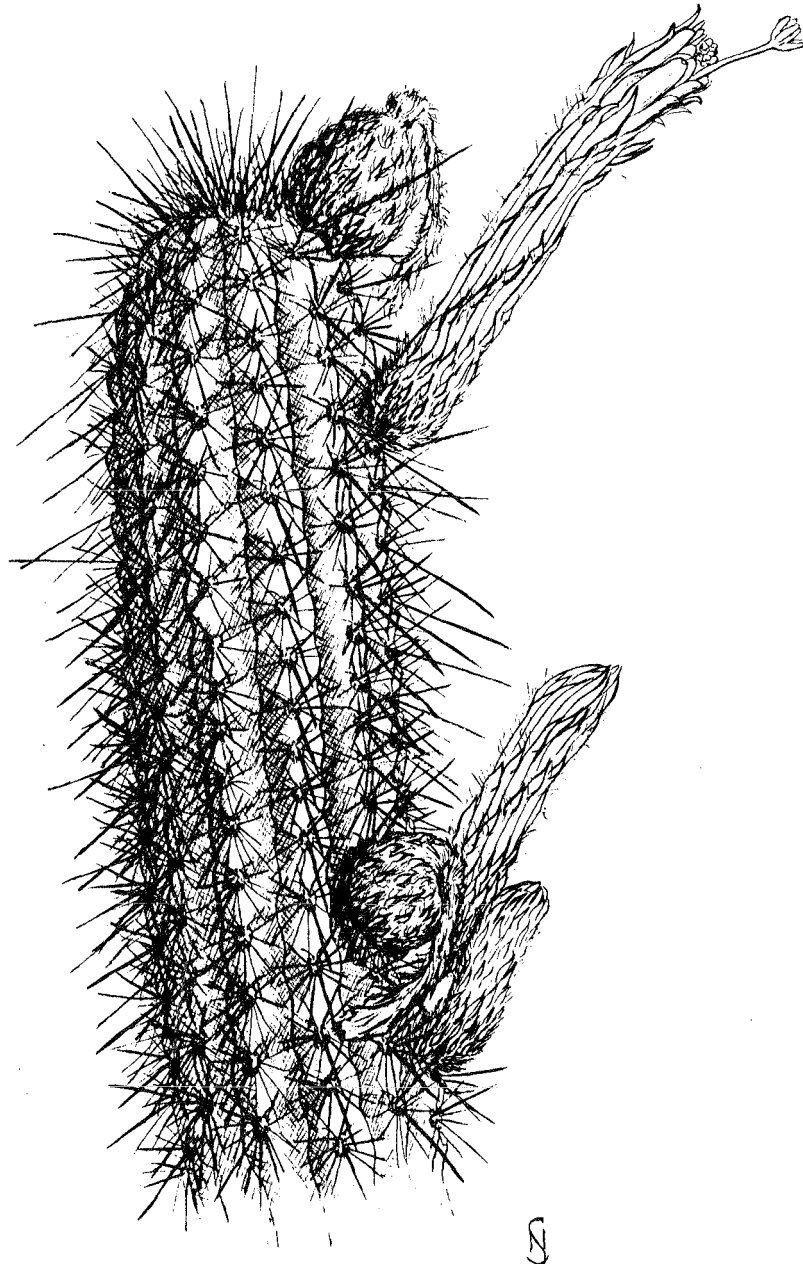
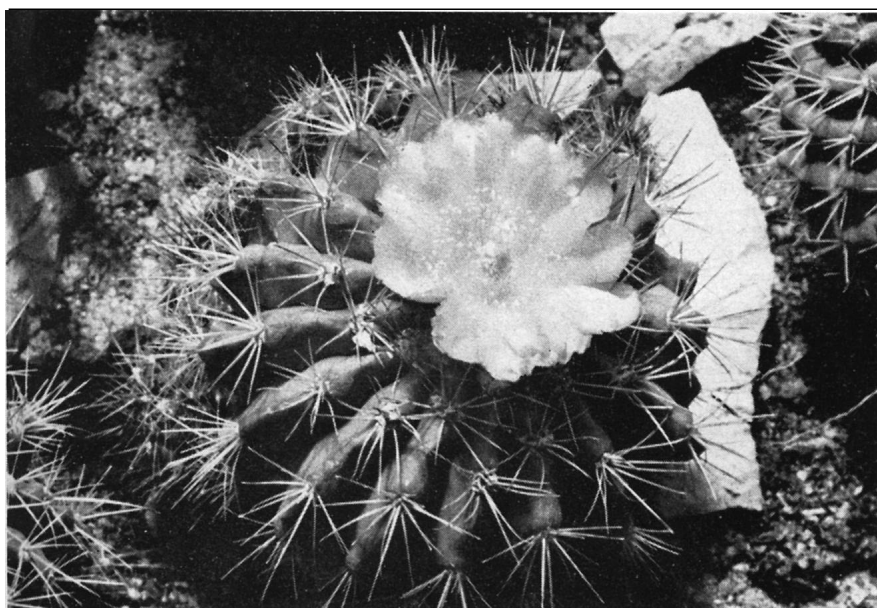


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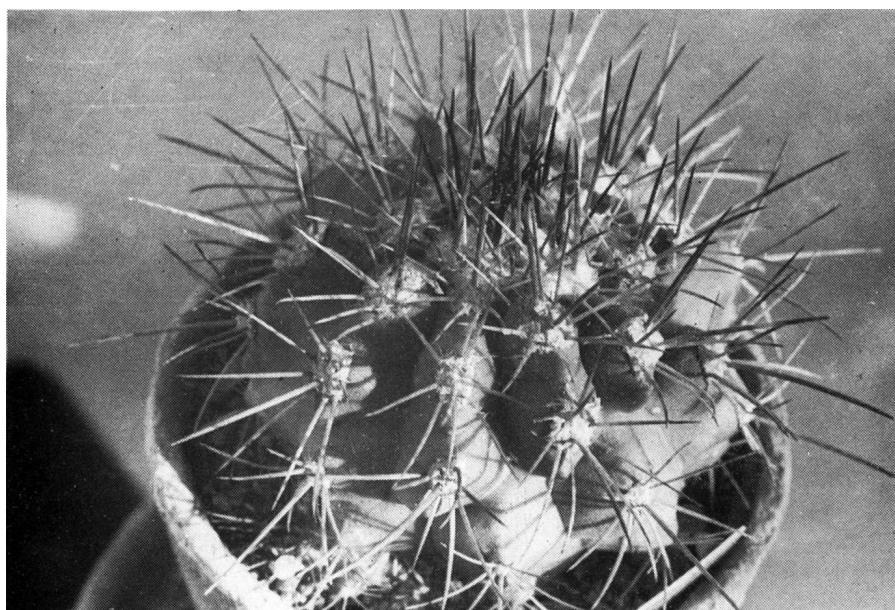
CLEISTOCACTUS SPECIES



COPIAPOA GRANDIFLORA

Collection - Les Cedres

CACTUS FRANCE 20.84:65



COPIAPOA GRANDIFLORA

Photo & Collection - I. le Page

It must have been 1965 when I started to collect cacti actively and it took me about 15 months to acquire about forty *Neoporteria*s and about twenty *Copiapoas*. These were all young plants and at that time I had never even seen a plant of either of these genera in flower anywhere. I did have a few duplicates, but some of those with similar labels appeared to me to be quite different species, and others with different labels seemed to be very similar looking plants. Quite a few plants were purchased as grafts but I aim to get them on to their own roots fairly promptly.

In 1967 I began to acquire the odd imported plant and I also had a visit to Holland that year. The exciting part of the trip was the visit to Wouters (it took me an hour to find his place — I got to the nursery just across the road and I did not find anything of interest to me there and nearly gave up for the day). We spent some time looking at his collection — did I know *Copiapoa* this? or *Copiapoa* that? Just a minute, this is what it looks like in flower! I came away with a number of grafted plants — all excellent stuff.

There were by now only about 18 or so described *Copiapoa* species that I did not have and I came to the conclusion that there was so much confusion over the species names that my best policy was to collect and grow the plants until I had sufficient material of reasonable age. Certainly the plants grew well — indeed they might even be described as positively exploding! Having obtained the loan of Volumes III and VI of Backeberg's *Die Cactaceae*, I set about translating the descriptions of all the *Copiapoas*. From this I found that several of my plants either matched Backeberg's description or appeared to be identical with his illustration of a species, but carried a different label. I even began to find one or two of the named plants which I had obtained from Wouters differed from the official description or from imported plants.

I took a look at seed under the microscope from half a dozen different species of *Copiapoa* and found them to be all "much of a muchness". They are all the same shape, all somewhat laterally flattened, all have a keel that does not run the whole height of the seed, all possess the same shape of hilum in a similar plane. The micropyle seems to be at the end of the hilum and sometimes has a rim round it and sometimes it is not well defined. The surface of the testa is tuberculated. They differ one from another slightly in that the tubercles or humps are more or less prominent, the keel varies in its acuteness, and so on. But I would not like to have to distinguish any one of these species from any other on the basis of the seeds alone.

Early in 1970 I was able to pay a visit to the Isle of Wight to see a consignment of plants that Sargent had just received from Chile. I must say that seeing all those imported plants definitely helped forward my appreciation of this genus. I purchased one of this, and one of that, and when I had spent rather more than I had intended to, I called it a day. One of those plants was a shrivelled looking *C. olivarna* from "North of Paposo". This name was a new one to me. A couple of months later I went up to see the plants Hallett had for sale in Anglesey and was quite pleased with my purchases from there, too. After that visit I finally got down to a distribution map of *Copiapoa* species which Harry Middleditch had been egging me on to do and quickly found it of inestimable value. Some species which I had felt were similar, proved to come from places quite close to each other.

During the summer, this plant of *C. olivarna* plumped up a bit and started to resemble a "dumetorum" which had arrived from Uhlig at about the same time, and during the summer I obtained two further collected plants under this name. I also had to acquire an extension to nearly double the size of my greenhouse as every available inch of space where a pot could stand was occupied, including the floor. When I had the full 25ft. length available I picked up pots from the floor etc., and spaced everything out and the whole greenhouse was full again.

But now I could see everything easily, I could put like with like, which produced surprising food for thought. By this time quite a number of my *Copiapoas* were now flowering and at the end of 1970 my *C. olivarna* put out its first flower. The bud was quite red — as usual with many *Copiapoas* — but when the flower is open it is pale yellow and rather large — some 4.5 cm in diameter. The following year all three plants of *C. olivarna* were in flower in April and the flowers were so large that I put a ruler across and two of them measured exactly 50mm diameter. My wife measured another *olivarna* flower while I was at work and made the same diameter. I seem to remember measuring a *montana* flower about that time, that was even bigger! So *Copiapoas* can have big flowers.

By 1973 these three plants of *C. olivarna* had grown a little more and were in flower from early May throughout the summer. These plants have a colossal flower for a *Copiapoa*, getting on for 70mm in diameter. I had still seen nothing in print about these plants, which I had now come to regard as indistinguishable from plants from two different sources that I had labelled "grandiflora". These two plants of *C. grandiflora* had not yet produced any flowers.

Both my *C. grandifloras* were acquired in 1967. One of them came from Bulthuis, a small grafted plant, one solitary head which measured only 1½" across the spines. This was degrafted in April 1971 and quickly established itself on its own roots. After a couple of year's growth it had produced several offsets and occupied a 5" pot. Since

then I have removed a number of the offsets and rooted them up. The other plant was bought from Uplands nursery under the name of *C. cupreata*; I believe that it was from the George collection (from near Ron Ginns) who grew it from Winter's seed, and Uplands purchased that complete collection. When I bought this plant it was 3" in diameter and 1½" high, on its own roots, with one offset. By the September of that year it had three or four offsets. I stripped off all the offsets in 1968 but by August 1971 it was back to 8 offsets again and occupying a 6" pot. Despite the label, I was pretty certain from the appearance of this plant that it was a *C. grandiflora*.

The evidence for these two plants really being *C. grandiflora* was strengthened when the two of them both flowered in May 1974 and both had large flowers for Copiapoas. The flower on the offset from the original Uplands plant opened out to 60mm diameter and the other — the ex-Bulthuis plant — made 80mm across. Unfortunately my film ran out in the camera and I bought another one only just in time to catch the flower before it expired.

Now we have moved down to Devon I am convinced that the air is cleaner than on the outskirts of London and it seems to suit my plants; but I shall probably have to shade in summer to avoid scorching the Copiapoas. Both the plants of *Copiapoa grandiflora* have responded by flowering again this year. I see Ritter, in his description of *C. grandiflora*, says that it comes from Esmeralda. Whereabouts is this place? I cannot find it on my maps on Chile.

Comments on *C. grandiflora*

... from H. Middleditch

Both these plants of *C. grandiflora* were on the speaker's table at our 1975 Brooksby weekend. The ex-Bulthuis plant had a purplish tinge to the green epidermis, perhaps reddish-purple in parts; the ribs were quite narrow at the peak and markedly depressed in between the areoles. The other plant (presumably ex-Winter's seed) had a fainter reddish-brown tinge to the green epidermis, again with the ribs coming to a narrow peak, but less depressed between areoles and with a faint suggestion of a chin above the areole. Alongside these two plants was a plant with two labels — *C. krainziana* var. *scopulina* and *C. grandiflora*. The body of this plant had a very rich purple colour indeed.

The port or fishing hamlet of Esmeralda appears on my 1:1,000,000 map of Chile roughly half way between Chanaral and Taltal.

... from R. Moreton

The two-labelled plant which I brought along to Brooksby was bought as a seedling from Roanoke many years ago now.

... from E.W. Bentley

Yes, I have now managed to locate Esmeralda, a tiny port of that name which lies a few miles south of Cifunchos.

... from I. Le Page. (C.I.)

I am quite familiar with a plant of *C. grandiflora* which is not in my own collection, which was originally obtained from the Dutch nursery of Edelman. It was brought into the island by a local collector, a Mr. Wilson who used to import a considerable number of plants for his extensive collection during the early 1950's; it was acquired by my stepfather about that time so this makes it in excess of 20 years old. I suppose that it is just possible it is a Ritter collection as he was extremely active at that time.

This plant formed nine offsets round the base and grew to occupy a 6" pan, although it is hard to see any growth at all on the main body. Any increase in size seems to be concentrated on the offsets. The body is a dull grey-green, with 11 ribs; the areoles are large, furnished with white wool; there are 3-4 central spines, 3.75cm long, slim, brownish going grey with age, radials 2cm long. As far as the owner of the plant can recall, it has flowered for the past five years, usually about July. In early July this year I noticed that it had two large buds which would clearly be open within a few days. The plant had obviously flowered earlier in the season as there were the dried remains of four flowers.

I borrowed the plant and took it home and put it in a sunny part of the greenhouse. The flowers opened together on July 11th, a hot sunny day; they remained open for two days and when fully open measured 6.5cm across and 2.5cm high.

From the enclosed slide (now in the slide library — H.M.) you will see the flower quite well. The outer petals had a reddish tinge running through the centre — just visible lower left of the slide. The petals were a satiny

lemon. The stamens were inserted in two series, one set being about 13mm long clustered tightly around the style and of fairly even length. The others were much longer, often irregular in length and widespreading; the average length of these was approx. 20mm; they were all lemon yellow colour. The style was just over 20mm long and carried 15 stigma lobes nearly 3mm long, also yellow but slightly darker.

... from A.F.H. Buining

I can tell you that my wife and I had the privilege of making the trip through Chile and the southern part of Peru together with Ritter. Since most of the published Copiapoas come from Ritter, I know that we were on the right habitats. I am satisfied that I made notes in my diary every evening on what we had seen that day, so it is almost impossible that my notes are incorrect.

As far as *C. grandiflora* is concerned, we went from the campsite (not a campsite as in Europe, but we slept in the car) near the sea north of Chanaral, where *C. cinerascens* grows. Going further north of Chanaral, not along the normal highroad, we lost our way until we found *Cop. columna alba*. Then Ritter knew where we were. Halfway between Chanaral and Taltal there is a small village on the coast called Caleta Esmeralda. Going there we passed a deserted goldmine and on top of a small mountain we found *Cop. longistaminea* and *Cop. grandiflora*, somewhat to the east of Esmeralda. And quite high above Taltal grow large groups of *C. krainziana*. Of all these habitats I have colour slides.

You must know that it is often quite dangerous to give the exact habitat of rare plants, for soon traders in cacti go often to these places and simply take all the plants they find. As soon as somebody starts in the trading business, he simply has to find the asked-for plants. This is why I did not mention in my article where these plants grew exactly. I think it would be better please not to publish these exact habitats for then those plants might come into danger.

... from A. Gray

When I purchased a *Copiapoa grandiflora* in 1967 it just about filled a 3½" pot and I believe it to have been grown from seed. Unfortunately it got rather badly scorched shortly after purchase and it took about 4 years to put on sufficient growth to be able to consider cutting off the top section and try for a tidy plant again. Having cut off the top, it then took a whole season to re-root and get re-established. Since then it has grown quite steadily and this year was repotted into a 5" pot and is now about 11cm diameter and 8cm high.

I had been inclined to think that this plant was a rather shy flower, but this last summer it sent out three flowers and of these, two have set fruit. I did make attempts at hand pollination, although I did not take precautions to prevent insect pollination, so the seed may well be hybrid. My recollections about the flower are unfortunately hazy but I recall thinking at the time that it had no particular claim to the title "*grandiflora*", if this is to be understood as something larger than usual for the genus, but it seemed quite comparable to *C. montana*.

As yet it has only sent out one offset. The plant body is a rather muddy green colour, with a whitish bloom on the lower part of the plant. Rib count is 12, radial spines 7-8 with 1 central spine. The spines generally are slender and pale, clustering in the centre when new, very much as per the illustration from I.le Page.

... from R. Ferryman

Copiapoa grandiflora flowers quite regularly for me. Last year I had three flowers, each a good 70mm across. The first two set seed and there were probably in excess of 400 seeds from the two pods. The third flower shrivelled in January and only produced about a dozen seeds. All three pods were deeply encased in the centre of the plant, each pod 10mm high, width 100mm at the top to 3mm at the base plus 30mm of flower remains. This plant is now offsetting.

A GRINGO ON THE HUNT FOR CACTI

An account of his journey by Wilhelm Knoll Translated by K. Wood-Allum from G.O.K. Bulletin for May 1974

I cannot really say for certain when the idea first came to me of visiting South America. I have always been keen on travel and on one occasion when I was viewing the cactus collection of my friend Ing. Oswald Klein in Vienna, I felt a strong urge to get to know the habitat of these wonderful plants sometime. My only chance was that I always remained in contact by letter with my relations in North Argentina. Countless times already had they invited me to visit them and in the Spring of 1972 I finally made up my mind to go there. I had one month to make all necessary preparations. From the Argentinian ambassador I obtained promptly and without great difficulty an entry visa, while my relatives promised me a good position in their construction business that would also leave me sufficient free time in order

that I could go on a cactus hunt occasionally,

At the beginning of August 1972 I was ready for off. With an AUA aircraft I flew to Paris, changed there into a Boeing 707 of the Brazilian airline VARIG and was already in Rio de Janeiro by the morning of the next day. A two hour wait gave me the opportunity to admire and photograph that glorious spectacle of a sunrise over the sea. Then off again via Sao Paulo towards Iguazu Foz, at the meeting point of Brazil, Argentina and Paraguay, where the stupendous waterfalls of Iguazu yearly draw thousands of sightseers. However, I had no time to admire this wonder of nature, for half an hour later I had to be flying on to Asuncion. At 4.00 in the afternoon I arrived there and was welcomed affectionately by my relatives.

Then we went at a brisk pace across Asuncion, down towards Ita Enramonda, the Paraguayan frontier post on the Rio Pilcomayo. An obliging official saw us quickly through the customs and passport formalities, and we crossed over the river by the ferry and arrived in Argentina towards evening. Further prompt attention to the customs documents followed, and we then roared down the splendid trunk road to the south. Here, for the first time, I gained a foretaste of the vast distances in this country. Sometimes one drove for 30 Km straight as a die down the road reaching a long drawn-out curve leading into a further 25 Km of straight.

We arrived at Formosa, the main town of the Province of the same name, when it was already nearly nightfall. A short stop, then we set off again, further in the direction of Resistancia, the principal town of the Chaco Province, where we arrived late at night. This Province has a surface area somewhat greater than Austria, but has only about one million inhabitants. The next day I passed the time by getting to know my relations' acquaintances, in looking around in the construction firm, and also in getting to know the country property some 40 Km from the town. It was here that I found the first cacti.

One has to know the area to understand the conditions in which these plants live. Endless plains, broken here and there by small dense woods, extend from horizon to horizon. It is almost impossible to penetrate the woods because the undergrowth is so thick. It is dry in winter and the clay soil goes as hard as a stone, and cracks open. In spring and summer there is heavy rain, up to 700 mm a month and at that time the cacti often stand in puddles for weeks on end. It is at this time of year that the cacti flower and it is a real joy to see whole clumps of *Cleistocacti* or groups of *Echinopsis* plants covered in flowers.

Now briefly to the eight species which I found in this area. WO 1 is a small growing *Echinopsis* which offsets to form large clumps. The white, or whitish-pink flowers open at night and mostly stay open during the following morning. These trumpet shaped flowers up to 20cm long and 12cm across with their fine scent, are a delight to the eyes and the nose.

WO 2 hangs down from the trees, gripping the bark of strong branches. It is probably a *Hylocereus* whose single shoots are covered with up to 25 small whitish pink flowers. The fruit is small, spherical, naked and, when ripe, dark purple to black and is enjoyed by the birds.

WO3 is a clumping *Cleistocactus* with short light spines which exhibits its typical *Cleistocactus* flowers for several days. The yellow-red buds only open a little into bright red flowers, which, if examined carefully, are a miracle of colours. The brick red filaments with the yellowy-white anthers project from the orange-red bloom, dominated by the pistil with whitish style and lime-green stigma. The tube has a little white felty hair. This flower is amongst the most beautiful of cactus flowers.

At the edge of the woods and in clearings in the woods, grows a columnar cactus up to 5m tall, whose white flowers completely cover the growing points of the side branches which are up to 16cm thick. This species seems to be self-fertile because in town a solitary example set seed year after year. This species is WO-4.

WO 5 is a large growing *Opuntia* species with edible fruits. The bright orange flower is of primitive construction; the ripe fruit is red and is readily eaten by animals. I do not advise picking them up, as the glochids can irritate the palms and fingers quite painfully.

WO 6 is found in the dense and shaded woods. It is a *Harrisia* species which twines its metre-long stems round trees from which they then hang down. It has a large flower, the largest I have ever seen on a cactus, 25cm long and across with pure white petals. From the base of the throat arise yellow stamens and a yellow pistil with yellow stigmas. It was indeed unfortunate that just on the very day that I wished to photograph this flower, the mosquitoes were making their presence felt to such an extent that I only took one shot and then very rapidly took to my heels. Truly, I was still a real Gringo at that time.

One pest which sometimes made me despair was a species of *Cylindropuntia* which I numbered WO 7. The long, stiff, and very brittle spines of this species which grows concealed in the grass, penetrate the thickest leather boots and then break off. Often I had to pull them out of the boots, with a knife and a nail before I could extricate

my foot which was effectively nailed to the boot.

The name of WO 8 is completely unknown to me. It grows in clumps under trees, individual heads growing up to 1.5m, semi-procumbent and only the growing point upright. The flowers have a grass-green tube, completely bare, the sepals are also green, the petals pure white, long and narrow. The rotate flowers open early in the morning and close in the early afternoon. The fruit goes red when ripe, splits open down the side to reveal large black seeds in white pulp which ants appear to love, since the fruit is usually empty within a day.

During my excursions through the fields and woods of this part of the southern Chaco, I was often able to observe the work of the camps, where immense herds of cattle were reared. Every three months the cattle must be herded together, in order to vaccinate them, then to shorten the horns, then to brand them and afterwards to pass them through the dip to control vermin. In the latter years there has been a change taking place, with the Indian humped cow — the Zebu — being crossbred with the indigenous and imported breeds. In this way a noteworthy improvement in the quality of the meat is obtained. Each year a grand cattle fair extending over several weeks is arranged, where the breeders exhibit their products and offer them for sale by auction. I myself have seen bulls there that many European breeders would surely dream of for many nights.

This part of the Chaco shelters a great wealth of wild animals. Only a few metres from the side of the road many species of storks, herons, and Ibis may be observed. Great flocks of wild ducks and wild geese move to their sleeping places each evening. Two species of vulture perch on the edge of the road and keep a look-out for prey. Elegant falcons describe circles in the sky, screaming shrilly. Small parakeets perch in the tree-tops, chattering and screaming and the red-headed Cardinal in the dense undergrowth chants his own peculiar and individual song. An immense number of other sorts of birds, whose names I know not, hurry like an invasion through the undergrowth — a great experience for the animal-lover. Whoever once sees the humming birds, shining in all their colours, flitting from flower to flower, will become oblivious to everything else around. Worthwhile mentioning is the already very rare South American ostrich, called the Nandu, that is still to be seen assembled in flocks in this locality. The Paga, a small running-bird, affords the connoisseur the finest roast fowl available.

Of the large carnivorous animals, there is the jaguar, which is also very very rare in these parts and also numerous pumas that represent a desirable target for the dedicated hunter. Wild pigs live in the marshes in bands of up to 60 animals, and small armadillos dig their burrows under the trees. Small stags and deer still further enrich the fauna, as well as a hord of hares, rabbits, porcupines, skunks and otters.

The fish life in the rivers is also incredible. Certain species of fish, such as perhaps the Manduruyu, the Sumbi, and the Manduray, reach a weight of 60-120 Kg. There are also piranhas, known locally as Palomettas, which are hardly ever dangerous at this spot although notorious flesh-eaters. The fish of interest to the sportsman in the Dorado. Once on the hook, this heavy fish (up to 35 Kg) struggles to its last breath.

Now back to the cacti. I sent examples of all these plants to my friend Herr Klein who will grow these plants on and certainly pass on a few.

... from H. Middleditch

I do believe that this is not the first time that I have come across a traveller's account of a journey in the Northern Chaco, when cacti were to be seen "standing in water". Perhaps it is as well to remember that the wet months in the Chaco, when this sort of sight might be seen, are also the hottest. The phrase concerning "the work of the camps" seems to be rather puzzling. What sort of camps, one wonders?

... from W.H. Koebel "Modern Argentina"

Speaking generally, the camp is a vast plain. The camp may be restricted to the flat lands which constitute ninety percent of the area that is suitable for both agriculture and pasture. It spreads its smooth surface for hundreds of miles on end, with no hillock higher than those which the ants have flung up.

The Chaco contains much that is curious in nature. The manner in which the forests are distributed about the land is not a little curious. The surface of the Chaco may be described as alternate plain and woodland. But that which marks the huge belts of forest as out of the ordinary is the abruptness by which their boundaries are marked. The edges, in fact, of these are as cleanly cut and as level as those of a well-planned plantation in an English park. The line is drawn with remorseless exactitude. Beyond it stretches the smooth plain, with not a tree upon it to break the severity of the contrast.

It is a land of strange watercourses. Broad streams that have flowed from the Andes, burrow beneath the earth here. In other districts a clay soil that is practically impervious brings about precisely the opposite phenomenon.

During heavy rainfalls, fish of from eight to twelve inches in length are to be found in the pools caused by these heavy downpours. These pools are utterly inaccessible to any watercourse or river, and the ground which they cover has been in a dry and parched condition for months previous to the rain. It is believed that these fish must sink several feet into the mud when the water dries up, and that they lie embedded in the earth to await the next rainfall.

. . . . W.E. Agar, A Zoological Expedition to South America, Trans. Royal Philosophical Society of Glasgow, 1909

Of all the denizens of the swamps in the Paraguayan Chaco, the most interesting to the naturalist is, of course, the lungfish of *Lepidosiren*. They are extremely abundant in the Chaco swamps — in fact, they form a very important part of the natives' food supply. During the wet season when the swamps are full, the lungfish lives like a fish in the water — unlike an ordinary fish however, in that it has to rise to the surface to breathe now and then, for its gills are reduced and incapable of extracating sufficient oxygen out of the water. In compensation for this, it possesses, as its name implies, a pair of typical lungs, by means of which it can breathe air. During this period the fish are captured by the Indians by spearing, although the thick weeds and reddish colour of the water make it quite impossible to see the fish. A full-grown female is over three feet long and as it is pretty thick, too, it presents a fair-sized target. When the swamps dry up, the lungfish makes a burrow for itself in the soft mud, and lies in it with its tail curled over its head. The burrow communicates with the air by a narrow opening. At first the fish lies close beneath the surface, but as the upper layers of mud dry up, it deepens its burrow, so that it is always found in a stratum of fairly moist mud.

In this burrow the fish has to lie till the swamps are again filled next rainy season. As this season is in some years missed out, it has to be prepared to last at least eighteen months without food. It makes ready for this fast by eating much more than it requires during the wet season, and storing up the surplus as fat, especially in the tail. During the dry season this fat is slowly re-absorbed. It was curious to think, that as one walked over the parched plains which represent the swamps in the dry season, that a few feet below that baked-up surface were thousands of living fish.

. . . . from Zoo Quest in Paraguay, David Attenborough

The land surrounding the estancia was not entirely flat, but undulating like the gently sweeping downs of Wiltshire. The owner spoke of it not as the "pampas" — that country lay several hundred miles to the south towards Buenos Aires and is level as a table — but as the "camp", an anglicised abbreviation of the Spanish word which means, simply, countryside.

. . . . response from W. Knoll

My comment that the cacti stand in puddles of water, only applies to my plants under the collection numbers WO 1 to WO 8 inclusive. They are to be found in the flat Chaco near Resistancia on the camp of my uncle, and there are trees, bushes, and high grass there and also cattle.

. . . . from H. Middleditch

If the lung fish find moisture below the surface during the dry season in Paraguay, then the cacti may possibly make use of the sub-surface water in the dry season as well. Does this mean that the roots of the Muscosemineae group of *Gymnocalycium*, for example, do not really dry out completely in the dry season. Is this one of the reasons why they appear to be so temperamental in cultivation?

ABSTRACTS FROM ZOO QUEST IN PARAGUAY by David Attenborough

From the hilly streets of Asuncion, you can look across the Paraguay river into a flat desolate wilderness. It begins on the opposite bank of the river and stretches westwards beyond the horizon for five hundred miles to the foothills of the Andes. This is the Gran Chaco. For part of the year it is a parched desert of dusty plains and cactus scrub, but in summer it turns into a gigantic mosquito-ridden swamp flooded by heavy rains and the streams which pour down onto it from the flanks of the Andes.

We left for the Chaco early in the morning. We took off from the airport and, as we circled Asuncion, we looked eastwards for a moment towards the verdant hilly country that begins just outside the town. Then we swung west over the Paraguay river, and saw ahead of us the Chaco. From the very edge of the broad brown river, it looked totally different from the land so close to it on the opposite bank. We could see no signs of human habitation. A stream wound across it, the forsaken meanders were left as weed-clogged stagnant lakes. Here and there, the land had been colonised by palms which were scattered thinly over wide areas, like a thousand hat-pins stuck in a faded green carpet, but for the most part there were no houses, no roads, no forests, no lakes, no hills, nothing but a desolate featureless wilderness.

We flew westwards over this ferocious inhospitable country for nearly two hundred miles until at last we sighted Estancia Elsita, our destination.

We had arrived at the end of the dry season. Most of the esteros, once gigantic swamps, were now barren tracts of baked mud, frosted by salt. Only where the ground rose slightly above the general level of the surrounding country had it been colonised by scrub vegetation, the monte. All the plants bore savage spines which protected them from the grazing cattle, desperate for fodder in the drought.

The nearest tract on monte began just beyond half a mile from the Estancia and stretched for several miles. In its denser parts, it was virtually impenetrable. Giant cacti, thorn bushes, and stunted palm trees were matted together with lianas: the ground was overgrown with the fleshy rosettes of caraguata, and every plant, bush, or tree bristled with spines, daggers and barbs that snatched at our clothes, stabbed through our canvas shoes and ripped our flesh.

Here and there palo santo and quebracho trees grew high above the thorn thickets and in a few places the bushes thinned into desolate meadows of isolated cacti growing among tussocks of coarse grass. One day I took a walk along a trail through the monte. After an hour or so, I sat down and gulped from my water bottle; hearing a buzzing noise above me, I looked up and saw a tiny green humming bird. The tree above me was laced with spiders' web and the humming bird was gathering the silk threads to build her nest.

When the wind blew from the south, it brought with it chillingly cold weather and often hours of drenching, depressing rain. The wind had changed to the north and the cold rainy weather had disappeared as we lumbered away from the estancia with the cart piled high and the oxen yoked to it. For the next three days we headed southwards across the plains, with copses of monte like islands of bush in a sea of grass. It was raining hard by the time we reached the Pilcomayo. Though it was not deep, the water swilled perilously close to the floor boards of the cart before the oxen finally hauled it onto the other bank. In the late afternoon we reached the patch of monte which was our objective.

After breakfast, Comelli suggested a long tour of the monte to the east. Before the sun was above the trees he rode quietly away, his dogs trotting ahead of him. Two days later the dogs trotted back into the camp, followed by Comelli jogging easily on his horse. He had travelled many miles to the east, as far as the end of the monte, but had seen no sign of the giant armadillo.

We went to Paraguay to look for armadillos. There is nothing in Europe which remotely resembles the giant ant eater, the sloth, or the armadillo. They are survivors from past geological ages when most of the animals of today had not yet appeared on earth. South America became separated from the rest of the world at a time when the Edentates — the group which contains the sloths, the armadillos, and the anteaters — were in the ascendant. Giant sloths, the size of elephants, browsed in the forests. Glyptodons, relatives of the armadillo, some over twelve feet long, lumbered over the savannahs. When the land connection with North America was re-established after a lapse of some sixteen million years, it enabled the jaguar and puma, the fox, the wolf and the horse to enter and compete for foods. When that happened, most of the Edentates were doomed to extinction. But some of their close relations still survive. The armadillos are the only surviving relatives of the Glyptodons. To look at them is to see a link with the strange, primitive beasts of prehistory.

Comments

... from H. Middleditch

David Attenborough's book "Zoo quest in Paraguay" contains some interesting pictures of tall, branched, columnar cacti which are to be found in the clumps of monte woodland. Some of these plants appear to be well over ten feet in height, with dozens of branches dividing again and again as they ascend. In his account of his drive westwards from Asuncion, Mhr. Buining refers to plants of *Stetsonia coryne* and a *Pilosocereus*: presumably, then these will be the two sorts of columnar cacti depicted in David Attenborough's photographs. The *Stetsonia coryne* also comes into the description by Nelida Serrana of the Argentine Cactus Society's outing to the Salinas Grande depression which lies to the west of Cordoba (Chileans No. 20 p8). It would appear, then, that this *Stetsonia* is an endemic component of the Chaco vegetation and may well appear in patches all the way from the Salinas Grandes to Paraguay — a spread of some 500 miles.

Most of us will accept the observations made by David Attenborough that certain of the present denizens of the South American continent are descendants of much earlier mammals, as a valid scientific appreciation. It is of interest to recall that when this sort of observation was first made by Charles Darwin, after his discovery of fossilised remains of large mammals in Patagonia, it was greeted with widespread disbelief and not a little abuse.

However, I wonder if David Attenborough is correct in writing that the horse was amongst the invading mammals responsible for the demise of the ancestors of the armadillos and the anteaters. Surely the horse was quite unknown in the New World until it was taken there by the Spaniards — until the American Indians acquired horses from the Spaniards they were as restricted in the pace of their nomadic life as the Australian aborigines remain today. Like the Assyrians before them, they made such good use of their new acquisition that there is a tendency to forget that they only learnt well from their invaders.

The chill wind that blew from the south is recorded by many writers besides David Attenborough. In the account of Colonel Fawcett's work in South America, this chill wind is described as a *surusu*, reaching as far north as the boundary of Bolivia and Brazil. Another author, W.H. Hudson, describes the cold south-west wind of the Argentine pampas as the *pampero*. The common cause of these effects is the irregular flow of cold Antarctic air northwards along the eastern flank of the Argentine Andes. These moving air masses travel north over the Gran Chaco where they not only bring about a rapid and marked drop in temperature, but the meeting between the cool air from the Antarctic and the warm tropical air usually results in a heavy downpour.

The cacti that grow in the lowland plains of Argentina, Paraguay, Bolivia, and Uruguay have to contend with this combination of dampness and lowered temperature. Little wonder that species of *Notocactus*, *Gymnocalycium*, and *Echinopsis* from this large area find no great difficulty in surviving the chilly damp of November and March when in cultivation in this country.

... from Charles Darwin, "Journal of Researches" 1845

I was delayed at Santa Fe (on the R. Parana) and employed myself in examining the geology of the surrounding country, which was very interesting. I was surprised to observe how great a change of climate there was between this place and Buenos Aires. This was evident from the dress and complexion of the men — from the increased size of the ombu trees, from the number of new cacti and other plants, and especially from the birds.

We here see at the bottom of the cliffs, beds containing sharks teeth and seashells of extinct species, passing above into an indurated marl, and from that into the red clayey earth of the Pampas, with its calcareous concretions and the bones of terrestrial quadrupeds. This vertical section clearly tells us of a large bay of pure salt water, gradually encroached on, and at last converted into the bed of a muddy estuary, into which floating carcasses were swept. Mr. Alcide d'Orbigny found on the banks of the Parana, at a height of a hundred feet, great beds of an estuary shell, now living a hundred miles lower down nearer the sea. And I found similar shells at a less height on the banks of the Uruguay. This shows that just before the Pampas was slowly elevated into dry land, the water covering it was brackish.

In the Pampaean deposit at the Bajada I found the osseous armour of a gigantic armadillo-like animal; I found also teeth of the *Toxodon* and *Mastodon*, and one tooth of a Horse. This latter tooth greatly interested me, and I took scrupulous care in ascertaining that it had been embedded contemporaneously with the other remains; for I was not then aware that amongst the fossils from Bahia Blanca there was a horse's tooth hidden in the matrix. Nor was it then known with certainty that the remains of horses are common in North America. My Lyell has lately brought from the United States a tooth of a horse; and it is an interesting fact, that Professor Owen could find no species, either fossil or recent — a slight but peculiar curvature characterising it — until he thought of comparing it with my specimen found here. He has named this American horse *Equus curvidens*.

Certainly it is a marvellous fact in the history of the Mammalia, that in South America a native horse should have lived and disappeared, to be succeeded in after ages by the countless herds descended from the few introduced with the Spanish Colonists!

... from Baron L. Nordenskiöld,

"Travels on the Boundaries of Bolivia and Argentina" The Royal Geographical Society 1903

We all met near the Bolivian frontier and started for Tarija, camping in the vicinity of the town. Tarija is famous for its fossil mammals; Weddell was the first to make collections when he visited this valley in 1875. In the upper strata of the soil, erosion has brought fossils to light in many places. We obtained skulls and skeletons of various forms, especially of *Mastodon andium* and *Equus curvidens*. These forms are especially interesting, since they emigrated to South America at a rather late period.

... from H. Middleditch

Although the author of "Zoo Quest" places his search in Paraguay, nevertheless the Rio Pilcomayo represents the boundary between Argentina and Paraguay, so that his excursion across this river would have taken him

into Argentina. Here he would be some 250 miles from Resistancia, where Knoll provides us with observations on the local flora and fauna. Resistancia is 500 miles from Buenos Aires as the crow flies and over 600 miles travelling distance. The "fleshy rosettes of caraguata" to which David Attenborough refers, belong to a Bromeliad.

FORMS OF FLOWERS

In various issues of the Chileans we have been able to publish a number of sketches of both external form and internal structure of cactus flowers, with the object of providing information designed to assist in identifying and classifying your plants. Several eminent writers now include fairly detailed flower sketches with their articles, suggesting that they regard this information as useful and reliable.

However, G.E.H. Bailey asks the Chileans "regarding the various sketches of stigma and anther arrangements depicted in your sketches, have you examined a considerable number of flowers of more than one species and found no variation in the arrangement? Because I am reminded of one of my first loves, the Primulaceae, in which both types of arrangement are usual within a species — they are known as thrum-eyed (with anthers uppermost) or pin-eyed, when the stigma shows on top. Incidentally, in *Auricula* for show purposes, the pin-eyed flower is regarded as defective".

Response from readers would suggest that variations in flower size, colour, and stigma disposition have indeed been observed. For example, John Hopkins comments "another interesting phenomenon is the decidedly small flowers that have resulted as a consequence of the "forcing" due to the hot weather of the last three or four days. This has been particularly noticeable with *Lobivias* Lau 489 and 493 — the latest flowers being only about two-thirds of the size of the largest flowers I have seen on the same plants either earlier on, or last year. A couple of flowers on *Lobivia caespitosa* Lau 310 which should be 6 or 7cm long or more, have been less than 5cm long and not very widely open. The hot weather has also resulted in many flowers lasting only one day instead of the usual two days, with the result that whereas I had a sporting chance in normal circumstances of cross pollinating some plants, I have had no chance at all lately!"

From Mr. and Mrs. Tree we hear that their "*Discocactus* has flowered again, two flowers on the Tuesday evening and one on Thursday. The flowers this year were much smaller than those last year — the tube was shorter and the petals were only half as big. But we did feed the plant last year. There is a bud in the cephalium now which looks as if it will be a larger flower. It just shows, though, how one can get conflicting views. If I had described last year's flowers and then a new owner were to describe this year's flowers, they would give a completely different description for one and the same plant. However, would the proportions of the flower remain the same and also the inherent peculiarities of its habit, despite the change in size?"

A variation in flower form was observed by J. Klavins when "Last year my *Parodia aureispina*, after the first lot of flowers, produced three more which were not round but elongated egg shape and much bigger — nearly double the size. Otherwise they were perfect and the last lot of flowers were back to the ordinary size and shape again and so were this year's flowers. There was plenty of room for the big flowers to open out round without being crowded and I didn't do anything special with watering or feeding.

On *Neochilenia nigriscoparia*, the very first flowers for the last three years have always been smaller and the following ones much bigger, especially if they open one at a time. This year it opened its first flowers on June 10th and then one or two together until the end of September. I cannot say just how much bigger the later ones were, but one noticed it at once. It has nothing to do with early spring watering because I usually give more water to my plants than most people do.

There is another thing — my *Weingartia lanata* had its stigma out of the buds four days before they opened and so it has been with some flowers from *Matucana crinifera* — but not with all its flowers. *Pseudolobivia obrepanda* pushed its stigma out a day or two before its flowers opened, too".

Other changes in flower size were observed by P.H. Sherville when "in the recent hot sunny spell we have had, *Notocactus crassigibbus* put forth a flower. On the first day of opening it was quite a small flower at only 48mm across but at the end of its six day life it was 62mm across — a whole 29% larger; that's inflation for you! *Parodia mairanana* flowers tend to pale as the season progresses, starting out at a real fiery orange at spring time and by the autumn generally degenerate to a rather pale orange. I first noticed this last year which of course was exceptional for its continuous sunshine which may have something to do with the change of colour. This year they are back to the fiery version in spring again".

The effect of poor weather in causing flowers to open perhaps only half-way is reflected upon by Mrs. M. Jones who goes on to say that "I picked up a strange plant at an auction last year, looking like a *Lobivia backebergii*. It

produced buds half-way up the body and I thought that the blooms would be yellow as a tip was showing through the bud. But on looking closer I decided that it was the stigma poking through, although the bud was still tightly closed. What do you make of that?

I made some notes on the flower of *Gymnocalycium horridispinum* which was a lovely soft purple pink but I could not comment on the stigma as it would not unfurl. Then, when the flower had withered away, lo and behold the stigma began to protrude beyond the withered petals, showing the separate stigma lobes. Does this mean that the stigma matures much later than the stamens (protandry?). I tried to pollinate it but no seed pod was set".

And we have a further observation from E.W. Bentley that "the visibility of stamens in the *Neoporteria* sensu stricto can depend on age and also on the degree of insolation. Two days ago a plant labelled *N. nidus* had two flowers with the petals closed and only the stigmas showing — and two with at least a few anthers showing 2 or 3mm below the stigmas. Today the first pair have plenty of anthers showing and the second pair have the stigmas apparently collapsed, covered with pollen and actually over-topped by the anthers. I had to dig the stigmas out to see that they were still there! But I also have plants in which the anthers do not seem to appear at all — or the tube closes round them again as the flower dies. I am keeping a watch now to try and find out what actually does happen here. Can the appearance of the latter flower be explained by the opening of the stigma lobes, so bringing the rays of the stigma below the tops of the anthers? Might the stamens also have continued to grow after the flower opened? But is this the typical flower form?"

.... from G. Charles

A collector in this locality has a *Notocactus uebelmannianus* which he claims puts out yellow flowers in some seasons and purple-coloured flowers in other seasons.

.... from D. Huxtable

My plant of *Gymnocalycium damsii* carried a number of white flowers in 1974, the petals having a brown outer midstripe. In the previous year it had put out pink flowers. There are some years when it occasionally puts out some white flowers and some pink flowers.

.... from R. Rolfe

We have a plant of *Trichocereus schickendantizii* which would be about six inches high, with a number of basal offsets; it produced a single flower which was about 8-9cm long and some 7-8cm in diameter. By comparison, the flower size is quoted as 22cm in length in Backeberg's *Kakteenlexikon*. It was suggested to us that a larger plant — presumably an older one — would produce a bigger flower. So to give the plant some encouragement we have repotted it into a 10" square pan, although it does look a little lost in it at the moment. The flower started to open up at about 8.30/9.00 p.m. and was fully open by midnight, which I understand is normal.

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

I have a grafted plant of *Neoporteria nidus* which I obtained from Su-ka-flor. When it flowered in 1969 I made a note that it looked quite different from *N. nidus*; it was a deep rose colour and the outer reflexed petals went up in tiers just like a decoration for a lamb chop. However, when it flowered in 1972 it was just like *N. nidus* (but a more vivid colour), the outer petals no longer in tiers.

.... from G.J. Swales

I have certainly seen some oval shaped flowers on an *Acanthocalycium* which was without question not due to spine pressures on the petals; this is the only plant of *Acanthocalycium* which I possess so I usually have a good look at it when it flowers. I have also noticed some flowers on *Weingartias* which were not quite round. I have a very interesting slide of a *Gymnocalycium* which shows four open flowers, three of which display the stamens in their various stages, from a newly opened flower with the stamens closely clustered round the style, to one with the stamens spreading from the style right out to the petals. In Spegazzini's original illustration of "*Frailea*" *bruchii*, the plant bears several open flowers and these display the stigma in various stages of opening, from having the lobes tightly bunched together, to being wide open.

.... from H. Middleditch

A number of the preceeding comments relate to exceptional flowers — exceptions which catch the eye and serve, by their departure from normal, to emphasize what we would normally expect to see in a flower more typical

of the species. Other comments relate to variations — usually of size or degree of opening — which could be attributed to the plant's reaction to either a change of environment, or a change in temperature, or even a change of season. We can see from these comments that we could be deceived if we only look at one flower on any plant and assume that the size or colour — or even the form — is typical for that particular species. Most collectors will probably look at a number of plants of a species in flower before becoming satisfied that they have a fair appreciation of the normal flower form for the species.

Many cactus flowers have a habit of opening out their petals pretty well flat in full, bright, warm sunshine; we would not expect a valid description of a species to encompass unusual flower forms, but do such descriptions make it quite clear whether flower sizes quoted are for a flower in full sun or not and for mid-season size and colour? The discussion about the day-to-day variation in flower size and colour on some *Notocacti* (Chileans No. 30) indicates clearly that there is a very marked and very regular change in both flower size and colour as these flowers age. It is perhaps open to question whether all valid species descriptions covering such plants do indeed take account of such regular day-to-day variations as the flowers age.

Now George Bailey specifically enquires about the consistency of the stigma and anther arrangements: some of the proceeding comments do relate to dispositions of stigma or anthers — or both. At first sight these comments and observations might be thought to relate to abnormal or unusual flowers, or perhaps to out-of-season flowers or to conditions of unusual temperature or dryness. But do all these observations necessarily relate to abnormal or unusual flower forms, or do any of them relate to changes in flower form which are perhaps fairly regular but which have not yet received much notice in the literature? We now have three major articles in this issue each examining and discussing whether such changes in form are a regular feature, each for a specific group of plants.

AN UNKNOWN CLEISTOCACTUS FLOWERS From H. Middleditch

Some ten or twelve years ago I paid a call on the cactus nursery of Churchman Bros. at Mansfield Woodhouse. On that occasion I found several interesting species of *Cleistocacti* for sale, mostly under field location designations only, without specific names. These plants appeared to have been of little interest to most of the nursery's customers, so although all the plants were upwards of two feet high and most of them were branched, they were all very moderately priced. Succumbing to this temptation, I purchased about half a dozen different sorts. However, for many years they remained pretty well unresponsive to my mode of cultivation. Whatever growth they managed to make seemed to be just about balanced by the drying off and dying back of the growing point. As a result they were never looked upon as one of the better exhibits in the collection and rather tended to be passed over when discussing plants with visitors.

Having been put to shame by several members talking about discarding rampant *Cleistocacti*, it seemed that I should really try to change my cultivation methods to see if it was not possible to make some decent growth out of my own plants. A writer in the German K.u.a.S. journal, and also one of our own members, did suggest that some degree of generosity in regard to root room, richness of compost, and water, would not go unrewarded. This led me to repot several of my *Cleistocacti* into rather larger pots — a step unfortunately made possible because of the extraordinarily heavy losses which I had suffered over the relatively mild winter of 1972-73. In addition to the extra room, a little more liquid feed was applied.

Flowers have appeared on *Cleistocactus strausii* in some seasons but not in others, whereas *Cleistocactus wendlandiorum* regularly produces a crop of flowers every year; but not until 1972 did the plant depicted on the cover of this issue decide to put out a couple of buds. They came from quite close to the crown of the stem. Unfortunately the day for our departure on holiday arrived just before the first bud matured, so nothing was seen of this particular bloom. However, the summer of 1973 brought forth half a dozen buds, some again from very close to the non-growing point and others from a few inches further down the stem. On this occasion I was able to see the flowers when they opened.

I was particularly struck by the fact that these flowers seemed to be quite different from any other *Cleistocactus* flowers with which I was familiar, in two respects — they were quite long, some 3" long at full growth, and also they grew straight outwards and upwards at an angle of about 45° to the stem. One or two other species of *Cleistocacti* which I have seen in flower had blooms approaching this length, but none of them consistently exhibited the same upward-and-outward angle of growth which was to be seen in these flowers.

During the month of May, a further bloom came a few inches below the crown of the stem and three more buds then started to appear. Before these had bloomed, I noticed that the first two flowers had both set fruit, quite without any assistance from me. The plant was then passed into the hands of Mrs. N. Swales, who drew the picture

on the cover for the Chileans. The subsequent flowers failed to set fruit and on July 28th the first-formed fruit fell off the plant of its own accord and on August 14th the second fruit also fell off.

The half-grown buds are a dull red colour, a darker red at the base, red along most of the length of the tube, and a washed out greenish-yellow at the top. The mature flower is a very deep purple-red at the ovary — a colour which I describe as plum despite the variable colour in which plums appear. Immediately above the ovary the tube is a crimson-red colour which gradually changes in going up the tube into a paler and duller red colour; the flower petals are yellow, the slim tapered tip of each petal having a greenish-brown patch externally, with a narrow yellow margin, so that from a distance the petals seem to have a dirty yellow appearance.

The tube does not have a completely smooth surface, for a series of shallow grooves or flutes run full length from ovary to petals. The long, thin, tapered scales are as wide as the flute at their base and are pale yellow in colour. In the axil of each scale is a little chalky brown hair. The younger buds appear to be fairly hairy but by the time the tube has stretched out to its full length, one gains an impression of rather more bare tube than hair. The style is creamy yellow, the exerted stigma yellow with a tinge of lime green; the anthers bright mauve-purple.

The fruit is a very dark purple (plum) colour, and enlarges to about 2cm in diameter, tapering upwards slightly to the base of the dried flower remains. It carries numerous scales, each of which have some hair in their axils. The fruit splits a few days before it falls off, exposing the black seeds secure in a mass of stiff, white, juicy, pulp. The seed was saved and sent to one or two of our New Zealand members, together with a request for help in identifying this species.

A search through the Kakteenlexikon of Backeberg and a tabulation of *Cleistocactus* flower colours, shapes, and sizes, had failed to produce an unequivocal identity for this plant. In the belief that it might be something a little out of the ordinary, the newest branch was lopped off and passed over to Tom Lavender, who was not able to establish the cutting (a feat which, regrettably, I find myself able to emulate from time to time without too much difficulty).

In 1974 I had decided that unless I took some positive action to try and get some steady growth on my *Cleistocacti*, I could not expect to counteract the persistent dying back of the growing point and I would never have any decent specimens of this genus in my collection. So instead of my usual practice of increasing the water a little in spring and then starting to add liquid feed in early summer, I added liquid feed to the water which was given in early March — even though the ground outside was rock hard with frost on some days and the sun was still only occasionally promising to dispel the all-pervading gloom of winter. On the very last day of March I noticed with surprise that one or two little woolly tufts had appeared, which I took to be new buds. I was still a little doubtful that they might be only new shoots, for in the hedgerows the Hawthorn was still black and it is rare for any cactus in my collection to start to put out flowers until the Hawthorn hedges on the other side of the Pennines are beginning to show some green.

We had a very dull April with precious little sunshine so it was perhaps not too surprising that by the last day in April the longest bud measured barely half an inch in length. After a further two weeks this had become an inch long and I decided to throw caution to the winds and get the plant into an even bigger pot; although an extensive root system had developed outside the pot via the hole in the base, much of this was saved in the process of repotting into a 7" pot. This was immediately followed by a week of sunny weather, when the plant was plied liberally with water and a good supply kept up frequently thereafter.

In the hedgerows the Blackthorn was in flower, the Hawthorns were showing some fresh green leaves, and the Sycamores were in full leaf, when one flower opened on this plant on May 16th; it stayed open until May 18th when it closed up for good in the evening. About 9.00 a.m. on the following morning I noticed that the next longest bud had increased in length by almost one inch over the previous 24 hours, which suggested that it was about to open; on revisiting the greenhouse at 11.00 a.m. I found that the bud had still not opened, but that 10-12mm of style and stigma was projecting beyond the tip of the still unopened petals. Although I was pretty certain that there had been no sign of a stigma only two hours earlier, I was suspicious that perhaps my brief glance had failed to note its presence. When next seen at 6.00 p.m. the flower had opened. Had I been regaled with this tale by another collector I would privately have felt very sceptical about its accuracy with regard to the apparent rate of growth of the style.

On May 25th the next bud had reached a length at which it would be likely to extend at speed prior to opening; it was a dull day, the sun only putting in an appearance late in the afternoon. By the following morning the bud had indeed grown to "opening" length; it was a bright and sunny day, very warm despite a stiffish north wind. On leaving the greenhouse at 12.30 p.m. I took special note of the bud, determined not to be left in any doubt on a second occasion, and observed no signs whatsoever of any exerted stigma or style; but on going back into the greenhouse at about 2.00 p.m., there again about 10mm of stigma was protruding from the still unopened flower. The flower petals were still not open at 3.00 p.m., but they were found open at 7.30 p.m. in the evening, the stigma lobes still being loosely

bunched together in a club shape.

Yet a third flower in turn put on the performance of popping out the stigma before opening and thereby set my mind at rest that indeed I was not seeing things. When this flower started to wither, it was noticeable that the stigma lobes seemed to be open wider than on the previous two or three days and they seemed to open even further over the course of the next two days before they, too, finally withered.

When flowering was complete, the plant produced three fresh offsets from well down the main stem. Having maintained my attentions with water, liquid feed and a sprinkling of Rose fertilizer pellets on the surface of the soil, these new offsets have all grown well, the longest having put on some 6" in four months. All new growths have dark reddish brown spines, in contrast to the yellowish grey spines on the old branches.

Comments

... from Mrs. L.E. MacIntosh (N.Z.)

The *Cleistocactus* sketch arrived on Friday — my first impression (after admiring the wonderful artistry) was of a *Borzicactus* or a possible hybrid; so I took off to a collector in Napier to let him see the sketch — he also remarked a hybrid *Borzicactus*! Suddenly I had an idea that it might be a *Cephalocleistocactus*. We studied *Cephalocleistocactus chrysocephalus* FR 326, which is only a golden form of *C. ritterii* FR 325; unfortunately everything had finished flowering, but we could remember that the flower appeared biocolor and the body fitted quite well. These plants are thicker and more robust than the true *Cleistocacti*; but we do not understand why they were separated from the main genus for we cannot find any form of cephalium. Amongst the *Cleistocacti* FR 67 *tupizensis* was the nearest but of course only about half as thick. The plants we were comparing with the sketch are really aged and sprawl in a group, as I imagine they would in habitat.

... from Mrs. D. Malcolmson (N.Z.)

Your letter and sketch of *Cleistocactus* safely to hand. I personally do not know very much about these plants, but have been along to one of our members in Auckland who does have a number of these plants growing in the ground, under cover and one he has picked out as being similar is what he calls *Cephalocleistocactus*. He does not have a name but the plant did have an FR number which he has now lost. He thinks it is the only one of its type with a yellow flower and I am having a slide of the flower copied to send to you.

... from H. Middleditch

The slide received from Mrs. Malcolmson showed a basically yellow flower standing pretty well straight out from the stem, quite characteristic of a *Cephalocleistocactus ritterii*; I don't think however, that this is closely related to the species on the cover of this issue. Although I see no sign of any hybrid characteristics in the stigma form, the shape of the petals round the mouth of the flower, or in the colour, nevertheless I agree with the comment from Mrs. MacIntosh that the general stance of the flower in growing upwards and outwards from the stem bears a close resemblance to the flower stance on a *Borzicactus* and it is this particular feature which, to me, sets this particular *Cleistocactus* apart from any other flowering species which I have seen myself.

... from Mrs. E. Pye (N.Z.)

The sketch of the *Cleistocactus* is most intriguing, but I am afraid that, so far, I can't put a name to it. I have been waiting until a plant of my own flowered — a first flowering — and a very generous one, too. It grew from a piece I had given to me by a friend in Canterbury. My plant is not the same as yours, alas, as tonight's dissection and examination has proved, although in the bud stage with its red tube etc. I thought it might have been.

... from Mrs. R. Howard (N.Z.)

Your letter came at an opportune moment as I sent the sketch to a friend near Christchurch who might have known it. He says "Now to the *Cleistocactus* without a name. My plant is Mrs. Grieg's original plant and is a *Ritter* introduction of the early '60's. It is quite an attractive species. In my collection here at Springton it never makes a great burst of flowers, but it is hardly ever without flowers. I even have some open at the moment (midwinter). I am sorry that I cannot be of more help in naming the plant". My copies of *Ritter's* early catalogues are in the hands of the local bookbinder at the moment, but from memory I recall various *Cleistocacti*. I might even be able to find the name of one of the batch, given time.

Yes, I have seen this performance of a flower "putting out its tongue" before opening, or at least this is what we call it. Is it due to the climatic conditions at the time, the absence of strong light perhaps? It can occur in *Cleistocactus* spp., *Lobivias*, and *Epyphyllums*, to name a few, but memory eludes me as to just which ones. This is something to watch for next summer.

... from G.J. Swales

In my collection I have a *Parodia* which produced a nice crop of buds and when these reached the stage at which another day would probably have seen the flowers open, the stigmas all popped out from the top of the unopened petals. I had already felt that the collection was due for a watering and this rather unusual performance drew my attention to this plant; when I had a good look I found that the compost had pretty well dried out. I gave it plenty of water and the flowers quickly opened, although they were rather small and the style held the stigma higher than normal above the rest of the flower. But the petals grew up to normal size in the course of a day or two and the flower then assumed its normal form. Could the incidence of the projecting stigma on the un-named *Cleistocactus*, as described by Harry Middleditch, be due to the plant having been rather dry at the time of flowering?

I have had a look at the close-up slide of the stigma taken at the time when the flower had already withered; it is possible to see in the slide that the flower petals are crumpled and shrunken. However, the stigma does not appear to have withered at all and it is possible to see the receptive papillae on the stigma lobes. I am very puzzled that the stigma should apparently still be receptive when the flower has withered, for in that condition there would appear to be no incentive for a humming bird to pay it a visit.

But is it the inner surfaces of the stigma lobes which are receptive to pollen? These inner surfaces are covered when the stigma is first exerted with the stigma lobes close together in a club-like bundle and are only exposed when the stigma lobes spread open. Could it be that the receptive surfaces are on the outer parts of the stigma lobes? Do the stigma lobes open wider as the petals wither because the receptive area of the outerfaces is also withering and shrinking at the same time?

... response from H. Middleditch

Anyone suggesting that a plant in my collection might have been left to go too dry would normally be on fairly safe ground; but although this particular *Cleistocactus* was in a clay pot and the weather was pretty sunny and warm during the flowering period when I made the observations on stigma exertion, I was plying the plant pretty freely with water at the time. It so happened that there were one or two plants including this *Cleistocactus* which I was particularly anxious to try and encourage to flower and my watering was decidedly more regular than might otherwise have been the case. So I would be surprised if the plant did find itself short of water in this particular instance — and of course, the rapid stigma exertion from the unopened flower was noted on three quite separate occasions.

Regarding the delayed withering of the stigma; a flower petal has a very large ratio of surface area to volume, so that once the water supply from the plant has been cut off from the petals, the petals could be expected to dry out and shrivel quite rapidly. On the other hand, the style has a much lower ratio of surface area to volume, and much of the surface area is closely enveloped by withering petals. The rate of water loss from the stigma and style will thus be slower than the rate of water loss from the petals. In these circumstances, the style could be expected to retain its turgid appearance much longer than do the petals — possible even for the two or three days that the stigma was observed to remain turgid after the petals withered.

This assumes that the water supply from the plant to both the petals and the style is cut off at the same time. The water supply may possibly continue to the style even after it has been cut off from the petals, thereby retaining the receptive style after the petals have withered. Could this be determined by cutting a flower off the plant body just before it starts to wither? It may be possible to observe whether the petals and style both wilt at the same rate or at different rates. If they do wilt at the same rate on a detached flower, this would suggest that the plant maintains a water supply to the style after the petals have withered. Which would immediately bring us back to Geoff Swales's question — to what purpose? To catch pollen off moths blundering around the flowers in the dark, perhaps?

... from D. Supthut

With regard to the slides of the *Cleistocactus* flowers, I stayed for a few days last week with Dr. Cullmann in Menton, with Marcel Kronlein at Monaco and also with Mr. Marnier at his splendid garden 'Les Cedres'. All three told me that they know this plant, but they have not been able to identify it. This plant is also cultivated at the "Jardin Exotique" and at "Les Cedres" as *Cleistocactus* sp. I believe that it is possibly a species from the group around *Cleistocactus smaragdiflorus*. In spring, when our *Cleistocacti* come into flower I will make a comparison with your slides.

... from P.H. Sherville

The slide which I showed at Brooksby of a section of the flower on my *Cleistocactus smaragdiflorus*, just as it was about to open, may well explain the sudden exertion of the stigma. The style is evidently longer than the enclosing flower, but the unopened petals keep it enclosed so the style has to bend into a series of waves. When the tips of the petals start to open, the style will no longer be restrained in its concertinaed state and will straighten out, pushing the stigma well out of the mouth of the flower. From the times quoted by Harry Middleditch it looks as though it only takes about an hour for the stigma to straighten out.

... reflection from H. Middleditch

And when I look closely at my flower section of *Samaipaticereus corroanus*, I see that this style, too, must have been constrained in a wave. So that will be why I thought the stigma was a little further above the anthers on the second flower — because at the particular time in the flower cycle that I looked at it, the stigma was indeed further above the anthers.

SAMAIPATICEREUS CORROANUS CARDENAS By R. Czorny

Translated by H. Middleditch from K.u.a.S.

This *Cereus* from Bolivia (El Puente de Samaipata) was a tree-like plant some 3.5m high at its natural habitat, according to the statement by Backeberg (*Kakteenlexikon*). The individual stems are 4-6 ribbed, in the young growth often only 3 to 4 ribbed. The profusely appearing flowers are tubular and open barely as broad as the tube during the night. They are about 5cm long and are slightly bent. Colour white, outer petals whitish green.

In addition to this plant Backeberg only spoke further of *Samaipaticereus inquisivensis* Cardenas, which exhibits almost the same flowers. At that time there was, moreover, a further undescribed species known: *Samaipaticereus peruvianus* Johnson. The illustration (in K.u.a.S. — H.M.) shows the top of the stem of a plant 5-6 years old with a free root run in my greenhouse. It is now about one metre high, only a solitary stem and still no tree. It flowered for the first time with 9 flowers altogether, that came into bloom one after the other. The photograph was taken early in the morning. We had confirmed that the flower was slowly starting to close up.

In cultivation this slim stemmed cereiform plant needs no special attention.. It prefers a bright and warm spot but at ground level its relatively slight diameter (about 1.8cm) stem does not want to be in full sun. During the growing period from March to September it accepts generous waterings with liquid feed. In winter it should be at a temperature of 10°C with the compost not completely dried out.

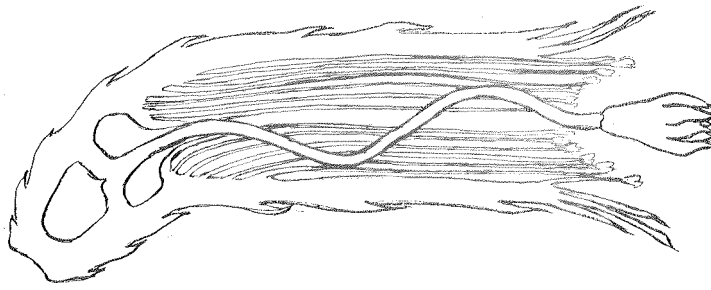
Comments

... from H. Middleditch

In my own collection I have two plants of *Samaipaticereus corroanus*; one of them is of unknown origin and is growing fairly well in a 3" clay pot, the other being in a 4" plastic pot. This latter plant was obtained from a Chileans member from Grimsby who was selling up his collection. On the one-day expedition from Durham to Grimsby to bring back the complete collection, the plants filled (or perhaps "overflowed" might be a better description) one car and one van, but apart from the odd spine or two being broken they came back virtually undamaged. On return, the plants were priced individually to cover the outlay in purchasing the collection and then lots were drawn by the participants to select purchases, the *Samaipaticereus* being one of my acquisitions.

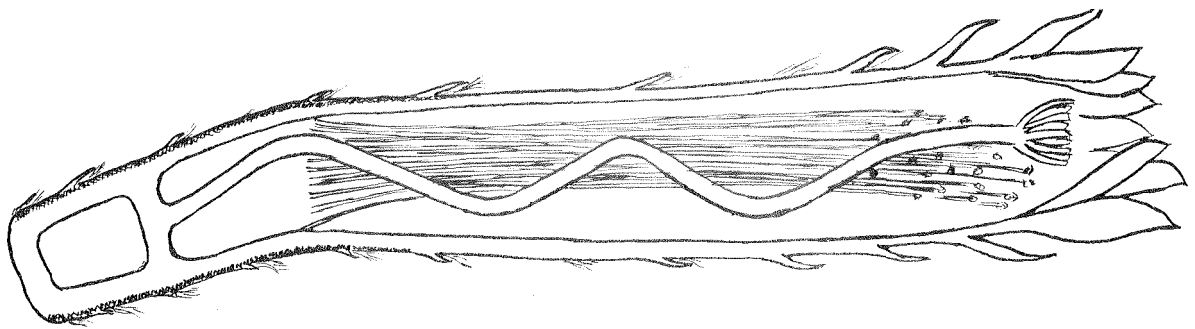
This plant was a single stem about 30" in height and had, we were told, been grown from Winter's seed. The base of the stem was about 2cm broad and was going corky in places. Whether it was dislike of its new quarters or some more specific cause, but in the following year the top of the stem started to show signs of being unhappy and eventually dried up. (A number of my *Cleistocacti* dry up at the growing point in a similar manner). When the few inches at the top of the stem had dried off completely, it was broken off the plant — not cut off. No further deterioration appeared at the top of the stem, but equally, no new growth took place.

In the following summer some new growth appeared at the two uppermost areoles at the very top of the truncated stem. At first I took these to be new branches, but when they were a little larger than match-head size their appearance began to suggest otherwise. Quite shortly thereafter it became apparent that they were, indeed, a pair of buds. By the time they were about 1cm long they were a fairly distinctive carrot shape, with a flat top, tapering outwards slightly away from their point of attachment at the areole. As the buds grew further in length, the very centre of the flat top became slightly depressed. The bud was completely green all over, the sides being fluted by shallow longitudinal grooves.



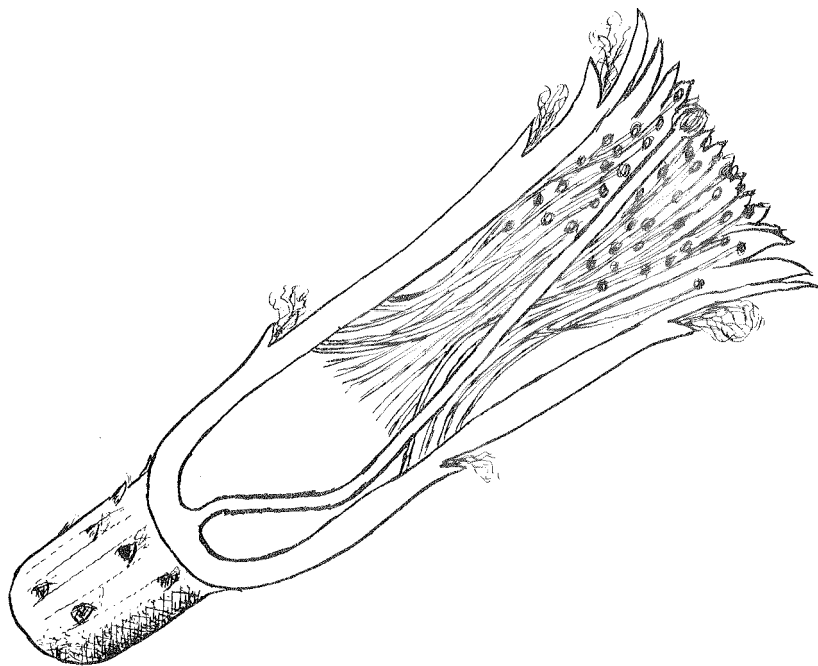
Cleistocactus jujuyensis

CACTUS (FRANCE)



Cleistocactus smaragdiflorus

Collection - P. H. SHERVILLE



Samaipaticereus corroanus

Collection - H MIDDLEDITCH

It carried numerous elongated scales which had some short, dark, woolly hairs projecting from their axils.

When the bud had grown almost to 2" in length, the wool in the crown of the bud had become longer and denser than on the remainder of the tube; a day or two afterwards when the plant was examined early in the evening, it became apparent that the bud was going to open shortly. At about 7.00 p.m. the uppermost sepals opened and exposed the white petals and by 9.00 p.m. the white petals had opened, forming an extension of the outline of the tube and had completely uncovered the crown of the flower. As it was still June, there was sufficient light in the sky well into the evening to take a slide of the flower, although the exposure time ran to nearly 30 seconds.

The white petals projected perhaps one or two mm beyond the external palisade of sepals; these sepals and the petals were very slightly reflexed at 11.00 p.m., so that in the preceeding two hours the flower had opened but a very slight amount further. By the following morning when the sun was coming up, the flower had already started to wither.

The second flower opened in a similar manner a few days later and a section was cut out of this flower, without removing the flower from the plant. The stamen insertion commenced about 1cm above the base of the style, and further stamens were inserted upwards from there towards the top of the tube. The upper third of the flower was dense with anthers, the middle third thick with filaments, and the lower third completely empty of stamens, the tube being about 12mm internal diameter. The stigma was carried level with the uppermost stamens, the stigma lobes being bundled together like a club.

Some years ago I came across a plant of this species in the Jardin Exotique at Monaco, carrying bright green pearshaped fruits having a coarsely ribbed exterior, and I was rather intrigued to see that both flowers on my own plant appeared to have set seed, including the one that had been sliced in situ. Fruits indeed had set, just the same green colour as the plant body. In the last week in August, the fruit formed by the first flower suddenly expanded from about 15mm tall and broad, and swelled out to a spherical shape of about 30mm in diameter.

Only a day or two after it had suddenly swollen up, the fruit split vertically in four places, the splits running right from the base of the fruit nearly to the underside of the flower remains. The fruit opened up widely at one of the splits, exposing the black seeds embedded in a bright orange coloured pith. The second fruit split in exactly the same fashion at a time interval more or less comparable to the interval between the opening of the two flowers. The fruit which had been formed first fell off the plant a day or two after it had split, followed shortly afterwards by the second fruit.

When taking the slides of the two flowers, I noticed that the stigma on the first flower was clear of the stamens and on the second flower it was surrounded by stamens whilst the top of the stigma was more or less level with the anthers. When this flower was sliced, it would be perhaps half an hour earlier in the evening than when the first flower was photographed. The style was seen to be slightly undulating and not dead straight. It was not until the slide of Paul Sherville's sliced flower was projected on to the screen at our Brooksby meeting that it became clear that when this undulation was straightened out — as it would appear to do in the succeeding half hour or so — the stigma would rise about 5mm above the anthers. To external appearances, the style would appear to have grown 5mm longer, with very great rapidity. Could this be the explanation for the rapid projection of the stigma on the *Cleistocactus* sp.?

WEINGARTIA & SULCOREBUTIA — A Seed comparison By J. Hopkins

I have had an opportunity to take a look at seeds of various species of *Weingartia* and of *Sulcorebutia* under the microscope. Although it would be quite inappropriate to draw any firm conclusions from the relatively few samples examined so far, several points have arisen which could be of interest.

From De Herdt I have obtained seeds of Lau 335, 337, and 327 *W. torotorensis*. John Donald has described Lau 335 as *Sulcorebutia cylindrica* in the same issue of *Ashingtonia* as he described Lau 332 as *Weingartia purpurea*. In his notes he comments that the seeds of these two spp. are very similar. My seed of Lau 332 from just one of my plants is much larger than anything else in this group that I have yet seen, and considerably different from Lau 335 — and vastly different from the general run of *Weingartia* seeds. But Lau 327 (*torotorensis*) is again much closer to other seeds of *Sulcos* than to the *Weingartia* seeds which I have at the moment. Oddly enough, *Weingartia fidaiana* and *W. neumanniana* seeds would appear to be much more like the general run of *Sulcorebutia* seeds than the main mass of *Weingartias*!

We all know that the fruits on *Sulcorebutias* are very small (as are those of *Weingartia purpurea* Don.) but what are the *Weingartia* fruits like? Small fruits containing a dozen or less seeds might be expected to have somewhat irregularly shaped seeds which are cramped together as they grow to fill the available limited space. One would probably

expect facets on the testa where seeds are abutting and this seems to be the case with the seeds of *Sulcorebutias* and of the two *Weingartias* mentioned above. Where there are numerous seeds in a much larger fruit or in a pulpy fruit, one may not expect much squeezing for space and hence more uniform and similarly shaped seeds would develop. As I have had no personal knowledge of *Weingartia* fruits, I looked around to see what I could find and not very much turned up: Lexikon: *W. fidaiana* — fruits small; some other species, fruits 8-10mm across. *W. sucrensis*, fruits 6mm across. Chileans: *Weingartia* fruits small (No. 25p 8,9); *Weingartia* fruits up to ¾" (No. 25 p.10). In the light of this paucity of information I hope that you may be able to obtain some observations from members on *Weingartia* fruits.

Coming back to the comments made by John Donald in Chileans No. 25, why, I wonder, does he refer to the vast majority of *Weingartias* as being close to *Sulcorebutia*? I would have thought that root form was equally as good a diagnostic characteristic at generic level as anything else? Thus the fibrous rooted *Weingartias* are *Weingartias* and the tap-rooted "*Weingartias*" are *Sulcorebutias*; apart from the tap-rooted *fidaiana* and *neumanniana* there is also the tap-rooted *W. purpurea* which is manifestly no *Weingartia* as witness the flowers, and the fruit, and the seeds, let alone the roots! What sort of root does *W. torotorensis* have?

I would like to get hold of some seed of *W. westii* to find out if this tap-rooted plant fits in with these ideas and of course samples of more species and duplicate or even triplicate samples of species from different sources will be needed to take these ideas further.

... from P.H. Sherville

Two of the Chileans members present at the discussion held at Phil Alcock's brought out an interesting point on the difficulty of producing seed on *Sulcorebutias* — and presumably its general absence from commercial lists is for the same reason. They have found that by pollination with *Weingartias*, reasonable quantities of seed are produced; evidence so far would suggest that true *Sulcorebutias* germinate. Certainly their habitats seem to overlap and they usually flower together; as they seem to be closely related to each other, could this perhaps be a natural self-contained system in habitat? As indicated at Brooksby last year, there appears to be a gradation between *Sulcorebutia* flowers and *Weingartia* flowers, with some *Weingartia*-like *Sulcorebutia* flowers providing a link.

... from H. Middleditch

But I think you will find that where the habitat of *Weingartia* and *Sulcorebutia* overlap, that the *Sulcorebutias* are to be found on the crowns of the hills among the grass steppe vegetation and the *Weingartias* on the valley walls and floors along with thornbush and columnar cacti.

... from J.R. Gooch

I have set fruit on both *Weingartias* and *Sulcorebutias*, 2 or 3 species — or rather I should say that the bumble bees have. It seems very likely that *S. steinbachii* and *S. glomerispina* cross pollinated, being out together last year and several fruits matured. But the reddish tinted fruits never reached much size; one or two dried remains which I have just inspected being about 3mm diameter. They only contain about 4-7 seeds — at least my poor samples do anyway. I do know that they show little change of colour on maturity except to lose the reddish tinge and more or less just dry up.

Weingartia multispina and *W. hediniana* have set fruit most years and *W. cumingii* once. I am not certain that these plants were cross-pollinated — pollen from other plants in flower at the same time may have been responsible. These fruits have more obvious scales than the fruit on *Sulcorebutias* and are not so flattened. *Weingartia multispina* in particular has very red scales that contrast with the very pale yellow fruit body. All the *Weingartia* fruits turn yellow at maturity before going soft and then drying up. I believe they should split at the base, but mine never seem to contain many seeds and the ovary wall just dries onto them leaving them clearly outlined inside.

... from P.H. Sherville

My *Weingartia sucrensis* did set fruit — just one! It was about 4mm across, hemispherical below and tapering up to the flower remains. It was initially green in colour and it just gradually dried up and the walls shrank on to the seeds inside. There was also a fruit set on *W. longigibba* but I only found out it was there when the ripe seeds appeared exuding from the dense wool! So the only thing I can say about the fruit on this plant is that it must have been small.

. . . . from T. Lavender

Our plant of *Weingartia longigibba* produced a bright green fruit rather like the colour of the bright green buds. The areoles are so woolly that the fruit is nearly half buried in the areole wool.

. . . . from R. Mottram

The number of seeds in fruits of *Sulcorebutias* is comparatively small to say, an *Echinopsis* or *Lobivia*. To quote a few examples — on *Sulcorebutia arenacea* the mature fruit is 8-9mm in diameter, red-brown in colour, splitting on ripening by a split along the uppermost third of the circumference, to reveal black seeds embedded in a white pulp formed from the funicles. Once split, the fruit dries very rapidly and the seed must be quickly gathered before it is lost. On one plant there were eight fruits containing 55, 9, 29, 8, 21, 6, 51, 49 seeds — average 28.5 seeds per fruit; on another plant there were twelve fruits containing 10, 12, 5, 17, 27, 31, 26, 50, 8, 11, 40 & 54 seeds — average 24.3 seeds per fruit. Mean average for both plants, 26 seeds per fruit.

On *Sulcorebutia lepida*, the character of the fruit is similar to the foregoing, but tends to dry even more quickly at maturity. On one plant the ten fruits contained 36, 61, 42, 19, 29, 81, 79, 56, 51 & 44 seeds, an average of about 50 seeds per fruit. On *S. steinbachii* only two fruits were observed, containing 62 and 63 seeds; this particular species has a fruit which stays dark green all its life. On *Sulcorebutia breviflora* only one fruit was observed and this contained 29 seeds. On the pale spined forms of *Sulcorebutia tiraqueniss* v. *electracantha* the fruit is pale green throughout its life and I am inclined to think that the fruit colour depends on the pigmentation carried by the flowers and spines.

The fruits on *Weingartia corroana* are indeed very similar to *Sulcorebutia* and *Rebutia*; they are 4 to 5mm diameter, at first greenish, soon ripening to reddish, then drying. Fruit wall disintegrates rather than splits. Whereas some of the more fleshy-fruited *Sulcorebutia* tend to swell a little on ripening, *Weingartia* fruits tend to stay the same size. Only three fruits collected, containing 30, 115 and 145 seeds, average 97 seeds per fruit. Seeds are smaller and more closely packed in this species than in the "gymnocalycioid" *Weingartias* or the *Sulcorebutias*. On *Weingartia fidaiana* only one fruit was observed, containing 21 seeds — this fruit has larger scales than others in this group. On *Weingartia neummanniana* again only one fruit was observed and this contained 29 seeds. The fruit was very similar to that on *W. fidaiana*.

. . . . from P.A. Smart

During the past summer I have set seed on a number of *Weingartias* and I have also been able to observe fruit set on *Weingartias* in other local collections. The fruits are round to turnip shaped, usually about 5 to 6mm tall and broad; colour varies from pale to darker brown, with scales which are more or less conspicuous. Maximum seed count was up to 150 per fruit. (A detailed schedule of the species by species observations will appear in a future issue of *The Chileans* — H.M.).

A CACTUS WEEKEND IN ATTERSEE

Slide show by Dr. Stieff. Translated by K. Wood-Allum from the G.O.K. Bulletin for November 1972

During the course of Dr. Stieff's slide lecture, we saw the genuine *Sulcorebutia steinbachii*, corresponding to the first description. A variety of it, listed earlier by Rausch as *S. vasquezii* and now according to Rausch *S. steinbachii* v. *horrida*, because of its strong black spines. A form of *S. menesesii* distinguished by its curvy flower arrangement with close, somewhat curved spines. Then the plant which Rausch says is his most beautiful discovery so far, *S. alba* with completely pure white spines, dark red flowers and very floriferous. *Sulcorebutia vasqueziana* has long, somewhat curly spines and is close to *S. verticillacantha*. A form of *S. sucrensis* from the 1964 expedition, then the well known *S. frankiana* with characteristic spines. Rausch has named this handsome plant after the well known cactus collector and investigator Ing. Frank from Vienna. It has two flower forms, one with a yellow throat, the other with a consistent lilac magenta-red flower.

Then came *S. mizquensis* or *S. verticillacantha* var. *mizquensis* R 194 and then *S. verticillacantha* v. *cuprea*, with clearly copper coloured epidermis. *Sulcorebutia crispata* has spines which are not protrusive but more adpressed and interwoven. *Sulcorebutia canigeralii* has several forms, the flowers either lilac, magenta-red or lilac and orange, or orangish. *Sulcorebutia flavissima* couldn't be left out, it is not so rare and can also be seen at the Linz Botanic Gardens. It looks like *S. tiraquensis* but is different in the flower.

Sulcorebutia markusii is particularly pretty with its dark blackish brown epidermis, even the buds are peculiar in that they can also emerge from close to the crown. *Sulcorebutia lepida* can be very different in coloration, from red to reddish brown or even yellow spines which are long. *Sulcorebutia pampagrandense*, a discovery from the 1964 Rausch expedition, is also very floriferous.

The extraordinarily beautiful *Aylostera heliosa* was of course obligatory but then followed the latest discovery, *Aylostera castanea* with chestnut brown spination and red striped flowers. We should not of course forget *S. eos* — said to be variously a *Mediolobivia* or a *Digitorebutia*, whose flowers are literally named after the dawn sky (Greek “eos”). *Digitorebutia albopectinata*, was another of Rausch’s discoveries and only recently described in *Succulenta*.

Then followed member’s choices — first *Lobivia maximilliana* from Herr Matsch of Salzburg, which he himself had found on a collecting trip with Herr Hoffmann and presented to him; then from Herr Till, *Lobivia cachensis* with very long spines and beautiful flowers. Herr Matsch had been very grateful to receive *Lobivia pusilla* (the miniature one), named on receipt as *pseudopusilla* but after flowering yellow, recognised as *pusilla*. The plant flowers early but then goes on through summer and autumn, which few *Lobivias* do. Then a new, or rather an old rediscovered plant, *Lobivia dobeana*. Rausch thought it was *L. aurea* but after it had flowered red, realised it was *L. doblana*. Yet another Rausch discovery of *L. famatimensis*, now described as *L. pectinifera* with a white flower. *Lobivia schreiteri* also flowers readily and grows splendidly on its own roots. The last one we saw was a typical flower of *L. jajoiana* which however, stems from *L. glauca*, under Rausch number 217, newly described in *Succulenta* as var. *paucicostata*.

Comments

... from J.R. Gooch

Sulcorebutia menesesii has a very dense covering of spines that are often curled and flexible and stand out from the plant body. They are chestnut brown at first but fade in age to light brown or cream. What ever is meant by the expression “curvy” flower arrangement? No feature of the flowers that I have observed could be described as curvy.

Sulcorebutia alba has a deep purple tinted body that emphasises and contrasts with the white spines beautifully. My plant, grown from seed ex De Herdt, is forming a nice clump now, having produced two complete rings of violet flowers in the spring. This must be one of the showiest species.

I am interested to see that *Sulcorebutia canigueralii* can flower lilac or magenta as well as the more frequently met with crimson, or orange with a yellow throat. I would have thought a lilac flowered *S. canigueralii* would be very difficult to distinguish from *S. zavaletae*.

... from H. Middleditch

Regarding the “curvy flowers” the original article stated “Kurvigen Blütenanordnung” which might perhaps be rendered as curvy flower arrangement. Could this be making reference to the flowers appearing as if lying on a curve, which is to be expected if they are from adjacent areoles on a spiral? A number of *Sulcorebutias* appear to exhibit areoles arranged in a series of spirals, one series curving in one direction and a second series curving in the opposite direction, similar to the well-known Fibonacci spiral arrangement of tubercles on *Mammillaria* and also to be seen on *Parodia*, *Neochilenia* & *Lobivia*.

SULCOREBUTIA CRISPATA Rausch sp. nov. By W. Rausch. Translated by E.W. Bentley from K.u.a.S. 21.6.1970

Simplex ad proliferans, 25mm alta et ad 35mm diametens, viridigrisea, radice rapiformi; costis ad 13, spiraliter in gibberes 5mm longos dissolutis; areolis 4mm longis; aculeis marginalibus ad 24, ad 8mm longis, circa corpus arachnoideo-contextis, valde arcuatis, tenuibus, vitreo-albis ad roseo-brunneis basi flavida incrassata; aculeo centrali nullo. Floribus ca. 30mm longis et diametentibus, albo-ad atro-magentis.

Patria: Bolivia, Tomina ca. 10km ante Padilla, 2,400m alt. Typus Rausch 288 in Herbario (Naturhistorisches Museum Wien).

Solitary to sprouting, 25mm tall and up to 35mm diameter; epidermis grey-green. With a tap-root; ribs up to 13, spirally broken up into 5mm long humps; areoles 4mm long; outer spines up to 24, up to 8mm long, spread spider-like against the body, strongly curved, fine, glassy-white to brownish-pink with a yellowish, thickened base; centre spine 0. Flower ca. 30mm long and in diameter, light to dark magenta. Habitat: Bolivia, Tomina, ca. 10km before Padilla at 2,400m.

Comments

... from H. Middleditch

In 1975 I obtained a plant of *Sulcorebutia crispata* from SPI at Wiesbaden: it was a solitary head of 35cm in diameter and height. The lowermost part of the body was pale brown and somewhat corky, partially devoid of spines;

the rest of the body was green although the spine cover made it difficult to discern the epidermis colour. The plant certainly looked like an imported specimen. It has grown a little in cultivation and maintained the same body habit. The tubercles appear to be arranged not so much in ribs as in diamond spiral fashion, like those on *Copiapoa humilis*. There are no distinct chins visible on the tubercles. The areoles are long and thin, almost 5mm long and less than 1mm broad, with very short off-white felt. The upper part of the areole terminates at the node between adjacent tubercles and the areole runs over the top of the crown of the tubercle. The upper end of each areole is higher up the plant than the lower ends of the adjacent areoles up the left-hand and right-hand spirals. The spines are virtually dead white, very fine, and number 18 or twenty per areole, pectinate, spreading sideways, those near the top and bottom of the areole pointing a little more upwards and downwards respectively. The spines are curved, some slightly, some markedly and most areoles display one or two pairs of adjacent overlapping spines. The individual spines may be distinguished more clearly by using a hand lens but even then it was not possible to discern any yellowish colour or swollen base at the foot of the spines.

Two offsets are now appearing from the corky base of the plant and also in 1976 two green, bluntly pointed buds appeared from about the junction of the green and corky parts of the plant. The flower opened out to about 35mm across, of lilac-mauve colour, the petals curving away from the ovary in a sweeping trumpet shape. The flower gave the impression that it was a little larger than any other flower I have seen on *Sulcorebutia*. One of the flowers appeared to have set seed — no brushing was done on the flower but the hot summer perhaps led to an even greater number of bees and hover flies finding their way into the greenhouse than usual. After a couple of months the fruit seemed to have shrunk and was a dirty brown colour.

From the handy compendium on the genus *Sulcorebutia* by Brinkmann, it is evident that this species (with the sole exception of *S. tarijensis*, widely separated from the remainder of this genus) is at the south-eastern limit of distribution of *Sulcorebutia*. The trail eastwards from Sucre passes through Yamparaez, Tarabuco, Zudapez and Tomina to Padilla, following the watershed between the Rio Grande and Rio Pilcomayo. To the southeast of Padilla, the trail, by numerous climbs and descents, gradually drops towards the lowlands of the Chaco. Although information on the vegetation regime around Padilla is conspicuous by its absence, my large scale map of Bolivia shows numerous hamlets in this area, suggesting that the natives find that the soil and climate support cultivation, to some extent. The area round Padilla falls within the zone of grassland, meadow and brushwood characterised by cool yet fairly moist climate, but there is no evidence yet available to indicate whether this (or any other) species of *Sulcorebutia* grows under these particular climatic conditions. The Lau field number list gives us Lau 394 *S. crispata* from the same location as Rausch's discovery, at 2,600m altitude. It also gives Lau 390 as a variety of *S. crispata* on the "road to Azurday". The road from where, one wonders, and how far along?

... from A.W. Craig

I have a specimen of Lau 394 which I obtained from Sargent; this plant looks just like the plant illustrated alongside Rausch's original description of this species in K.u.a.S. In addition, I have a plant of Lau 390 which looks nothing at all like *S. crispata* — it has far fewer radial spines and each areole has a single, slim central spine about 5mm long which stands straight out from the body. I also have two plants of *Sulcorebutia* Lau 391, which come from Sopachuy; this place is even further south than the location of Lau 394 and so should qualify as the most south-east outlying species of *Sulcorebutia*. These two plants are labelled *S. verticillicantha*. Another plant which I obtained with the label *Sulcorebutia* Lau 394 is nothing at all like *S. crispata* and looks much more like my two Lau 391, so I assume that it has been incorrectly labelled. As well as these, I have two plants of *S. sucrensis* which have a spination which is very similar to the so-called *S. crispata* owned by Harry Middleditch, whose plant does not look to me like the picture alongside Rausch's original description. I would think the label on this plant should be changed to *S. sucrensis*.

... from H. Middleditch

In addition to the plant of this species from S.P.I., I also have a rooted offset of Lau 390 from John Hopkins; this little plant certainly exhibits the spine clusters with the slightly wavy ends crossing through the spines from the adjacent areole and standing slightly away from the body; when this plant is placed alongside the specimen from S.P.I., I will admit that they are not identical but I am still inclined to retain the name on the latter plant.

... from J.R. Gooch

I have been a bit puzzled by the apparent variability of *Sulcorebutia crispata* since I obtained my first two plants from Uhlig, some 3 or 4 years back. One had a pale green body and dense fine white spines standing out from the plant; the other had a light purplish body and more open curled white spines. I felt sure that these two were different until they flowered, but the flowers were identical. Since then I have obtained 2 more specimens, one much more pectinately spined, the other with much more of the purple body exposed. Plants I have seen in other collections have

revealed similar variations. A plant of HR 27 Sulco. *crispata* shows a rather more pectinate spined appearance than is typical.

The description in K.u.a.S. certainly describes a "yellowish thickened foot" to the spines, but this is not discernable on any of my plants. However, I shall be re-examining all those which I come across very carefully in future to see if I can observe this particular feature. Now I am unable to say with certainty from memory if *S. crispata* exhibited one or two series of stamens, but I do feel sure that the outside of the flower tube is similarly coloured to the petals in all instances. I would agree that there is apparent likeness between *S. crispata* and *S. sucrensis*, but in my experience *S. sucrensis* is always narrower bodied, short cylindric in shape, compared to the generally much more globular *S. crispata*; in addition, the spines always have a "neat" pectinate appearance.

... from J. Hopkins

My three larger plants of Sulco. *crispata* (2 of Lau 390 and 1 of HR 27) are all very similar with 13 spiralling ribs and midgreen to reddish tinted green epidermis. The areoles are very long compared to their width, about 5-6mm x 1mm and bear 25-32 thin, flexible more or less appressed spines 5-10mm long, the lowest 5 or so thinner, almost hair-like and generally shorter than the rest. Spine colour varies from pale straw-yellow (Lau 390) to pale brownish (Lau 390) to grey brown (HR 27). A small propagation from V 587 has white spines. Areoles are about 5mm apart and consequently the spines interlace and cover the body, for spines develop as soon as new areoles appear at the apex. Bodies are about 2.5cm high and 3.5cm diam. at most, sometimes solitary; there are two heads of this size on one Lau 390; but they usually offset freely around the base when 2cm or so in diameter. The second plant of Lau 390 and the HR 27 are like this.

Flowers are various shades of magenta and appear freely around the lower sides of the stem. The typical size of flower with petals opening fully in suitable conditions is 3cm long and 3cm in diameter. Although there is an apparent separation of the stamens into two series on my slide of these plants in flower which was shown at Brooksby this year, I have noted quite a few *Sulcorebutias* showing this characteristic when the flowers first opened. The stamens are much more uniformly distributed inside the flower on the second day. I remember first noticing this with *Weingartia purpurea* Lau 332. Reverting back to the appearance of the spines, these are indeed somewhat more outstanding in the yellow spined Lau 390 and the areoles are a trifle broader.

I see that Rausch considers that *Sulcorebutia crispata* and *S. sucrensis* (and others) to be forms of *S. verticillantha*.

NEOPORTERIA FLOWERS By O. Porsche

Translated by E.W. Bentley from *Bestäubungsleben der Kakteenblüte*, Jahrbuch. Deutsch. Kakteen Gesellsch. 1938-39.

While the allocation of bird-flower cacti to the flower-types of bird-flowers set up by E. Werth, normally occasions no difficulty, there are nevertheless cases in which this is rendered more difficult, when the flowers in the course of their flowering life go through various stages of development whereby their appearance is so altered that they seem at different times to belong to different flower-types. This state of affairs is apparent in the situation pointed out by Johow for *Chilenia chilensis* and *Chilenia acutissima* in habitat. Johow, it is true, has given no pictures in his work, but his description is so clear that from reading him one imagines one is seeing the flowers for oneself.

According to him, the flowers of both these species go through three developmental stages. In the first flower stage the inner corolla leaves (petals) enclose the stamens completely and the style for the most part, so that merely the end of this with the unreceptive stigma sticks out beyond the false-tube formed by the corolla leaves lying close together. Flower-ecologically speaking, then, this forms, through the false tube formed by the inner corolla leaves together with the reproductive organs enclosed by it, a "secondary flower" or a "tube flower" within the flower, just as in the iris each style with the stamen below it together with the associated perianth leaf forms a lip-flower (cf. Troll 1928 pp 310-317). This stage lasts longest — certainly for 2-3 days. During this time ripe pollen is emitted from the anthers; the flower thus exhibits protandry (ripening of the stamens first), which is widespread in the family. The next (second) stage is distinguished from the first merely in that the stigma has become receptive, its branches (lobes — H.M.) have spread out star-wise and its receptive surfaces have developed. In the two first stages then, the visitor is presented first with pollen and then the receptive stigma. These two flower stages occur then, in my terminology, at the "high-point" of the flower when, as a rule, nectar production is at its richest. Since both pollen uptake and shedding can occur during the "tube-flower" stage, the above two species would be allocated to the "tube-flower" type. In the third and last stage the inner corolla leaves (petals) bend outwards, starwise, and the flowers now represent more a "bell-flower". The second and third stage last merely hours.

Consequently I interpret the flower biology in the following manner: for pollination the first two stages are critical and include the "high-point". The flower is a bird flower of which the false "tube-flower" represents the vital stage for the purposes of pollination. During the first stage the humming bird receives on its visit, pollen, on the beak base or brow — or more rarely throat — according to the length of its beak, which, in the second stage, becomes transferred to the stigma. The outer spread-out corolla leaves (petals) contribute to the enhancement of the display in the first two flower stages, which however is already provided by the inner petals. In the third flower stage only pollen uptake by the bird is possible, so far as pollen remains available, since by this time the stigma has already wilted. This last stage immediately precedes wilting of the flower.

Because of its structure the flower can only be pollinated by a visitor hovering freely before it — besides humming birds, then, only by day-flying hawk moths of suitable body size and proboscis length designed for nectar drinking. However, perhaps for the above-mentioned reasons, in habitat the humming birds are their decisive pollinators. Johow observed neither humming birds or butterflies as visitors, but merely in the second and third stages small bees on the search for nectar and pollen, which however do not come into consideration as cross-pollinators of the flower. Although, as he strongly emphasized, self-pollination is completely excluded in both species, most plants set fruit, so that in his opinion the decisive pollinator cannot be rare. In my opinion these are humming birds, which by their lightning-swift appearance and disappearance can, in the space of a few seconds, exploit or pollinate all the flowers of a stem and which one can therefore only surprise in their flower-working if one waits — if possible undetected by them — a fairly long time for their visits.

The state of affairs established by Johow for the *Chilenia* species is also of interest in that it perhaps makes understandable the differences in presentation in pictures of *Mamilloopsis senilis*, the flower-life of which possibly runs similarly. The species has been figured on the one hand as a tube-flower with projecting stigma, and on the other as a quite long-tubed bell-flower with a perianth opening flat and spread out at right angles (Schlumberger 1853 p.334, Fig. 61-62, Duursma 1935 p.134). Following the behaviour of *Chilenia chilensis*, the first picture corresponds to the first — the other to the third — flower-stage of this species. *Mamilloopsis* would differ principally however from *Chilenia chilensis* that in the first and perhaps also the second stage all the outer perianth leaves are appressed tube-like, while in *Chilenia* only the innermost do this.

In the figure of *Chilenia chilensis* (Bluhende Kakteen III, Plate 138 as *Echinocactus*) the situation observed by Johow was not quite made manifest. It is therefore possible that the same will be found in other representatives of the family. Particularly the species of the old genus *Echinocactus*, in natural habitat and in cultivation, should be studied comparatively.

The situation in *Chilenia chilensis* is in no way isolated in the sphere of the bird-flower. In the main the same phenomenon is shown by various species of the malvacean genus, *Malvaviscus*, of which I have particularly studied *M. arboreus* in Buitenzorg (Java) and Costa Rica and was able to make observations on its pollination (see Porsche 1905 p.3). As can be seen in Figs 59 & 60 the five completely free corolla leaves (petals) are, by inherent design, drawn together into a tube which leaves free only a small entrance-opening at its mouth. From the corolla tube projects the stamen-tube with the anthers and stigma. At the "high-point" of the flower the corolla tube is very turgid and at the same time the style is strong and elastic. The flower is a definite humming-bird flower. It offers bees no alighting facilities. The tube entrance allows only space for the insertion of the delicate beak of the humming bird. Hovering freely in front of the flower the humming bird inserts its beak and in so doing pushes back the elastic style, receives pollen on its brow and gives it up to the stigma. When the bird leaves the flower the style column comes back into the centre. Immediately after the "high-point", when the flower begins to fade, the corolla leaves open, separate, and the corolla becomes campanulate. At this stage however the flower has everything behind it, it has already been pollinated. The flower then at its high-point is a tube flower, but a bell flower in the final stage before wilting.

Comments on protruding stigmas on *Neoporteria* flowers

... from P.D.R. Allcock

About two years ago I purchased an imported plant of *Lau 858 Neoporteria gerocephala* from Tom Jenkins at his nursery. This looked as though it was little more than a remnant of a plant, with a thick root about 3" long which tapered from about 1" in thickness at what was (presumably) the top, to a blunt end some ½" thick. I think that the original head must have been chewed off by some animal or other and a fresh head had then grown from the residual root; this head was just a dirty grey-brown stump about 1½" in diameter and to judge by its appearance it seemed to have been buried below ground level. Growing out from the side of this head in turn was the most recent growth, a slightly larger head but this time covered with a mesh of closely overlapping bristly spines. To allow this latest head to face upwards in its pot I had to lay the root horizontally. It became established quite promptly and starting putting out a fresh offset.

Round about the end of December I was quite surprised to see a pair of buds appearing out from the spines of this latest offset — it would have been difficult to see them any earlier because of the interlacing spines. Despite their appearance at a difficult time of year, I was determined not to lose the buds, because it was an imported plant and I had not previously flowered it, so I gave it dribbles of water on warm days.

When the flowers finally opened they were well over an inch tall, much higher than a *Neoporteria rapifera* and probably about 1½" high. The flower was the typical *Neoporteria* form, with the outer petals expanded and the innermost petals unopened. The flowers actually opened when there was nothing else in flower in the greenhouse so I happened to take particular notice of them; when I first saw the flowers open the yellowish green stigma was protruding out of the pinky-violet petals. The flower remained in this condition for two days (possibly three) and then the inner petals opened out; the flower then remained in this condition for a considerable length of time — possibly as long as a week. This happened during a spell of very cool weather — I doubt if the temperature was above 65° F in the greenhouse over this spell and there was no sunshine to speak of.

.... from H. Ewald

Some of my *Neoporterias* do push the stigma out of the flower before the inner petals open — but not all my *Neoporterias* do this.

.... from R. Zahra

From the observations made on the *Neoporterias* (*sensu stricta*) that flowered in my collection, I noticed that the inner petals don't open for a very long time. These will hide the anthers and pollen but the tip of the stigma always protrudes out but very seldom opens. I have also noticed that the inner petals open a little only a few hours before the flower becomes limp. In some cases the stigma protrudes out of the bud many days before the flower opens. In one case on a *Neoporteria* similar to *N. robusta* the stigma was visible out of the bud for 9 days before the flower started to open. This does not happen regularly, but it is common enough that I should mention it.

In your letter you did say that in the last stage the inner petals open. I have observed many cases where the inner petals hardly open enough to expose the pollen. In certain cases to pollinate the flowers myself I had to force open the inner petals to get at the pollen. However I cannot say that it is normal for the stigma to protrude out of the unopened bud, although it is normal for it to project beyond the inner petals which stand up and form a sort of tube hiding the anthers.

As a general rule the *Neoporterias* flower here in the Autumn when the climate is always cooler and there is always a great amount of moisture in the air. It is perhaps because of this that I have noticed that their flowers remain open for a very long time. These flowers also open very slowly and those that do flower in early Spring always take less. The *Neoporteria* similar to *N. robusta* flowered in April, which is late flowering by *Neoporteria* standards. The stigma lobes were closed when projecting through the unopened bud and opened only a few days (probably two or three days) before the flower died.

.... from E.W. Bentley

I have had a look through my record cards and can find no mention of true *Neoporterias* with protruding stigmas. Last year however I noticed that this occurred on a highly floriferous *N. reichei* grown from seed. Also that the stigmas were not protruding on a second plant from the same seed batch. I have previously had two or three *N. chilensis* in flower and more are in bud now, but I have not seen any protruding stigmas. I will watch these.

(Later). You will be interested to know that yesterday, when showing someone round the greenhouse, I noticed two *N. subgibbosa* in bud, each with one bud from which the stigma was protruding. Both flowers were open today.

.... from Mrs. L.E. MacIntosh

The *Neoporteria stricta* will flower right through the winter and into Spring; August will see the larger flowered ones coming in — while these flowers are larger they are the same shape and habit and all in the various rose shades. The German writer was correct, the stigma protrudes very early from the unopened flower and stays like that until the flower dies. The inner petals never open and one never sees the stamens; the outer petals open and often curl right back at no stage are the stamens exposed. Some of these are self-setters, but never set for me without help from a foreign body, the stigma being out of reach of the pollen and the curled inner petals protect the pollen from being blown about by draughts. They are not hard to pollinate as there is always loads of pollen and the petals are easily opened, but they immediately close up fully again afterwards. The stigma lobes do open as the petals open, so the German writer could be correct in part.

Neoporteria wagenknechtii and *N. rapifera* are seldom without flowers in my greenhouse and it appears that sun or heat makes no difference — the flowers are always the same. If you have a look in a copy of Borg (p.305 of 1963 Edition — H.M.) he shows a picture of *N. acutissima* with a typical flower wide open, with the open stigma protruding from the unopened inner petals.

... from H. Middleditch

I have a number of *Neoporterias sensu stricta*, one or two species of which flower each year; some of these plants usually put out a number of buds in late autumn which fail to survive the winter. However, this group have really excelled themselves this spring and there are now over half-a-dozen *Neoporterias* in flower. Amongst these are plants labelled *N. villosa* and *rapifera* — one of the others I would take to be *N. mammillaroides*. They are all the fairly short flowered species. Among these plants only *N. nigrihorrida* var. *crassispina* had the stigma lobes projecting out through the unopened inner petals.

... from G.E.H. Bailey

You refer to the translation stating that “the tip of the stigma projects out of the top of the unopened bud prior to the flower really opening”. Could there possibly be an error in translation here? I have had bloom on six species of *Neoporteria sensu stricta* so far this season and of them none has a stigma protruding from the unopened bud, but both *N. nidus* and *N. coimasensis* have their stigmas exerted slightly beyond the middle petals and this condition lasts throughout the life of the flower. It seems to be a useful device to ensure cross-pollination.

... from P.H. Sherville

My *Neoporteria rapifera* has now opened its bud and the stigma is exerted through the inner petals for a couple of days before they finally open. I will watch *N. microsperma* when that one opens to see if there is a two stage opening of the flower there too.

... further from R. Zahra

One or two of my *Neoporteria sensu stricta* have just started into flower. The stigma was noticed showing out of *N. littoralis* and *N. pseudolaniceps* (n.n.?). However, this does not occur regularly, and even on the same plant not all the buds show this peculiarity. The stigma was noticed up to 10 days before the flower started to open. In fact it was seen when the bud was still very small. The stigma was of course closed and was only seen as a very small yellow-white dot on the top of the bud. It remained closed even after the flower opened and projected out of the tube formed by the inner petals. It opened well only after the inner petals forming this tube started to part a little, almost showing the pollen filled anthers inside. The stigma seems to open up about 2 to 4 days before the flower dies completely. This year I also noticed two buds on one areole on a *Neoporteria*.

... from R. Sharman

Neoporteria floccosa did exert the stigma some five or six days before the opening of the flower. I have wondered if this could be a peculiarity of certain individuals or perhaps the result of weather not being suitable to rapid flower opening — a couple of my *Rebutias* also do this on occasions. The appearance of the stigma protruding from a bud being quite brief when the weather is bright and hot and forcing the flowers to open rapidly.

... from J.R. Gooch

My limited selection of *Neoporterias* have never exerted the tip of the stigma beyond the top of the unopened petals for a day or two before the flower opens, but it is a feature that I have observed quite regularly on *Echinopsis* and *Lobivia*. It appears to occur quite at random; several kinds that showed early stigma exertion last year not doing it this year — and vice-versa. Two very young buds on an *Echinopsis eyriesii* developed their stigma some 3cm beyond the tips of the buds and the petals only caught up with the stigma on the night of opening.

I should point out that in those instances which I have observed, the stigma did not mature until the normal flower opening, or at any rate the lobes remained closed together. With this in mind, together with the fact that it is by no means a constant feature, I remain at a loss to explain why the stigma growth should advance so.

... further from H. Middleditch

At the 1976 Chileans Annual Gathering a number of slides were shown of *Neoporteria* flowers. It was interesting to note that, with one or two exceptions, almost all the flowers had the stigma lobes just visible above the tips of the inner row of petals.

MATUCANA PAUCICOSTATA FLOWERS From H. Middleditch

I have had a grafted plant of *Matucana paucicostata* in my collection for several years now and I suppose that it must have flowered fairly regularly for the last three or four years. The buds first appear as small humps of pale grey wool very close to the growing point and take absolutely ages to show any signs of growing larger. Once signs of growth become a little more obvious, it only seems to take about a week for the buds to get to about an inch or so high — and then they seem to get about half as high again almost whilst you look at them, although it probably takes a day. This is a pretty sure sign that the bud will grow to about double that height within the following twenty four hours or less and that the flower will probably start to open before the next day is out.

The flowers always seem to come out together in perfect unison, two or three or four at a time. Last year produced two such flushes of flower but the plant really excelled itself in the previous season by producing four bunches of flowers, each separated by an interval of a few weeks.

This year the last batch of flowers failed to follow the normal pattern of all three opening on the same day, as one of the flowers had got slightly behind and did not open till one day after the other two. I suppose it was this peculiarity that first caused me to look a little less casually at the flowers and I then noticed that the last flower to open differed slightly from the other two in regard to the relative disposition of the stigma and stamens. This feature was rather carelessly dismissed as being natural variation in the form of the flower and I might have continued under this impression for long enough if, by chance, I had not taken another close look at the flowers on the very next day. Lo! and behold, but all three flowers were now slightly different again in the relative disposition of the stigma and stamens from when they had been examined barely 24 hours before. So presumably the difference seen then was not just natural variation, but a change in the feature of the flower related to the length of time it had been open. So out came the camera, tripod and all the rest of the paraphernalia, rather belatedly, to get this state of affairs down on film.

Having very nearly deceived myself once over the nature of the apparent change in the relative disposition of style and stamens, I now took very particular care to notice their relative dispositions. It became evident from these observations that when the flower initially opened, the stigma is quite positively projecting clear of the stamens and it appears to remain in this relative position during the first day of opening. On the second day of opening, the stamens are more or less level with the stigmas and on the third day the stamens project beyond the stigma; at this stage, the stamens project as far past the stigma, as the stigma projected beyond the stamens when the flower first opened.

This change in relative disposition can arise either by the style shortening slightly or by lengthening of the filaments carrying the anthers. To judge by the disposition of these parts in relation to the petals at the mouth of the flower, it appears that it is the stamens which grow in length after the flower opens.

On the first day of flower opening, it was quite possible to move the plant around for photographing without disturbing any pollen from the anthers. But on the third day of flower opening, any attempt to move the plant immediately led to a little shower of pollen leaving the anthers and cascading on to the lower petals at the mouth of the flower. On close examination of the anthers, these appear to be compact when the flower first opens but on the third day of flower opening the anthers seem to be larger and very fluffy. This suggests that the anther does not open to expose the pollen until either the second or third day of the flower opening.

This sequence of events was discussed at our Chileans '74 Gathering, when we had a *Cleistocactus wendlandiorum* on the table which was in full bud. One of these buds was open on the Sunday morning, with the rich green stigma projecting just short of half an inch out beyond the open mouth of the flower. The purple anthers were still within the mouth of the flower on the morning, but by the early afternoon they had grown out of the mouth of the flower; by Monday, they had caught up to the stigma.

A glance at the colour illustration of *Arequipa rettigii* in Chileans No. 27 p.137 reveals a pile of yellow pollen on the lip of the petals, presumably shed by ripe anthers — but here the stigma is still well above the anthers. Possibly the filaments may extend in length between the time of the flower opening and its final closing, on this particular plant as well as on the *Matucana*.

In the same way that Bill & Yvonne Tree observe (in the article above) that the change in the size from one flower to another on their *Discocactus* could result in two different flower descriptions, similarly a description of a freshly opened *Matucana paucicostata* would include "stigma exerted beyond stamens", whereas a mature flower would be described as having the "stamens exerted beyond the stigma". Would it be necessary to include a reference to this change in the description of the flower on the plant, if we are to avoid a confusing description? If the original author failed to include such a reference in his description, are we justified in modifying the official description for this species to accommodate inclusion of such reference?

This still leaves the central question, why does the plant adopt this mode of growth of the flower? If we are to accept that the anthers do not release their pollen until well into the second day on which the flower is open — as evidenced by the tendency to shed pollen on to the flower petals after that time, but not before, it would appear that the flower passes through a definite cycle. With the stigma exerted beyond the stamens and the anthers as yet unripe, the stigma can only receive pollen carried from another flower. This assumes that the stigma lobes are receptive at this stage of the flower opening. The stamens then extend and the anthers ripen and shed pollen. Is this sequence arranged so that the pollen will reach the stigma and self-pollinate the flower in case no cross-pollination has yet taken place? Is the stigma still receptive under these conditions? Do the stamens extend so that they are far enough out of the mouth of the flower to come into contact with the pollinating bird or insect, whereas the initial position of the stamens does not bring them into contact with the pollinating agency? However, at any stage of flower opening, a pollinating agent will come into contact with the stigma lobes, which do not change their relative position.

If this is the case, then a pollinating agent will only pick up pollen when visiting a mature flower and will only pollinate the stigma on a newly-opened flower. Is this why the flowers on *Matucana paucicostata* all come out exactly at the same time? For a pollinating agent visiting the plant will find only either mature flowers, and so gather pollen, or only freshly opened flowers, which receive pollen from another plant. In other words, is it nature's method of ensuring cross-pollination between different plants and avoiding cross-pollination between two or more flowers on the same plant?

Comments on *Matucana paucicostata* flowers

. . . . from P. Allcock

On a point which came up in discussion at Brooksby — my *Submatucana calliantha* is now producing its third crop of buds (all the same size and growing at the same rate) this year, and no doubt they will, if they make it, all open at the same time as happened with the previous two lots of buds: and for that matter with *S. madisoniorum* var. *pujapatii*, *S. paucicostata* and *S. weberbaueri*. This would seem to suggest that the periods of receptivity of the stigma and ripeness of the pollen in these might bear investigating. Have you any ideas on how one might go about this? It seems to me that it would have to be a very delicate and carefully controlled piece of work.

. . . . from P.H. Sherville

I suppose that the validity of the explanation put forward by H. Middleditch for the change in stamen disposition on these flowers, all depends on the stigma being receptive when the flower first opens, and on its being unreceptive when the anthers are ripe and shedding pollen.

Following the talk on Pollination given to the Brooksby Gathering by Dr. Proctor, I visited him later at Exeter and had a very interesting discussion upon this subject. He suggested that when the stigma is receptive, it is at a slightly higher temperature than the rest of the flower. Apparently this can be checked by taking a photograph of the flower using infra-red sensitive film, which shows up the warmer parts of the flower. I have acquired some suitable infra-red film and will give this idea a try next time I have any *Matucana* in flower.

. . . . from Mrs. L.E. MacIntosh

Using my little brushes as frequently as I do enables me to calculate when certain plants are ready for pollinating. From observation I am inclined to think that the stigma ripens first in most cases. With regard to *Matucana*, *Borzicactus*, and *Seticereus*, the stigma always shows first above the stamens which keep growing after the flower has opened and not until the stamens have grown the required length is the pollen ripe. This must give the flower a second chance to become fertilized, surely! I have carefully sliced open flowers of each sort while still closed and found the stigma quite a $\frac{1}{4}$ " above the stamens, which I removed, then brushed the stigma with ripe pollen and in all cases fruit has set, so this means that the stigma was ripe before the flower opened.

With the *Gymnos* I have often found a very newly opened flower can be caused to set fruit, while nothing happens with a flower on another plant which is on the point of dying; presumably the pollen on the first plant needed the extra time to ripen.

I am not so sure that the stigma lobes need to be open to get pollinated; usually I have loads of pollen so I just dab regardless — however I do prise the lobes apart and take more care if my pollen is scarce, simply to make sure that what little I have hits the mark. I have also opened a "dead" flower — which has been closed one day — and got fruit to set, so the stigma must have still been ripe. I reckon those stigmas are just never going to miss a chance.

... from G.J. Swales

It is rather difficult to give a fairly simple answer to this question of ascertaining when a stigma is receptive. There are possible problems in that a flower could be self-pollinated or pollinated adventitiously by a roaming insect. If the anthers have already split at the time the flower opens, it will be necessary to take steps to avoid the stigma being pollinated by its own stamens. Thus the bud would have to be dissected for the purpose of removing the anthers before maturity and the plant kept in isolation to avoid uncontrolled pollination by insects. Pollen would need to be taken from another flower on the same plant to check for self-fertilisation and from a flower on a different plant to check for cross-fertilisation.

The absence of seed from a single test of this sort would not be conclusive for it would be necessary to carry out a number of tests of this type on different flowers, at various intervals over the period during which the flower is open. This obviously involves an appreciable number of tests and hence requires an appreciable number of flowers, in order to ascertain at what part of the life of the flower the stigma becomes, or ceases to be, receptive.

When I am trying to set seed on a plant, I usually remove an anther to dab it onto the stigma. If the stigma lobes are not yet opened, the anther is inserted down between the lobes with a pair of forceps, as often the inner surface of the stigma lobes only are receptive. When the forceps are opened to release the anther, this forces the stigma lobes apart and the anther subsequently remains held between the stigma lobes. To carry out a test on the normal receptivity of the stigma, the pollen would have to be dusted on to the exposed parts of the stigma lobes.

It is possible that the stigma lobes only become receptive when they have opened out. Just because an anther is forcibly placed between closed stigma lobes and produces seed does not necessarily mean that the inner surface of the stigma is receptive at that moment, but may become so later.

The conclusion would appear to be that there are considerable difficulties in determining at what stage of flower opening the stigma is receptive.

... from H. Middleditch

When attempting to place an anther on to a stigma by using a pair of tweezers, I find that the anther remains adhering to the tweezers instead of remaining on the stigma, as intended. No amount of fiddling or shaking seems to persuade the anther or anthers to drop off. Can we have an explanation from those who find this operation simple, please?

... from I. le Page

This summer has been notable for its sunless days and cool weather and in consequence flowering has been poor. Only *Matucana aurantiaca* and *M. madisoniorum* have been in flower, although *M. pallarensis* has a bud at the time of writing (November) but I don't hold out much hope of this developing so late.

I did manage to keep an eye on my *M. madisoniorum* and this opened three flowers on August 19th which lasted for three days. On day one the stamens were on average 3-4mm behind the stigma lobes, while by day two they were approximately level and by day three were 3-4mm ahead — so this species at least would agree with your observations. A brief look at *M. aurantiaca* flowering last month produced similar results. The pollen is shed in the manner you describe on to the lower petals but this does not happen until the later stages of flowering, when it becomes clearly visible on the lower petals.

... from G.E.H. Bailey

As I found a bud on my *Matucana intertexta*, I thought I would wait until it flowered, but it has taken rather a long time to make up its mind. It is rather a ragged flower but quite interesting in colouring — orange yellow, with red tips and undersides to the petals. The stigma is much exserted and the stamens appear to be lengthening, but I noticed when I took it down for photography that all the pollen spilt from the ripe anthers long before the stamens had elongated sufficiently to be effective in fertilising the stigma. I flicked some pollen on to the latter, hopefully.

On *Matucana variabilis* the stigma was exserted, the stamens growing up round it until they were about level with the lower limit of the stigma proper. This did not set seed. On *Submatucana calliantha* the stigma was not exserted, but tried to poke its way out of the open side of the bundle of stamens. A local fellow-collector had a grafted plant sold to him under another name, which I identified as a *Submatucana calliantha* variety, slightly smaller in every way from my form. This plant showed exactly the same formation of stigma and stamens. My own plant flowers throughout the summer and set several pods of seeds.

On *Arequipa herzogiana* and *A. rettigii* the stigma is exerted, the stamens growing on during the time the flower is open but not quite up to the level of the stigma. These are very good and almost continuous flowerers but set no seed. On *Loxanthocereus gracilis* the stigma is again exerted when the flower first opens, but the stamens then grow right up to the level of the stigma and this one, too, sets seed.

... from Mrs. L. Teare

Your letter arrived just in time to catch my *Matucana aurantiaca* flowering for the third time this season. On the first day, the green stigma was well above the stamens; on the second day the stigma was barely visible through the stamens growing up around it, and on the third day the stigma was completely hidden by the longer stamens. When my *Matucana crinifera* flowered it was bright red with a cream stigma and here the stigma remained visible, projecting beyond the stamens all the time the flower was open.

... further from P. Allcock

My Lau 187 *Submatucana paucicostata* has now flowered (May/June) with all six flowers opening simultaneously. There was no sign of the stigma protruding from the buds before the flower actually opened, but the stigma was well above the anthers when the flowers first opened. Over the six days the flowers were open, the anthers steadily overtook the stigma until — on all six flowers — the stigma was completely hidden in the anthers. One flower was sectioned on the fifth day; the nectar chamber was found to be 5mm in diameter and 3mm high and full of nectar. This plant has flowered twice each year for the past two years — May and September — so I will make some more observations in September.

Although I have not been looking out for elongating stamens on *Matucana* flowers in previous seasons, I am fairly sure that all those that have flowered for me — *tuberculosa*, *calliantha*, *aurantiaca*, *hystrix*, *weberbaueri*, *madisoniorum*, *celendinensis* — have exhibited this phenomenon. However, I shall be most interested to check on this, this year.

... from P. Conrad

Of the *Matucana madisoniorum* that I raised from seed I have kept several plants, as well as having plants propagated vegetatively from several different clones from the original collection by the University of California at Berkley. Five of these plants started to form their buds about mid-May; they develop quite slowly and upon opening gave me an opportunity to observe the stigma lobes being overtaken by the growth of the stamens after the first day's opening.

My first *M. madisoniorum* flower of the season opened sometime between midnight and 6.00 a.m. on the 15th of June. When I first observed it at 6.00 a.m. the stigma lobes were approx. 3mm above the stamens and by 2.00 p.m. on the same day the stamens had overtaken the stigma lobes. This plant is an offset from PCH 1521, UCBG 57.880-4. The second flower, on an offset imported from K. Knize, opened on June 18th and again I first observed it at 6.00 a.m. with the stigma lobes above the stamens by approx. the same amount, 3mm. Throughout the day the stamens continued to grow past the stigma lobes and in fact by 11.00 a.m. the same morning the stamens were even with the stigma lobes. In checking the plant today at 4.00 p.m. I found that the stamens were now some 13mm above the stigma lobes and it appears to me that the entire tube and petals have grown significantly in the 1½ days since first opening.

... further from P.D.R. Allcock

This year I have had flowers on the following species of *Matucana*, all of which have displayed the phenomenon of the anthers growing up past the stigma: *aurantiaca*, *aurieflora*, *celendinensis*, *intertexta*, *grandiflora*, *hystrix*, *weberbaueri*, *madisoniorum* & its var. *pupatitii*, *paucicostata* & its var. *robustior*, *calliantha*, and *calvescens*. All these were imported plants and in addition a seed-grown *myriacantha* also displayed the same feature. My imported plants of *Arequipa weingartiana* and *spinossissima* and the seed-grown plant of *A. rettigii* also flowered this season and they, too, exhibited this self-same phenomenon.

... further from P. Conrad

Since writing to you last I have made further observations on flowers of *Matucana* etc. The temperatures quoted are the minimum and maximum for the hot house, which is ventilated.

Matucana madisoniorum flowered on June 29th (min. 58°F, max 105°F) this being a seed-grown plant. The three flowers opened sometime between 12.01 a.m. and 8.00 a.m. The relationship between the stigma lobes and the stamens was different on each of the three flowers as follows: one with the stigma lobes \pm 1.5mm above the stamens, one with the stigma lobes and stamens level with each other, and the third one with the stigma lobes half a mm below the stamens. Within a few hours the stamens rapidly overtook the stigma on all three flowers.

On July 25th the same plant had one flower open. There was no evidence of its impending opening when I last observed it on the previous night at 11.30 p.m. but by 6.00 a.m. of the next morning the flower was fully open with the stamens already past the stigma lobes by approx. 3mm. Min. 64°F, Max 110°F — it was quite a warm day, so apparently temperature plays a significant role.

The bud which was visible when the three flowers opened at the end of June, opened itself in the middle of August on the 16th (min 60°F, max. 102°F) 17th (min 57°F max 104°F) and 18th (min 65°F, max. 76°F, with rain). The flower was fully open by 10.00 a.m. when first observed, when the stigma lobes extended above the stamens by about 3 to 4mm. When next observed at 9.00 p.m. on the same day, the stamens were about 1mm above the stigma lobes. The flower remained open for two more days with the stamens continuing to grow slowly further beyond the stigma lobes until 4.00 p.m. on the third day they were over 8mm past the stigma. This is the longest time that a Matucana flower has remained open for me. The first two days were bright and sunny but the third day was dull with rain — approx 0.4 inches. Rain is most unusual for our area in August, the normal monthly mean being 0.03 ins. The maximum total for an August, in 44 years was in 1935 with 0.54 inches with no more than 0.10 inches recorded in any other August up until this year.

My Matucana calliantha is an imported plant ex De Herdt. On August 7th (min. 58°F, max. 107°F) one flower opened between 12.01 a.m. and 6.00 a.m. The stigma lobes were just barely above the longest stamens when first observed at 6.00 a.m. Their relative positions changed very slowly so that by 4.00 p.m. the longest stamens were just even with the stigma lobes — by 5.00 p.m. all of the stamens had grown to equal length and were even with the stigma lobes — no further changes took place.

... from H. Middleditch

I can imagine that the warm climate in California might well induce the stamens on a Matucana flower to grow rather more rapidly than is, perhaps, usual in habitat. The rate of stamen growth observed on the flower which lasted for three days is pretty comparable with my own experience. I am inclined to the belief that the habitat conditions under which Matucanas grow are likely to bring about this rather slower rate of stamen growth, for I would agree with P. Conrad's suggestion that temperature plays a significant role in the duration of this phenomenon.

... from G.J. Swales

The growth rate of any plant increases with an increase in ambient temperature. Certain chemical reactions double their rate of reaction for every 10°C rise in temperature, but of course botanical growth is far more than just a chemical reaction. Enzymes also increase in activity with increase in temperature. The upshot of this is that it would be normal to expect the stamens to grow at a faster rate in a higher ambient temperature. The duration of the flower opening is also very dependant upon temperature — for example, flowers on Harrisia and Echinopsis will stay open on a dull day and last until the evening.

... postscript from H. Middleditch

The recent long hot summer, often coupled with little or no wind, has led to my greenhouse running for several days at a time at an unusually elevated temperature; the thermometer has stood at 110°/120° F in the greenhouse practically all day long. A watering session is as good as a sauna. My same Matucana paucicostata that first led me to notice the stamen growth during the life of the flower, opened four flowers on one of these warm afternoons and before dusk the stamens had grown as far as they had previously taken two days to grow. Perhaps it had the same sort of conditions that P. Conrad reports above from California?

... further from P.H. Sherville

My Submatucana grandiflora has opened its flower when the weather is rather more dull and cool for a change, and the stamens are slowly overtaking the stigma. They have probably grown half their total increase in length in about 24 hours.

MATUCANA PAUCICOSTATA Ritter sp. nov. By Friedrich Ritter Taxon XII 3, 124: 1963

Corpus 8-14 cm altum, 4-7 cm diam., prolibus radicanibus; costae 7-11, obtusae, 7-15 mm altae, crenatae, tuberculis conicis, areolis griseis, 2-3mm diam., 10-15mm inter se remotis; spinae badiae, cinerascens incurvatae, radiales 4-8, 5-30mm longae, centrales 0-1; flores 6cm longi, zygomorphi, ovarium albo-floccosulum et longo albo-pilosum; camera nectarifera 1mm longa, 4mm diam., diaphragmate clausa; tubus, floralis 35mm longus, tubiformis, vestitus sicut ovarium; tepala 20mm longa 8-10mm lata, acutata, atrocinnabarina, violaceo-marginata; stamina inferne alba, superne purpurea; stylus cinnabarinus, stigmatibus 4-5; fructus latior quam longior, viridis, subpilosus; semina 1-2mm longa et lata, rhomboidea, aspera, brunnea, hilo magno, griseo.

Habitat — Peru, Prov. Huari. Dept. Ancash; collected as FR 597.

(From the Latin) Plant body 8-14cm in height, 4-7cm diameter, with rooting offsets; ribs 7-11, blunt, 7-15mm in height, crenate, with conical tubercles, areoles grey, 2-3mm in diameter, 10-15mm apart; spines reddish-brown becoming greyish, incurving, 4-8 radials, 5-30mm in length, centrals 0-1; flowers 6cm long, zygomorphic, ovary with dull white tufts of wool and long dull white hair; nectar chamber 1mm long, 4mm diameter, closed by a diaphragm; flower tube 35mm long, cylindrical, clothed as the ovary; stamens white at the base, purple above; style vermilion, with 4-5 stigma lobes; fruit broader than long, green, slightly hairy; seeds 1-2mm long and broad, oval, rough, brown, with large hilum, grey. G.J.S.

Comments

... from P.H. Sherville

I have two plants of *M. paucicostata* which differ in appearance; both of them have flowered. In comparing them it seems that the Lau collected plant is fairly close to Ritter's original description.

	Original FR 597	Lau 107	Ex Schliepfer
Body height	8-14mm	10cm	6cm
Diameter	4-7cm	6cm	7cm
Rooting offsets	Yes	Yes	Yes
Body colour	Not given	Rich matt grey green	Yellowy green
Number of ribs	7-11	8	8
Ribs	Blunt	Blunt	Blunt
Rib height	7-15mm	6-7mm	7-8mm
Ribs	Crenate	Crenate whilst young only	No
Tubercles	Conical	Conical/pyramidal	Hemispherical
Areole colour	Grey	Whitish grey	Whitish grey
Areole diam.	2-3mm	3-4mm	2-3mm
Areole separation	10-15mm	10-12mm	22-24mm
Spine colour, new	Reddish-brown	Rich chestnut	Grey-white & dark tips
Spine colour, old	Grey	Grey	Grey
Spine arrangement	Incurving	Some curved (random)	± straight
Radials	4-8	Mostly 5-6	5-7
Radials length	5-30mm	10-20mm	8-12mm
Centrals	0-1	0-3	0
Flowers — length	6cm	56mm	51mm
Flower shape	Zygomorphic	Sometimes zygomorphic	Zygomorphic
Flower tube & ovary	Dull white hair	Grey hair	Brown hair
Nectar chamber	1mm x 4mm diam.	2/3mm x 6x7mm oval	Not recorded
Stamens (filaments)	White at base, purple above	Purple with paler base	Purple with paler base
Style	Vermillion 4-5 lobes	Red	Red
Stigma lobes	? Yellow	Yellow	Yellow

... from H. Middleditch

No wonder I was not able to see the nectar chamber on the flower of *M. paucicostata* which I sliced, if it was only one mm high! I can see that if some of the Matucanas are going to have nectar chambers of this size I shall have to take a close-up shot of it and project the slide on to the screen before I can see what is there. From the comparative dimensions for nectar chambers given above I am also beginning to wonder if there could be variations in nectar chamber size in a species, just like the variations in flower form which have been the main concern of this issue? By that I mean not hairsbreadth differences but the sort of difference that is noted above i.e. nectar chamber height 1mm and 2/3mm. Now if a description of a species is to encompass this sort of variation how does the original author have any idea what the extent of the variation is throughout the species? Since he has no such ideas, in all but a few cases, the original description can hardly be expected to cover the variation which does exist in the species. So is the author constrained to describing the Type plant, of which he can be reasonably sure that his description fits. So is Geoff Swales mistaken in thinking that a description is of the species and not the type plant (Chileans No. 31 p. 24-30)?

Parodias have long been recognised as a worth-while asset in a small greenhouse or windowsill collection, retaining a nice compact size and producing a very reliable spray of flowers each year. However, they do seem to suffer from a regrettable tendency to lose their roots; I have suffered this experience with my own plants and I have talked to several other collectors who have a fairly good selection of Parodias and they, too, would seem to have this problem. Not only does this cause a serious setback to the growth and flowering of the plant, it can involve extra attention in nurturing it back into good health.

My collection is watered pretty regularly and also sprayed fairly frequently, so I hardly think that this problem arose through neglect. In looking at my Parodia fairly frequently I discovered that — despite my regular waterings — their growth was anything but regular throughout the season. When they were growing they seemed to grow quite rapidly, at other times they were virtually standing still. The growth and the no-growth periods seemed to be unrelated either to my watering or to the weather — it was not a case of growing only in warm, sunny, weather or anything like that.

I suppose that one tends to look at a plant that is in flower rather more acutely than when it is not flowering. Whatever the reason, I did begin to realise that once the flower buds had started to appear on a Parodia, they would grow no further out from the centre of the plant, although it might take several weeks for them to mature and flower. In other words, the flowering period was one of the times when the Parodia was in no-growth. This might explain why Parodias are always regarded as having their flowers crowded close to the growing point. In other genera the buds may appear close to the growing point but — owing to the growth of the body — are much further away from the growing point when they open.

Conversely, I do find that before the flower buds appear, my plants exhibit a very rapid rate of growth in the spring, for there are always fresh areoles and spines to be seen growing in the crown at this time; and the previous year's flower remains can be seen visibly creeping over the shoulder down to the side of the plant during this part of the year. Again, there is no doubt that the previous season's flower remains are well out to the shoulders by the time the winter resting period arrives, so this represents growth which must take place after the completion of the flowering season. However, even when the flowers have died away, they seem to remain in the same position — not far from the crown — for several weeks during the height of the summer. The growth which takes the flower remains out to the shoulders can thus be seen to take place in the late summer or early autumn.

Outside the winter resting period, Parodia seem to have a go-stop-go cycle of growth; a short, fast growing period in spring, no growth in summer, either during flowering or for a period afterwards, followed by another short period of fast growth in autumn. It would appear to be worth trying to match this mode of growth with appropriate watering of the plants, so I start by giving plenty of water in spring. During the flowering period I reduce watering and withhold water for a period of 4 to 6 weeks thereafter — perhaps as long as two months. Once the plant shows signs of wishing to start into growth for the latter part of the season, it is more liberally plied with water. I find that one has to be most meticulous in observing the plants in order to water at the correct time, but at least up to now, by watering in this manner, I have managed to avoid the previous problems of losing the roots on my Parodias.

One might imagine that the reason for loss of roots, which I and other collectors have experienced, would be due to watering the plant in the summer when it was resting in a period of no-growth and when it was taking up little or no water. I presume that the roots have a tendency to rot off if plied with water when they are inactive. It is only when this 'no-growth' continues into autumn that one realises that the plant is not showing its normal seasonal growth and then it becomes evident that the plant has lost its roots. Sometimes it is too late to attempt to reroot the plant in what is left of the growing season. Perhaps it is even worse if the situation is not diagnosed until well into the spring growing season, after which one has the unrewarding prospect of trying to persuade a rootless Parodia to produce new roots during its summer "no-growth" period. This thankless task no doubt impresses itself more firmly on the memory than a late-season discovery of the trouble — a situation which is often corrected through the twin opportunities of autumn and spring growth. So the myth is born of "my Parodia lost its roots again this winter" — whereas in fact, these plants would seem more likely to lose them in summer.

Comments on Problem Parodias

... from R. Carter

I would agree that Parodia do have this twin cycle of growth; the apparent ease with which they lose their roots has also happened with my plants, and to reroot them is — I find — an extremely difficult task.

I have observed my plants for quite some time and I feel that one of the main deciding factors controlling growth is the length of day and night. Coming as they do from near the tropics where the equal day and night prevails, I fancy that the greatest amount of growth takes place in cultivation here in late summer and autumn, which would be in keeping with their natural southern hemisphere growth cycle.

Over a period of years my compost has been changed several times and now I use equal parts of coarse sand and coarse riddled oak leafmould, plus a small amount of a heavy clay loam and a good dusting of John Innes base fertiliser. The compost is extremely coarse in texture which to me is the most important aspect. Results so far this year are promising, several plants which were visibly shrinking have now filled out and made good progress — perhaps the prolonged warm weather of autumn has done them good. I would like to see several years growth in this new compost, but would welcome any comments on my ideas.

... from P. Sherville

I would certainly agree that representatives of the genus *Parodia* are amongst that group of plants most worthy of a place in anyone's greenhouse.

I have 44 plants bearing that generic name but I am convinced that some at least are merely varieties of other species, but would certainly claim around three dozen different representatives of the genus. All except the largest specimens (about five in number) are grown in trays (plastic ones about 3" deep) containing between 10 & 15 plants depending on the size of the individual specimens. As the root systems appear to be of a mainly fibrous nature, with only scant evidence of any taproots, this mode of cultivation seems to suit them well (apart from which I am convinced that they enjoy one another's company!!). The soil is very rich and quite open and is never allowed to dry out, and I think that this is probably the key to Mr. Wood-Allum's problem. I have a feeling that it is only when the soil dries out that troubles commence, in that the fine hair-roots die and in *Parodias* they seem to be difficult to regenerate. Thus when watering is recommenced, the plant is unable to absorb it — and is also carrying dead and damaged tissues which are obviously very prone to disease and subsequent decay.

I have lost very few *Parodias* and those that have rotted have done so within two to three months of acquiring them and I do not look upon that as a reflection of poor cultivation techniques. I have plants of importation and also seed raised stock and have experienced little in the way of difficulties of cultivation — that is not to say that I do not suffer problems with *Parodias*, because I do! I have two very obstinate plants which simply sit and sulk throughout each year; they are *P. nivosa* and *P. chrysacanthion*. Both plants are small and make little headway each year; they grow a little but shrink at the base by a corresponding amount! *P. nivosa* did flower about two years ago but has not done so since. *P. chrysacanthion* has never attempted to flower.

With regard to the plant growth slowing up during flowering, I can't honestly say that I have noticed this phenomena, in as much as erratic patterns of growth usually reflect as deformities in shape of the plant body, such as constrictions or bloated sections. My own *Parodias* are usually very uniform in growth and are aesthetically very pleasing with their intricate but regular spine patterns. Again, there are one or two exceptions: *Parodia echinus* is generally a very tatty plant and the flowers leave large scars above each areole and large tufts of wool and bristles around the crown and shoulder of the plant. This plant also has a tendency to make a great number of buds and only open two or three into flowers. The other plant which "suffers" from flowering is *P. erythrantha* — on this plant the flowering areoles are usually quite devoid of spination. It is not because I pull the flowers off! I always leave all my flower remains intact on all plants. When the flower remains finally drop off one is left with unsightly gaps in an otherwise regular spine pattern.

One further point about flowering concerns the flowers remaining near the crown of the plant. This has the effect of making some species appear to have a "cephalum" — a point brought out as far back as the 1972 Brooksby Gathering. This effect is seen most clearly on my plants of *P. ocampoi*, *gracilis*, *schutziana*, *multicostata*, *mairanana* and *procera*. These plants have their crowns constantly enveloped in dense wool whether in or out of flower, but there is no evidence to suggest that growth is in any way modified as it would be in a genuine cephalium.

I wonder if Mr. R. Carter has tried vermiculite to overcome difficulties in re-rooting *Parodias*? I have always found this most successful. I raise all my seeds in this media with abundant success but last year the cat scattered some of the seedlings and many were broken off at the neck. Of the *Parodias*, only two failed to reroot — and one is talking of seedlings of ¼" and ½" in diameter. All the other *Parodias* rerooted, mostly within 10-12 days.

I have conducted a quick analysis of my flowering records for one year and found that to date I have had one or more *Parodias* in flower on all but 18 days of the year. From March 3rd to November 6th there was always a *Parodia* flower to be seen. No wonder Mr. Wood-Allum recommends the genus.

. . . . from I. Le Page

On the question of Parodias the summer rest, the chief growing period is towards the autumn months of August and September; this is particularly so with the microsperma group and in fact mine are still growing strongly now in mid October. I am not sure that they have a summer rest or simply start late — mine do not seem to grow much in the spring. Certainly the chief flowering period — June and July — doesn't produce much growth; the idea about the flowers clustering close around the centre because of the period of reduced active growth might well be correct.

. . . . from G. Watts

There does appear to be a diversity of flowering times within the genus as well as the interesting feature that some plants retain their dead flower heads. *Parodia chrysacanthion* seems to be able to flower at any time of the year, whereas the others appear to flower throughout spring, summer, and early autumn. Why some should retain their dead flower heads and others not, I do not know. The *maasii* group, *gracilis* types, *stuenneri*, *tarabucina*, *tuberculata*, and *otuyensis* are among those that I find do not; whereas *cardenasii*, *comosa*, *thionantha*, *faustiana*, *nivosa* and others do so and remain firmly attached (similar to *Notocactus scopia*) for some time. I have also noticed with interest that some *Parodia* have very deep seated seed pods which leave a saucer shaped depression in the plant body when the capsule is detached.

. . . . from W. Withers.

I am not surprised to hear that someone else has had trouble with losing roots on Parodias. I have had difficulty with Parodias for long enough — I have tried them in clay pots and in plastic pots and back into clay again, but they didn't seem suited at all. Now they are all in shallow trays made out of fibreglass, which I made from one of the kits of fibreglass and resin that you can buy, forming them in a mold. There are no drainage holes in the base of these trays, but each one has a short length of copper pipe bonded in to the short side, next to the bottom of the tray. When I water the trays, this drain is corked shut; the idea was to let out any excess water but I can get the amount about right at each watering now. I cease to give the Parodias any water from about early August and then leave them dry until the following March. They have given much less trouble since I started to grow them in this fashion.

. . . . from J.D. Donald

The midsummer resting period to which you refer is fairly general amongst all the South American cactaceae, except for *Notocactus* and *Echinopsis* and *Gymnocalycium* in part. It is usually induced by high night temperatures and possibly also excessive sunlight per day. Certainly Parodias, Lobivias, and Rebutias are the most affected and these always have a real burst of growing activity from late August to November.

. . . . from H. Middleditch

The suggestion that high night temperatures may be coincidental with the summer resting period would seem to match my own experience. During the summer the greenhouse seldom falls below 50°F at night, but come the second week in September and the night temperature will drop by at least 5° and thereafter rarely be near 50°F again. It is at this time that the spate of autumn growth gets under way.

. . . . from C. Webb

As far as I am concerned, your contributors on the subject of the four-period cycle of annual growth have omitted a fifth event — namely that they then die!! But to be serious, I am not sure that even the Argentinian Parodias neatly fall into those four period in the average collection — too much depends on the weather in a particular year, overwintering temperatures and hence dryness and even position in the greenhouse and hence intensity of light. In my collection I have to accept very low temperatures over winter and thus my plants normally dry out well before mid-October. I don't start watering until mid to late March so I get a lot of root loss which has to be re-started each Spring. Thus with all my Parodias I find that there is a very little early growth, but they flower well from May to early August and then do what little growth they care to after that.

This year was of course odd with such a long hot summer and they got very little water at all until late August, then lots up until mid-October. Results are that flowering started as usual in late May, tailed off by mid-July and then a big burst of growth and flower in August-September. Indeed I still have flowers in October on *P. schwebsiana*, *microsperma*, *mairanana*, and *elegans*.

I do have a lot of trouble with a brown stain on Parodias; it is not red spider and also not scorch. I believe it may be the delayed result of light frosting but I have no conclusive proof of this. Do you know what *Parodia* sp. *Trancas* is?

I got some seed of this name and managed to raise one plant. At present it is still rather small to identify; it is very tuberculated, deep bronze green, spherical with shining white bristly spines.

. . . . from Mrs. L. Teare

We have very hot summers here and most collectors near Adelaide have their plants bedded outside in the garden. In the middle of summer they are bone dry. The growing period here seems to be from September to the end of December, then it gets so hot that everything stops, but it starts again in April.

. . . . reflection from H. Middleditch

Adelaide is situated at about 35° S latitude and most *Parodias* are found between 17° S and 27° S latitude in habitat in Bolivia and Argentina. If this natural habitat does not have a continuous vegetation cover of shrubs, bushes, grasses and herbs, then the ground which is bare will absorb the heat of the sun and also become thoroughly dried out, just like the open beds of cacti near Adelaide. The plants growing in habitat are to be found at a higher altitude than Adelaide but the difference in altitude may well be just about compensated for by the difference in latitude. Hence if these two sets of conditions are indeed roughly comparable, we might well expect that *Parodias* in habitat will have a cycle of growing-stopping-growing over spring, summer and autumn, just as they do in Adelaide. And in a number of collections in the U.K. as well, it would seem.

. . . . from T. Lavender

Not long ago I changed my compost and now I am using Kerrymuir peat-based compost. The shop where I bought it had no idea what the pH value was, so I soaked some in water and then tested the liquid with indicator paper. This may not be the most accurate method of sampling the acidity of a soil but I did find out that it was slightly acid. To make quite sure that the compost does remain acid, I use acidified water to water my plants. I am pretty well satisfied that my compost is now more acid than the mixture I had been using previously, and there is no doubt that the *Parodia* are growing much better.

PARODIAS — HOW I GROW THEM By Werner Krasucka Translated by K. Wood-Allum from K.u.a.S. 21:7.1970

Who does not have *Parodias* in his collection? *Parodia* fans maintain that they are the jewels among cacti. This degree of esteem is however relative since one often comes across *Parodias* in amateur collections which are far from splendid. The appearance and floriferousness of *Parodia chrysacanthion* soon determines whether the treatment of *Parodias* in collections corresponds to their requirements. It has to be conceded that the amateur can only grow his plants in the light of his individual capabilities and objectives.

Two principles apply in my collection: firstly to collect scientifically and secondly to give the plants the best and most suitable treatment. This guarantees that the plants are aesthetically a joy to behold for every collector. Most *Parodias*, particularly all the Argentinian species, have a yearly cycle of four periods which must be observed: 1. a period of growth in April/May; 2. the main flowering period in June/July; 3. a resting period in August; 4. the main growing period in September/October.

In the Spring growing period the plants regain the size they had achieved the previous year and begin slight growth which, with flowering size plants, soon stops. The plant then devotes all its strength to the production of buds, flowers and fruit. Bud formation takes place in May whilst the main flowering period under normal conditions lasts from the middle of June to the beginning of July. In August, after the flowering period, the plants have a summer rest. During this period the seeds are formed and ripened. The main growing period then begins in September and lasts until the end of October. The winter rest then begins, more or less forced on the plant by our climate. There is, of course, a plus or minus element to these timings since each grower's conditions are somewhat different.

Generally *P. chrysacanthion* is the first to flower. Next come the Brazilian *Parodias*, after those come *P. saint-piena*, *P. aureispina* amongst others. Most of the Bolivian *Parodias* flower in July, August and September, amongst them *P. schwebsiana*, *tarabucina*, *multicostata* and *compressa*. As a rule, seed ripening of the microsperma forms takes 4-6 weeks and of the Bolivian species mentioned above some 8-12 weeks. Often, especially with the Bolivian species it takes months to establish whether seed has set. The fruits lie deep in the wool of the crown of the plant and are therefore not visible. The compost for *Parodias* should consist of 1/3 sand, 1/3 garden loam and 1/3 peat. The peat assures a balanced pH value. Many specialists, amongst them Herr Brandt of Paderborn, obtained the best results with a peat compost and fertiliser feeding. Tapwater often has too high a pH value. The peat lowers the pH automatically to a level which suits our plants. My plants are watered thoroughly from below to preserve the full beauty of the plants. All the *Parodias* are grown in square pots set in plastic trays which are filled with the appropriate amount of water.

When I repot I fill the lower third of the pot with peat and top up with the compost I have described above. The peat at the bottom of the pot acts as a buffer against the lime in the tap water and therefore constitutes a double insurance against the alkalisation of the compost. The plants are heavily watered during their main growing period. I feed twice during the year. I recommend observation of the August resting period which I mentioned above. Generally I apply insecticide twice a year with a gap of three weeks. First I use a systemic and then a contact insecticide. Parodias are rarely affected by the dreaded red spider but root mealy thrives in the peat. My pest control programme takes care of them. The microsperma forms are particularly susceptible to root mealy. These species have a very weak root formation. I withhold water from the end of October/beginning of November through to the beginning of April except for seedlings which receive light watering occasionally.

Treat your Parodias like this and you will be successful. There are, of course, exceptions; for example, *P. mairanana* has no fixed flowering period. This species flowers in high summer and often only stops at Xmas. Shade is often recommended for Parodias. I have tried both methods, one year of strongly shading the whole collection, the next year I did not shade. I prefer the latter because it produces better spines, but good ventilation is essential. The most sensitive reaction to strong sunshine was observed in *P. maxima*, *commutans*, *uhligiana* and *maassii*. These plants in the *maassii* complex clearly do not enjoy exposure to excessive sun. It is worth noting that they all suffered some damage, despite being in excellent growing condition.

Every cactus grower swears by his own methods and his own experience. If you have little joy with your Parodias, try mine.

A URUGUAYAN COLLECTS CACTI Reported by Mrs. J.M. Hobart

At a special meeting held at Brooksby, Leicestershire, we had the opportunity to listen to a talk about Uruguay and its cacti from Dr. Patrick Moyna, of Montevideo who had visited several parts of Uruguay in order to collect cacti for his research work and was currently paying a return visit to Britain. Dr. Moyna opened his talk by describing the climate of Uruguay as very similar to that of Sydney in Australia, of Southern Italy, or of Georgia in the U.S.A. There is a fairly even distribution of rainfall throughout the year. The normal summer temperature will reach 25° – 30°C but there are a few days only in summer when it rises to 40° – 44°C and nobody feels energetic in that sort of heat. Some snow fell in 1975 but that was the first time since 1922. In South American terms the climate of Uruguay is considered as temperate, but in Britain it may well be described as quasi-tropical. It is the winds from the north which are hot whilst by contrast, the south wind is cold. The winds from the east bring rain and the pampero or west wind can blow very strongly indeed, as much as 50 - 80 m.p.h.

The two great river systems of the Uruguay and Parana-Paraguay discharge into the La Plata estuary. The basin drained by these rivers is very extensive indeed, being second only to the Amazon basin in extent in South America. The La Plata estuary is very broad – some 200 miles across opposite Montevideo – but it is also fairly shallow; because such a large volume of water is fed into the shallow estuary by the Uruguay and Parana rivers, the water is fresh most of the time as far down as Montevideo and even further seaward. It becomes brackish only when the tide is pushed in by an east wind. The river deposits silt on the southern bank (Argentina) where the vegetation in consequence grows right to the waters' edge, but there are extensive sandy beaches on the Uruguayan side of the river. These sandy beaches are usually formed into bays backed by fairly low lying land, separated by rocky head-lands usually only one or two hundred feet in height and of varying degrees of ruggedness. Cacti are to be found on these rocky headlands, sometimes among the grass which partially or almost wholly covers the gentler slopes and their occasional rocky outcrops. Sometimes *Wigginsia* sp. and *Notocactus scopae* are found in crannies and ledges on otherwise bare, jagged, steeply-sloping rocks virtually in range of the sea spray from the waves breaking on the rocks below. On a small island in the Bay of Montevideo there are seven species of cacti to be found.

Further inland, Uruguay is a green land with no very high hills – the tallest being only about 1,500 feet high. There were slides showing a gently rolling landscape with isolated hills, some of these with truncated tops. There seemed to be a distinct absence of people in the countryside and indeed half the population of Uruguay is concentrated in Montevideo. Most of the vegetation was low growing for there are few native trees in Uruguay; those that do exist live mostly along the banks of streams. Elsewhere stands of non-native pine trees and Eucalyptus have been planted. Most Australian plants do well in Uruguay. We saw some native acacias and other trees – mainly Leguminosae, – together with various Compositae. The landscape is markedly greener in winter than when dried up by the summer heat. The flowering time for native plants extends from November to April; on a slide taken in midsummer we saw species of *Eryngium* and *Senecio* in flower.

Dr. Moyna stressed the very great difficulty of finding cactus plants among the grass and even on knowing where to start looking for cacti. The hills are not very high but can be a trek of some distance from the nearest vehicle

track. Some flat-topped hills are so steep sided in fact that Dr. Moyna has never been able to reach the top. He is virtually certain that more species of cacti await discovery in Uruguay. One method of pin-pointing a likely cactus habitat is to spot the tall *Cereus* and *Opuntias*; the smaller globular species are nearly always to be found there too. The tall *Cereus peruvianus* was shipped to Europe from Lima — hence its name — but it is nevertheless native to Uruguay. Each particular type of cactus tends to occupy a particular type of terrain — *Wigginsia*, for example, are hardy and tough and live under rocks, on rocks, or on rocky slopes. Sometimes these rocky patches are hillocks, rising slightly and gently from the surrounding countryside. Some *Wigginsias* rise above the grass which grows on the rocky patches; these are very tall and probably very old *Wigginsias* — but how old, no one knows as no records are kept and no one really cares what age they grow to. The *Gymnocalyciums* live on the grassy slopes of headlands or hills or on the flat tops of hillocks and they are usually sunken into the ground. The grass grows in tall tussocks making it very difficult and tiring just walking through it. The blades of these grasses grow in spiral tufts, coloured brown and green and look just like cactus spines, but when examined closely there are no cacti there. On the other hand Dr. Moyna described how he and his helpers tramped for an hour or two up and down through clumps of knee-high grass, finally sitting down weary and empty-handed, only to discover that they had been walking around over soil-level cactus heads all the time!

Slight variations are evident between the generally similar looking plants from one isolated growing place and those from another area. But Dr. Moyna suggested that there was nothing to prevent these species cross-pollinating in nature. It was remarked that there were colonies of *Notocactus scopi*, one of which consists of all-white spines, another with all red and still others with varying combinations of red centrals and more or less white radials. In addition, there is a small colony of black-spined *N. scopi* plants to the north and east of Montevideo, separated by some hundreds of miles from other plants of this species. In habitat, the *Notocacti* flower earlier than the *Wigginsias*. The seeds from the *Notocactus* fruits are carried away by ants and probably those of *Wigginsia* as well, for *Wigginsias* are to be found growing out of the fine soil of ant hills. It is impossible to have an English-type picnic in Uruguay because of the presence of large and active ants.

Near some of the grassy and rocky headlands which had proved to be a reliable source of cacti, there also grew some pine woods. Cacti were not expected to grow within these woods but one day Dr. Moyna had taken a walk into one of these woods and to his great surprise found some *Wigginsias* growing amongst the trees. In fact they were large and healthy and “cultivated”-looking. The rocky headlands and sandy beaches together with the occasional pine woods stretch all along the southern coast of Uruguay. Along the Atlantic coast, for some 200-300 miles south of the border with Brazil, there are extensive areas covered by sand dunes, which support no plant life at all.

Dr. Moyna then described some of the research work on cacti currently being undertaken in the College where he and his team are trying to establish the presence of distinctive chemical substances which may be peculiar to various groups of cacti. Four lines of investigation have been pursued so far:

1. The pigments in the flower petals.
2. Polysaccharides. These are complex compounds such as the pectins which are present in beetroots and citrus fruits; when they occur in fruit, they help our home-made jam to set.
3. The waxes on the epidermis.
4. The alkaloids present in the plant bodies.

With regard to the flower pigments, the yellow pigments have proved to be the same as those found in the yellow flowers of other families; the red and purple pigments, however, which in other flower families are the anthocyanins, are betacyanins in the cacti. These betacyanins are unstable in sunlight so cactus flowers tend to fade quickly. The odd colour that sick plant bodies often turn is also due to the presence of betacyanins. The polysaccharides were expected to yield information on generic limits within the cactus family but this line of research has not been successful and some other chemical may prove a better line to follow. The waxes of the cactus epidermis have proved to be very different from waxes of other families, in that it was not very practicable to separate the hydrocarbon and ester fractions, something which is normally not difficult to do. Hence in this respect the cacti differ from other plant families.

In reply to questions, Dr. Moyna confirmed that some Bromeliaceae are to be found in Uruguay and that *Dyckias* often occupy the same habitat as the cacti. Also there are a lot of native *Tillandsias* in Uruguay — we saw a slide of one growing in a tree near Dr. Moyna's laboratory. In this connection he himself posed the question as to how the *Tillandsias* get their mineral requirements as they have no apparent connection with any soil. In response to another question Dr. Moyna commented that cristate and monstrose cacti are not uncommon in habitat.

Dr. Moyna observed that although he had visited many places in search of cacti, there were extensive areas of his country that he had not yet visited, others that he had only surveyed briefly. He had found that the black soil in the south of Uruguay changed abruptly to a red soil in the north-west. Under this red soil is a layer of basalt. This change of soil certainly did affect some plants. Thus *Eucalyptus robustior* — which has no essential oil — cannot grow in the red soils but is widespread in the southern parts of Uruguay, whilst *Eucalyptus globosus* — which does contain essential

oil — is planted in the north west but grows poorly on the black soils.

Dr. Moyna concluded his talk with a shot of the single most destructive agent against cacti in his country — the sheep. They have roamed wild over the countryside since their introduction 200-300 years ago and can eat through anything. It was suggested that they kick the spines off the plants before eating the flesh.

Comments

... from H. Middleditch

Although I have read quite a number of articles by European collectors which describe their experiences and observations on collecting plants in Uruguay, I certainly did not appreciate the difficulty of locating cacti among the long grass of the very gently rolling countryside. Nor did I expect to see cacti growing in crannies on the cliffs within reach of the sea spray. The patchy nature of the places where cacti grow had already been expressed by various writers, but through Dr. Moyna's lecture and slides it became a great deal clearer that most cacti in Uruguay do indeed appear to occur on isolated patches of ground covering no great area, one patch separated from another by greater or lesser distances — perhaps like a version of the Galapagos Islands but in greater numbers, each "island" of cacti exhibiting some differences from its nearest neighbours, like Darwin's finches.

... from P.H. Sherville

I do recollect Dr. Moyna describing the relatively limited height of the hills in Uruguay, but I understood him to say that one of the seven hills near Monte-video was the tallest in Uruguay, about 1,500 feet high. After hearing Dr. Moyna describe how he was able to locate some of the growing places of the small globular cacti by travelling around the countryside looking first for tall *Opuntia* and *Cerei*, I read part of Backeberg's "Stachlige Wildnis" where he was collecting in northern Argentina. He, too, made almost the same sort of comment about finding small globular plants by watching out for the larger growing sorts.

We had the good fortune of a further chat with Dr. Moyna on the journey to and from Brooksby; he thought that if one removed the trees from the landscape then the terrain around Brooksby and South Leicestershire was quite similar to most of Uruguay. In addition, the actual day of his visit (in the middle of our heatwave) was quite typical of a normal Uruguayan summer's day. He also made two points which may be of use to potential travellers in Uruguay. When we drove across farm tracks and minor roads he said that these represented the normal quality of major road (outside the cities) in Uruguay. Secondly, the word "gringo" which is often used in a derisory manner in many Latin American countries is quite friendly and polite in Uruguay. Although Uruguay is the second smallest country in South America (after one of the Guyanas), Dr. Moyna has still not been able to visit a great many parts of his country. For the benefit of potential explorers, he did extend a welcome and invitation to anyone finding themselves in Uruguay to pay him a call, and he would be happy to spend a couple of days in the field with them.

... from R. Mottram

One fact we must bear in mind about Dr. Moyna's talk is that he is essentially talking about the cacti of Uruguay and so we must be careful not to read generalisations into his findings. For instance, those present may have departed with the notion that all *Opuntias* have a basic chromosome number of 33 compared with $2n=22$ in the rest of the cactus family. Discussing this later with Gordon Rowley, he evinced surprise at this comment, never having found polyploidy in any species of *Opuntia* hitherto. Polyploidy is rare in the *Cactaceae*, but is known for instance in *Mammillaria prolifera* whose varieties embrace $2n=33$ and 44. It is probably safe to assume therefore that Dr. Moyna was referring only to those Uruguayan *Opuntias* which he or his colleagues had examined. It would be interesting to know which species are involved.

We should also therefore be cautious about generalising from his comments about the chemical substances found in his cacti. Are the north American red and purple-flowered cacti carrying betacyanins or are they anthocyanins? As far as I can recollect, there are few red and purple flowered species native to Uruguay, so the sample analysed may be very small. Once again details of the species involved in the research would be illuminating.

On the question of finding cacti in habitat, Dr. Moyna himself said that it was possible to get to know the most likely spots, not only by the presence of *Cereus peruvianus* but also by the terrain. Although I have never set foot in a cactus habitat, my impression is that the cacti are almost always found on sloping rocky ground — the steeper the better, and succeed best under the direct protection of a rock. I often think we ought to forget about pots and simply sandwich the roots of our plants between two pieces of rock. Who's for a cliff face in the greenhouse? But, seriously, I do find that larger cacti do very well when the roots are exposed and regularly drenched.

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

For some reason or other I had expected Uruguay — or at least a large part of it — to be quite hilly and rugged and I was absolutely amazed to see from Dr. Moyna's slides and talk just how flat (or nearly flat) the general landscape was. Almost as surprising was the general absence of trees, except when near to a watercourse; I might have thought that this impression was due to the slides which we saw having been taken in cactus growing localities — but on enquiry Dr. Moyna did confirm that this aspect was typical of his country.

Another thing which greatly impressed me was Dr. Moyna's command of the English language — he found little problem in answering the usual sort of rapid-fire questions that the audience does throw at the speaker at Brooksby. Within the limited time and budget at our disposal we could only notify members within about an hour's journey of Brooksby and those who did not take advantage of this opportunity certainly missed an excellent talk.

. . . . from G.J. Swales

Dr. Moyna's talk and photographs were of particular interest to me as he had previously sent me five specimens of the same species of a Uruguayan *Gymnocalycium* and they had already established themselves in my greenhouse by the time of his visit. I was able to see photographs and hear descriptions of the actual place from which they were collected — one of the rocky headlands on the south coast of Uruguay. To the over enthusiastic collector these five plants could perhaps quite easily represent three species, but in fact they were collected within a very small area and merely illustrate very convincingly the natural variation within a single species. Dr. Moyna himself regarded them all as examples of *G. leeanum*.

ANOTHER NEW NOTOCACTUS? From P.D.R. Allcock

During a trip to Germany over the Spring Bank Holiday, I returned with a depleted bank balance and a correspondingly improved cactus collection! At S.P.I. I discovered a small batch of *Notocacti* (about 6 or 7 in all) which Peter Thiele told me were sent to him as *Notocactus herteri*. One of them was in flower — white petals flushed with pink and a pink midstripe! Of course, I snapped up this plant (it was about 3 DM I think) and two others of the batch as well. One of them has since flowered in my own greenhouse; it is a slightly darker pink, I think. Mr. Thiele said that they were definitely not *N. herteri* and I agree — it had far too many ribs and lots of fine white radials. A natural hybrid between *N. herteri* and *N. scopae*? What are the habitats of the two? Anyway, I will bring them along to Brooksby for discussion.

Comments

. . . . from H. Middleditch

In answer to the question about habitat locations for *Noto. herteri* and *N. scopae*, I turned to see what the available literature could tell us. From Backeberg's *Kakteenlexikon* it appears that *Noto. herteri* emanates from the Department of Rivera in Uruguay. This is on the northern border of Uruguay, half way between the Atlantic Ocean and the Rio Paraguay. This is the highest part of Uruguay.

In the *Chileans* No. 21 p. 115 Buining describes the discovery of *Notocactus purpureus*, a plant closely allied to *Noto. herteri*; he states that it is found "in about the centre of the state of Rio Grande do Sul", which would place it between Santa Maria and Candelaria. Ritter himself states (*Ibid*) that the plants are to be found on the Serra Geral Australis — a feature which is not identified on my own maps.

These two closely allied plants could occupy limited localities with no similar specimens in the intervening distance; on the other hand, plants of a similar sort may occur in far less distantly separated patches over the intervening gap. Since the intervening ground is equally elevated, the latter would seem to be at least probable.

Coming now to *Notocactus scopae*, Backeberg's *Kakteenlexikon* provides no guidance as to place of origin. Schumann's *Gesamtbeschreibung Der Kakteen* states that Prince Neuwied sent seed to the Berlin Botanical Garden in 1816 when botanising from Rio de Janeiro, but again gives no real help on location. However, Herter in his *Flora Illustrée de L'Uruguay Cactacees* (Cactus France, 9:42; 1954) does tell us that *N. scopae* occurs in Uruguay in the Departments of Maldonado & Lavalleja — both in the south-east of the country — and also in Cerro Largo, Tacuarembó, Paysandú, and Rivera which are all in the more northerly and more elevated part of Uruguay.

Thus it would appear that in the Department of Rivera, close to the boundary of Uruguay with Brazil, the habitat areas of *N. herteri* and *N. scopae* do overlap. This does not exclude the possibility of the distribution of *N. scopae* extending beyond the Uruguayan border into Brazil; in his account of his first visit to Horst in Brazil (*Chileans* No. 5 p.1) Buining records that he collected *N. scopae* in the Serra do Cacapava in the Province of Rio Grande do Sul. Now the town

of *Cacapava* is about two thirds of the way from the border of Uruguay to the location given for *N. purpureus*; this suggests that there is a fairly broad overlap of the distribution areas of *N. scopa* and *N. herteri* et al.

... from G.J. Charles

When Paul Sherville bought Phil Allcock's collection I was able to acquire that plant of *Notocactus herteri* which had the remarkably different flower. It flowered in June this year, producing the most amazing apricot coloured flowers! Unfortunately it decided to open its flowers on the day that I was moving my greenhouse, which was dismantled, the foundation slabs taken up, and re-erected all in one day — naturally with plenty of willing hands; but it didn't really leave any time to spare for keeping an eye on these flowers. They had slightly faded to a more pink colour on the second day when I managed to photograph them. After seeing all the slides of flower sections at Brooksby last year, I decided to try my hand at this although I had never done any before, and this particular flower was one of my first attempts.

... from J.R. Gooch

If memory serves me correctly, Phil Allcock spotted these plants at S.P.I., there being only two or three available. They were being offered under the label of *N. scopa* form and not *N. herteri*; as P. Thiele assured us that they were collected material (though no field data was available) Phil purchased them all. Later, when Phil parted with much of his collection, I acquired my plant, Graham Charles presumably another and Paul Sherville I understand got the third one. I am hoping that they really are field material and not the result of somebody's jiggery-pokery. There is a real resemblance to both *N. scopa* and *N. herteri* and I suppose the possibility of a natural hybrid cannot be ruled out. Similar thoughts were offered — and perhaps still are — concerning *N. roseo-luteus*, this one being somewhere between *N. herteri* and *N. mammulosus*.

My ex-S.P.I. *N. scopa* form is 7½cm in diameter, rather flattened-globular. The body is dark green with 26 ribs. Areoles are white felty with up to 20 very fine white radial spines up to 7mm long and 2 to 4 centrals, needlelike and a dark red-brown colour, up to 2cm long. The flowers are a very attractive light salmon pink and, at 4½cm diameter, slightly larger than most other *N. scopa* forms that I am familiar with. This set no seed of its own accord and I made no effort to hybridise it.

... from P.H. Sherville

I have had a look at the slides from Jim Gooch and Graham Charles of their plants of *Notocactus scopa* variety in flower which, like my own plant, are ex-Phil Allcock's collection. Indeed my own flower was more peach coloured; the flower on Jim Gooch's plant appears to be distinctly pinkish on the slide, whereas mine was midway between that and the darker *horstii/muegelianus* colour. Probably it could be better described as a "vibrant" colour. The flower colours on both the other two plants seem to be rather washed out, a bit like *N. rutilans*, whereas in mine the colouration was more intense, especially at the petal tips — but they were paler at the base than in a normal *herteri*. Now regarding the colour of the bud wool, I would say that on a normal *N. scopa* it was a richer rather than a darker brown i.e. a chestnut or foxy colour, in comparison with the bud wool on my own plant of this particular form. Although, having said that, I do have a *scopa* with grey wool on the flower buds!

A CHILEANS FIELD TRIP From Paul Sherville

The concept of a Chileans trip to South America was mentioned in Chileans No. 31. For me the scheme has now crystallised: I have received a letter from Bryan Adams in Montserrat and he is proposing to arrange to go in December 1977. Now here we have a competent botanist with some years of field experience, keen on cacti, three quarters of the way there, enquiring if someone will join him! Would any other Chilean members be interested in going? I have been to see my Bank manager and he proffered much useful advice: such as, register the trip as an expedition in the form of a limited liability company. The duration of the expedition is open ended at present but obviously the longer the expedition the more valuable it would become. In addition to plants and seeds we will be looking for mineral specimens, and of course primarily we will be concerned with the recording of data, soil samples, temperature, humidity, etc.

I have paid a visit to the Peruvian, Bolivian and Chilean embassies and at each one received a most favourable reception when I explained the objectives of the trip. I took along a copy of the Chileans to indicate the sort of way the resultant material would be studied and presented and this appeared to create a favourable impression. However, careful enquiries about plant collecting received a distinctly noncommittal response; I am beginning to suspect that in the present climate of conservation, and especially after the recent international agreement on controlling plant exports and imports, that it could be very difficult to get plants out of South America. Recently I have had an order for

plants returned from I.S.I. because the U.S. Government has declined to issue an export licence. Perhaps the days of importing cacti are coming to an end?

. . . . from H. Middleditch

After all the discussion at the 1975 Brooksby weekend about a possible Chileans field trip, when various problems and possibilities were reviewed, it is inspiring to see that two Chilean members are now preparing to undertake just such a trip. May we ask any member who may wish to offer support to Paul Sherville in this venture to contact him direct (address on back cover).

. . . . from R. Mottram

It seems a very odd suggestion from Paul Sherville's Bank Manager to form the expedition into a limited company. It would cost at least £100 to do this — and who would be the shareholders, directors, and so on? And what happens to the company afterwards? Accounts of some sort would have to be filed with Company House — which is another effort and expense. I would be very cautious about accepting this sort of advice without a very good reason for it.

. . . . from J.R. Gooch

Thank you for letting me know about the ideas for supporting a small group of Chileans members on a trip in "the field". I remember well enough this subject being broached at the Chileans '75 weekend. Many members present at that time indicated that they looked favourably on the idea, though I have to admit I wonder how far anyone would get into South America and for how long, relying almost solely on Chileans finances, and I don't believe that I was willing to commit myself at that time. Now, however, with the likelihood of 4 or 5 members covering their own costs for the journey, it seems to me that many members might well feel disposed to put up £20 or £50 towards the expense of a protracted period researching the true nature of various plant habitats and — hopefully — collecting seed with detailed data.

Those participating will, I am sure, already have ideas as to those areas they would like to research. From a purely selfish viewpoint, I favour areas in Southern Bolivia and Northern Argentina. You will understand that I have in mind Weingartias, Sulcorebutias, and several of the interesting, seemingly little collected, Lobivias from Northern Argentina, such as *L. cachensis*, *chrysochete*, *kuenrichii*, *nigrispina*, *rebutioides*, *stilowiana*, and others. All my *L. densispina* forms are ex nursery stock that may or may not have hybrid blood. A few seeds from a documented plant would be very welcome.

Having said that, I must make it quite clear that I do not intend to imply that I would not support research in other areas, I just throw in my own interests as likely sites. If it turns out that quite a lot of members are interested in limited sponsorship, presumably some rationalisation of both route and area to be covered will have to be made, and, as has already been suggested, exact objectives prepared. I can well imagine everyone suggesting a different area such that our men in the field would need to traverse the whole of South America in order to fulfill requests.

. . . . from J. Hopkins

I would have very much liked to have taken part in an expedition such as that Paul Sherville suggests, provided I can get leave from work. But how can an expedition be everywhere at once and what is required of participants?

. . . . from R. Ferryman

I intend to accompany Paul Sherville on his trip to South America, the problem being the size of the party — if there were more than the three of us, the cost would be less. My own aim is somewhat varied, as my main interest is Chile. I would like to work from north to south, paying particular attention to plant variation, basically to see if one can work any system on the distribution. I hope to give particular attention to certain specific areas, such as Arica, where *aricensis*, *saxifraga* and *iquiquensis* grow. Here we have three very similar species which supposedly offer a link with Islaya. Another aim would be to find Backeberg's Chileans *Pyrrhocactus* — *P. subaianus* — and find out what it is growing with or near, to determine any relationships. Topography would form an important aspect of the trip. Whilst wishing to see as much as possible, I would prefer to work and understand just a few restricted areas rather than rush round on a sight seeing tour of cactus countryside. But we still need to work out something more definite.

. . . . further from P.H. Sherville

The outline Itinerary under consideration is: Santiago-Coquimbo-Copiapo-Chanaral-Taltal-Antofagasta-Calama-Allogue-Pulacayo-Chocaya-Tupiza-Villazon-Tarija-Villa Abecia-Camargo-Potosi-Sucre-Aiquille-Mizque-Cochabamba-

La Paz-Puno-Arequipa-Caman-Atico-Chala-Nazca-Puquio-Abancay-Ayacucho-Huancayo-La Oroya-Cerro de Pasca-Huanuco-Toyabamba-Cajamarca-Chacapoyas-Bagua. It is not altogether clear that there are even vehicular roads between some of these places, so the programme is quite flexible. Plastic might be a better word!! I would like to take this opportunity to stress that we will not promise plant material to anyone, but duplicate slides, maybe even film, together with all collected data, will be available to subscribers.

. . . . from H. Middleditch

Other members may wish to participate in a discussion of possible aims and objectives for this trip; an extra Chileans meeting is being considered, to be held in the spring, to discuss this and related matters.

THE CHILEANS, CONSERVATION and IMPORTED PLANTS

The recently introduced regulations bring in far more comprehensive controls on the exporting of plants from habitat and their importation into Europe and elsewhere. It does appear that we are likely to have less and less opportunity of acquiring habitat specimens of cacti, although the precise situation at the moment seems to be reminiscent of the curate's egg. It is unlikely that many collectors among Chilean members are desirous of supporting wholesale grubbing-up of cacti over wide areas, in a fashion that amounts to destruction of the balance of the ecology. On the other hand I feel that many of our members would not altogether agree with a complete ban on habitat collection, or else our efforts to appreciate the real identification and habitat ecology of these plants will be ossified on the basis of currently available material. And in the way of the world, the imported plants in existing collections will not last for ever.

Should we be so bold as to suggest that Chileans' members are a "special case" and deserve to have the chance to acquire or to continue to acquire habitat plants? Do we put forward as a reason to support our case that these plants are reported upon in the pages of *The Chileans Journal*, which (apart from rare examples) is more than one can say for Botanic Gardens or I.O.S. protected collections? So do we divide the Chileans' members into sheep and goats, those who report upon their acquisitions and those who do not? And who would like that job? Do we ignore those members who do not fancy so much putting pen to paper but enjoy themselves propagating all sorts of interesting plants so they become more widely grown and so more widely studied? How many imported plants of a genus does a collector need to have before he becomes a deserving case for acquiring any more imports? How do we set about acknowledging the valuable asset of a greater or lesser number of imported plants which exists in many of our members' collections; at the same time preparing the ground for our claim to continue acquisition of habitat material: all with the absolute minimum of administrative machinery and expense? And remembering that we are talking about a hobby which people wish to enjoy. H.M.

. . . . from P.H. Sherville

Recently I had the pleasure of attending an I.O.S. meeting in order to advise those present of our proposed trip to South America next year. Also under discussion at the same meeting was the recently compiled list of specialist collectors, now published by the I.O.S., which includes a good number of Chileans' members. My own feelings are that this list could lead to inconvenience and even possibly theft if it came into the wrong hands. I do feel it would be worth while to have our own list of Chileans' members who grow imported plants, draughted on a plant species basis, giving only a reference number for the actual location of the plant. This has a two-fold advantage: all locations of specific plants are brought together for ease of reference when seeking a mate for a plant about to flower. In addition, the actual location of the plants can only be traced via a responsible representative of *The Chileans*.

. . . . from P.A. Smart

I have been wondering how long this unfortunate facet of conservation would take to bite and from recently reported events it would seem that the crunch is pretty near. As far as I am concerned, it would be a tragedy if the supply of genuine material dried up. There has been very little in the way of habitat *Rebutias* imported in the last few years — apart from the Lau expedition; as some of the older "names" have been rediscovered we are just getting a chance to prove the inadequacy of a lot of the earlier work on the group.

You are quite right about my interest in the *Rebutia* (sensu Br. & R. and others) and I am certainly prepared to act as Study group leader. This group is my special interest in the cactaceae; I have a pretty representative selection of imported material among the total of some 300-400 plants of this group. Recently I was lucky to have the chance to buy a large batch of *Rebutias* from Ron Ginns who was selling off his cacti; as material for study I have the history of each one and they are all grown from Ritter (Winter) seed or are Ritter collected plants, or propagations

thereof. I am delighted to have got hold of this original genetic material and in a year or two will be able to pass some of it around. However, to be frank, I only let genuine study material go to those whom I know will study it; I do think that offsets of such material should only go to those who correspond on the subject and not to unknown casual enquirers.

Although you might reasonably conclude that any member who attends the Brooksby Gathering is keen on studying his plant material, I think that there are plenty of keen ones (like myself) who find that the particular time of year makes it difficult to get to Brooksby. And as to how to find out otherwise whether an enquiry for offsets is from a casual interest or really for study, I'll have to think about that one. But in any case, anyone interested in our plants is most welcome to visit my collection at any time.

... from E.W. Bentley

I am not surprised to hear about impending restrictions on imports of plants. Although I am not keen to be designated a Study Group Leader, etc., I am quite prepared to let it be known that people can come and look at my Copiapoas if they wish. My reluctance to being considered knowledgeable on Copiapoas stems from the fact that I am not sure of the labels on my plants and don't go around looking at other collections to know if everybody is talking about the same plant.

... from R. Ferryman

I do have a fair selection of imported Neoporterias and I am indeed quite happy that this be made known through the Chileans. I think that we all expect a possible ban on plant imports from South America at some time and obviously we have all got to think very seriously about propagation of wild plants — something I am very keen on. Perhaps I am somewhat biased as I am a keen cultivator but inevitably our plants are going to get much harder to obtain. Perhaps there would not be the drain on wild material if more cultivating had been done in the past and this I feel is where we have to stir up some action. If the Chileans can get themselves recognised in this field it will be a great help to all concerned.

Over the past few years I have bought, where possible, two or three plants of the same type — here seed production is my first aim. It is different just to remove the odd offset but generally none of us are happy about cutting up good plants; however, when I have achieved the first objective of seed production I can cut up at least one plant to enable offsets to be distributed. At present I do not feel inclined to take the knife to these plants, but if I felt that these offsets would be going to "good homes" (and not just general growers), then I would respond. I also have in my collection several Cardenas' collected plants, particularly Sulcorebutias (received as Aylostera/Rebutia), which I am now propagating and it would be nice if these went where intended!

Now with regard to the distribution of propagations made from wild plants/seed, I would like to see some form of index made where "specialists" within the Chileans could register. In this way, these specialists could be offered the plants/seeds before they become generally available. But how one arrives at such a list would be a problem.

... from R. Zahra

Just now a great effort is being made internationally to stop the business being carried on in plants collected from their own native lands. I am not really a conservationist, but I do believe that better plants could be grown from seeds. I think that this idea should be given publicity in the Chileans. I believe that in the long run this will work in our favour, as if we stop buying mature collected plants then firstly the seeds of more interesting species would become available, secondly there will always be a native stock to fall back on to study and compare with, as plants even in the best conditions tend to change their appearance, and thirdly, through growing from seed we would be able to keep more than one plant of every kind, and thus have a better idea when forms exist within one species.

... from H. Middleditch

But who is going to fall back on the native stock and study it? And precisely how is it to be studied in the field — just on site? Why do Buining, van Vliet, Rausch, Krahn, etc., constantly note in their collecting accounts that plants of which they were in doubt had to be sent back to Europe in order to determine their identity? And how is anyone in Europe going to be able to continue to provide these answers if the only plants that come here are the ones that cannot be identified in habitat? Now our correspondent proposes to use seed-grown specimens as the basis for study and comparison, but I would suggest that this is not really practicable, for those of our members who have had the good fortune to be able to compare habitat and seed grown specimens of Copiapoa, Haageocereus, Lobivia, etc., will be all too familiar with the differences between one and the other, which can sometimes be quite astonishing.

Now in regard to the thought that habitat collected plants change their appearance somewhat in the course of cultivation, I would suggest that our member has a look at some collections that I personally know of in this country where growth on Copiapoa, Matucana (even haynei sorts), Lobivia, Gymnocalycium, etc., is retained to a highly commendable degree. He would have no alternative but to revise his idea that plants in the best condition tend to change their appearance. Certainly he could claim they lack the bits chewed out by animals, they lack the dirty unwashed appearance of a plant nearly buried in earth, and they lack the corky or abraded surface of a plant abraded by wind-blown grit. But I didn't really think that these features contributed to species determination. Which could help to explain why field collectors so often send material to Europe where one can compare it with plants from a wide range of locations, an exercise which is impossible in the field. So all in all I cannot see an effective appreciation of native flora being attained by the means our correspondent suggests.

. . . . response from R. Zahra

I quite agree that there are the heroes of the cactus world who grow imported plants better than they had been growing in their native country. These people need every encouragement, but besides these there are the others: those who could not grow them properly, those who could afford to buy the most expensive plants and then just neglect them. Then there is the big question as to what will happen to the beautifully grown collected plants when the owner gets old, sick, or dies? Many beautiful plants have been wasted because of this and I hate to see beautiful plants being wasted. So I am not against imported plants being cultivated in special collections like Ashington, the Exotic Collection, Kew, the Jardin Exotique, and collections attached to Universities.

Then there are the plants lost between collection and their final arrival in a collection where they have a good chance of survive. There are many plants lost due to over-collecting. I have seen slides of huge piles of Echinocereus, Obregonia, Mammillaria, and Thelocactus, all rotting away in the rain — because an American dealer had offered 25c for every plant, and the indians collected every plant in sight. When the dealer called again with a truck he could only take a very small proportion of what they had collected. The remainder just stayed there in piles, the result of this sort of thing is the fact that certain species which were very plentiful in a certain area are now scarcely met with.

Now we are not botanists in the real sense of the word. We are horticulturalists, most interested in the aesthetic beauty of a particular species, than in its cells, or the shape of its pollen. Of course as all good horticulturalists, we want to separate one species from another, to be able to give a plant the best conditions it wants, and so one has to know a little botany. But let us be honest — does this make us scientists? Does this give us a right to make us protectors of the world's flora? It is quite true that certain things grown from seeds never grow exactly as they would in habitat, but this is the challenge that we as good horticulturalists must face.

. . . . from H. Middleditch

If our correspondent had had an opportunity to participate in one of our Chileans Annual Gatherings I could hardly imagine him continuing under the misimpression that Chileans members qualify only as horticulturalists. I would have thought that a fair number were qualified to study and protect one small facet of the world's flora.

. . . . from J. Hopkins

I already have about a dozen imports of my own which have been decapitated for one reason or another and the resultant offsets will be made available in due course on the seedling list. It has occurred to me that this sort of thing could be of considerable value as a source of plants. It may be that some other members have imported plants which may, for example, be damaged ones, which they no longer want and which they may be prepared to offer to the pool; some members have already contributed in this fashion. I have purchased half a dozen imported plants and deliberately damaged the growing point; now they are putting out offsets and these, too, provide vegetative offsets of original reference material. An increase in the scope of this scheme would be a step in the right direction i.e. the reduction of demand for habitat plants. The more publicity we can give to the propagation of habitat material the better.

I am also interested in purchasing seedlings, and would be pleased to hear from any member who has anything available. It is not practicable to circulate all members with a list of seedlings available but members sending me a stamped addressed envelope will receive the next issue of the seedling list. I have obtained another greenhouse mainly to house seedlings and propagation material; it is not up at the time of writing but I have plenty of temporary storage for any plants arriving in the winter.

. . . . from J.R. Gooch

I must admit to being very surprised to learn that the U.S. Government have so seriously restricted the export of cacti that an institution like the I.S.I. who have intensively propagated plants from a very small number of habitat plants or seeds should have an export licence refused. The case for restriction of the plundering of selected

habitats of increasingly rare plants is of course overwhelming, but the minority of growers who are interested in any kind of serious study of field material must feel somewhat concerned.

I do have a number of imported plants of both *Sulcorebutia* and *Weingartia* and would be most pleased to try and assist the study of this group by being a sort of "Study Group Leader". Certainly I anticipate propagating both vegetatively and by the production of true seed, and this need is of course emphasised by the increasing restriction on the import of plants.

... further from H. Middleditch

In the light of current restrictions on the import of cacti, it would appear to be appropriate for The Chileans to revise the emphasis in our back-page listing, as quite a number of our members have built up valuable collections of imported plants over the past few years. These now constitute a valuable source of reference and it would appear to be appropriate to refer to them as reference collections. Some genera are well represented by imported plants in greater or lesser numbers in many collections and in several instances the member's name appearing on our back cover represents one reference collection from the many which (happily) do exist.

It may be that quite a number of our members would like to see a more active effort made to propagate from the imported plants which are now to be found in such collections. But it does seem evident that those members who will make the effort to produce true seed, or offsets, would prefer them to pass into the hands of those members who do intend to study them. But could not other of our members, whose main interest lies in seed raising or grafting, be encouraged to help with this propagation? How can we encourage members like Roger Ferryman to cut into some fine plants for propagation? How can he, and others like him, be assured that the offsets or seedlings do go to interested growers? How can members who are prepared to purchase propagated plants for study find out where to obtain them? Does our back-page listing form a starting point for enquiry? Is our Annual Gathering adequate for making wider contacts for plant exchange? It is proposed to hold an extra Chileans Gathering in Spring 1977, to discuss this and related matters.

CHILEANS SPRING GATHERING 1977

It is proposed to hold a Chileans Gathering at a suitable venue in the East Midlands near Easter, possibly April 1st to 3rd inclusive. Cost of board and accommodation is anticipated at £16 per head. In addition to the discussion of the proposed field trip by Chilean members, and aspects of conservation (considered above), it is anticipated that there will be opportunity for practical photography of plants and flowers. There will be talks on a wide range of genera, largely orientated towards suggesting features worthy of observation in the growing season. For information on venue, dates, time, precise cost and to make a booking, please contact Mrs. J.M. Hobart, 39 Woodside, Darras Hall, Ponteland, Northumberland.

It is intended to hold our Autumn Annual Gathering over the weekend of September 9th, 10th and 11th when *Cleistocacti*, *Rebutia*, and *Neochilenia* will be included in the range of discussions.

ERRATA CHILEANS No. 31

Page 6 line 1 for *Sierra chcia* read *Sierra Chica*

Page 6 line 36 for bits read bites

Page 22 line 21 for *Sulcorebutia vasquensiana* read *vasqueziana*

Page 22 line 40 for indifferent read different.

Page 23 line 27 for hugh read huge

Page 25 line 24 for writes read writers

Page 26 line 18 for the read that

Page 29 line 19 for vrietal read varietal

Page 29 line 33 for blake read black

Page 30 line 3 for we obliged read we are obliged

Page 34 line 34 for fact of lens read face of lens

Page 39 line 24 for barley read barely

Page 39 line 46 for La Pax read La Paz

Page 40 line 41 for off specimen read odd specimen

Page 43 line 31 for *canaensis* read *cantaensis*.

STUDY GROUPS/REFERENCE COLLECTIONS

Cleistocacti	T. Lavender, 62 Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
Copiapoa	E.W. Bentley, Northside, Grosspark Hill, Tiverton, Devon.
Frailea	J. Forrest, Beechfield House, Meikle Earnock Road, Hamilton, Scotland.
Gymnocalycium	G.J. Swales, 5 Hillcrest, Middle Herrington, Sunderland, Tyne & Wear.
Lobivia	J. Hopkins, Primrose Cottage, Monks Lane, Audlem, Cheshire, CW3 0HP.
Matucana/Borziactinae	P.H. Sherville, 51 Park Road, Enfield, Middlesex, EN3 6SR.
Melocactus/Discocactus	Mrs. L. Teare, 27a Maher Street, Kensington Gardens, Adelaide, South Australia, 5068 Australia.
Neoporteriae	R. Ferryman, Nichelia, The Street, Stonham Aspal, Suffolk.
Notocactinae	G.J. Charles, 23 Burnham Road, Great Barr, Birmingham, B44 8HU.
Parodia	A. Johnston, 11 Malvern Road, Scunthorpe, Lincs.
Photographing Cacti	A.W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm, Yorks.
Rebutia	P. Smart, 5 Tomlinson Avenue, Gotham, Nottingham, NG11 0JU.
Sulcorebutia & Weingartia	J.R. Gooch, 51 Bourn Avenue, Hillingdon, UB8 3AR.
Trichocereus	N.T. Hann, 5 Lake Road, Shirley, Croydon, Surrey, CR0 8DS.

THE CHILEANS

Organiser	H. Middleditch, 5 Lyons Avenue, Hetton-le-Hole, Co. Durham, England, DH5 0HS.
Treasurer	R.L. Purves, 19 Brocks Drive, Fairlands, Guildford, Surrey, GU3 3ND.
Membership Secretary and Back Numbers	Mrs. A. Lavender, 62 Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
Seed Exchange	J. Hopkins, Primrose Cottage, Monks Lane, Audlem, Cheshire, CW3 0HP.
Slide Librarian	A.W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm, Yorks.

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