12/74	507.22	expenses	196.79
In advance	265.00	Purchase of plants	—

	777.12		
Sale of Back numbers	296.08		
Sale of Year Books	82.79		
Sales of Index	15.10		
Sales of Plants & Seeds	118.65		
Miscellaneous income	82.68		
Deposit account interest	121.69		
Balance c/f from previous a/c	531.11	Balance carried forward	924.16
	-----		-----
	£2,025.22		£2,025.22

The past year has been one of numerous delays and difficulties both in the production of the Chileans and reprinting of back numbers. In order to match publication and subscription periods, the current subscription has been defined to cover three issues of the journal, instead of a twelve-month period.

The sales of back numbers and of seeds contributed handsomely to keeping our financial position sound over the past year, but the comparison between forward costs and income presents a disquieting situation.

The current annual subscription was settled early in 1974; subsequent price movements would indicate that a figure of £2.80 would have been more in line with the outlay anticipated at the present cost levels, without any allowance for inflation. In addition, back numbers which are now selling at £1.75 per volume are costing over £3 to replace. Consequently it is anticipated that expenditure will be likely to exceed income by about £1,000 over the period covered by Nos. 28–30 inclusive.

This shortfall is in excess of current reserves. It will therefore be necessary to call for a supplementary subscription in order to avoid insolvency. You will be notified in No. 29 Journal of the supplement required (The Austrian Cactus Society, now with an annual subscription in excess of £7, was obliged to call for a supplementary subscription of c. £1.20 in mid-1974 to maintain financial solvency).

A most welcome and valuable number of comments, slides, prints, fruits, and seeds have been received from members and regrettably it has not been practicable to reply to each correspondent with the speed that their contributions deserved. It is anticipated that these comments and contributions will be appearing in forthcoming issues with collated data from other sources.

The Chileans continues to be indebted to our translators, without whose support the breadth of our coverage would be severely curtailed. In addition, we are now finding that the search for

information from less-recent literature has become of increasing importance and we have received help and advice in this direction from various members. In the background, the most efficient execution of their several functions by our Hon. Officials has continued to ensure the smooth running of our activities.

Our Membership Secretary would like to express her appreciation to those members who helpfully enclosed a S.A.E. when sending administrative queries. The Slide Librarian would like to thank those members who have prepared a commentary to cover the slides in a particular genus; it is hoped that this will increase the value of those sets for the members who borrow them.

STUDY GROUPS / ROUND ROBINS

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