# THE CHILEANS '81

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FLOWER, FRUIT & SEED Castellanos & Lelong

# Austrocactus patagonicus







AREQLE, ABNORMAL FLOWER, SEPALS, SCALE.

K.u.z.s. 28 2 1977





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# AUSTROCACTUS FLOWERS From A. Johnston

Could you throw any light on the genus Austrocactus? I have had a chance to get hold of various sorts and they all look different. I have a collected plant of A. patagonicus, and grafted plants of DVV 1, DVV 2, A. hibernus Lau 879 and another un-named sort. I have had some pleasing results with these as three different species have flowered now. I have been able to propagate quite a number of cuttings and it is interesting to see the way they grow from small cuttings with insignificant little spines into a plant with nice spines and much stronger body growth. Grafted pieces generally grow well and I have used several stocks without any trouble: Trichocereus pachanoi, T. spachianus, and one unknown one. Most of my plants are growing in my own loam-based mix but I have rooted some cuttings in soil-less compost and in a silver sand. After having no success with growing from seed I have suddenly had a fine crop of seedlings, too.

The imported plant of A. patagonicus is now about 7 or 8 inches high and the cultivated growth is just as strongly spined as that which grew in the wild, and there is no real change in the stoutness of the body or the form of the ribs. The plant has flowered for the last two years and the petals are extraordinarily thin, you can almost see through them. The stamens are bunched round the style and then there are a few more spread out, nearly touching the petals. The stigma is dark red. It will set fruit without being pollinated but the fruit is not large and contains only a few seeds. Fortunately it came into flower last year at the same time as my DVV 2, so I cross pollinated the flowers and the fruits were then much larger. The fruits were almost covered with long white bristle-like hairs which straggled up above the top of the fruit. Eventually the fruit split vertically when it was still turgid. If I remember correctly there were four fruits and as there was so much seed I counted it. There were about 600 seeds altogether.

The Austrocactus seed is very unusual, very rough and mis-shapen. I sowed most of the seed, trying it in John Innes based compost and in a peat based compost, but the germination was very erratic. The seedlings grew very long and thin before putting out the first two cotyledons and then before they started to form any minute areoles they seemed to start to dry up from the bottom. This problem certainly was not rotting, just drying up. One or two of those which did not pass out in this way, I planted down deeper in the compost and some of these did manage to keep growing. The rest of the seed was just left in the greenhouse over the winter in a saucer, but it would not have been subjected to a temperature below freezing. In the following spring I was busy sowing some conifer seeds in Arthur Bowers compost, which I was putting into plastics pots and then putting the pots into polythene bags. These bags were then sealed and stood on top of the gas central heating boiler in the kitchen. It seemed a waste to leave the rest of the Austrocactus seed just lying around so I put it into a 4ins. pot, moistened it, sealed it up in a plastic bag and stood it alongside the others on the boiler in the house. The Austrocactus seed germinated like mustard and cress. I began to get bothered that they might damp off, so I took them out of the plastic bag and put them into the propagator; later on I potted them up. They do not want to grow upright and obviously like to be lying down, like DVV 2. They are only fifteen months old now and about three inches long. The newer the growth the fatter the body is and the longer and stronger the spines, some with a hooked tip. They still have the long thin neck at the base that the original seedling formed after germination.

My plant of DVV 2 originally came from Albert Parker; it was labelled from Jurin do los Andes and looked rather like a short bit of Chamaecereus. It would not root at all for Albert Parker so he gave it to me. It was all shrunken at the top and and was rotting off at the bottom. The only part of it I could save was barely 1 inch long, which I grafted but I did not have much hope that it would grow. However, the graft took and it grew and thrived. During the following year, it started to show some stronger growth. I had been able to let Albert Parker have a propagation off my other plant of DVV2, and he kept his in a less sunny position than where I was keeping my own plant. His plant showed so signs of producing any particularly stronger growth like mine so I decided to put mine even closer to the glass. The new growth on the body then became even stouter still and the spines even stronger, so after that I moved all my Austrocactus plants on to the shelf just underneath the roof glass. Now I am quite sure that they need to have plenty of light to produce the strong body and spine growth. The flowers only seem to appear after the plant has developed this strong growth form. The original Chamacereus-like part of the body is now not much more than three quarters of an inch thick, with short bristly spines, but the latest strong growth has a body a good two inches across. The tubercles there are nearly half an inch high. They are divided from each other by broad grooves which reach right down to the base of the tubercles, so there is a line of tubercles, not a rib. The tubercles are very steep sided with an almost flat top, looking a bit like the shape of a ship's funnel. The areoles are elongated, with short white wool. The spines are coppery coloured, all straight and spreading and up to 300mm. long possibly two or three mm. thick at the base and perhaps flattened a little sideways. Near the growing point, all the spines stand more or less straight outwards, but later the outer spines become more spreading. At the bottom of the areole (the top on a hanging stem) there are some shorter and finer spines.

I think that DVV 2 must be a creeper as it obviously prefers to grow lying down, it even hangs downwards down the side of the pots. Whether grafted or not it sends down aerial roots and these can become quite strong. Once the plant is growing strongly the offsets can be taken off and they will root down, but weakly-spined offsets taken from a plant looking like a Chamaecereus do not want to root down. I have removed from this plant two of the offsets which had already developed the strong growth and rooted them down. They were put onto 5 inch pots to give the aerial roots a chance to go straight down into the compost. These two are now well established. Another offset is on a graft and this now has three tails, all with strong growth,

which are hanging down the sides of the pot. This plant is hung up right under the crown of the roof. It put out a bud last year which was not quite as hairy as the bud on A. patagonicus, but it grew much larger; there were some white hairs and some hair-like brown bristles twisting round for a short way above the top of the bud. The buds swell out in the centre before the flower opens and remind me of a large Lobivia flower about to open. The flower was an absolutely enormous size, at least twice as large as the flower A. patagonicus. It was facing more or less into the sun and it was the only Austrocactus flower whose petals opened out flat. There is a tinge of coppery colour (rather like the spine colour) towards the top of the bronze-yellow petals and the stigma is yellow. This was cross pollinated with the A. patagonicus and both set fruit.

My A. hibernus was a piece off a plant which Tom Jenkins received from Lau. It grows well on its own roots and offsets from both soil level as well as from further up the stem. So far it is growing upright and looks different from all the other species of Austrocactus. The tubercles are still fairly shallow, with a faint shallow groove separating the ribs. As usual, there are only short weak spines on the lower part of the body, but near the growing point, there are now pale chesnut brown spines up to 20mm. long. Once it had achieved this sort of growth form, there was no trouble in rooting down an offset from this plant. I also have a small piece of DVV1 which I could not root, but managed to get it going on a graft, and now it has two offsets.

My other Austrocactus does not have a name. It is a grafted plant with many offsets and also grows in a sprawling fashion; so far it has shown no signs of wanting to hang down like DVV 2. It has white spines which have a dark brown or black tip. There are a few short lengths of Chamaecereus-like growth with quite short, weak spines. Where the growth is slightly stouter the tubercles are still very shallow but the spines are distinctly stronger and some have a very distinctive curved hook at the tip. Now the plant is up near the roof, it has put on some even stouter growth, a little more tuberculate, with even stronger spines which are straight, stouter, without any hooks but still dead white with a black tip. There are no aerial roots on this plant. A detached offset is very difficult to root down, the hardest of any Austrocactus, but it grows well on a graft. This plant has flowered this year for the first time. The petals were a yellow colour and so was the stigma. The original piece of this plant, came to me as a graft from Horst Ewald in 1973, and I understand that it was A. gracilis.

I had heard that the original cuttings of DVV 2 came into this country from van Vliet to John Donald and that he then sent them to Eddie Barnes for propagation. Evidently after Eddie Barnes gave up his collection, John Donald could not trace the whereabouts of his DVV Austrocactus, so I let him have a couple of rooted offsets. I am on the lookout for any Austrocactus material that I can get hold of as I find these plants very interesting and would like to find out all I can about them.

# .... From Horst Ewald

Round about 1971 or 1972 I received a little piece of an Austrocactus from Keith Mortimer. It was only a short length so I cut it into two even shorter lengths and then cut each of those diagonally. This gave me four grafted pieces. One of them went back to Keith Mortimer when it became established and another went to Tony Johnston. I still have one plant which has grown well on its original graft. It does not grow upright and it does not hang down the sides of the pot; it grows more or less horizontally. It has white, hooked spines but does not make any aerial roots. One of the stems was producing a rather more robust sort of growth so I cut it off last year and now it is pretty firmly established on its own roots.

# . . . . . From K. Mortimer

Round about 1970 I received from a Doctor in Nuremburg, Germany, a cutting of an Austrocactus with short, white, hooked spines. As Horst Ewald was pretty good at looking after queer bits like this, I gave it to him to propagate and in due course it came back to me on a graft, growing well. Unfortunately I cannot recollect the name of the Doctor who sent me the plant but I do believe he was a gynaecologist.

#### .... From H. Middleditch

Not long ago I was translating an article from K.u.a.S. in which the author commented that "it took a child-doctor a quarter of an hour to make an "incision" in the earth with a pickaxe to extract the tuberous rooted Thelocephala..." This was written by a Prof. Schreier. Is there any chance that he might have been the gynaecologist from whom this plant originated?

# .... From K. Mortimer

Yes! Indeed, had you not quoted his name I doubt whether I would have remembered it. I believe he received the plant from a collector in Argentina.

#### .... From Prof K. Shreier, Nuremburg

Many years ago I received from Mr. Lembcke, now living in Hamburg, several plants of an Austrocactus species. One of them developed a beautiful yellow flower with a red pistil. Mr. Lembcke brought the plants from Lago Argentino. . . . . From R. Coulsting

I was given a cutting of an Austrocactus in 1972 by Eddie Barnes — it was approximately 1½ to 2ins. long. I felt that it was too risky to try and root it so the growing point was grafted on top of a small Trichocereus spachianus. I then cut the remainder in half longitudinally and both halves were grafted on to Selenicereus stocks. The cut was made longitudinally to enable me to get the maximum contact with the vascular bundles and, as I had hoped, it produced three offsets from various areoles. It was one of these grafts that flowered some four and a bit years after grafting. I had it on my top shelf and the plant was about 9 inches from the glass, facing due south. I had put it in this position so as to ripen the shoots and make it flower. It had also been fed with tomato fertiliser (Bio) several times. The soil I use is home-made John Innes No.3 without any lime, as our soil is

alkaline, mixed with 50% coarse washed river sand. It was unfortunately cooked after flowering in the somewhat warmer than usual summer weather and, I am sorry to say, expired.

This is a trailing cactus, the shoot that flowered was approximately 5ins. long and hung down the side of the pol. The spines are not hooked, but a little curved at the ends. The flower size was 5.4cm. in diameter and the formation of the flower fascinated me as it was quite unlike any other cactus flower. I have had a look at my slides and it looks to me that the stamens come from a ring (hymen?) at the base of the flower and climb up the pistil to just under the stigma lobes reminding me of a stook of corn; and then at the base of the petals are a small number of stamens lying close to the petals, with the anthers just below the point where the petals curve outwards. There were 54 stamens in the outer circle.

I feel that the main cause of this plant flowering was the sun it received; I do remember the flower being sensitive but I believe that it was so to both heat and light and I must observe this more closely next time I have a chance. The information given to me on the label was as follows: Austrocactus gracilis, Dirk Van Vliet East of Jarin do Los Andes S. Argentine, occurs on rocky outcrops. Very rare.

#### .... From A. W. Craig

I found a plant of Austrocactus sp. in Harry Middleditch's collection which he obtained as small grafted tail from Eddie Barnes. It was obviously not very happy and showed little signs of growth, so I acquired the top half and regrafted it. This put out some branches so I was able to remove some of these and graft them as well. One of these plants produced a main stem about 3ins. long and four branches between 1½ and 2ins. long. I had to take this off the graft as the stock seemed to be exhausted, which is really quite odd as the Austrocactus seems to be quite slow growing. I had used various stocks for the different offsets and there did not seem to be any difference between the stocks; even Trichocereus spachianus which is usually capable of carrying a strong growing scion for 4 or 5 seasons had fared no better. It is usually the fast growing scions which exhaust their stocks.

Various other grafted plants were taken off their stocks at about the same time (mid September) and placed alongside the Austrocactus on the same box to root; they are just starting to show signs of putting out root, but the Austrocactus has already put down pink roots of up to ½ inch long, from various points along the length of those stems which are lying close to the ground. On all the Austrocactus, whether rooting or still on grafts, the stems which have reached about 2½ to 3 inches in length are putting out new spines which are much longer than on the previous growth. On each areole there are 3 radiating spines up to 2cm. long, slim; on earlier growth they were only 2-3mm. long, later up to 7mm. long.

From Mrs. L. E. MacIntosh

Now for the amazing Austrocactus, of which I cannot find any literature referring to it except for one small mention in Rolf Rawe "Cacti in the Southern Hemisphere": cylindrical soft-fleshed, spines strong, one central hooked. Flowers from apex, funnel shaped, pink, diurnal; need severe freezing in winter, very sandy, acid, mineral soil". Now I do have some of D. van Vliet's plants, pieces sent to me in 1970 from Eddie Barnes, named Austrocactus gracilis from west of Jurin de los Andes. The only way to describe this monstrosity with the thin tail and the fat head is to send you a piece. When I received my pieces they were just thin tails, numbered 1 to 4 with locality as above but from east, west, north and south Argentina. These I grafted and they quickly grew many tails; while they greened up a bit from their appearance on arrival, the growth was otherwise still the same.

During the winter I lost all but 2 of them and came to the conclusion that they must be wrongly named so I put them in the shade and treated them as Aporocactus. But that did not work; they always looked half dead. Then I caught up with Rolf Rawe who mentions four species including A. gracilis. So last summer I put up a glass shelf in the hottest part of the greenhouse which was almost freezing in winter and said "live or die". And live they did, the tails grew long and made others from the joints until I had quite large bushy plants: they also threw out roots along the stem. Our winter was the severest for many years, but beyond a little shrinkage they survived — come this last spring, once again into the water trough they went and were never allowed to dry out, much to my amazement the ends of all the tails fattened out. You can imagine how grotesque these plants now look.

I removed one of the fat heads and grafted it as a flat graft and this has now grown tails from the bottom of the scion and the crown is growing out thin too just like the original growth. If you graft your piece too you should end up with something similar looking like a trifid from outer space! These must surely be the clowns of the cactus world. I forgot to say that I added nutrients to the water to allay our heavy lime content. I also have trouble convincing visitors that I have not grafted the round heads on to the tails as the growth is so different. They have not flowered yet, but I have hopes for next spring!

I should like to hear your views on Austrocactus as I have several plants which purport to be such but most of them look like under-nourished Chamaecerei, rather than the cylindrical hook-spined plants I had imagined. The only exception is A. patagonicus, which I grew from seed last year and grafted; this is now a 1 inch plant and looks more like a Notocactus at present.

# .... From R. Moreton

I got some seed of Austrocactus patagonicus from De Herdt and apart from the very poor germination (only three seedlings from one hundred seeds), the seedlings are most interesting. They make me think that Austrocactus is not

closely related to any other South American species, as the seedlings are tall and thin when still at the dicotyledon stage, just like North American Echinocacti.

# .... From J. Medway

I attempted to grow Austrocactus patigonicus from De Herdt's seed in 1975 but I had no germination at all. I do know that David Whiteley has managed to raise some from seed.

.... From R. Mottram

I have sown a large batch of Austrocactus seed, but only about half a dozen seedlings came up. Perhaps it has to be sown fresh, like Frailea, to give good germination. Or does it have to be frozen?

.... From Mrs. P. Mills

I obtained a plant of Austrocactus patagonicus from Tom Jenkins in 1974; it has now doubled its height and stands about 5ins. high. The new growth is very similar to the old, and neither old or new growth has hooked spines, more like strong curves. This plant bloomed on 30th May, 1975 and again in 1976 on 10th May. On both occasions it set fruit, and although the flowers were never hand-pollinated, there are usually plenty of bees about in the greenhouse. I have tried sowing the seed for two years running, immediately after gathering it, but have had no germination at all. I gave some seed to Tom Jenkins, and so far he has not germinated any.

It was interesting to see the slides from R. Coulstring of his plant in flower, which differs in colour of petals, stigma — on mine it is purple — and the fact that my flower has two rows of petals whilst that on the slides has only one. Now that I know all the other things to observe and note, I will make sure that I don't miss anything. I will collect as much information as I can and hope to have some seed to send later in the year.

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

A big thrill for the season has been the flowering of Austrocactus gracilis, very early in the spring. I noticed that one or two branches had several small pink dots, very woolly with silky white hairs; these were only on branches at the side of the plant facing east and would have got all the winter sun. The buds came from the new growth in the centre, but as time passed, all but one bud on each branch aborted; at that time spring was being very reluctant and we went back into cold wintery weather. As the days warmed up again, the three remaining flowers developed very nicely. They are the colour and size of a Pyrrhocactus flower — or probably somewhat larger, for they measured 2ins. across when fully opened. They reminded me of an Opuntia flower, for they had a short and very hairy and scaly tube, and the petals were narrow and pointed, cream in colour at the throat shading out to brownish beige at the tips. They remained open for a week, and even though I loaded the stigma with their own pollen, they have not set seed.

# .... From R. Ferryman

When I saw A. patagonicus in flower in Mrs. P. Mills' collection, the flower was slightly scented, a somewhat spicy or cinnamon smell. I say slightly scented deliberately as she had not noticed this herself and took a couple of sniffs before agreeing that it did have a scent!

# .... From B. Phipps

When we visited S.P.I. in 1974, we had a good look round the staging, and found a miserable, thin, shrunken stem lying abandoned in a tomato box. It looked for all the world like a piece of hawthorn twig. It cannot have been highly regarded by the nursery as we got it as almost a gift. When we returned to our hotel later in the day, we washed it down in the handbasin in our bedroom, laid it out to dry and later wrapped it up for our return home. It did not look as though it had much chance of producing anything at all, never mind a presentable plant. However, after we got it back to the greenhouse, it defeated our worst expectations by establishing itself. It was not exactly grown rapidly, but it has put on a small amount of growth each year and the spination on the new growth compares favourably with the habitat spination, which has the almost viciously hooked spines. It is a fairly typical Austrocactus patagonicus.

Three years after we acquired it, flowers appeared near the top of the plant on the cultivated growth and it has flowered each year since then. There are two or three flowers which bud up and finally open out together. These flowers have quite an unusual scent; to me, they smell like a Victorian front room and it is very difficult to describe this sort of smell. The flowers happened to be open when we had friends visiting, and my friend's wife said that she recognised the scent, as it was the smell of soy sauce. I would agree with that!

#### ... from D. W. Whiteley

It has been suggested that Austrocacti have a relationship with the Notocacti, but I am of the opinion that Austrocactus is more probably related to the Neoporteria-Pyrrhocactus group. The spiny scales on the flower tube look a lot like what I would regard as the pyrrhocactoid Acanthocalyciums. The seeds of Austrocactus also look to me to have affinities with Neoporteria and Pyrrhocactus seed.

# . . . . further from H. Middleditch

On the inside front cover is the seed sketched by Castellanos and Lelong; the side view compares quite well with the seeds photographed by Francis Fuschillo and shown at our Autumn weekend, but the hilum looks as though it has been viewed and sketched at a three-quarter angle and not truly end-on. The seed is up to 2 mm broad but even less than half a mm in thickness. The surface looks as if it has a complete covering of grey Rice Crispies.

Both R. Moreton and A. Johnson comment upon the very elongated form of growth exhibited by the young seedlings of Austrocactus, up to the dicotyledon stage. The illustration in Britton & Rose's Cactaceae of an Austrocactus plant growing in the wild shows it to be completely surrounded on all sides by a bed of stones and pebbles. Is this sort of surface typical of the areas in which Austrocactus grow? One could imagine a seed falling down into the crevice between stones or pebbles and germinating there; does it have to elongate fairly rapidly in order to get up between the stones and reach the light?

Austrocactus are reported from many parts of Patagonia. Castellanos and Lelong report them from Tupungato, Prov. Mendoza, at 1,400 to 1,500 m altitude; also from Valcheta, Prov. Rio Negro, and Rio Gallegos; Province Santa Cruz. Austrocactus intertextus is reported from Talagapa, Prov. Chubut, by Spegazzini. Britton and Rose report Austrocactus from General Roca, located some way to the east of Nuequen. Austrocactus bertinii was found not far from Comodoro Rivadavia of the coast. The DVV plants appear to come from Junin de los Andes. These DVV plants with the sprawling form of growth are from a location at a much higher altitude than all the other locations (except Tupungato). Do the Austrocacti adopt an upright form of growth at lower stations and a sprawling form of growth at higher places, where the average temperature is lower, and possibly the wind is sharper? What do we know about the climate in Patagonia where these plants grow?

#### .... from Mollie Robertson 'Days in Patagonia'.

An endless monochrome of wind-ridged sand stretched to the horizon. The eye grew weary by the sheer monotony of mile after featureless mile. A hot searing wind blew across the bluffs of sandstone. Devoid of life, it seemed the end of nowhere, with neither bird nor flower to soften the scene. This was Patagonia. Talcahuala was a flat sandy ranch, with few waterholes, stocked with sheep. The only hills were those of the Sierra Colorada, a red ridge many leagues distant across the wastes of sand that stretched to the horizon, dotted with algarroba bushes. An almost constant wind blew over it in summer which seemed to come direct from a furnace. Temperatures of 99 degrees F. were a commonplace at this ranch. At mid-day the heat smote one with an almost tangible force. One of the major problems was to maintain a supply of water for the stock during the hot summer months. In very dry years we might lose half the stock. Lying a good deal lower than the other ranches, it never had severe winters and hardly ever had snow.

One day a swarm of locusts descended on the ranch. A long way off, low on the horizon, was a thin dark smudge. In less than half an hour the thin smudge had widened into a broad opaque ribbon that blotted out the sun and spread a murky twilight everywhere. Even as I gazed with apprehension at this cloud, the first whirling bodies of locusts began to alight around us. Locusts continued to arrive like a fitful shower for about twenty minutes, then the main swarm positively rained down. Presently the gloom outside lifted a little; then the swarm rose like a dark cloud and disappeared in the direction of Sierra Colorada. We surveyed a nightmare landscape denuded of all verdue. Not a blade of grass remained, and every bush sported bare twigs only.

After two years my father moved to the Huanaluan ranch which was located in the Andean foothills. On the second day of the journey to our new home we left the open plain and began to climb. Huanaluan was situated much higher up in the mountains. The winters were therefore bitterly cold with much snow and, possessing more springs, the whole area was much greener. Talcahuala carried only sheep but at Huanaluan we also had horses and cattle. The cattle grazed the marshes alongside the stream. In spring the marshes teemed with insects and marsh birds --- herons, wild geese, moorhens, and ducks of all kinds. Swallows dipped and zoomed above the water; the reeds were the favourite haunt of a tiny humming bird. Gradually the year moved from the brief green of spring to the burning summer. In quick succession there bloomed a profusion of white flowers, rather like freesias, closely followed by a purple variety of the same flower. Both had deep yellow centres. At the same time there bloomed another flower, white, possessing a rich perfume. By mid-September all would have vanished and most of the ranch was a barren wilderness. The only flower which remained was a kind of marigold, great clumps of yellow flowers giving off a pungent peppery smell and exuding a sticky fluid at the base of the flower head. The long tussocky grass and low bush foliage would grow more parched day by day. By mid-summer even the stream flowed more sluggishly each week as it receded further from the heat-cracked bank. There were two kinds of summer weather; one was the day that dawned with a pleasantly cool breeze which would soon die away under a torrid sky; every living creature panted in the motionless air. The other kind of summer day would start without a breath of wind; then, precisely at 10 a.m. a little breeze would arise, growing to a flurry and increasing rapidly to a hot blast that whirled the dust into clouds along the track and smote the grass into flat swathes. Punctually at 4 p.m. this wind would drop.

By April the first snows would have mantled the shoulders of the Cordillera. Imperceptibly, as April gave way to May, most of the marsh birds departed. Every day now the sheep were being urged off the highest mountains and down to the lower slopes where they would be more sheltered. Implacably the cold increased. A bucket lowered into the well crackled on water that had frozen over. The stream was transformed overnight into smooth ice. Lightly fallen snow lay around the ranch house. Then one day the real snowfalls of winter came. Later blizzards would pile the snow deeper and deeper. Paths to the well and woodpile had to be cut through four or five feet of snow. Meanwhile the work of rescuing snowbound stock had to continue. Severe winter conditions continued from the middle of June until the end of September. Then came a few short weeks of spring, while Nature recovered from a winter at 5,000 feet above sea level, before the growing heat of full summer



was upon us.

Each year about half the sheep on our ranch would have to be walked all the way to Roca (General Roca — H.M.) a distance of something like 200 miles. The sheep cropped their leisurely way across the scrubland, a slow passage from the hills where the flock could graze all the way. But when the Traversia was reached they must cross the waterless waste as quickly as possible. Next day before dawn, camp would be struck and the long column of sheep would be on the move. It generally took about three days to make the desert crossing. The only halt was for a few hours at night. Soon after leaving the desert and whilst still amongst desolate scrubland, the sheep would scent water. This came from the Rio Negro, almost a day's march distant. From the railhead at Roca they would travel to the freezing plant in Buenos Aires.

Within the fenced-in ranch lands some flat-topped mesas of weathered rock and scree rose abruptly from the surrounding scrubland. Here a horse's tread could bring both animal and rider down in an avalanche of scree. The lower slopes were mostly made up of scree, low scrub and sparse tussocks of coarse grass. These conditions continued for about half way up and then petered out completely. Above, the rocks rose denuded of all vegetation to the very summits. One of these was about 2,000 feet high (the Andean Mountains made this one look like a small hill by comparison). We would scramble up a canyon which was an almost impenetrable tangle of sage and algarroba. At the foot of the last sharp ascent low cloud would often envelop us.

Not far from the ranch was an escarpment where long ridges of rock protruded like bones of a skeleton. We wandered across the rocky outcrop and choosing a place to sit we noticed that the rock looked exactly like the bark of a tree. We scraped away the top surface of scree until there was no doubt that we were sitting on a massive portion of pinkish-brown stone trunk that had once been a tree. We scraped and dug into the surrounding ground until we laid bare a large area of petrified tree-trunk that must have been forty feet in length. We were excited at our discovery, as no trees grew in this part of Patagonia.

.... from Charles Darwin "Journal of Researches" 1889.

The Beagle anchored within the mouth of the Santa Cruz. Three whale-boats started up the river. The river flows over a bed of pebbles, like those which compose the beach and the surrounding plains. Our regular day's march carried us on an average only ten miles in a straight line. The country remained the same, and was extremely uninteresting. The level plains of arid shingle supported the same stunted and dwarf plants; in the valleys the same thorn-bearing bushes grew. Everywhere we see the same birds and insects. Patagonia can however boast of a great stock of small rodents.

.... from P. Denis "The Argentine Republic" 1922

The rounded pebbles of granite and eruptive rock, so often described since the time of Darwin, sometimes free and sometimes embedded in red sand or limestone, are spread over the tableland round the masses of rock and are especially abundant in the coast region. It is the wind that explains the concentration of the gravel at the surface. It separates the pebbles from the more mobile material around them. Wherever the outcrop strata contains pebbles the wind eventually converts the place into a field of shingle. It has done this with the terraces of the Limay. The lightest particles, caught up repeatedly by the winds are carried to a great height and go beyond the Patagonian region.

.... from A. F. Tschiffley "This Way Southward" 1945

Early on the morning, we set out from Bahia Blanca. Owing to the previous night's downpour the road we followed was very muddy but after some time we came to sandy parts where we could drive much faster. The storm must have been local, for after about three hours we found ourselves in a countryside where everything was bone dry. Instead of vast green pampa, we were now in an undulating region. Here and there were dunes, partly covered in coarse grass; then occasional patches of ground encrusted with salt and sulphate of soda. These patches are called salitrales. Only here and there grew trees and bushes and as we travelled further southwards they became sparser and smaller.

Once across the Rio Colorado we found ourselves in a new world. Near the reddish river, plantations and long rows of poplars thrive thanks to artificial irrigation, but less than half a mile south from the river, the scenery is startlingly different, being a vast sandy waste where nothing but scrubby bushes grew. Some of the shrubs had yellow flowers, not unlike English gorse. Every now and then, a guanaco disappeared into the bushes, or rheas scuttled for safety as we approached. From San Antonio del Oeste, to the south, the scenery was all the same; a vast rolling plain covered with coarse bushes, a cloudless blue sky, but all the time the wind, the incessant wind. For hundreds of miles along the coast the ground is covered by gravel and extremely deep deposits of well-rounded pebbles. From Puerto Lobos I was once more on a dead-straight track; everywhere there was sand, fine gravel, and scraggy bushes. Immediately beyond the green valley of Chubut, the semi-desert begins once more. At Comodoro Rivadavia there is nothing to be seen but dismal barren hills and clouds of sand being blown about by incessant strong winds. The further south I travelled, the sparser and lower became the bushes, until near Santa Cruz they were no higher than heather.

.... from "Latin America" G. J. Butland.

Patagonia stretches through 1,000 miles of latitude from the Colorado river to Tierra del Fuego. It consists predominantly of a great plateau sloping eastwards from the Andes to the cliffs on the Atlantic coast. Although over extensive areas the surface is monotonously undulating or flat, it is by no means uniform in elevation. Considerable areas north and northeast of the Chubut river exceed 5,000 feet above sea level and most of the region is over 2,000 feet in altitude. Into this

surface has been incised a series of rivers draining eastwards from the Andes. They flow, however, as misfit streams in wide canyons which at the time of the melting of the great Andean ice sheets must have contained many thousands of times the volume of water which their present rivers hold. These great channels have gouged out high-cliffed corridors with a poor development of lateral valleys. They have the typical cross-section of rivers in arid country, with the more resistent rocks in their sides standing out as ledges above the less resistent, a feature which has been emphasised by wind erosion.

The Patagonian region comprises a series of plateaux between the sea and the pre-cordilleran trough. The surface of these is covered in places with river and glacial debris brought from the Andes, in places with more or less recent lava sheets. Elsewhere it is free of these adventitious materials so that the sedimentary and even the granitic rocks and the products of their decomposition occasionally form the uppermost stratum. Wherever waterborne or glacial material covers the plateau, the winds tend to remove the lighter particles and to leave the surface strewn with rocks, pebble and shingle. Armed with the sandy dust the winds proceed to attack projecting rock surfaces and carve them into a maze of hollows and shapes. The thin cover of vegetation throughout the central belt of the plateau is powerless to prevent the winds being almost supreme as weathering agents over a very large area. Under an arid climate the cracked and jagged upper layers retain their broken form for very long periods; in some parts the lava fields are almost impassable.

Two features, namely general aridity and strong winds, dominate the climate throughout the Patagonian region. Only a small proportion of the whole receives a precipitation exceeding 10 inches by annual average. The winds that reach the plateau of Patagonia from the Andes are dry in the main and readily absorb any surface water over which they blow. The few lakes that exist are therefore liable to get dried up periodically, leaving saline deposits in their beds, which become re-dissolved in part or entirety when the water returns with the succeeding rainy period. Depressions of this type are known as salitrales. Over wide areas of Patagonia a great deal of surface water gets collected in these salitrales whose margins are even more unfavourable to vegetation than the surrounding areas of higher ground which drain into them.

The small rainfall of most of the Patagonian area comes mainly in the winter. This seasonable concentration favours evaporation during the season when the sun is strongest and accounts in some measure for the general aridity. In the provinces of Rio Negro and Chubut fresh water is found only in scattered localities; either in the valleys of permanent rivers or in the depressions called mallins which are sufficiently well provided with water to have an outlet, or along the edges of the basaltic lava sheets resting upon impermeable strata where rain water that has worked through the cracks in the lava finds an outlet. The vegetation in these three more favoured types of situation contrasts by its greenness and variety with the prevailing grey and xerophytic vegetation of the plateaux.

... from Preston E. James "Latin America".

Landing on the desert coast of Patagonia is not easy. Cliffs at the water's edge mark the beginning of the plateaux. Back of the coast there are vast areas of plateaux, some of sedimentary origin, some composed of flows of dark-coloured lava. Above the plateaux stand areas of hilly land, composed of resistent crystalline rocks. In Patagonia the roar of the wind seldom ceases. It is not a steady, strong breeze like the trade winds of the low latitudes, but a boisterous stormy wind that carries rolls of cloud with it and that frequently changes its direction as different air masses sweep by. As one proceeds southwards, the last of the hot summers is to be found in the valleys of the Rio Colorado and Rio Negro. At Choel-Choel, on the Rio Negro, the average of January is 75.4°F. At Colonia Sarmiento, the warmest month averages 64.6°F and at Santa Cruz the average is only 58.6°F.

# A RARITY - AUSTROCACTUS PATAGONICUS By Eberhard Jahn

Translated from K.u.a.S. 28:2:1977 by R. F. Kollar

The genus Austrocactus must be regarded as one of the rarest in collections. For many years, these beautiful plants were nearly forgotten, although the first of them were known at the time of Cels and Schumann. The main habitat is in the south of the Argentine and Chile approximately between the 38th and 50th degree of southern latitude while the northern boundary is formed by the Rio Negro. There they appear in association with the flora of the extensive grass and thornbush steppes (Pampas), and also of the sunlit beech forests to the west of the Steppes, along the southern Cordillera. The temperatures there are very much the same as in central Europe, with summer temperatures as high as 40 degrees centigrade. An unwelcome feature are the violent storms, being in the same latitude as the "Roaring Forties."

Professor Buxbaum attempted to show that Austrocactus represented a link between Corryocactus and Pyrrhocactus, but with its own line of development. This can be accepted for the following two reasons: firstly, the form of the flower is not particularly different from that of the Corryocactus — but with one important exception, that the stamens are arranged in two series, the inner series being laid closely round the style and the outer one is spread out flat similar to the Lobiviae; secondly the seed is similar on one hand to the seed of Corryocactus and on the other hand a marked similarity can be established between it and the seed of the "primitive" types of the Pyrrhocacti, such as P. strausianus, and P. bulbocalyx.

In the description of A. patagonicus (Weber) Backeberg, the stem is up to 50cm. high, 5-8cm. diam., dirty green. 8-12 ribs, the central spines stronger than the radials, 3-4cm. long, the base bulbous. Flowers are at apex of stem.

5-6cm. diam. and length . . . outer petals slightly serrate with an acute spine point. Inner petals . . . serrate, also acutely spine pointed . . . stigma violet to black." The fruit is a "round berry, about 1cm. diam., embedded in wool and weak bristles, with few seeds. These are 1.5 by 2.5mm. obliquely bonnet shaped. markedly flattened. testa rugose or ruminate. Backeberg quotes as typical habitat Patagonia, between Rio Chubut and Rio Negro. This represents an area of 200,000 square kilometers! Lately an Austrocactus dusenii has been available from an unknown source, only as grafted plants, looking rather like a Chamaecereus. Flowers have not been observed as yet. Altogether, information on this genus is sparse and sometimes misleading (A. philippi!).

One of my plants spent the last winter in the open together with a Tephrocactus floccosus, on the south side of a rock garden, and did not come to any harm. In the spring, a number of buds appeared, but were not fully developed — the dry weather of this year could well have been too much even for an Austrocactus. Propagation by offsets is easy, but appears to be difficult from seed. Fresh seed taken from my plants has not germinated up to now and imported seeds are unobtainable. To ascertain whether the seeds are "low temperature germinators" some seeds are at this moment exposed to a temperature down to -12° C.

# ..... from H. Middleditch

The stigma colour for A. patagonicus is "violet to black", as born out by the flowers seen on cultivated plants. which have an upright growth. The plants of DVV 2, grown by R. Coulstring and A. Johnston have petals of a different colour. a yellow stigma, and a decumbent growth form; they must surely be a different species, possibly A. gracilis. The Austrocactus ex Lago Argentino has a procumbent form of growth, a white spination, and a yellow flower. It may come from an environment not greatly dissimilar to that in which DVV 2 grows. Up to the present time, it does not seem to have an identification. Austrocactus hibernus would appear to be of upright growth and seems to be closely related to A. philippi. A comparison of the two descriptions and of their respective habitat locations may prove useful.

The original description of A. patagonicus by Spegazzini in "Primitiae flora Chubut" in Revista Facultad Agronom. Vol. 3 1897-1898 reads as follows: Cereus patagonicus Web (in litt.). Habitat. Not rare in dry arid valleys here and there in the central and maritime regions (i.e. of Chubut — H.M.). Offsetting, cylindrical, small (20-30cm. high, 5-8cm diameter), green, 9-ribbed, areoles tuberculate, not close together (1cm. apart), spines 8-14 of which 8-10 outer ones are radiating (10-15mm long), 1-4 centrals, erect (15-25mm long), at first pale horn coloured later becoming blackish, with bulbous base. Flowers turbiniform (nearly like Echinocacti) (4cm high and 5cm diameter), exterior pink, interior almost white, fragrant, tube very short, exterior furnished with white hairs and numerous rigid upright adpressed horn-coloured bristles later becoming black.

Since this description was quoted by Spegazzini in 1897-8, it is rather remarkable that Britton and Rose should say in 1923 that "Dr. Spegazzini was surprised to learn that (Austrocactus) was reported from southern Argentina." It is also interesting to note that Weber and two Chilean members observe that the flower is fragrant, but not Britton and Rose. Spegazzini also published a description of A. duseni which does not appear to differ markedly from A. patagonicus, except that the former is scentless. But discussions in the pages of the Chileans have produced ample evidence to illustrate that a faint flower scent is not always evident to an observer. Furthermore, even flowers which have been observed to be scented at certain times have been found to be inodorous on other occasions. Does Spegazzini's original description in Nov. add. ad FL Patag, help to clarify the position of A. duseni?

In Britton and Rose's publiation it is noted that A. bertinii was discovered by Cels in 1855. Unfortunately Cels does not warrant an entry in Alice Coates' "Quest for Plants." Whereabouts did Cels go to in Patagonia? The illustration of A. bertinii in Britton and Rose would perhaps pass muster for an A. patagonicus. And what exactly is "Hort. France II 5., 1863" in which it was published? Britton and Rose also tell us that this plant was recollected by a Captain Bertin 1861. A sea captain. possibly? Of what ship — one engaged in some surveying work, with a botanist on board? There were many European vessels engaged in this sort of work during the course of the nineteenth century, whose findings were subsequently published. Does Captain Bertin appear in one of these publications? Who originally stated that this plant originated from latitude 45° 30' south? Would this plant not fall within the compass of A. patagonicus?

All in all, the observation that information regarding this genus is "sparse and misleading" would appear to be fairly well justified.

# from G. J. Swales

The author suggests that Austrocactus has been put forward as a "link between Corryocactus and Pyrrhocactus but with its own line of development." Presumably, he is thinking of the relationships between these three genera as they have developed over a long period of time. However, I am not at all clear now a genus can be a link and at the same time have its own line of development. If it is a link, it must surely join two things together; and if it is joining two things together, it can hardly be altogether separate.

# THROUGH THE HEART OF PATAGONIA By H. H. Pritchard

We arrived at Buenos Aires early in September 1900, and on the 10th, we embarked again on the transport by which we had passages to Patagonia. On the evening of the 15th we approached our harbourage, Puerto Madryn. When all

our baggage had been brought to shore, we went on by the miniature train which plies between the Weish colony at Trelow and the coast. Trelew is a settlement of houses on the emptiness of the pampas. All around the houses the pampa rolls away harsh, stony, overgrown with little humpy bushes of thorn and dotted here and there with wheat-land.

From Trelew to Camarones, the country was for the most part like the bare deer-forests of the Scottish Highlands, but with espinilla (thornbush) replacing the bracken. You may be voyaging at an easy jog over the pampas seeing the land apparently roll to the horizon, when suddenly you dive down a track leading between shoulders of the pampa. Then you are riding perhaps a couple of hundred feet below the level spread of the pampa, in one of the many canadones before reaching Camarones. Marches varied from fifteen miles to forty a day; when the afternoon sun waxes less strong, the horses are off-saddled and turned loose. In a country intersected by deep canadones, it is a difficult matter for the Gauchos to bring in the horses at first light next morning. Their tracks perhaps run easily through a belt of soft marsh and then are invisible upon a pampa of shingle and thorn.

On October 10th, I decided to cut across to the Rio Chico of Chubut and march along the river valley, the tall cliffs of which would serve as a barrier to prevent the horse troop straying at night. At each side of us were bare, bald grass hills, rolling in hummocks and their sides sprinkled with thorn scrub. The scenery here consists of alternating canadon and pampas; over all the tearing wind, which seldom drops. We were in a land of many flies, chiefly sand-flies, which buzzed and stung us horribly. By evening we reached the Rio Chico. On October 12th, I rode on down the canadon then cantered over the rolling ridges of pebble and thornbush on the other side of the Chico. That night a puma came into the camp. We could hear it moving among the pots and pans by the dead camp fire . . . Conical hills of sand have now taken the place of bush covered ones; on October 16th, the sand of the river bed was driving in the wind and filling everything. The muddy Chico is flowing through a land which looks as if it led over the edge of the world . . . Wearily we wend our way towards the distant blue hills . . . In the gorge and round our camp fire spreads a growth of rank lean weed, full of yellow flowers. Late in the evening, I went up over the ridge of bare hills. We saw a herd of guanaco and crawled towards them. The stones were a penance; the only cover was thorn and little of that on the pampa above the valley where our camp is.

The wagon now being broken beyond repair we had to use sixteen of the horses as pack-horses; half of them had never had a cargo on their backs until that day. That night the temperature fell to 12° below freezing point. The wind increased the rigours of the cold. On October 21st we observed enormous flocks of Chilean widgeon as well as some grey teal. The next day we arrived at Colohuapi, the furthest settlement in the heart of Patagonia. Nearby lie the twin lakes Colhue and Musters. The mournful whistle of waterfowl in countless flocks was to be heard.

We started from Colohuapi and made a march of about fifteen miles. The day was very warm indeed and the night rather cold, the thermometer at midday and at night being respectively 74° F and 37° F. All the following day, guided by a Tehuelche Indian, we rode across bare stony pampa devoid of game. While we were getting ready the next morning, a thin rain and yelling wind came down the canadon. It then rained so heavily in the night that we put up the tent and were glad of its warm shelter.

On October 31st, soon after we started, a big cloud blew out of the south and brought with it a heavy hailstorm which whistled before a driving wind. We hired one of the indians to guide us across the high pampa to Lake Buenos Aires. We left on November 3rd; a mighty wind blew from the west bringing with it showers of sand that stung us sharply. Huge rolling downs, bare hills and no vegetation save a few tussocks and scattered meagre scrub. The indian said the whole district is buried under snow in winter, only the high bald tops of the hills being visible. By November 5th we had climbed to some 1200 feet above sea level and the temperature was extremely cold. Canadon and pampa and high ground succeeded each other as we rode along, sometimes bare, sometimes sandy, sometimes thorn covered, often stony and strewn with fragments of basalt. Generally overhead a pallid blue sky and below perpetual wind. In the afternoon, I came up a rise and there lay our goal before us. On our way to the shore of the lake, we passed through a stretch of extraordinary aridity, a white and yellow spread of mud and stones that filled a valley between two scrub covered hills . . .

After our Christmas dinner at the camp overlooking the lake, the pack horses were loaded up on December 26th and we trooped away. All day we travelled over a pampa covered with basaltic fragments and thom bushes. Some of these bushes had a red tulip-like flower. Literally thousands of guanaco appeared on the summits of the surrounding barren ridges. We made our way up to a bare black highland of basalt; no wood, no water, no grass. During the next day or two we continued to travel over the same waterless stony pampa. There were pigmy hillocks. Before reaching the river Belgrano, we came in sight of a troop of horses being driven across the pampa. At first sight, we thought them a mirage. On enquiry, I was told that my friend Mr. Waag was in command. I had made Mr. Waag's acquaintance in Buenos Aires and we had arranged to meet in Patagonia if possible. We were most kindly entertained and enjoyed the luxuries of butter, bread, tea, milk and sugar. Flies abounded and bothered us as we ate our meal.

We were now in the valley of the (Santa Cruz) Chico; the valley here was green with grass. The grass was like that of an English meadow. Rain fell at night and the wind blew, but with the razor-edge of cold off. On the 11th we hit civilisation — a drinking shop.

(The account of the onward journey to Lago Argentine will appear in a forthcoming Chileans).

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# PHYTOGEOGRAPHIC STUDY OF THE LOWER RIO NEGRO REGION By Prof. L. Hauman-Merck

### Translated from Anales Museo Nacional de Historia Natural de Buenos Aires Vol. XXIV, 1913 by H. Middleditch

This region forms the north-east corner of what is called the Patagonian plateau. This "plateau" appears here as a very irregularly undulating plain, now and then having a fairly uneven relief and whose level rises gradually from the sea towards the interior. The highest part of the district of Patagones, at one hundred km. from the sea, rises to only 70m above sea level. But a most remarkable peculiarity of the region is that the largest part of the undulations in the plateau do not. properly speaking, form valleys debouching into other valleys, but form true basins completely enclosed, entirely separated one from the other, whose slopes are often steep and very uniform. In consequence, this gives them the appearance of craters, whose bottom is commonly at a very low altitude — for example 8m above sea level at the Salinas de Algarrobo. As a result, the landscape consists of a series of small hydrographically independent basins, of which the bottom is often occupied by a salt bed or a salt marsh, dry during the larger part of the year and accumulating but a small quantity of water, due partially to the smallness of these basins and partially to the great aridity of the climate. The area of these salt beds, which in summer look white or pink from the top of the surrounding hills, varies from a few hectacres to many square leagues.

The winds in this region are of considerable importance from the botanical point of view. They are remarkable as much for their frequency as for their intensity, as I have seen myself in February and March. Storms are fairly frequent, often dry and cold, stirring up clouds of sand which scratch and even lacerate leaves, as I had an opportunity to see on the fruit trees and poplars at the agricultural station on the plateau near Carmon de Patagones. This is sufficient to explain the low height of the vegetation on the plateau and the need for the bushes which grow there to have small and leathery leaves; many as we saw are even entirely leafless.

The climate of the lower Rio Negro is essentially mild and dry. The three coldest months (June-August) have an average temperature of 7.4° C. On winter days, the average minimum is 5.5° C at the coldest hour (5 o'clock in the morning) but temperatures do drop below freezing. On the other hand, the average temperature of the warmest months (December-February) is 20.7°, with an average diurnal variation of 10°, and an occasional maximum of 41° C. Rain is always scarce, averaging 300mm per annum, but in some years there is more than 400mm (1884, 1911), and in other years there is less than 200mm. Rainfall is slight when it does occur, which on average is on 49 days of the year.

Flying insects are not very abundant, in summer at least. The insects fairly frequent on the plateau are a large wasp and a long fly, which does not mean that they are important to the pollination of the flowers. Of other Hymenoptera there are very few species as well as individuals, likewise for Diptera, whilst Lepidoptera are very rare. Finally, I must mention the abundance of ants.

### Flora of the plateau

From the Rio Negro to the Rio Colorado there extends with dispiriting monotony the xerophilous vegetation of the Argentinian "Monte." This continues further to the north of the Rio Colorado and into provinces in the west and north-west of the Republic. The characteristics of the "bushy monte" which is to be found in this part with which we are concerned, is as follows. It is a fairly thick brushwood (bush-steppe) of shrubs which branch from the base and whose height rarely exceeds two metres; shrubs with very few leathery leaves, sometimes leafless, almost all very spiny. Between the bushes are to be found scattered clumps of under-shrubs which generally exhibit similar features and also herbaceous plants among which xerophilous grasses predominate. The ground is never covered by a continuous turf, being bare between the clumps where there may be seen rounded pebbles or outcrops of tufa or gypsum. The basic elements are, among the bushes: Larrea divaricata, Gourliea decorticans, Condalia microphylla and Prosopsis juliflora; and among the under-shrubs: Chuquiragua erinacea, and Baccharis ulcina.

It is necessary to mention also the cacti ("tuna" or "cardons") which are characteristic elements of the vegetation, although not found here in sufficient numbers to be able to play an important role in the landscape. Ten species belonging to the three principal types of Cactaceae — Opuntia, Cereus and Echinocactus — have been named for the region by Spegazzini (Cactacearum platensium tentamen 1905). Among the large sorts, the most common are the fine Opuntia sulfurea, with extremely spiny joints of smallish size, and Cereus coerulescens. Neither of these exceed one metre in height. The second species exhibits here a curious phenomenon, wherever its branches reach about one metre. This appears to be the height above the ground up to which they receive sufficient shelter from the surrounding thicket. They then bend over almost at right angles, and always in the same direction, almost exactly north to south as I have verified may times with the aid of a compass. But the predominant winds are not in this direction, in fact just the reverse according to the information acquired on the spot. Those extraordinary gusts of wind which are frequently produced in the country would alone have the necessary force to produce the curvature described. Among the small species Echinocactus gibbosus is by far the most numerous.

As for the herbaceous flora it is composed principally of various grasses among which the most common is Stipa tenuis ("flechilla"), abundant to the point that at the end of summer, one sees bundles of its seeds rolling along with their whiskers twisted round each other, occasionally covering the bare soil. In addition 1 noted: Poa lanuginosa, Poa denudata, Hordeum murinum, Stipa papposa, Stipa gynerioides, and Stipa caudata. A further dozen sorts are far from rare but are only met with as isolated individuals and play no role in the appearance of the countryside. With the exception of two species, the herbaceous vegetation other than the grasss are pretty small in numbers of both species and individuals. Still scarcer are those whose flowers are conspicuous, for example: Nierembergia rigida — white flowers; verbena erinoides — violet flowers: Sphaeralcea australis — pinky-orange flowers; Sphaeralcea patagonica — pink flowers; Zephyranthes andersoni copper flowers; Zephyranthes mesochloa — white flowers.

A quite exceptional role is played by two annuals which exhibit a complete absence of any xerophytic adaption, viz: Erodium circutarium and Medicago denticulata.

As has already been observed, the appearance of the region is one of great monotony, on account of the marked uniformity of the vegetation. It is possible to distinguish three types of vegetation which correspond to three types of ground:

1. Brushwood with Larrea divaricata; this is the most typical and the most widepsread Monte. It is frequently found on undulating ground which it covers with a thick and varied shrubby vegetation amongst which, according to the place, either Larrea (jarilla) or Gourliea (chanar) predominate. With these two are also found Prosopsis, Bougainvillea, Atamisquea and Monttea. On the other hand Condalia microphyllia is rare. Herbaceous vegetation is sparse. The soil is completely bare between the clumps of bushes, especially in summer. On the surface there may often be seen pebbles or outcrops of tufa or gypsum. Some herbaceous plants take refuge at the foot of the bushes. As one approaches the coast, coming from the interior, the bushy vegetation begins to thin out about fifty km. from the coast. The Gourliea and Larrea are the first to disappear.

2. Brushwood of Condalia microphylla. This most often occupies valleys (here called canadas) where the ground is level or slightly undulating. The quite clayish ground is certainly more fertile as grasses abound here, almost entirely covering the earth. The Condolia are more or less separated from each other and are usually the only bushes. Their low rounded clumps make dark spots on the backcloth of green grasses. They are almost always accompanied by Chuquiragua erinacea and Baccharis artemisioides. In the valley bottoms where the ground is even more clayey and occasionally a little saline. grow the tall, thick, hard, sharp tufts of Stipa caudata (pasto puna) whose cylindrical leaves are so leathery that no animal is able to eat them.

3. Moors of Sporobolus arundinaceus. Although the ground is always poor in clay it is not uncommon to come across places usually of limited extent where the soil is almost entirely sandy. At these places is found a component not encountered elsewhere — Sporobolus arundina, the "junquillo", a grass with a few narrow leathery leaves.

#### Soils

An appreciable number of soil analyses have been made by the Chemical section of the Office of Geological and Topographical Maps. From the strict botanical and ecological point of view, the value of this data will be self-evident. These analyses are those where the particulars of the flora on the soils from which the samples were taken, is known to me. Information may be obtained from the study of the natural vegetation, especially in arid regions, where quite small differences in the physical properties of the soil can profoundly modify their influence in regard to the natural vegetation. It seems to me to be quite probable that if a specific plant association has once been established, then if the same vegetation association were to be observed, be it ever so far away within the widespread phytogeographic formations as those in Argentina, the soil will nevertheless be similar.

# . . . . From H. Middleditch

In the part of Patagonia discussed by Prof. Hauman, it would appear that the cacti grow in association with the Monte vegetation. The principal component of this vegetation is shrubs in scattered clumps with bare ground between. By all accounts, the bare ground is generally covered with stones. Like the Cereus coerulescens and Gymnocalycium gibbosum, Austrocactus may also be associated with this stony ground. The account by Pritchard and the article by Prof. Hauman suggest that the valley bottoms have a different soil and vegetation. Spegazzini says in his original description that A. patagonicus comes from dry, arid valleys. Which environment is really favoured by plants of Austrocactus, the stony plateaux or the less stony valley bottoms? According to Soriano (La Vegetation del Chubut) the Monte formation extends southwards from the Rio Negro and occupies the north-east quarter of Chubut province, so it covers a fairly large proportion of Patagonia.

When Prof. Hauman is talking about Cereus coerulescens, he refers to its habit of growing upright to about one metre in height, and then becoming procumbent. He then goes on to suggest that this curvature is brought about by the force of the extraordinary gusts of wind which occur. I do find it rather difficult to follow just what he is trying to suggest, especially when he says that the wind blows at right angles to the direction in which the plants lean down. If they were blown over surely they would be uprooted?

#### .... From H. Middleditch

I suppose that Prof. Hauman is suggesting that he cannot see any obvious reason why the columnar cacti should start to adopt a decumbent growth after reaching about one metre height. There is no record available of Prof. Hauman's background, but if he was fairly fresh from Europe, he would naturally assume that columnar vegetation might be forced into a procumbent position by the force of the wind, just like trees being blown over in Europe. Probably he was quite unfamiliar with procumbent Pilosocereus, procumbent Haageocereus, or procumbent Seticereus. One of my own Seticereus reached about half a metre in height before bending over fairly sharply just above ground level and becoming procumbent — without being uprooted. There seems to be no reason why Cereus coerulescens should not bend over and become procumbent in just the same way without any external force being required. Prof. Hauman's training and experience probably led him to assume, erroneously, that a columnar Cereus required some external force before it would change from an upright to a procumbent form of growth.

This is an example of how important it is to know the background, training, and experience enjoyed by authors since this can be of great assistance in divining when they are making statements which both misled themselves and mislead their readers.

# . . . . . Further from G. J. Swales

There are also examples — quite a few in County Durham — of trees which grow with a definate bias away from the direction of the prevailing wind, at exposed sites near a coast or close to elevated hilltops. In this case, it is the abnormal reduction in temperature arising from direct exposure to high wind velocity which greatly restricts development of leaf buds at the windward side of the tree; growth becomes confined largely to the leeward side. In the case of the curving Cereus Coerulescens, it may be possible that the plant adopts the procumbent growth form to avoid over-exposure to the growth retarding effect of the winds.

. . . . . Further from H. Middleditch

If the wind is carrying fine sand that can lacerate leaves as Prof. Hauman observes, or scratch a face as Mollie Robertson says or chisel into softer rock as E. W. Shanahan suggests, then presumably it could make existence very difficult for a non-woody Cereus stem projecting above the shelter of the surrounding bushes. So does this Cereus grow procumbent to get away from the teeth of the wind?

## . . . . From R. Kiesling

Austrocactus is not very well known. Patagonia is a very extensive region, with not many cacti, and it has been visited by only a few collectors. The problems of travelling in Patagonia are the great distances involved, the wind, and the poor roads. You need to have a windscreen shield, a complete set of tyres, and a deep pocket for the cost of the petrol. Examples of cacti are very isolated because the wind distributes the seed far and wide; sometimes they do grow in colonies, so it becomes necessary to stop every few kilometers in order to acquire a number of plants in one day. You may find some Austrocactus and Maihuenia, the odd Pterocactus, and with exceptional luck, you may find some Gymno gibbosum.

My trips to Patagonia have only been three. One to the Sierra Grande in Rio Negro; in the Sierra and also towards the coast at only 300m from the sea there is A. patagonicus. Another trip was to Neuquen city, close to which grow Austrocactus patagonicus. In Piedra del Aguila in Neuquen province, I found an Austrocactus species with straight yellow spines. The other trip was very lengthy, during which I found only A. patagonicus.

In the Instituto Darwinion we have some thirty sheets of herbarium material of Austrocactus. In the south N.M. Correa collected A. patagonicus in Santa Cruz, at approx. 50° 30'S, 69° 30'W. Austrocactus is to be found in the north of Santa Cruz, in Chubut and Rio Negro, to the east of Neuquen and the south of Mendoza provinces. All these places are very windy indeed. The soil is covered with gravel; under the gravel it is possible to find different sorts of soil; sandy, rocky, sand and clay, but never humus. As far as I know, these plants grow at low altitudes or on low hills, from 20 to 800m above sea level.

The most common is A. patagonicus, whose correct name is A. bertinii. This is erect, massive, cylindrical or barrel shaped, with very strong and hooked spines. Austrocactus dusenii is from Chubut; it has a long, slender, cylindrical sprawling body with dark spines. The flowers are without bristles or spines. The Austrocactus species from Neuquen is similar but the spines are light yellow, not hooked, and the flowers have bristles and spines. Perhaps this is only a variety of A. dusenii. Austrocactus gracilis is very characteristic because it is the smallest species. It grows only at the border of the Patagonian desert with the forest of Nothofagus, close to rivers, as far as I am aware. I do not know of any fragrant flower in the genus Austrocactus, and none of the herbarium sheets mention this character, but it is possible that they are scented. I saw only a few flowers and in the middle of a windy desert it is difficult to detect any scent.

#### A PONG FROM THE PACIFIC SHORE From P. A. Smart

On entering the greenhouse one afternoon this summer I noticed a very powerful sweet scent in the hot atmosphere. I immediately looked for a second crop of flowers on plants of the Echinocereus viridiflorus group, but found none. A careful 'nose-around' identified the offender as a small seedling of Islaya copiapoides. Although the plant had flowered once before this year and also last year, I had not noticed any scent. The flower was a very greenish yellow colour not dissimilar to that of the E. viridiflorus forms which are often very strongly scented.

One very annoying feature of the Islaya scent was the fact that although I knew the smell, I could not put a name to it. My wife gave her opinion, as did four visitors later that day. All the names were different and some were conflicting. The following day I had a large party of visitors and put them to the test, listing the most interesting opinions. Two women, who both claimed to have very sensitive senses of smell could not detect any odour at all! The printable descriptions include:

Citrus, not quite orange or lemon, probably lime.	"I can only smell the plant — smells like any
Sweet and sickly, unique but not unpleasant.	other cactus."
Overpoweringly sickly — quite repulsive.	Musty, rather like soil.
Acrid — not unlike vinegar.	Clover or sweet pea.
Minty — the type mint sauce is made from.	Almond scented.
Like my bath oil (couldn't remember what it was	Cucumber like.
possibly lemon scented bath oil).	Musk.
Definitely rose-scented - like Super Star.	Spicy.

Opinions on the strength of the flower scent varied from "just perceptible" to "overpoweringly strong". From these observations it would seem that the human sense of smell is very variable and does not seem to correlate with the smokers and scent users. It would also seem that our power to describe scent is very limited. Possibly the temperature, light, turgidity of the plant tissues, and the age of the flower might well be contributory factors in the strength of perfume.

Although there were quite a few bees in the greenhoue they never approached the Islaya flowers, being interested mainly in the Mammillaria, Notocactus, Copiapoa, Coryphanthanae and other odd North Amercian genera. This observation was confirmed when the Islaya flowered again a week or so later. On the occasion of the second flowering the scent was much weaker, although the weather was cooler and duller.

My own first reactions to the possibility of scent in Sulcorebutia flowers for example were perhaps a little hasty — am I resolved to have a thorough sniffing next spring. I wonder, though, how one can hope to find strong scents when after years of growing I have never noticed scent before. The old adage that if one looks hard enough for something one usually manages to find it, might possibly have some bearing here, Who nose?

.... from Proctor and Yeo "The pollination of Flowers" New Naturalist series, 1973.

The olefactory (scent-sensitive — H.M.) organs of bees are similar to those of other insects and are confined to the antennae where they are mixed with the tactile hairs. Worker honey-bees can detect dilutions of scents ten to one hundred times weaker than those just perceptible to man and they are also very good at discriminating between slightly different mixtures of scents. It was found by Lex (1954) that the different parts of a flower often smell differently to human beings. She then used flowers cut up into these parts for experiments with bees and found that the honey-bee could easily distinguish between the scents of the parts.

The role of scent in the approach of honey-bees to food was investigated by von Frisch (1954). Observations show again and again that vision is important in guiding bees to a food source from a distance, but that scent is taken account of at close range and exerts a powerful influence on the bees' behaviour. It is interesting that exactly similar behaviour is found in the Diptera. The majority of flowers visited by bees do not have a very strong scent and in fact the scents to which the bees pay attention at short range may be very faint to our noses. The flowers used by Manning and some of the flowers which Lex found to have internal scent differences are not normally thought of as being fragrant. The use of such faint scents by bumble bees was clearly demonstrated by Kugler (1932). The flowers used were those of the Duke of Argyli's Tea tree (Lycium halimifolium), Viper's Bugloss (Echium vulgare) and Common Toadflex (Linaria vulgaris) and the results were the same with each. Kugler showed in further experiments that the bees were responding to the specific flower scents and not merely to the smell of vegetable matter or flower scent in general.

Among honey bees, scent plays an important part in the communication of information about sources of food. Returning foragers bring into the hive the scent of the flowers from which the food has been obtained and this scent is used by other bees to find the same kind of flower. Von Frisch found that the bees in the hive could learn a flower scent either from another bee's body or from the nectar she had collected.

In various experiments, Lepidoptera were tested with flowers covered with glass vessels or plates, so that the effective scent source was separated from the flower, and in all cases the insects flew direct to the flowers. It is important to make clear that these experiments merely show that once the insect has brought the flower within its range of vision, it uses vision for its final approach. All that Knoll tested in the way of response to scent by nocturnal hawk-moths was the possibility of guidance at short range and this was ruled out by the unexpected good vision in dim light which his experiments revealed. Since many moth-pollinated flowers produce their scent mainly at night it is hardly possible to doubt that some moths respond to it.

A general account of insect senses has been made available by Imms (Insect Natural History 1947). Tactile stimuli are received by hair-like organs scattered over the body with varying density. The perceptions of chemicals in the vapour state (sense of smell) is closely related with that of chemicals in solution (sense of taste) and it is not usually possible to say whether an organ is a tasting organ, a scent organ, or both. The structures concerned with chemical sense are thin-walled discs in the cuticle, or thin-walled projecting or sunken hairs, and they occur on the tarsi of the legs, the antennae, and the mouth-parts.

In Diptera (two-winged flies — H.M.) the taste organs are chiefly in the region of the mouth, but they are often occur also in the tarsi of the legs. When they taste food with their legs, insects automatically begin to lower the proboscis in

order to teed. It is, therefore, easy to investigate the sensitivity of the taste organs in the legs. In this way it has been found that the legs of the blow-fly (Calliphora vomitaria) are 100 to 200 times more sensitive to the taste of cane sugar that the human tongue.

# .... from H. Middleditch

So if different parts of a flower give off different scents, do we assume that the different scents quoted by Pip Smart's cross section of sniffers represents the various scents from different parts of the flower? Although there seems to be a fair amount of literature concerning the scent sensitivity of insects, no-one has (as far as I can find out to date) seems to have run a check on the scent-sensitivity of these two legged animals. How about a spot more statistical control if the visitors can be persuaded to return at the next flowering, by testing each with the old parlour game of unlabelled egg cups containing vinegar, lemon juice, distilled water, etc., with a duplicate set at quarter strength to identify the sniffers with the sensitive noses — a snifficiency factor, perhaps?

How does one divide a flower into parts without transferring the scent from one part to another part in the process? After slicing a flower in half for photography I am often faced with the most difficult task of removing the odd chopped-up stamen which always seems most reluctant to part company with the cut surface; and as for trying to get it off the tweezers after it does come off the flower...! So I do wonder exactly how one is supposed to go about cutting a flower up into parts. And into which parts? A pile of stamens, a pile of petals, the pistil and the remainder? Or into more than four parts? As G. J. Swales has already observed in these pages, we seem to have very little information on what scent is and where it really comes from.

#### .... from Strasburger, Textbook of Botany, 1970.

In plants there are specific unicellular or multicellular internal and external systems whose metabolism is directed particularly to the production of certain secretions or excretions. If the extruded material remains within the lumina (envelope — H.M.) of the cells, they are then referred to as excretory (or secretory) cells or tissues. If, however, the products are expelled through the wall of the cell we are then concerned with glandular cells or glandular tissues.

Excretory cells and tissues are scattered sporadically in the various primary tissues, Excretory cells are isodiametric to tubular. The excretion products accumulate as numerous small or medium sized vacuoles (minute droplets — H.M.). Eventually these products often almost completely fill the lumina of the cells. Ethereal oils (scent — H.M.) are an excretion product of widespread occurrence — examples are the secretory sacs or cavities filled with ethereal oil of oranges, lemons, and other members of the Rutaceae.

Besides secretory cells — and like them either singly or in groups — we often find glandular cells in the epidermis or in other kinds of tissues. These cells, in contrast to secretory cells, release their secretions outside the plant body or into intercellular spaces. The extruded materials often have an ecological significance. A continuous layer of glandular cells is often porous. In the epidermis occur glandular hairs, where the glandular terminal cell is developed as a head. Multicellular glandular papillae are also found (e.g. in Viola tricolor). The secretion itself is often an ethereal oil or resin. In such cases the secretion takes places between the outer wall of the glandular cell and the cuticle (the outermost skin — H.M.), so that the latter is raised up (as secretion accumulates in the intervening gap? — H.M.) and in many plants the cuticle is ultimately ruptured, thereby releasing the secretion. This occurs in many plants e.g. Primula, Pelargonium and in many Labiatae. The epidermal glands are classified according to the nature of the excreted material and thus we can refer to nectary glands (or nectaries). These latter produce a sugary secretion which attracts insects. Nectaries, consisting of glandular epithelia (surface tissue — H.M.) or hairs, occur principally within flowers; these are floral nectaries. Extrafloral nectaries found on petioles (in Prunus, Acacia), stipules (on Vicia) or in the angles between the nerves of the leaf (Catalpa) have a quite different construction.

The glandular cells or epithelia enclosed within the plant tissue border either on to irregular intercellular spaces or on to canals which may form an interconnecting system penetrating the whole plant. According to the nature of the contents we can again distinguish them as e.g. oil canals or sacs. Oil canals formed in this way contain ethereal oils in the Umbelliferae. Latex ducts are found in the economically important rubber tree, Hevea. Sacs filled with ethereal oils are found in species of Hypericum.

The hydrocarbons of the ethereal oils are terpene derivatives and must stem in some way from the carbohydrate mechanism of the plant's metabolism. Both excretion and secretion form an important part of the plant's metabolism and they must not be neglected despite the little that is currently known about them.

# .... from H. Middleditch

"Epidermis" in the above context is the surface layer of cells on either the plant body, leaf, petal or internal part of the flower. Thus we are provided with an explanation of how scent is secreted into special cells in the form of ethereal oils which are then released into the surroundings. Strasburger indicates that one manner in which these are secreted is immediately below a surface cuticle or very thin skin (probably thinner than the wall of a soap bubble) from whence they are released into the atmosphere. It would appear that the ethereal oils are still liquid before release, but turn into vapour when released into the surrounding atmosphere.

In underground working for coal, a serious potential hazard can arise from an increase in the effusion of

dangerous gases into the workings from the surrounding strata whenever there is a drop in barometric pressure. In a similar way, the ethereal oil secreted immediately below the cuticular surface of a petal could be expected to be under a pressure more or less equivalent to the surrounding atmospheric pressure; when the barometric pressure falls, the ethereal oil will then be at a higher pressure than that of the surrounding atmosphere. This increase in pressure difference across the cuticle wall which retains the ethereal oil could then exceed the burst pressure of the wall. With falling barometric pressure there could be a rapid increase in the rate at which cuticles retaining ethereal oil will rupture and release the oil as scent. When Pip Smart had his first Islaya flower open, was the barometer falling sharply and so leading to the rupture of a large number of the sacs containing ethereal oil? When the subsequent flower opened, was the barometer steady, so that the cuticle retaining the ethereal oil was not subjected to the appreciable difference between internal and external pressure and the normal rate of rupture was not accelerated?

The aroma from a bunch of flowers on the red-flowering Notocactus uebelmannianus was observed by several cactophiles (Chileans No. 36 p. 141) but then B. Plunkett has not been able to discern any scent at all on his own flowers of this sort. Could that have been due to the barometer rising at the latter time, thus reversing the differential pressure between the atmosphere and the etheral oil, providing additional support to the cuticle in retaining the ethereal oil? Can there be other factors at work? Does a Discocactus flower start to perfume immediately it is fully open, or is there a delay period whilst the ethereal oil is formulated and deposited in the sacs? Are Echinopsis flowers similar in the relationship between the time they are open and the time they are scented? Do traditional scented flowers exude a steady scent for almost the whole of the time they are open? Are there any scented flowers which only exude their fragrance for a part of the time they are open?

On one occasion I went into the greenhouse and found it full of a very marked scent; I had to go round the various open flowers before I discovered the source was a Notocactus rutilans. The scent seemed to be very marked on a morning but less so as the day wore on.

. . . . from R. Ferryman

Quite a number of Islayas have flowered for me so I have been able to try sniffing at the flowers to see if there was any scent. Up to now I have not found anything in the way of scent in any of my Islaya; as I think my wife has a slightly better sense of smell than I possess, I also asked her to check several Islaya flowers, but she was not able to detect any scent either.

# . . . . . from J. Arnold

I find that flowers on Islayas are usually scented; certainly I have not set out to make a systematic check on my Islaya flowers over a season but I do seem to think that every time I have sniffed an Islaya flower it has been scented. The scent, of course, is not strong and I suppose that you really have to look for it before you find it is there. I would not like to say that all Islaya flowers smell the same but I do think that they have a similar sort of scent.

### CEREUS CANDELARIS Meyen By J. Soehrens

Translated from Zeitschrift fur Sukkulentenkunde I 1923/24 by H. Middleditch

The traveller who ascends into the country in the Province of Arica, in southern Peru, in order to proceed beyond Tacna into the interior, here enters one of the most desolate wastes on our Earth, which continues high up into the Cordilleras. In Arica and at the coast it does not rain; at Tacna, 560m a.s.l., years pass in which no rain moistens the bone-dry earth. If one ascends from this town in a north-easterly direction into the Cordilleras, the previously gradually rising terrain changes into a bleak mountainous landscape, that bears a resemblance to that which we have been shown in pictures of the moon. Here, as there, the sun shines remorselessly year in, year out, on a lifeless rocky desert. And yet there is here, in our part, life. On the fields of rock and sand, grey like them and only noticeable to the observant eye, there may be seen a species of the genus Tillandsia of the pineapple-plant family, with a vitality that enables it, in a wondrous manner, to surmount the hostile environment and to maintain life with tenacious perseverance and to provide for propagation. This Tillandsia is entirely rootless; instead, all parts are covered with small scales, with which it sucks up the water necessary to it from the mists which are characteristic of this region. I have not been able to discover whether these plants flower; I am inclined to accept that, just as it produces no roots, it does not bring forth any seeds. Propagation takes place by branching; great clumps are formed in this way, many thousands of which cover large areas of ground.

Towards the evening of the first day's journey, the bottom of the rainy zone was reached in the vicinity of 1900m a.s.l. (In this territory, it rains in the summer months of December, January and February — occasionally into March. In the higher parts, the rainfall is more plentiful and goes on longer). Here we were at the start of the cactus country. There are small, half-starved, barely recognisable plants of Cereus candelaris and C. fascicularis that occur here at the threshhold of existence. As we climbed up higher, so the vegetation improved somewhat, but it remained monotonous; low-growing small-leaved shrubs, mostly Compositae, and tufts of tough-leaved grasses growing at wide intervals from one another, on the slopes. At 2,100m a.s.l., the first specimens of Cereus candelaris appear. As a vestige of a long-since departed richer

vegetation, the "Sabala" (so the plant is called by the Aimara Indians) grows up above the sparse gnarled shrubs in its vicinity. It seems, indeed, as if we had here a relict before us. The other accompanying genera in its neighbourhood are so different in their form, seem so modern by comparison, that even the most indifferent must be struck by the isolated situation of this plant. Cereus candelaris grows mostly solitary, but also several together on the slopes and in the gullies. The main roots of this plant are very extensive; they spread very widely in all directions, stretching far out under the surface. The multiple branching of the fine roots likewise becomes dense below the surface, because the dry, solid ground has nothing to offer them deeper down. By means of this root system, the plant is in a position to make use of each drop of rain that falls within its area. The infrequent rains and the mist (known as "Camachaca" in Peru), in this region have surely given rise to the development of the root system associated with these plants.

The trunk of the Cereus candelaris that I examined had up to the branching point, a height of 2.50m, the girth not being measurable on account of the densely packed spines, but perhaps amounted to 60-70cm. From the ground level up to 1.60m above, it was covered with spines. The upper part as far as the branching point was entirely spineless, pale fawn coloured, circular and smooth, the disappearing ribs being indicated only by fine, unraised longitudinal stripes. Meyen said "In old age the spines fall off to the foot of the trunks, and these then become quite bare". These remarks no doubt relate only to the old dying plants, of which the timber is used by the Indians to build their huts; I have never seen such completely bare trunks. The areoles on the spiny part of the trunk become enlarged and expand into hemispheres on it. New spine growths continually join the old. It would be a fruitless exercise to count them; from small bristles up to prominent 8cm long ones, all lengths are represented; a few 20cm long central spines stand straight out or point somewhat downwards; in new growths, all spines are black, chestnut coloured at the base. Also the wool in the areole is renewed; it is yellowish at first, later it becomes black and hardened. The branches of the crown grow in all directions; they have the self-same vellowish-red colour as the upper part of the trunk, also the branches have this colour; both wither in the upper parts from the tip down, the new stems appear on the lower parts, especially on those of the branches. These latter have a girth of 35-40cm at the base, 20 ribs. which however later increase towards the tip, some dividing there! The areoles are small, round to elliptical spines are absent. The boughs as well as the branches appear as if dead on account of their colour and on account of the faded tips Only through the last-mentioned fresh offsets does the plant give to the observer any appearance of life. The green of these fresh offsets becomes moderated by a superficial white coating of wax. The ribs, similar in number to those on the branches. are on account of constriction resolved into smooth tubercles, the crown is turnished with thick, yellowish wool and white bristles, which are brownish at the tip, first becoming almost grey, then later being shed. This Cereus is also furnished with spines in only one part of the trunk, the upper part and the crown are spineless

Cereus candelaris rarely seems to flower; twice I visited the area in which it grew, without seeing either flowers or fruits; also Meyen did not see any. By roundabout means I later obtained a flower and a fruit, for the first time, in a very damaged condition. But since I have no assurance that these parts belong to our Cereus. I forbear to pass on the description here. One rarely sees younger, still unbranched specimens of Cereus candelaris. I have not found any that are just about to branch, although I have searched diligently. Of one as yet unbranched, not quite 2m high plant. I made the following notes: Ribs 13, T-section above the areoles, spines numerous, on the lower stem 15cm long, 9-10cm long at the crown, black in the new growth, reddish-yellow at the base. As in the old plants, there also grew on this one new wool with the new spines on the old areoles. This plant was coated with a grey wax covering. On an old branched plant that through some misfortune had lost its crown, a new offset had srouted from the upper spineless part of the trunk. It was of a dark green colour, had 13 ribs broken up into tubercles, from whose areoles dense white wool domed outwards. The apex was enveloped by thick white wool and by numerous spines: the latter were black on the new growth, reddish yellow at the base. This offset matched precisely the apex of a young, as yet unbranched plant, as 1 have described above

We have here the following biological data: one hand span above the new offset, the Cereus had built up a multi-branched crown over many years of growth, that was itself capable of giving rise to flowers and thence to seeds, and that was also entirely different not only from the young plant, but also from the trunk that gave rise to it. And now to build this crown again from new, the plant must take a step back and again produce on the old stem the immature form, in order from this to be able to build the main branching crown.

The distribution of Cereus candelaris is narrowly limited in both directions. In the Cordillera it does not reach any further downwards than 1900m: upwards the boundary is situated — no doubt only in favourable places — above 2,400m. The northern boundary probably lies near Arequipa; Meyen saw some specimens there. In the south the boundary coincides with that of the Province of Tacna and the northern boundary of the Chilean province of Tarapaca in the Quebrada Camerones. The distribution range from north to south consequently spreads pretty well over 3 degrees of latitude. Cereus candelaris in its middle and upper locations is accompanied by Echinocactus leucotrichus Phil. (Echs. hempelianus Gurke). In this desolate terrain, that handsome plant with its red flowers gives the traveller a pleasant surprise by its appearance Comments

#### . . . . . From H. Middleditch

Soehrens himself paid a visit to the area now lying astride the present boundary between Chile and Peru. where he observed the plant we would now call Browningia candelaris. This species was also seen by his fellow-countrymen.

Reiche and Pohlmann, during their botanical survey of the Vitor and Camerones valleys which lie close to the 19th parallel of latitude. After the above article was written, Werdermann came across these plants near Parca which lies close to the 20th parallel. There is no record in the literature of Browningia being found any further to the south than this last location. In Rauh's account of his trip to Peru, contained in "Beitrag zur Kenntnis der peruanischen Kakteenvegetation", there is a reference to Browningia candelaris occurring on the run from Nazca to Puquio via the Rio Blanco. This location is about the 15th parallel of latitude. Hence the spread from north to south certainly extends over five degrees of latitude, as established by later botanists, compared with the three degrees of latitude quoted at the time of the above article by Soehrens.

Soehrens remarks about the difficulty of finding plants in flower or fruit; on a later visit to Browningia habitat in northern Chile, Werdermann expressed just the same view. The credit for observing the nocturnal flower for the first time must go, apparently, to Dr. J. N. Rose, who illustrates the bloom in Britton and Rose "The Cactaceae". However, it is rather difficult to establish the time of year at which he made his observations near Arequipa. An examination of the dates at which certain field collections were made (and these are found sprinkled infrequently throughout the foregoing publication) might suggest that Browningia was found in flower near Arequipa during the latter part of August i.e. before the onset of the rainy season.

The article by Meyen in which he first published Browningia candelaris, appeared in Chileans No.37 p.13. Like many other writers, Soehrens expresses the doubts which arise from Meyen's statement that 'on this candelabra cactus the spines fall off in old age leaving the trunk bear.' It may be as well to bear in mind that Meyen was visiting South America by ship, making journies of varying length from the ports of call. Prior to his trip inland from Arica, he had seen no tall, columnar cacti several meters high, such as Trichocereus pasacana or Browningia. At our 1979 Autumn weekend, Roberto Kiesling showed a slide of a Trichocereus pasacana in habitat, branching in the upper part, with almost all the spines having fallen off the lower trunk leaving it almost bare. This comment related to plants observed in Argentina. In the Fuaux Herbarium bulletin for November 1953, Cardenas notes in regard to the Trichocereus pasacana to be found in Bolivia "most plants of this species lose their spines at the base." It was suggested in Chileans No.37 that Meyen could have confused the bare trunks of T. pasacana with those of Browningia. It is to be noted that in his "Grundzuge der Pflanzenverbreitung in Chile", Dr. Kard Reiche observes that "in the course of his accounts, Meyen gives such short and scanty diagnoses frequently mistakenly established as new genera and species, that identification becomes difficult; in addition inaccuracies certainly occur in the information about habitat location." Although Meyen undoubtedly wrote an interesting and informative travelogue, it would now appear that his statement about the spines falling off the trunk in age probably related to Trichocereus pasacana and not to his Browningia candelaris.

. . . . . From G. J. Swales

Soehrens tells us that the cactus country commenced at 1,900m altitude, but that the first specimens of Browningia candelaris appeared at 2,100m elevation. What sort of cacti were to be seen in the interval, at the very lowermost reaches of the rainy zone?

# A DESERT JOURNEY by Isalah Bowman

From "Desert Trails of Atacama" - American Geographical Society - 1924

On my first pack-train journey into northern Chile where the nitrate desert begins, I was delighted to find all my expectations of desert scenery realised. For the first fifty miles (from Iquique on the coast, east towards the Andes — H.M.) there was but a single spot where a natural growth of green could be seen from the trail and but one other where there was any green growth at all, and that besides a desert well about which were clustered a few low huts. All the rest was naked rock and sand, brown and yellow in colour.

The deserts of the world are not lifeless places, although lifeless tracts of more or less limited extent can be found in almost all deserts. In northern Chile where is the driest climate in the world there are villages, because even there the desert is not absolutely rainless, and where there is rain there are streams and settlements beside them.

The settlements along the western foot of the Andes are all alike in that each depends upon a mountain stream that has a steadily diminishing volume westward towards the desert. When there are unusually heavy mountain rains and snows, the streams reach the border of the desert in greater volume and spread their mantle of waste over many square miles of the desert. Each stream is deeply incised below the level of a broad piedmont slope. Separated by wide stretches of barren rock and sand, the settlements are oases, almost like oceanic islands in the degree of isolation they possess. The precarious situation of most of the towns is one of their striking characteristics. The least accident may betray them. This is well illustrated by the history of a line of settlements, in the Charcarilla valley. It was at one time a fertile district. But early in the 1870's, a great flood came down the gorge, broke down irrigation ditches, cut up the terraces, or deposited infertile sand, gravel and even boulders upon them, devastated the farms and overwhelmed the orchards. I saw the irrigation works of the now deserted village of Algarrobal. Here and there a neglected orchard tree or pepper bush, or the crumbling mud walls of some abandoned home, are a testimony to the ruin wrought by the flood.

For the pack-train journey across the Atacama, the desert of northern Chile, I obtained mules and guides at

Lagunas. We prepared for a journey of several weeks and set out early in May for a pass at the southern end of the Cordillera Sillilica. The first day's journey was to take us to Matilla. Soon after we rode out from Lagunas, we entered the piedmont slope formed of mountain detritus washed into place at times of heavy rain or of melting snow in the mountains when the streams come down in torrents. Along this slope we saw men digging fuel from the ground — an astonishing way to get firewood. All the more curious is to hear the phrase "mining for wood". This exploitation of wood depends chiefly upon algabarro trees brought down by mountain streams where the shifting of stream channels had undermined patches of algarrobo woodland.

Beyond this point we rode further into the piedmont and entered more broken country. From the summits of the ridges between the shallow valleys we could now look over the whole width of the nitrate pampas and see the low hills of the coast range outlined against the top of the fog bank that hangs over the edge of the Pacific. The Desert Trail, where it crosses the salars, appeared broad and white in contrast to the darker yellow brown of the pampa.

By three in the morning we reached the floor of the Quebrada opposite Matilla, but in the darkness we could not find the ford, so made camp there. The next morning we crossed over to Matilla. This village is supported by a thin thread of water from the Altos de Pica, far above. Halfway up their slopes one comes upon the edge of a belt of grass that denotes a rainfall slightly heavier and regular in occurrence. It is a mid-mountain belt of annual rains and permanent pasture. Almost before we had time to note the first spears of grass at about 8,000 feet we also noted the first bird calls since we had left the coast.

This belt of grass that lies like a band across the western face of the mountains also has an upper edge where the short and nutrituous grasses give way to the bunchgrass, or ichu grass as it is called, and ground mosses and resinous shrubs such as the tola bush. High up on the plateau we were surprised to find the large and straight-stemmed cactus (cardon) where there are nightly frosts for at least six weeks of the year during late May, June and early July. The belt of grass between 8,000 and 10,000 feet extends all the way from Peru southwards along the mountain flanks into central Chile. It is a feature of the mountains that has all sorts of interesting effects upon the local life, fixing the position of many mountain trails and determining the summer pasturing grounds of the mountain Indians.

# IMPRESSIONS OF CHILEAN CACTI By E. Werdermann

Translated from Monatsschrift der D.K.G. 1929 by H. Middleditch

Our knowledge of cacti is based to a great extent upon observations of specimens cultivated over many years in Europe. However, whosever gets to know these obstinate fellows in their homeland, where they have chosen for themselves in the wild their own place in the sun, will have come to know how much they have lost of their individuality under the influence of the completely altered essential living conditions here, and have assumed a different appearance. Which cactophile would not nurture thoughts of being able to admire his favourite just once in their natural surroundings, as they themselves fit into the general landscape and often even lend a characteristic it stamp to it? When grass and herbs have long since dried up and their short-lived existence in the arid region of the desert and semi-desert has come to an end and leafless bushes with rigid dried-out branches continue in a death-like sleep, then all life appears to have flown from these stiff-armed forms. Yet, at this very time, they often first put out their bridal dress and bedeck themselves with delicate colourful flowers. There, one should study them and get to know their ecology and living conditions. But how many have this privilege? At the nature lovers, may they enjoy that fine spectacle and be responsible enough to recognise the preference for cacti in Europe as only a whim of passing fashion, as a result of which, through reckless uncontrolled collecting, a profit may be made from them. When one sees in what quantities Europe has become flooded with imports at this time, and also knows that the majority of these plants are condemned to an early death on account of lack of proper knowledge of the method of treating them, then a faint dread creeps up concerning the nature of the devastation in habitat, that later generations must encounter. I must therefore in addition at this point direct two requests to the cactus collector.

Do not exterminate the plants; which in any case lead a difficult struggle for life in nature and are only able to reproduce themselves again with difficulty. Do not send to us only the plants, but also pictures of them in their homeland and pass on what we here are not able to get to know about their origin, life, and their surrounding conditions.

#### Cereus candelaris Meyen

This most striking representative of the cactus family from the territory of Chile was discovered by Meyen in south Peru in the neighbourhood of Arequipa and described briefly in his work "Reise um die Erde" in 1834, Volume 1, p.447 As Vaupel mentioned in the Monatsschrift fur Kakteenkunde 1920 Vol.30 p.63 no more information has reached us concerning this monotypic plant for quite some time. Also K. Schumann quoted this species in his Gesambtbeschreibung der Kakteen p.165 only under "at present unknown species."In 1914, the indefatigable investigator of the Peruvian Flora, Prof. Dr. Weberbauer, sent a specimen preserved in spirit to Dahlem that was thoroughly investigated and well described by Vaupel in the place quoted. Since then Cereus candelaris has twice again been observed and photographed in habitat, by Dr. Rose in 1914 near Arequipa (Illustration in Britton and Rose, Cactaceae II p.64 as Browningia candelaris) then by J. Soehrens in Tacna province, which at the present time is placed under Chilean sovereignty. He is a distinguished scholar of the Chilean

Flora, in particular of its cacti. We have unfortunately heard too little of his extensive knowledge and varied observations, perhaps because of his advanced age. He has studied this plant in detail. An excellent photograph and very detailed description is to be found in the Zeitschrift fur Sukkulentenkunde Vol.I, 1923/4, to which really nothing further has been added.

The picture taken by me in 1926, in the province of Tarapaca (which is famous on account of its saltpetre deposits) in a valley near to the hamlet of Parca at 2,500m altitude, shows this almost primeval-looking plant from the currently southernmost known habitat. The gnarled giant always grows solitary, not only on the floor of the waterless Quebrada, but also ascending the dry, bare slopes above. The solitary specimens on high ridges produce an effect of times long past and give a peculiar character to the whole valley. Our picture shows a specimen several meters high, whose lowermost branch I could not reach even with my outstretched arm, despite my height. In the background stand four smaller, as yet unbranched, columns, young plants of the selfsame species, which only branch at a certain size by lateral offsets, appearing at well spaced intervals. The thick stem in the lower part bristles with strong spines, whilst the boughs in the crown remain unarmoured. Soehrens has previously referred to the peculiarity of the root formation. Rain rarely falls in these areas, which are probably amongst the driest in the world. Often years can pass in that way. But fog banks, especially in winter and spring, are often so heavy that the otherwise dust-dry ground is superficially soaked with dew in the night and morning hours before the shining sun appears in the ever-blue sky. It is thus understandable that the roots spread themselves out close to the surface of the earth. In order to eagerly absorb each available drop of this moisture, so frightfully precious in these desert regions. Not a single specimen carried flowers or fruit, for which Meyen and Soehrens had also searched in vain. Rose discovered flowering plants around Arequipa and described them in his monograph.

#### Cereus brevistylus K. Sch.

In the same valley as Cereus candelaris, but 1,000m higher up, at around 3,500m, was adden to be found an imposing representative of the genus Cereus that enlivened the bare rocky areas, that for only a few weeks are decorated with isolated ephemeral herbs and only here and there support dry shrubs. However, this Cereus is known from South Peru and is new for Chile. Weberbauer sent some pieces to the Botanical Museum in Dahlem, Schumann recognised it as a new species and named it. It was described by Vaupel in Engler's Botanischen Jahrbuchen 50, 1913, supplement III. Rose, whose chief merit is still that he searched for so many cacti in their homeland, examined them in habitat, and also recorded them on photographs. He found this species around Arequipa again and brought a habitat snapshot into his monograph Vol. II p.67. This picture shows a relatively young specimen, whose spination is somewhat shorter than in ours, which is already fully developed. Also it does not exhibit the plainty visible characteristic formation of the individual columns. The specimens found by me had already finished flowering, but carried abundant yellow-green fruits larger than apples, that in their young stage are furnished with numerous spiny areoles. At ripening, the areoles fall off, or at least allow themselves to be easily removed and then the small-seeded, exceptionally juicy fruits with their aromatic, slightly acidic taste form an agreeable means of refreshment in the waterless sun-scorched rock-desert, by which the dry palate is pleasantly refreshed.

#### Pilocereus celsianus Lem.

While we are showing the species in the above illustrations, which perhaps even yet have not been cultivated by us, we may now greet a fine old acquaintance in its homeland, that has already frequently undertaken the long journey from the Andes to our fatherland. Pilocereus celsianus (Oreocereus celsianus — H.M.) was imported for the first time by Bridges from Bolivia and described by Lemaire. The range of distribution of the species is fairly wide and lies in Bolivia, south Peru and the very north of Chile. The adjoining illustration comes from a photograph taken at almost 4,000 altitude, and indeed from the same region that at a lower level is colonised by C. brevistylus and C. candelaris. However, the latter species does not ascend as high as P. celsianus. At these high levels, the temperature variation is very considerable even in midsummer, through lack of cloud cover and the consequent extraordinary intense loss of heat by radiation at night. The daytime temperature rises at noon to over 30° C to sink to zero and below only shortly after the disappearance of the sun. With insufficient protection against too much moisture, it should not be difficult for us (i.e. in Europe — H.M.) to grow fresh imports in the open, but not those weakened by cultivation.

#### Comments

#### ..... From H. Middleditch

This review of the larger columnar cactus plants which grow on the Pacific-facing slopes of the Andes, deals with a fairly localised area in the very north of Chile, lying at 20° S latitude. Thus it lies at a distance of 1° of latitude south of the valleys visited by Reiche and Pohlmann (Chileans No.38, p.157) and at about 2° of latitude south of the area visited by Johnson, near Tacna. This itinerary also lies quite close to the track followed by Knize on his "Trip to the Cordillera." Over the altitude range in which the cacti are to be found, all these accounts agree in placing the Browningia at the lower levels within this range and the Oreocereus at the higher levels, usually with little or no overlap.

Weberbauer in his "Flora of Peru" describes the east facing slopes of the Andes in southern Peru as being a southern desert up to an altitude of about 2,000 meters and even higher in places. This is followed by a herb-poor zone of columnar cacti, which occurs between the upper limit of the desert and then upwards to about 3,500 meters altitude. Weberbauer quotes the most conspicuous object at lower elevations within this herb-poor zone, as Cereus candelaris, which

prefers to grow on the stony fields and rocks. Common among the shrubs from this same zone is Schinus molle. Between about 3,500 and 4,000 meters lies a region much richer in grasses and shrubs, but which still supports some cacti (although mainly lower-growing sorts), such as Oreocereus celsianus.

From a comparison of Weberbauer's description of the vegetation zones in south-eastern Peru, with the accounts in this series of articles relating to the northernmost part of Chile, it is clear that both these areas really constitute a continuous belt of climatic zones. Over the length of this zone, in any given altitude band, many of the features of the vegetation remain unchanged over a wide spread of latitude. In particular, the cacti exhibit a very similar segregation by altitude over almost the whole of this section of the Pacific flanks of the Andes.

# .... From G. Charles

The concern expressed by Prof. Werdermann at the depravation of the habitat by the importation of so many cacti into Europe, has a remarkably modern ring to it. His appeal for cactus hunters to collect pictures of the plants in the wild together with facts about their environment, would be absolutely in tune with a great deal of the current attitudes on conservation. Indeed, his words seem so appropriate that I would like to see them given as wide a publicity as possible by The Chileans.

# A TRIP TO CHILE By H. Johnson

Translated from K.u.a.S. 3.3.:1952 by H. Middlewich

On the south side of the pass from Puno, we descended slowly, often scrambling up the slopes in search of Lobivia. We found nothing, however; probably the area is too dry. A form of Tephrocactus ignescens cropped up occasionally. The first fresh cactus which we saw other than the Tephrocactus was a large Corryocactus with a clear yellow flower. At 3,600m the first Oreocereus appeared. Oreocereus celsianus is a remarkably variable species; it ranges from almost hairless forms to those with profuse white or black hairs. Also it varies considerably in the growth form. Near Tarata we discovered a new variety with a substantially different fruit. It is orange coloured at maturity; the areoles bear short, brown, silky hairs. The opening of the fruit does not follow the usual mode for this genus (through the basal opening) but instead the capsule bursts at the apex, from which the seeds scatter. Birds were to be observed very frequently on the plants, although they did not touch the fruit of O. Celsianus as a rule. About 3,200m altitude I found a new Arequipa on a limestone outcrop. A Trichocereus peruvaianus variety was in flower. Shortly afterwards, there appeared another Arequipa. Corryocactus was also there still, but the fruit was elongated instead of spherical. One very long-spined, procumbent cereus grew here and there, probably a Corryocactus.

At 2,800m the Oreocerei were very frequent, all the variations growing mixed together. The new species was also there, displaying however no intermediate grades. Also plants which seemed to be Oreocereus trollii, suddenly appeared. A very interesting Tephrocactus with extraordinary long spines and large joints grew only on one hillside. A Platyopuntia with reddish spines and small glochids was frequently to be seen. The Oreocereus occurred as far down as 2,000m, where it was already very hot and dry, being much lower than I had anticipated. At this lower altitude, the stem was much slimmer and had far fewer hairs than further above. Another Arequipa was to be found here on beds of clay. The spines were more bristle-like.

Browningia candelaris appeared round about the point where the Oreocereus disappeared. In scattered clumps in a sandy canyon there grew a peculiar sort of Cereus, that I first took for an Arequipa. It was not in flower and its procumbent stem reached 1m in length. Some had short central spines, in others they were up to 9cm long. As we descended towards Tacna, the vegetation completely disappeared. The last cacti were a strongly spined Tephrocactus, creeping and columnar Corryocacti and Browningia candelaris bearing fruit.

#### Comments

# .... From H. Middleditch

In his description of the western slopes of the Andes in southern Peru, Weberbauer says that the typical vegetation of that zone is closely related to that of the adjacent parts of Chile and Bolivia. He notes that on the plateaux up to about 10,000ft. altitude "among the columnar cacti, the tree-like Cereus (Browningia) candelaris is a most conspicuous object at the lower elevations." Between the altitudes of about 10,000 to 12,000 feet, Weberbauer observes "in some places the columnar stems of Cereus (Oreocereus) celsianus and its relatives, distinguished by the tuft of long white, or brownish-red hairs covering their top", are accompanied by Tola bush and ichu grass. Similarly, when travelling inland from the coast, Backeberg, Wedermann and Knize have all noted that the first columnar cactus to be encountered is Browningia candelaris, and then Oreocereus does not appear until a higher altitude is attained. Werdermann, like Johnson, is quite specific in stating that the two genera did not overlap. Now the altitude at which Browningia candelaris is to be found is given by various authors as follows: Meyen, 1833 — Algemein Gartenzeitung 6,000-9,000ft. (2,000 to 3,000m) at Rio Palca; Meyen, 1834 — Journey around the world, 5,000-7,000ft. (1,700 to 2,400m) at Rio Palca; Reiche and Pohlmann — Vitor and Camarones valleys, 1,900-2,500m (most prolific at 2,200 to 2,400m); Soehrens — 1,900/2,100m to 2,400m, Inland from Tacna; Werdermann, 2,500m at Parca; Wagenknecht 2,500m on hillside east of Mocha; Knize, below 3,000m to the west of Poroma. (Place names

may be located on the map p.13 Chileans No.37).

Johnson says firstly that "the Oreocereus occurred as far downward as 2,000m, much lower than I had anticipated" and then "Browningia candelaris appeared where the Oreocereus disappeared." There is no evidence of any climatic anomaly in the valley of the Rio de Tacna which would lead to the Browningia growing outside the altitude zone quoted by other writers. Hence one becomes obliged to query the accuracy of the observation that Oreocereus grew down to an altitude of 2,000m since this would surely overlap the normal distribution zone of Browningia. Was Johnson carrying a barometer with him, like Pentland did in 1827 and Wedel in 1853? Or not?

The Oreocereus with the fruit opening at the apex does not seem to have appeared anywhere else in the cactus literature, although it is possible that it may be O. tacnaensis. The very long-spined procumbent growing cereiform plant found at approx. 3,000m altitude may well be an Erdisia rather than a Corrycactus, although the altitude does appear to be too high for an Erdisia. There is no reference to Erdisia in this article although these would have been expected to grow on these Andean slopes. The location is indeed not far away from the original finding place of Erdisia aureus which was discovered by Meyen. The plants of Oreocereus which Johnson describes as O. celsianus might well have been called O. hendriksenianus by other authors. In this way, the Cereus celsianus referred to by Weberbauer is also very probably synonymous with Backeberg's O. hendriksenianus. On these same western slopes of the Andes but further to the south, Pilocereus celsianus was seen by Werdermann above Parca and Backeberg observes in his Die Cactaceae Vol II that this too is synonymous with O. hendriksenianus. Oreocereus celsianus seems to be a fairly stoutly growing plant with some offsets, whereas O. hendriksenianus appears to be of somewhat more slender growth and forms clumps of a great many stems.

# A BROWNINGIA CANDELARIS (Meyen) Br. & R. FLOWERING IN CULTIVATION

#### by W. Rauh

### Translated from K.u.a.S. 18:3:1967 by H. Middleditch

To the characteristic plants of the cactus vegetation of south Peru and north Chile belongs the remarkable columnar cactus Browningia candelaris, a representative of those cacti that, like the cephalium-bearers, shows a sharp differentiation of its branching system into a purely vegetative and a fertile section. Browningia is a pronouned rarity in European collections, since seeds have scarcely ever been available. In addition, the plants grow so slowly that a cactophile would never see his plant flower. Finally, Browningia is one of the few cacti that on the whole does not allow itself to be propagated vegetatively by means of cuttings. All attempts pursued hitherto on these lines, as well as grafting, have come to nothing. Krainz reported that he had succeeded with a seedling graft on to Eriocereus bonplandii, which had reached a height of about 40cm. in the course of 24 years, but then it had perished as a result of an error in cultivation.

If one travels along the road from Tacna towards Arequipa in south Peru, one encounters for the first time between 1500 and 2000m, these strange, almost primeval, cacti which grow in association with Weberbauerocereus on ground covered with white volcanic rock and usually almost devoid of any other vegetation. From the densely spined trunk, up to 40cm, thick at the base, and some 2 to 3m high, spring upright or pendulous, curved, spineless branches. The mightiest specimens, approaching 6m high, were identified by us in the rocky desert between Nazca and Puquio and in the Chuquibamba valley (see Backeberg Fig. 841). The development of Browningia takes quite a different course from the rest of the Peruvian cacti. In youth, the plant forms an unbranched column about 2m high; the flat ribs arranged in 30 to 40 vertical lines carry large areoles (up to 1.5cm diameter) which produce up to 50 strong, outstanding radial spines, unequal in length, at first amber yellow, later fading to grey and black. The strongest, horizontal outstanding or upwards curved and frequently twisted spines reach a length of up to 20cm; even old areoles still continually produce new spines.

When the initially totally unbranched column-like trunk reaches a height of 2m, the strong spine formation then ceases and the rounded areoles produce only bristly hair, which is intermixed with short, deciduous spines. At this stage it would appear, at least on the basis of our observations, that the primary stem largely ceases its longitudinal growth. The plant now changes even its physiological behaviour, as it enters the mature stage in which it is capable of flowering. This becomes evident in the initiation of branching. The first side branches appear in an almost whorl-like arrangement on the spineless end-section of the primary stem, slightly above the densely-spined zone, that in this way stands out more than before.

The first series of side branches then branch again in their turn at their base, usually from their lower side, so that a multiple branched "crown of branches" results. The side branches are initially upright, later they often hang downwards, forming a curve. Since the areoles of the side branches lack any fierce spination, they are not dissimilar in appearance to the branches of the fossil Sigillaria . . .

The flowers usually occur close to the crown of the individual branches. The very large fruits crowned with the dried-up flower tube and provided with scale leaves, have an aromatic smell. Their relatively large seeds are embedded in a whitish, sweetish-tasting pulp, that is sought after by the ants. In that way, the seeds are then eaten. That may indeed be one of the reasons why in the wild, despite an appeciable production of seeds, only very rarely are seedlings found. An additional cause, moreover, is that the seeds require a certain humidity for germination; in the districts where the Browningias grow, however, the precipitation can fail to appear for several years and the young seedlings dry up. For that reason Browningia always occurs only as isolated specimens, never in dense stands. Despite thorough searches, the author did not succeed on

either of his Peruvian expeditions in collecting small plants that would have been suitable for shipment in Europe.

Consequently Mr. Werner Hoffman was asked to search further afield for young plants during his collecting trip to Peru. Since even his efforts were without success, he sent in 1964 a more or less 3m high plant with side branch growth just commencing. None of us had expected that this would continue to grow. As a result of the reconstruction work on the new Succulent houses for the Botanical Gardens, the plant had to be planted out in a large tub and over wintered in the relatively warm Africa-house. Nevertheless, after but a short time it showed signs of life, became plump, fresh green and also produced a new side branch. When the new Succulent house was erected in the Spring of 1966, the Browningia was awarded a place of honour in it. As we carefully removed it from the tub, we observed that it had formed a mass of new roots. The plant immediately reacted to the bedding out by forming flowers. In May there appeared on the primary stem first of all two buds which quite quickly grew larger, but then fell off. A few weeks later, early in May, two further buds were formed, both of which, however, this time attained full development and are illustrated here. The flowers open at about 22.00 hours. Around midnight they are fully opened and smell faintly sourish. On the following morning between 8 and 9 o'clock, the flower begins to close up. Its long tube is weakly curved and thickly provided with pale chocolate coloured membraneous scales terminating in a short spiny point, which higher up the tube, take on the appearance of outer, light chocolate coloured flower petals: the intervers ones are white to cream coloured, as also are the stamens and the style with its papillose stigma lobes

It is very likely that the present occasion is the first time that a Browningia candelaris has come into flower in Europe. We can only express the home that his plant will indeed remain long in cultivation and even come into flower quite often.

#### Comments on Browningia candelaris

# .... From W. Hoffman — A Peruvian Diary -- K u.a.S. 1965

Browningia candelaris is amongst the most unusual of cacti. The 2 to 3m high stem with its vicious spines forms a crown of branches in old age. Since these branches have resisted all attempts at cultivation by grafting or rooting. I have determined to transport a full plant back to Heidelberg, despite its size. In the Arequipa region, we later collected a B. candelaris, the packing and transport of which would have been impossible without the generous help of some German friends. Although this specimen arrived in Germany in the middle of winter, it rooted again within a few months. Our last days in Arequipa were taken up with packing the plants, among the the 3m Browningia, which needed a specially made crate. The case with the Browningia, topped up with Lobivias and ready for transporting, weighed 300kg.

#### . . . . From H. Middleditch

When I first read this article at the time I received the monthly K.u.a.S. Journal. I am obliged to admit that I paid very little attention to it. Certainly I did not appreciate just how unusual it was to have this particular plant in cultivation and especially one of this size; nor did I realise that the appearance of a flower in cultivation was very probably the event of tr decade in the cactus world. Sadly this lack of interest on my part probably reflects a vicious circle. Plants rare in cultivation are rarely written about — being rarely written about, most growers know little about them — because little is known about them, no-one is particularly interested in growing them; and so they are rare in cultivation. I did have a vague idea that they came from somewhere or other in the western half of South America, possibly somewhere between Lima and Santiago. Having once put together the series of articles and translations concerning this plant, and also having a fairly good map of northern Chile and southern Peru, I was able to understand the geographical distribution of Browningia candelaris. This explained to me just whereabouts the plants really did grow and greatly helped me to understand something about the ecological niche which they occupied.

In his account of his travels in southern Peru (Chileans No.27), Rauh accompanied the original publication in Cactus (France) with illustrations of the successive stages of growth of Browningia candelaris, from a single stem like a telegraph pole, through the initial stages of branching to the later multiple branching the finally to a candelabra-like crown of branches. A similar series of illustrations also appeared in Rauh's brook "Beitrag zur kenntnis der Peruanische Kakteenvegetation." The first presentation in the U.K. of these stages of development was given by J. M. Chalet, the visiting speaker to the Chileans' 1977 Autumn Gathering, when slides were shown of plants photographed in the vicinity of Arequipa which likewise displayed the successive stages of growth of this plant.

A year or two after the appearance of this article in the K.u.a.S. Journal, a visit was paid to the Heidelberg Botanical Gardens during one of our Continental Cactus Tours. It had been anticipated that we would see the magnificent display of plants in the large Succulent House, surrounding the Browningia which was the subject of the above article and was illustrated there. However, when we arrived, some changes seemed to have taken place, the plants in the corner of the Succulent House were not those to be seen in the K.u.a.S. photograph of that spot — and there was certainly no Browningia there. Had we got to the right place? Had the bedding been re-arranged in the intervening period? We were told by the Botanical Institute that Prof. Rauh had been absent on a collecting trip in Madagascar when the Gardens were visited by an American who had brought a truck with him; the visitor had previously conversed with Prof. Rauh and Prof. Rauh had indicated that if there were any plants in which the American was especially interested, he need only ask the staff of the Botanical Institute for them. On this basis (we were told), the American asked for many fine plants, which were thereupon loaded into the truck, including the famous Browningia. Hence its absence at the time of our visit. Apparently Prof. Rauh had



IN THE WILD Krainz Die Kakteen

# BROWNINGIA CANDELARIS





Flowering at Heidelberg KuaS 1967



not pursued the matter on his return, not wishing to offend his visitor. For the record, each member of our visitng party was offered a cutting from any plant of their choice at the Institute.

It is now some years since I was presented with a seedling Browningia candelaris by David Angus who had sown a batch of seed and grown on two or three plants. These had reached some six or seven inches tall and then virtually ceased to put on any further growth. Although this particular plant has put on a small amount of growth since that time, it could well claim to be the slowest-growing columnar plant in my collection. I once enquired from Ron Ginns whether he had ever grown this plant; he told me that he also had a seedling plant, which also grew very slowly, but for some unexplained reason put on about 5 inches of growth during 1972 to reach around 13/14ins. in height.

. . . . From Mrs. M. B. Levitsky

In 1962, I obtained a seedling Browningia candelaris from Bob Flores who raised it in 1950. It is now well over twenty years old. For several years I questioned its identity, because it looked so unlike the habitat photos. I now realise that a seedling is something else, and I hope that this one is what it says it is. In 1964, I put it outdoors in one of my cold frames, and it got a very bad sunburn - not only discoloured, but the tissues caved in. Since then I have kept it in the greenhouse in light shade. In 1969, I started treating it for what I thought was scale, on the base of the plant, but what I now think of as the common ailment of South American plants when subjected to the hard water of Big Sur. By December 1972, the plant had grown to 60cm high, and was rather curved - not quite upright. I had a big rock in the pot to try to balance it. While I was in San Francisco it fell down and when I got back it was on the floor of the greenhouse. cracked through the stem. I had to cut it where it had cracked, and the lower part had fallen out of the pot and most of the roots were broken off. I threw that part away. I had to wait a long time for a good callus on the upper part before reporting and trying to re-root it. It is 43cm. high, 6cm. in diameter, with 12 rather shallow ribs, radial spines about 20, very short, only about 6mm at the longest, central spines 2 to 6, the longest 20mm; radial spines straw colour to light brown, the centrals golden brown to chesnut brown. Vascular tissue in a circle only 10mm in diameter. The stem is a very beautiful light green, and the areoles are oval, and filled with a soft yellow wool. At the lower part of the stem the ribs are almost flat, but at the newer part there is a furrow between the ribs, making the ribs about 10mm high. Perhaps I can no longer be said to be growing this plant; but I was growing it, until it fell down. .... From E. W. Putnam

Regarding Browningia, I once heard our good friend, Albert Buining remark that it is impossible to root this genus from cuttings. I have to respectfully dissent. A cutting of B. candelaris is growing in my collection after being taken from one of my own plants. I will admit that it took 5 to 6 months to make roots! This particular plant fell over and broke in December 1972; the lower half (which had roots) rotted off. The upper portion was potted up again in June 1973, when it was about 40cm high. By April 1974, it had made a few roots, but no new growth. It was kept on a heating cable all through the season and by November of that year, it had put on 4cm of growth. This may mean that a seedling plant will re-root while a cutting from a collected plant will not, or it may mean that this plant is mis-named. I cannot tell, as the young plant does not resemble the mature ones very much.

#### . . . . . From G. J. Swales

Professor Rauh suggests that the Browningia fruit contains a pulp which attracts the ants and in this way "the seeds are then eaten." Is this correct? I would suspect that it is only the pulp that is eaten by the ants and any seed that is carried away at the same time is only because the seeds stick to the pulp. Could this be the method of seed distribution? .... From Ruth Bartlett "Insect Engineers" 1959

The favourite food of nearly all ants is meat. Whenever they find a dead insect, pieces are chewed into juice for food. When meat cannot be found, they live on vegetables, which are nearly always easier to find. But even vegetables are sometimes scarce and ants who live in very dry desert-like parts have learned to gather the seeds of plants and store them in their nests. Once inside the nest, they bite off the chaff, then carry them to a store. After a while the seeds start to sprout. The ants then bite off the new sprouts and carry the seeds to the outside of the nest to dry out. The ants prefer the seeds that have sprouted because they have a sweeter taste. When dry, the seed is carried back again to the store. In dry periods, when it is very hard to find other food, the ants must eat their stored grain. But the seeds cannot be eaten yet. First it must be given to a soldier ant, who chews and crushes the seed until it is soft like dough. The ants mix this with some saliva in order to mould this dough into shape. It is then taken outside the nest once again, when it is set don on the hot bare ground. When the sun has baked them hard and crisp, it is taken into the nest once more and eaten there, and used to feed the larvae. .... Response from G. J. Swales

It is well known that ants relish the sweet semi-fluid exudation produced by certain aphids. In fact, the ants often treat the aphids in the same way that a farmer will look after a herd of cattle. It would seem to me that the ants are attracted to the sweet exudation on aphids, so that I do not quite see why they should be thought to consume the seeds as well.

.... Further from H. Middleditch

But if there are no aphids when the Browningia grow — and what could the aphids possibly live off, especially in the dry season? - then the ants would find the pulp of the fruit a suitable substitute. But surely it cannot be stored - it would go mouldy; pulpy fruits in my greenhouse go mouldy in a few days. So surely the ants need the seeds to live off during the rest of the year? In any case, you would prefer a two-course repast to a one course meal, so why not the ants likewise?

#### TRICHOCEREUS SCHICKENDANTZII FLOWERS From R. Senior

Growing out in the garden I have a plant raised as Trichocereus schickendantzii which came — I recollect — as seed from Winter in Germany in 1962. I think I must have got them as grafting stock, but I no longer have a seed catalogue from those days. The two plants which I have kept have now been grown out of doors all year round. One of them is bedded out in the garden where it has had a couple of fairly bad winters, only a few days of snow and frosts down to 24 degrees F. but very wet. Normally I would dig in a couple of shovel fulls of special grit for drainage but that particular plant was just bedded out into the garden soil. I did not really think that it would survive there, but despite its conditions it is growing very well. Curiously this plant is now branching from part-way up the stem and I thought at first it was a mere aberration. The first two branches were produced about 8° above the ground level, which looked very odd but now there are another two which have appeared at the same level on the side away from the lawn. There are no branches at ground level.

This plant obviously grows taller under glass than outdoors — when mine was still in the greenhouse, it flowered at almost four feet in height. A cutting was planted out of doors and this has now flowered for me in the fresh air. The flowers seem to open in the late afternoon or early evening and then stay open for 36 to 48 hours. They may close during the night — I have never got up to see! It is difficult to say when they "close" really, as from the fully expanded state they can take several hours slowly closing. Mind you, I don't think much can be read into the experience of one plant in one situation — I imagine much different behaviour might be expected from a plant growing at a higher temperature under glass.

Certainly they seem to be a "multi-headed clumping plant" like the La Mortola plant — I would love to see La Mortola sometime, I have read so much about it. But "Cereus-like and slender" — I suppose it is possible — depends how tall this particular plant grows and whether it bulks out or not. If it got pretty tall it might give the appearance of being slender. It is true that the plants do not meet up with the Backeberg description — he says they grow up to 25 cm. high. The plant which is bedded out is 26" high and a darker green than the other normally grouping form which is 22" high. Really these two are quite dissimilar. The taller, darker plant has 15 ribs, a stem 3½" in diameter. oval areoles 3mm. long by 2mm. wide, 75mm. apart with 11 to 14 more or less radial spines and one longer, more erect central spine. They are not really radial or central of course. New spines are chestnut brown, dark brown tipped for half their length, later going chalky white, brown tipped. Radials vary from 5 to 15mm. long, two or three more erect than the others. The central is about 20mm. long and downwards pointing.

I have had an opportunity to visit R. Senior's garden in Cornwall, with its interesting selection of semi-tropical shrubs and plants, as well as this "T. schickendantzii", all facing over the bay towards St. Michael's mount. My first reaction was to note the similarity to a plant grown by Mr. and Mrs. Lavender under the same name. However, I do not think that R. Senior's plant could really be described as "multi-headed clumping" as this description is usually applied to plants having a more cushion-like growth, commonly branching close to, or even below, ground level. In addition, I am unable to find T. schickendantzii listed in Winter's 1962 seed catalogue (or 1961), I have no subsequent issue. The slides received from R. Senior which are of his plant in flower in his garden will be sent off to R. Kiesling in Buenos Aires to seek his comments.

Some of my earliest cactus purchases are indeed in the Winter 1962 seed list which you sent me — that brings brings back some memories! It is just another reminder that the names taken for granted for years can sometimes need checking. A few remain obvious and incontrovertable, But as soon as someone says "But surely . . .!" others have a question mark.

#### . . . . . from R. Kiesling

The plant shown in the slides which you sent, does not seem to be T. schickendantzii. I have observed that T. schickendantzii in culture is very much like the plant shown in Abb. 1082 in Backeberg Vol. II. But in nature, what I consider to be T. schickendantzii is deep green, not yellow-green, and also the diameter of the stem is greater. Another outstanding feature in T. schickendantzii is that the spines are almost equal — the plant in your slides has central spines which are longer and stouter than the radials. I cannot quite decide whether your plant is T. cabrerae or a form of T. thelegonoides (T. rubingianus).

#### .... further from H. Middleditch

The slides which were sent to R. Keisling did not show clearly that this plant branched from above ground level, whereas T. cabrerae Kiesling sp. nov. does branch from ground level. Indeed, it now appears that the mode of branching could provide quite a helpful guide towards identification. There are several species of Trichocereus which branch part way up the main stem and grow into veritable trees, such as T. werdermannianus and T. terscheckii. So far, I have been unable to find any dwarf Trichocereus which branches part-way up the stem. Having acquired a copy of the original description of T. schickendantzii, I am now fairly satisfied that the clumping plant which is often grown under this name does conform to the original description. The plant which I have seen cultivated under this name by R. Senior, T. Lavender, and A. Craig and of which I also have a cutting, might possibly be Trichocereus manguinii.

.... from D. Supthut (Stadtische Sukkulenten Sammlung, Zurich)

I had hoped that I might be of help to you in identifying this Trichocereus. But unfortunately the slides only

show the flowers very well. Although I am far from certain, I feel that this Trichocereus is a rather longer spined form of T. spachianus. Anyway, I have sent the slides to Dr. Heimo Friedrich in Austria as he is probably the best person to consult about Trichocerei on the continent.

# . . . . . from Dr. H. Friedrich

Your letter and colour slides of an unknown Trichocereus in British collections has been sent to me by Dieter Supthut of Zurich; he thinks that I might recognise the plant because I am especially interested in this genus. But my investigations in this direction are more theoretical and concentrated on seeds, pollen and other such diagnostical items which are easy to get from friends in parts of the world where larger plants can be grown out of doors.

As far as I can see from the slides, any resemblance with plants I know seems to me to suggest a form of the very variable Trichocereus strigosus. The slides should show more of the outer parts of the flower and of the body to be sure about identification. I do not think that the branching habit is typical — it may rather be induced by cultural circumstances. As you observe correctly, there are two groups of Trichocerei: the tree-like species which do branch high above ground level and the dwarf species branching from the ground. But I think there are none with typical branching 20cm. above the ground.

I do much regret that I cannot give you more decisive information, but the taxonomy of this genus is far from being settled, Besides, some taxa like T. striçosus and other dwarf species seem to be extremely variable. But you are certainly right if you guess that this plant is *not* T. schickendantzii.

. . . . . from R. Ferryman

The illustration in Die Cactaceae which Roberto Kiesling mentions is certainly the plant generally cultivated as T. schickendantzii, which in turn appears to fit Britton and Rose's description of it. Kiesling's understanding of T. schickendantzii in habitat is interesting. Upon checking Winter's lists for a T. schickendantzii, I came up with: "1954. Trichocereus FR 41 sp. Province in Jujuy. About 1½m. high, stems 15cm. thick, short spines". In 1957 this becomes: "FR 41 T. schickendantzii (Echinopsis)". The description is repeated with an additional note that it makes good grafting stock (which the cultivated plant certainly does not!) In 1960 we have FR 41 appearing as "FR 41 Trichocereus shaferi, Br. & R. niedrig" (means dwarfish) with no acknowledgement of any amendment. There is no further mention of Trichocereus Echinopsis schickendantzii in Winter's catalogues or indeed any FR number in the Chileans' Year Book. Ritter, in his treatment of Neoporterias, appears to regard a lot of the older names as "nomen confusum" — in fact he just ignores them! Maybe we have a similar instance here.

.... response from H. Middleditch

Trichocereus shaferi seems to be fairly conspicuous by its absence from most collections. Apart from Britton and Rose giving T. schickendantzii the wrong body colour, it is interesting to compare their original description for T. shaferi sp. nov. with that for T. schickendantzii Web., as tollows:

	T. schickendantzii Web. (Non. Br. & R.)	T. shaferi Br. & R.	
Body	Offsetting at base	Caespitose	
Colour	Light green	Light green	
Ribs	14 to 18	About 14	
Stem Height	15-25 cm.	30-50 cm.	
Diameter	6 cm.	10 to 12.5 cm.	
Areoles	Close together	Approximate (close together, H.M.)	
Areole Wool	Bare	White felted when young	
Spines	At first nine outer and four centrals	About 10	
Length	Five to 10 mm.	12 mm. or less	
Colour	Yellowish	Light yellow	

This would suggest that T. shaferi is about twice as high and twice as stout as T. schickendantzii, but otherwise not too dissimilar. Hardly surprising, then, that Backeberg took them together to compare with his T. manguinii. But in his Die Cactaceae Vol. II, Abb. 1080 T. shaferi looks remarkably similar to his Abb. 1282 Helianthocereus huascha. Both plants have vertical ribs with closely-spaced small areoles and starry spines. The breadth across the spine clusters is about the same as the gap between the tops of the rows of spines on adjacent areoles. But according to Britton and Rose's description, spines 12mm. long will touch tips between adjacent areoles on 14 ribs at 12.5 cm. diameter. It would be nice to find a plant that bore some resemblance to Britton & Rose's description of T. shaferi.

We are fairly close to the coast here on South Island at the southern end of the Canterbury plains. We have a fairly cold winter, frosts range from a few degrees to a near record 15 degrees F. These temperatures are recorded at the Botanical Gardens which seem much colder than at my place which is only a mile or so away as the crow flies. The coldest I recorded in my cold frame was 10 degrees F. of frost and that was when 15 degrees was recorded at the Botanic Gardens. Our first frost is about 1st June and we still have light frosts in August when Spring is well on the way. Even at this date the air temperature in my main frame can reach almost 100 degrees F. We generally get a good hot summer here, the temperature

reaching around 86 degrees F. in the shade — lovely weather for cacti. The rainfall averages about 25" for a year. I water my plants well in the summer and let them get plenty of heat, 100-120 degrees F. is quite common throughout the summer. They thrive beautifully in these conditions and the growth is quite amazing. Many people here have all their plants outside and cover them in the winter.

Some of my plants are growing in my outside garden and among these are Trichocereus schickendantzii and T. shaferi. The main obvious difference between the two is that the flowers on T. schickendantzii have green outer petals whereas those on T. shaferi have reddish-brown outer petals. Both of them have flowers which would be about as broad as they are long, that is about six inches. Most of my Trichocerei flowers open during the evening and remain open for 3-4 days. This does not seem to be affected by the sun.

. . . . . from M. R. Holland

There were some slides shown at the Chileans' 1978 week-end of a Trichocereus growing out of doors in a garden in Cornwall, which looked very much like my plant of an unknown Trichocereus. It was obtained about 10 years ago as a cutting from a plant in Worfield gardens. It is now about six feet high and on average it is 9 cm. in diameter. There is one offset from the base about one foot high and this represents three years' growth. There are 16 ribs at the base and 18 from the middle upwards. The areoles are 3 mm. wide by 4 mm. long, 10 mm. apart. The felt in the new areoles is pale brown changing to grey in older ones. There are generally 10 radial spines and one central spine, sometimes 4 centrals and 9 radials. It seems as though some radial spines may become centrals if the areole increases its spine number. Radial spines 8 mm. long, central spines 15 mm. long, pointing downwards. In the crown the new central spines are chestnut brown and the radial spines are paler brown, but by the tenth areole from the growing point, all are straw coloured with a darker tip. Older spines are grey/white with a darker tip.

.... from R. Kiesling (At a local Chileans meeting in the N.E.)

Now that I have been able to see the plant grown by T. Lavender I can tell you that it looks to me like Trichocereus thelegonoides. It is not difficult for me to understand that you found a problem in identifying these plants, as the original description by Spegazzini is not correct and his mistake has been repeated by Britton & Rose. It is quite well known in Argentina that Spegazzini often wrote about cacti from memory, although he did not work this way with other plants in which he specialised. It seems to me that he has confused the tree-like growing habit of Trichocereus terscheckii with his new T. thelegonoides; T. terscheckii has a very stong upright trunk with a considerable number of branches, but where I have seen T. thelegonoides growing in the wild it scarcely manages to grown one metre high. The stems do grow much longer than this but then they are laid down on the ground with the growing end curved upright. In Trichocereus thelegonoides there is a very strongly marked cross-furrow between each areole and each tubercle is hexagonal in shape. In T. thelegonoides there is again a groove across the rib between each areole, but the ribs are separated by grooves running more or less straight up-and-down the plant and the cross furrow often does not run right across the full width of the rib. Perhaps in some plants this cross-furrow is not very obvious until you look carefully, but it is a very useful means of identifying this particular species.

So once again we have an example of the need to interpret a description of a species in order to decide what name to give to a plant in a member's collection. Once again it becomes necessary to identify what is correct and what is misleading in a description, before a plant can be identified.

ECHINOPSIS SCHICKENDANTZII Weber

Translated from Dictionnaire D'Horticulture Bois I 1893 By H. Middleditch Synonym: Cereus schickendantzii Web.

From the Republic of Argentina, Tucuman Stem oblong or cylindrical, height of 15 to 25cm. up to 6cm. in diameter, light green, offsetting at the base and forming clumps with many heads; 14 to 18 vertical ribs, not quite sharp, not very deep; areoles close together, bare. Spines yellowish, slim, flexible, sharp 5 to 10mm long; at first 9 outer and 4 centrals, much later many more. The flower is not as yet known bud apical covered with black wool. Fruit edible and pleasant. Comments

.... From H. Middleditch

This description seems to match fairly well the plants which are usually grown under this name, especially the many heads, and the light green colour. One or two of my Trichocerei have grown new spines on old areoles — areoles which are well over ten years old, but I cannot say that I have noticed this happening on T. schickendantzii. It is rather important to note that Britton and Rose incorrectly describe this species as "dark green" and since very few people indeed are likely to have had ready access to the original description given above, then in regard to body colour, Britton and Rose could have misled an awful lot of cactus "authorities" who looked up the description in their publication.

.... From G. Rowley

I checked Bois Dict. Hort. P473 which validates E. chinopsis schickendantzii Web. in Bois. Weber was an excellent botanist but a very reluctant writer and many of his names were published for the first time in Bois's all too little-known dectionary. Hence they are cited Weber in Bois. Since Weber supplied the data however, he is the publishing

author. There is no earlier publication of Cereus schickendantzii Web. Remember that Weber's description came from a small cultivated barren plant — doubtless he would have wished to see flowers before publishing it as new.

# ECHINOPSIS SCHICKENDANTZII By C. Hosseus

Translated from Notas Sobre Cactaceas Argentinas by H. Middleditch

Echinopsis schickendantzii has raised a succession of doubts regarding its correct genus. Weber himself initially classified this plant as Cereus, as is implied by a reference from Schumann, 1905 p.127 which gives C. schickendantzii Web. as a synonym. Schumann classifies the species as Echinopsis and mentions that the flowers are known only in the bud stage, apical, surrounded with black wool. Spegazzini, 1905 p.487 amplifies the foregoing and states that the species certainly belongs to the genus Cereus — "Flowers funneliform, 20-22cm long, unscented, with white petals" and that the plant often grows in the mountains at an altitude of between 1,000 and 2,500m, in the provinces of La Rioja, Catamarca, Tucuman, Salta and Jujuy. It is to be regretted that he did not make further reference to the species later, and in his general catalogue 1925 p.76 he accepts the new classification of Britton and Rose Vol. II p.144 as Trichocereus schickendantzii. These authors do not reproduce any illustration; in the appendix to Vol. IV p.278, they add that another photograph exists, as well as that reproduced by Alwin Berger in Moeller's Deutsche, Garten, Zeit. 25:475 f. Nr.16 as Echinopsis schickendantzii.

Britton and Rose, as well as Schumann loc. cit. p.238, quote Tucuman as the place of origin, and the northwest of Argentina as the area of distribution. Berger draws attention to the fact that the plant received from Weber at the Garden of La Mortola on the Italian Reviera, has the shape of a cushion of globular stems; he states, moreover, that he is acquainted with individuals which agree with Weber's description of an approximate height of 34cm. He says that they originate from examples from another garden in the Riviera which, according to reports, possess much longer stems, even comparable to Cereus. That the plant has remained so small in La Mortola, could perhaps be in consequence of the relatively dry location.

The flowers appear laterally in the neighbourhood of the crown, open by night and remain in this state nearly three days; the total length of the flowers extend to only 17cms and all the petals are of a pure white. This species can be in no way as common as Spegazzini indicates, since it turns out that despite an intensive search, I have not found it in any part of the four provinces up to the present time. According to Schumann, it was Schickendantz who found it in Tucuman, and who first took it to Europe. He also reports that the fruit has an agreeable taste.

Concerning the allocation of the species to a genus, I would like to give an opinion as soon as I have found the plant; however, for the time being I classify it in Echinopsis because in several respects it is reminiscent of Echinopsis aurea. Berger emphasies that the plant develops stems both in the form of a column, and also in globular form. In the literature, no prominence is given to this phenomenon which we find with particular frequency in Trichocereus. Nor is it often emphasised that in the place where the various species of the genera Trichocereus (e.g. T. candicans, T. lamprochlorus), Echinopsis (e.g. E. leucantha), and Acanthocalycium (e.g. A spiniflorum), grow naturally, long stems are found sometimes as much as 30cm (12ins.) and more. They are like upright columns or drooping, depending on the location (that is to say in ravines) and form in the lower part globular stems which in the majority of cases later elongate, often acquiring the lengthened form of the species. Well now, if we cut off these globular stems at an early stage, and graft them on to another cactus or cultivate them in a flower pot, we often observe that now they do not elongate, but instead remain in this state.

Echinopsis aurea and its varieties, with a globular form in the beginning, sometimes acquire elongated stems (but never more than 22cm), when they are found isolated between stones in a warmer locality, as in the neighbourhood of Cruz del Eje.

#### Comments

#### .... From H. Middleditch

There is an article by Alwin Berger in M.f.K. for 1905, whose contents appear to be similar to those quoted by Hosseus. Berger does indeed state quite clearly that the flowers "remain almost fully open for three days." My plants of Trichocereus are not exactly forthcoming with flowers and my memory of the few flowers which have appeared is uncertain as to the duration of time they remained open, but three days does seem to be longer than I think they stayed open. Unless of course the first late afternoon on which they open is counted as one day, the second day when they do usually remain open is day two, and perhaps a not too hot or bright day follows when they struggle to keep open for another few hours before finally closing, is day three.

# .... From R. Ferryman

Basically I can confirm that Trichocereus flowers will remain open for periods of 36 hours or more, provided the weather is on the cool side and particularly if it is also fairly humid. I can recall three Trichocereus that flowered in 1978; a single stemmed plant grown from Cardenas seed as T. tarjensis, whose flower lasted at least 36 hours. The second plant that flowered is a sprawling clump so far un-named — somewhat similar to T. candicans. This is a large clump, over 24ins. across, and flowers fairly well. Flowers on this plant stayed open for 2 to 3 days almost without exception but whether this was purely because of the poor summer or because of the particular ways of this plant, I cannot be sure. I can remember on one occasion

making a mental note that that whilst this Trichocereus carried open flowers, the flowers on Notocactus were not fully expanded. The third plant, T. thelegonoides, did nothing out of the ordinary.

What part the weather plays is difficult to gauge: 1978 was generally a very poor summer, and yet I had an Oreocereus in flower for the first time, Loxanthocereus, Oroya, Seticereus, Pilosocereus, Arequipa, and even Mila in flower — in fact, as far as flowers went, 1978 was a good year for my plants.

#### A NEW TRICHOCEREUS CLOSE TO T. SHAFERI & T. SCHICKENDANTZII.

#### By C. Backeberg

Translated from Cactus (France) No. 35. March 1953 by H. Middleditch

For a considerable time I have had in my possession a photograph which was given to me by Mr. Marsoner and also a plant brought back from Argentina at the same time. This plant has never flowered. I knew that it was different from Trichocereus schickendantzii — its stem is taller, different too from T. Shaferi which has fewer ribs and is more stocky. Being in possession of a T. Shaferi. I am able to compare all these plants.

This year the plant has flowered on the same day as the plants of Mr. Marnier who has the same unknown Trichocereus. The new species is clearly distinguisable from T. schickendantzii in that the latter is shorter, has flowers whose tubes are green, with green outer perianth segments — that is to say, the lowermost ones. Mr. Marnier at first believed this to be a hybrid specimen but fortunately we hold Marsoner's photograph and my own plants. This species which has set fruit can accordingly be described:

#### Trichocereus manguinii sp. nov.

Plant upright, growing into clusters, branching from the lower part, of a dark green colour, reaching 95 cm in height and 11 cm in diameter 18-20 ribs, barely projecting; areoles round, felted, slightly depressed; about 11 radial spines and up to 5 centrals, 1.5 to 4 mm and more in length, whitish with brownish tips when they are young, acicular. Flowers up to 16 cm in length and 18 cm broad when they are expanded; tube reddish brown colour, scales about 6 mm in length; outer-most perianth segments reddish-brown, inner segments white, up to 19 mm across, extremity pointed, some occasionally up to 3 cm broad, greenish throat; filaments of the stamens greenish-yellow, yellow towards the upper part, inserted in 2 series; style yellow and 3mm in diameter, stigma lobes 23, greenish-yellow. Ovary and tube covered with brown wool. The lower series of filaments are inserted half way up the interior of the tube.

T shafer has 14 ribs, 9 radial spines and 2-8 centrals of a light grey colour and attains about 50 cm in height. This species is named after Mr. Manguin, curator of the Natural History Museum of Paris.

This species with branches clustered around the upright central stem, very floriferous, is one of the finest species of the group of Trichocerei of short stature.

from J. W. Bagnall

Some five years ago I had an opportunity to purchase a Trichocereus at a collection which was being sold up. I was looking for a larger, well-grown plant and this particular one took my eye. It was growing with a free root run in an almost rock-hard soil that needed a pick to break it out. The plant was single-stemmed, some 50 cm high and I put it into a 12° pot; for most of the summer it is out in the garden and during the winter it is packed into the back of the greenhouse. It has grown about 20 cm with me, so that I will be surprised if it is now less than twenty years old. There was no name at all with the plant.

The crown is fairly broad and flattened and the body is a rather yellowish sort of green, both features somewhat reminiscent of T. schickendantzii, but there is now only one branch from the base, which is almost as stout as the main stem. After looking through various entries in Backeberg's Kakteenlexikon and discussing possible names for the plant at the Chileans' weekend event, especially when Roberto Kiesling was talking about Trichocerei, it seemed to be quite probable that the plant was T. manguinii. If the seeds that Backeberg produced in Marneir Lapostelle's collection were germinated and the resultant plants were distributed via commercial outlets of that date, this plant may have originated from that source. The main stem is now 75 cm high, so it could have further to go; it is 11 cm in diameter and has 18 shallow ribs, all of which fits the description for this species. The areoles do not give an immediate impression of being sunken, however, and the spines tend to be rather longer than those described by Backeberg.

The plant has now produced two flowers from quite close to the growing point. The weather was rather dull at the time so the flower was slow to open and perhaps lasted longer than normal. There was no scent when I first saw the flower open but it was very strongly scented when I looked at it later. The flower was 17 cm long but only 10 cm in diameter when I first measured it and 12½cm when I measured it later, so it may not have been fully open even then. The tube was more green than brown but was much darker than the body. The outer petals were certainly reddish brown, the inner petals more cream than white, some 20 mm broad and pointed. I have not seen enough Trichocereus flowers to be able to tell if these petals were especially pointed. The filaments did look as though they were in two series and the stigma lobes matched the description in number and colour. The style was not like a cylindrical tube but rather a column made up of rods running down from each stigma lobe. I was undecided what it was best to do with the first flower and I did not section it to see if the style was hollow. The flower was visited by at least one honey bee — it is on a slide! and this flower set fruit. The fruit was dark green, slightly elongated globular: I was waiting for it to change colour as it became ripe but it dehisced quite unexpectedly, splitting

lengthways. Quite a few Chilean members obtained some of the seed and then the residual fruit went mouldy, so I had no seed left for myself!

CEREUS THELEGONOIDES sp. nov. By Carlos Spegazzini

Translated from Anales del Museo National de Buenos Aires Vol. XI, 1905 By H. Middleditch

Thelegonus, aborescens, ramosus, viridis, costil humilibus 15, transverse sulcatis ac in mammillis subquadratus solutis, aculeis tenuibus radialibus 7-9, centrali I; floribus majusculis extus parce squamuloso-villosis, phyllis candidis. Habitat: in drier hills of Province Jujuy.

Observations: Trunk 4 to 6 metres long, cylindrical (18cm diameter), with branches clustered parallel and erect above, branches curved-ascending more or less elongated and robust (5-8cm diam.), apex blunt, with new growth yellowish-green, the other grass-green. Ribs barely undulate, blunt, slightly raised at an early age separated by a very acute groove, thereafter passing into almost flattened; areoles very small (3-4mm in diameter) at first pure white, later becoming grey, spaced at intervals of 8-10mm; spines in new growth reddish-yellow, soon dingy honey-grey, bristle-like, short (4-8mm long). Flowers borne laterally, large (20-24cm long), with well separated green scales having fairly long soft hairs on the outside, interior petals reversed lanceolate, pointed. Species intermediate between Cereus thelegonus Weber and Cereus santiaguensis Speg.

TRICHOCEREUS THELEGONOIDES (Speg) Br. & R. By R. Klesling Translated from Darwiniana Vol.21, No.24 1978 by H. Middleditch

Synonyms: Cereus thelegonoides Spegazzini An. d. Mus. Nac. de Buenos Aires XI 1905.

Trichocereus thelegonoides Britton and Rose, the Cactaceae 2, 1920.

Trichocereus rubinghianus Backeberg Descr. Cact. Nov. 3.15:1963 (name not validly published due to failure to indicate herbarium specimen).

Echinopsis rubinghianus (Backeberg) Friedr. and Rowley I.o.S. Bulletin 3 (3) 1974. Echinopsis thelegonoides (Speg) Friedr. and Rowley loc. cit.

Stems cylindrical, trailing, up to 3 (-6)m long. Creeping part branching, sometimes very stout (up to 18cm according to Spegazzini). Erect part of about 1m in height and 5-8cm in diameter, with 15-16 obtuse ribs with acute furrow between ribs, of 1cm in height and 1-2cm broad, with a horizontal notch between areoles which divides the ribs into more or less square shaped tubercles, more evident in the new growth. Areoles round, of 3-5mm diameter, with ample whitish felt. Spines tapering-cylindrical, somewhat flexible, of 0.5mm diameter at the base, yellowish to light chestnut coloured, later grey, sometimes with a black tip, centrals 4, of 7 to 15mm long, radials about 11, 5 to 7mm long.

Flowers from the apex or lateral but near to the apex on all stems, actinomorphic, scented, nocturnal but also open by day on overcast days. Pericarpel light green, tapering, 15cm long by 2.5 up to 6cm diameter. Pericarpel scales triangular, sharp 1cm long by 4mm broad, with axilliary hairs grey to black, 6cm long. External parts of the perianth triangular, fleshy, green, with longitudinal reddish stripe, 2.5cm long by 6mm broad. Interior parts of the perianth white, oval lanceolate, 11cm long by 3cm broad. Stamens in two series, leaning sideways; the upper series in a ring at the throat, with filaments 3.5cm long, white, and the lower series along the tube between 1.7 and 8cm (above the base of the style? — H.M.) with filaments 9.5cm in length, greenish-white colour. Anthers 3mm long and 2mm broad, more or less rectangular. Nectar chamber 17mm long at the base of the tube. Style greenish at the base but cream above, 4mm diameter, by 18cm long. Stigma with 22 yellow linear lobes, 2.2cm long, by 1mm broad. Ovary globular, about 2cm diameter, with numerous white ovules. Fruit spherical to ellipsoid, 4 to 6cm diameter. Seeds glossy black, dimpled, 1.1 to 1.2mm long, 1mm tall, and 0.6mm broad, in the shape of a lengthened comma, much tuberculate, with the grooves between the cells scarcely visible and large indentations, diminuitive longitudinal keel, small terminal hilum.

Distribution and Ecology. "In the very dry hills of Jujuy Province (Spegazzini, Ibid). Collected between Lozano and Leon (Dept. Capital), at Abra de Canas (Road to Valle Grande, Dept. Ledesma), at Huacanchi (Dept. Valle Grande) and at El Fuerte (Dept. Santa Barbara).

As to the cultivated specimens from these four locations in the same type of environment, it was noticed that they retain the distinctive differences between the populations. At Leon they are to be found at the upper margin of the selva, at some 600m above sea level, under the canopy which is formed by various trees, on slopes facing east. At Abra de Canas at a similar altitude, but in the middle of thick selva, at a more humid and shady spot; and in the other places, on dry and sunny hillocks, at some 1,000m above sea level, surrounded by chaquena vegetation. A comparison between examples from these places shows the following differences:

Locality	Form	Stem Height	Stem Dlam.	Cross Furrows
Leon	Creeping-ascendent	1.5m	8cm	marked
Abra de Canas	Ascendent-erect	1m	5cm	barely visible
Huacanchi	Creeping-ascendent-erect	3m	8cm	marked
El Fuerte	Creeping-erect	1m	10cm	marked

#### Observations

As happens many times in the Cactaceae, the populations are of one uniform habit. Regarding the possibility that more than one species is being considered, I ought to explain that the plant which is to be found at Leon approaches the original description more closely than the others. In spite of its name, I observe no resemblance to Trichocereus thelegonus (except the new growth of the ribs). On the other hand it appears to be related to Bolivian species, as for example T. grandiflorus Bckbg.

Material studied Jujuy - R. Kiesling 337 (La Plata Herbarium) and R. Kiesling 1216 (Instituto Darwinion Herbarium). Otto Kunze (New York Botanical Garden).

# .... From H. Middleditch

Whilst Roberto Kiesling was over in Britain I took the opportunity to enquire from him about several Trichocerei in my own collection which had either doubtful names or else none at all. One particular plant, with a stem about twenty inches long, crept across the others on the staging; it looked in its sprawling habit to be somewhat like Trichocereus coquimbanus, pictured in the pages of Britton and Rose. Not at all, I was told; just look at the quite distinctive tubercles of elongated hexagonal shape, rather like Loxanthocereus tesselatus: as good a Trichocereus thelegonus as one may find anywhere. Well then, how about this more slender-stemmed upright growing plant (which happened to be ex-Ginns collection) with much less robust spination and a nice grass-green body colour. A closer look; this one is T. thelegonoides — see the short horizontal grooves which are just visible between each areole? But it does not really look much like the stout plant with the deep bluish-green body which also has similar cross-grooves: yes, but the plants differ between one population and another and there are quite likely "to be other populations which I have not yet seen which extend the range of variation that I have come across up until now."

# PARODIA MESEMBRINA Brandt spec. nov. by F. Brandt.

Crescit erecta, colore viridi, circiter 10 cm. alta, diametro 7 cm. Costae 21, in modum spirae tortae, tubercula continua sunt. Areolae diametro 4 mm. est, lana alba et tecta, 4 mm longa. Aculei marginales circiter 10, magis in latera et deorsum radiant, 8mm longi et albi. Aculei centrales usque 7, quorum sursum erecti in formam cruci constituti, in superiorem partem ceteri aculei tenues, omnes aculei erecti sunt, acute et fusci, 1.3 cm. longi. Pericarpellum 4 mm diametro, colore viridi, lana alba; et 2mm longa, saete fusca. Receptaculum 1cm longum, colore viridi flavo; lana alba; squamae fuscae, longae; saeta tenua et fusca, in superiorem partem longa, aperta et nigra, 1.2cm. Flores diametro 4cm., colore flavo. Folia exteriora colore flavo et 1cm. longa sunt, in acumine colore purpureo. Folia interiora 1.5cm. longa, 4mm. lata, colore flavo, acute roseo. Stamina flava; anthera colore, quem "creme" vocamus; stilus 2cm. longus, albus stigmata numero 15, alba et tenua, 4mm. longa. Fructus 4mm diametro, fuscus et mollis, lana alba, saeta fusca. Semen 0.5mm. diam., testa minima, strophiola maxima. Testa fusca splendida et levia. Strophiola magna et spongiosa, item foramen in acute micropyle, minimum, omne spongia contectum. In basim versus funiculus est, quem etiam bene cernere possumus. Strophiola spongiosa, colore quem "creme" vocamus.

Patria: Argentinia, Prov. La Rioja, Ambil 500 m alta, in montibus Sierra de Malanzan, septentrionalis via Cordoba — San Juan. Holotypi partes et membra vim demonstratia in herbario Heidelbergensi conservantur. Holotypus in Coll. F. H. Brandt No. 68/a.

(From the German) Body upright and solitary, pale green, 9 cm high, 5 cm diarn. Ribs 21, completely divided up into small tubercules. Areoles white-woolly, about 4 mm diarn. Marginal spines about 8, only radiating sideways and downwards, white, up to 8 mm long. Central spines 7, the 4 lowermost standing in a cross, about 1 cm long, 3 further centrals directed upwards, but these shorter; all central spines stiff and straight, only slightly curved upwards, all red-brown. Pericarpet 4 mm diameter, green, with white wool and 2 mm long, brown bristles. Receptacle 1 cm long, greenish-yellow; wool white; scales brownish, oblong; bristles fine and short below, brownish, long and black to the margin above, distinctive, 1.2 cm long. Outer petals 1 cm long, yellow, tipped purple. Inner petals 1.5 cm long, 4 mm broad, yellow, with purple tips. Flowers yellow, 4 cm diameter. Filaments golden yellow, anthers cream coloured; style 2 cm long, white, stigma lobes about 15, long and thin, white. Fruit, soft-skinned, brownish, with white wool and brownish bristles. Seeds 0.5mm diameter, of which the great part consists of the strophiole. Testa small, hemispherical and smooth, redbrown, shiny. The strophiole large, completely filling the hilum and expanding even further out, spongy. Micropyle at the highest point of the strophiole, but only rarely evident as a small depression, usually enclosed by the strophiole tissue. The funciculus at the basal end of the strophiole and is usually to be seen there as a clear depression. The strophiole is spongy, creamy-white.

Place of Origin. North Argentina, near Ambil, Prov. La Rioja, north of the San Juan to Cordoba road, in the most south-easterly spurs of the Sierra de Malanzan there, around 500 m altitude.

. . . . from G. J. Swales.

The description of the seeds includes the phrase "Testa small", but I do not understand how the Testa can be small. It is stated to be smooth so presumably this would not be a reference to the size of any surface humps?

Possibly Brandt intended to suggest that the amount of Testa to be seen was small in comparison with the size of the strophiole?

#### A BURNING PROBLEM - 2 by J. Theunissen

# Translated by W. W. Atkinson from Succulenta 59.2.1980.

My first contribution under this heading has not gone by without response. A few of those were in writing and (fortunately) not always in agreement. This can only benefit objectivity. At the request of a German friend. I sent a copy of the manuscript before publication in Succulenta, to Herr Brandt with my request to let me have his opinion on it. Contrary to my expectations I received surprisingly promptly a very lengthy reply from him. in which he endeavoured to clarify a number of matters. Herr Brandt is an entomologist by profession and had already made extensive study tours before the last world war especially to the Himalayas, from where he brought back various new species of insects. In entomology, it has gone much further than in our hobby, so that each species can be identified without ambiguity by the genitalia, which are absolutely identical in different examples of the self-same species.

That his descriptions only appear in the lesser-known periodicals is ascribed by Herr Brandt to a "conspiracy", that would have as its objective the boycotting of his work. If this impression then has already been felt by Herr Brandt, then it seems to me not unlikely that this has been generated by the fact that it is not easy to correspond with him He always evades enquiries and it is quite certain that an Editor cannot continue to write indefinitely.

It will not arouse any astonishment that Herr Brandt, reaffirms that the plants described by him really are all separate species or varieties. According to his communication, he has also spoken to Lau about the complex of Tarabuco species. These grow in an extensive area, but really always within well-defined localities and are easy to separate in both habit and seed form. Lau himself did not really know what to do with this group. The same situation also applies to yet other species.

In this letter he concluded with a clarification about seed shapes. Years ago. Herr Brandt received for study purposes small samples of many species of Parodia seed from Krasucka. He received five seeds of each species from the seed which Krasucka had obtained from Lau. The greatest surprise indeed was that there were hardly any portions in which the five seeds were identical! With most portions he found seeds of two different sorts, some even with three! What would be the result from a portion of 100-500 seeds! In addition to the seed originating from Lau, the selfsame picture appeared with seed that Uhlig supplied. Even seed that had been supplied from Ritter did not always belong to one and the same species!

From Mr. Middleditch I received a letter in which he points out that more than one species of plant could have been offered under one field number. The mistake is often made by collectors in the field who both offer one species under different names as well as different species under one name. It follows that we as amateurs believe that there are mix-ups in the nurseries whereas the nurseryman should not be held entirely to blame. He thus makes one point in favour of Brandt and refers back to the three "new" Gymnocalycium which were discounted by the D.K.G. in 1923 as being only one species, but later did become accepted. All these species are to be found in a fairly limited area but nevertheless are still accepted today as separate species. He wonders if the "cactus establishment" dimisses Brandt's name out of an outmoded form of conservatism or if, in the end, the D.K.G. will be shown to have been correct.

With reference to his findings on seeds of one species I posed the question to Herr Brandt if it should not be concluded that either all seed suppliers deliberately confuse us by mixing more than one species of seed in a portion, or that the seeds in a single fruit are as varied as human beings. In the latter case it must be admitted that seed form is not, on its own, a suitable method of identification. This is also confirmed by such scientists as Prof. Diers and Dr. Barthlott who concern themselves with scanning electron microscopy. The first conclusion I personally rule out.

I also posed the question to Herr Brandt whether it was correct to describe plants with which someone else namely Ritter, was already occupied. I named the plans and the ethical right of Ritter to describe them. Brandt is of the opinion that Ritter forfeited this right at the moment he began to sell plants and seeds. Concerning the seeds, he stated that he made a drawing of the "average seed" in a fruit. I have therefore invited Herr Brandt to put his knowledge of cultivation and seed raising of Parodias at the disposal of Succulenta readers through a series of general articles, i.e., no formal first descriptions. I hope that in this way it will become clear how Herr Brandt studies his plants so that it can easily be judged if his descriptions can be justified.

# . . from W. W. Atkinson.

The phraseology of the original text concerned with how it comes about that different looking seeds appear in packets of one species, clearly hammers home Theunissen's view that this can have two and only two possible explanations — one of which he considers to be ridiculous.

. . . . from H. Middleditch.

Which suggests that he rules out — or ignores — the possibility that more than one sort of seed may become inadvertently offered in a named portion? So how much does seed vary in any one species, or even more specifically, in any one fruit?

#### . . . from F. Fuschillo.

The colour of the seed from one fruit of a Gymnocalycium is remarkably consistent. When taking slides of seed I often sift through the seeds in order to find the classic shapes, but I have never rejected a seed because of its uncommon colour. Apart from a number of mis-shapen seeds, the rest are all very much alike. With a waisted seed, the waist





Parodía Mesembrina Photograph & Collection F. BRANDT



is always consistently located. The hilum is also always the same shape. But I do find that the size of the seed varies. When measuring the size of a seed I start off by considering the hilum to be horizontal; a vertical distance from there to the top of the seed is the height of the seed. The distance between the outermost points on the seed, measured parallel to the hilum. I take as the breadth of the seed. With seeds which have a mean dimension of (say) 1.0 mm height and 1.3 mm breadth, then I find that the height can vary from 0.85 to 1.05 mm whilst the breadth varies from 1.15 mm to 1.35 mm. But the ratio of height to breadth is pretty constant to within less than 10%. This is based on seeds taken from one fruit. I have noticed slight differences in the seed from one year to another on one or two plants, but I do not know the origin of those plants.

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

As a matter of practicalities, I cannot conceive of any seed supplier deliberately mixing two or more species in one packet, as the Dutch writer virtually suggests. They do, after all, hope to make a living by selling as many packets as possible, not just one per customer! On the other hand, seeds from the most reputable suppliers are, on occasions, mixed as I am only too well aware. I had always assumed that this was due to accidental spillage during packeting or to the gathering of a fruit from a superficially similar (though actually different) plant either in the greenhouse or in habitat.

It is my experience that seeds within a given fruit are, to all intents and purposes, identical. One must bear in mind that shapes my be distorted by pressures within the confines of the fruit and that infertile seeds may often develop quite a long way towards maturity before ceasing growth; but in both cases, it is immediately obvious to the practiced eye what sort of specimen one is dealing with and these can be discarded when estimating colour or making measurements.

I would wish to modify somewhat the statement that "seed form is not, on its own, a suitable method of identification". There are a number of Gymnocalyciums which I could confidently name from a single seed and without the aid of the scanning electron miscroscope. I am sure that the same would apply to other genera should they be studied in sufficient detail. However, two points should be noted: firstly, I have been studying Gymnocalycium seeds on and off for about twenty years! Secondly, in spite of this, there are still many which I certainly cannot identify in this way. However, it is rapidly becoming my belief, that where species cannot be identified in this way, it is the species concept (i.e. too narrow) which is to blame and not the seed! This, I think, brings us back to the old, old, problem, what constitutes a species?

There does appear to be some inconsistency in J. Theunissen's criticism of Brandt. In his article it is stated on one hand that Brandt "always evades enquiries" and on the other hand that "a prompt reply" was received from him. Does the writer mean to say that it had previously been difficult to elicit a reply from Brandt?

# THOSE QUEER YELLOW PATCHES - A query from A. W. Hill

A few years ago I paid a visit to Whitestone nurseries where my eye was caught by a bicoloured plant of Lobivia luzma — bicoloured in that the body was partially green and partially yellow. This took my fancy and I added it to my collection. For several years it has stood close to an Echinofossulocactus which has also grown with a yellow streak up one side. Last year I discovered that my Parodia schwebsiana v. applanata had acquired a yellow tubercle. although I am convinced that it was green when it first grew. A quite small seedling of Mammillaria under the staging has also produced one yellow tubercle. All my plants are in similar compost and are treated pretty much alike so I would not have thought that these yellow patches were caused by a cultivation fault. Yet what are they?

. . . from R. Mottram.

Among the plants which I acquired from the previous owner of Whitestone nursery was an Aylostera heliosa which produced flowers having streaky petals. This was a grafted plant and used for propagation offsets. About three years ago I grew some more Aylostera heliosa from seed and last year I sent sample offsets from both grafted and seedling plants to the Department of Virology at Wageningen University.

# . . . . from C. P. van der Beek, Wageningen

I have checked the samples of Rebutia heliosa by means of the electron microscope and the enclosed photographs show that two different viruses were present in the seedling and three different viruses in the grafted plant. It is possible that the virus may be seed-transmitted. Alternatively, the plant may have been infected by means of aphids or nematodes, which are known to transmit viruses. (The electron microscope photographs concerned were on display at The Chileans 1979 Autumn Gathering).

#### . . . . from F. Wakefield

I once had a mammillaria which had yellow tubercules down one side. When one of the tubercules was sectioned it was possible to see the two layers of colour — the yellow overlying the green. The discussion at Brooksby about the effect of virus attack did ramble rather and I am not sure anyone was well informed on this subject. For my own part I think that most bi-coloured plants are due to either trace element deficiency (often magnesium) or are chimeras. It would be interesting to hear an authoritative talk on this subject.

.... from "Botany". Weier, Stocking and Barbour, 1970

One of the most common symptons of virus infection in plants is the occurrence of light green or yellow areas on leaves. Uniform stripes or irregular bands of the normal green colour may appear in the leaf. Many variegated horticultural

varieties of plants undoubtedly are infected with some mild-acting virus. The diseases characterised by mottling or variegation of leaves are referred to as "mosaics", and almost all are regarded as virus diseases. In the lighter or yellow areas of leaves the chloroplasts may be absent or very reduced in size, or they may be yellow in colour. The reduction in the green pigment, and therefore in the colour of the leaf, is called chlorosis. Not all chlorotic leaves, however, harbour a mosaic virus; chlorosis may be due to other factors, including mineral deficiencies. Flowers of infected plants are frequently dwarfed, mottled, or streaked.

Any organism that carries a disease-causing agent from one living thing to another is called a vector. Insects, particularly those that feed on plant juices, are the most important vectors of plant viruses. Certain types of aphids, thrips, and leafhoppers account for the transmission of viruses from one plant to another. Some viruses can be transmitted from one host to another only through specific insects. Other viruses are so highly infectious that they may be carried from one plant to another by almost any sort of contact. Tobacco virus may be carried from one plant to another on hands or clothing. The tobacco virus is not destroyed in the manufacture of smoking tabacco. Thus should cigarettes made from virus-infected leaves be smoked, the smoker may easily carry the virus on his hands to healthy plants.

.... from P. Goodson

A virus is basically an ultramicroscopic piece of nucleic acid covered by a protein skin. These form themselves into different shapes which can only be seen through an electron microscope. The most common plant virus is probably Tobacco Mosaic Virus (T.M.V.) which as its name suggests induces the plant to produce chlorotic mosaic effects in the leaf. It should, however, not be assumed that because a plant has signs of mottling, mosaic or variegation that it has a virus infection. These symptoms can also be caused by nutrient deficiences or surpluses, or other causes. Likewise it should be remembered that mosaics are not the only indication of the presence of virus diseases. Stunting, distortion, lack of ability to root and breaking of colour in flowers have all been associated with viruses at some time or another. Viruses can also be latent i.e. produce no signs of their presence. An apparently healthy seedling plant of Copiapoa turned out to have five different viruses!

I would be glad to receive any material from bi-coloured plants for testing for virus disease. This involves disecting a portion of the plant, so spoiling it for collection — Plant Pathologists and cactus growers don't really mix! I would suggest that the best way is for growers to remove a section of the plant themselves. I require a piece of plant about the size of a sugar cube, both of the green and of the yellow areas. These should be put into separate plastic bags, sealed and labelled, telling me the area of the plant it was taken from — and of course the name of the plant. The bags should then be put into small boxes and sent to me by first class post at the Hatherly Biological Laboratory, University of Exeter, Devon. I must stress the importance of cleaning the knife both before use and after every cut, and also hands should be washed after handling the segments.

# CHILEANS AUTUMN WEEKEND From D. W. Whiteley

As a pretty regular attender at these events, I would like to give some views on the comments which appeared in Chileans Vol. 10 No.35 about the Autumn weekends. These are attended by those with a specialist knowledge in one group as well as by general collectors. I find that although I specialise in Neoporteriae, I often learn just as much or more about my pet plants from the general collector, or from those specialising in other genera, who have come across the same or similar problems to those which I am seeking answers to. It is rather surprising how those with a general interest can impart valuable information to a specialist — often far more valuable than they realise. Many have flowered and have slides of plants that the specialist has not yet flowered (or does not even possess!). This sort of information can add to that obtained even by a study group on a single genus. In this way, any collector has information to contribute to a Chileans meeting, no matter how unqualified they may think themselves. All that is required is a little knowledge of the South American cacti and the interest to learn more. So as to who is "qualified" to attend a Chileans meeting, the answer is "anybody and nobody". Anybody because interest is the only real qualification and nobody because we all have something to learn.

I have indeed found among members the same little resentment of not being invited to a Chileans meeting that Roy Mottram remarks about. Surely this shows a basic misunderstanding of how the weekend works — you don't wait for an invitation, you say you want to come! Due to postage costs etc., the circulars about the meeting are only sent to those who have been the previous year or who have asked for information. If you simply wait for an invite you will never get one! Everybody feels strange at attending any group or event that is new to them, but this soon passes off if one is prepared to join in. You don't have to worry about how ignorant you are on any subject as most of us there have been bluffing the rest on this for years! All that is needed is to ask a speaker to justify or explain himself if you don't understand or disagree with something. Certainly, the Chileans meeting is really not the place for persons who must buy the biggest and best unmarked plant for winning first prize at shows and when they have got it never bother to study it.

#### . . . . . From P. Goodson

As a newcomer to the Chileans weekend, I should start by saying that I thoroughly enjoyed it. Now I have a much better idea what many of the discussions are all about — previously it was all rather fuzzy. I would be inclined to agree with Graham Charles' comment that anyone going to a Chileans weekend for the first time does "jump in at the deep end." Although in my case this was no bad thing. However, I would like to see consideration (for want of a better word) given to newcomers in regard to discussions on habitats. I found these discussions tended to go above my head because in a lot of cases I had no idea where they were other than "somewhere in Bolivia". A general map of South America up on the wall for the speaker to refer to, would have helped. Once you know the general area, then at least you can start thinking about where to look for a more detailed map. Examples of the sort of thing are: the Belen-Mazan area covered by Jorge Piltz' slides the places that John Medway visited in Bolivia and showed on his slides, the Lago Argentino site of that rare Austrocactus. David Whiteley, for example, seemed to be well aware that Valley X was next to place Y, just north of Z. Those familiar with places and the general geography may well know where this is, but please spare a thought for newcomers (and new readers).

I would agree completely with Graham Charles' comment that the Brooksby weekend is stimulating; but I cannot agree with David Whiteley that is no place for people who like to grow plants for showing etc. I do grow my plants with the intention of showing, partly to publicise the plants and to get more people interested. I do enjoy NCSS Judges Course as well, but I also like to study my plants: the two go hand in hand with me. This brings me to the date at which the Chileans weekends are held. Would it not be possible to fix the date permanently for the second weekend in September? Then it would not coincide with the Judges Course on the first weekend in September and anybody who wished to go to both would then be able to do so. Perhaps there are members who would come to something new or different in the shape of the Chileans' weekend if it meant that they would not have to go without the lighter side of the NCSS meeting?

#### . . . . . From P. Allcock

I do think it would be an excellent idea to move the weekend forward to an earlier date. For anyone connected with schools or teaching, the second weekend in September usually falls just within the start of a new term, which causes difficulties because it interferes with preparatory work for the new session, and maybe upsets timetables if one has to arrange for Friday (or part of it) off within official term time. I also feel very strongly that the weekend is far too short. How do other members feel about this? I think serious thought should be given to extending it by 24 hours at least. At present it is almost a rush to pack everything into the time available and even then some items or item usually have to be omitted for lack of time. Perhaps we could have more time just for chatting amongst ourselves? Had the possibility been considered of moving the weekend forward to mid-August? There would also be more plants in full growth and flower at that time.

In my own case, this year's weekend event fell within the official College term time. As I had been presented by the College with a commitment that extended into that weekend, it meant that I was not going to be able to participate in the Chileans meeting. It was only by chance that events transpired which resulted — literally at the last minute — in my being able to redirect my footsteps in the direction of Brooksby. The information which came out of the slides that were shown to us by the visiting speaker from Germany was particularly valuable to me. I was naturally glad of the opportunity to see those slides, to hear the commentary, and for the informal conversation with our visiting speaker after the open discussions. Although conversation continued until the early hours of the morning (or is 4.00 a.m. the late hours of the morning?), the insight gained into the subject is invaluable. In consequence I feel that getting through the amount of work that we do at the Chileans' weekend makes it well worthwhile. After all, it is only one weekend out of the year. Might not some of our members find an additional day — as suggested by Phil Allcock — poses problems in obtaining time off work?

It must be of course be accepted that we have not normally preceeded each discussion subject with a brief outline of the geographical locations involved. It would appear that it may be as well to consider doing so. It is all very well to say that we have provided quite a selection of maps within the pages of The Chileans Journal, but not everybody will carry an impression of these to a particular discussion. The normal size of wall maps are quite handy when one is stood beside them, but hardly suitable for a person sitting in a room several yards away from the map concerned. It seems probable that the best approach may be to have a map of South America on a slide (this is already available) on which the general location can be indicated, then put up on the other projector a map of the particular locality involved. Do any members have country maps on slide, or maps from The Chileans Journal on slide?

To add one extra day to our weekend event would involve an addition of some 50% to current charges. Bearing in mind that one member expressed the view that the cost of the 1980 weekend alone was an important factor in deciding whether to attend, I suspect that any proposal for a longer "weekend" would be self-defeating. However, perhaps Phil Allcock would like to take a straw poll on this point from those attending our 1981 event?

. . . . From Mr. and Mrs. R. Coulsting

This was our first visit to the Chileans' weekend, and I must say that everyone was most friendly and helpful and we certainly did not feel strange there. The accommodation was better than we had been led to expect. There was nothing spectacular about the meals but they were quite adequate — after all, that was not the objective of our visit to Brooksby! Regarding the comments about some resentment caused by not being invited, I feel that is quite sufficient if members who have previously been to a weekend received details of the event and a notification appears in the Chileans this is how we ourselves knew of it and arranged to come. We would certainly intend to come again.

# BUININNG'S DISCOCACTUS BOOK From J. Arnold

This is a splendid publication, one of the best works on a specialist genus that I have come across. The pictures, apart from one or two exceptions, are of good quality and a great aid to identification, especially where there is more than one photograph of a species. Just one picture can be misleading at times, particularly with Discocactus which can change so much from youth to an older plant. I still find it difficult to see just how D, albispinus can be separated from D, zehntnen, but that does not detract from an extremely useful book.

From G. J. Swales

If I ever get round to producing a book dealing with Gymnocalycium, I would hope that it will be up to the standard of Buininngs' Discocactus book. I have always admired the sketches made by Brederoo and they are a credit to this book. Naturally, I have had a quick look at the seed sketches, and I am struck by the fact that every seed looked more or less similar: at the same time, they are a quite distinctive seed in comparison with other cacti. Many of the seed sketches do not seem to give a true view on the side, but rather more of a three-quarter view. Seeds are notorious for lying where they want to lie and Brederoo seems to have made a beautifully accurate drawing of what he saw. However, these are not absolutely suitable for comparison purposes. To be able to compare shapes and sizes accurately, one requires a strictly hilum or side view for each seed. But the information here is still a great deal better than that in Rausch's Lobivia book and I regard it as excellent value for money.

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On page 11 of "Discocactus", there appears the Latin description of the genus Discocactus by Pfeiffer, which our readers will have already seen on p.135 of Chileans No.36. This includes the sentence 'Frutices simplicissimi, disciformis, costati et aculeati." In the Chileans, this was rendered correctly as "completely unbranched shrubs, disc-like, bearing ribs and spines." It was pointed out by G. J. Swales in that article why a botanist would describe this plant as a shrub, i.e. because it was neither a herb nor a tree. But in the Discocactus book, this is incorrectly rendered as "Fruits very simple, disc-like, ribbed and prickly." The translator evidently found this puzzling for he says that Pfeiffer's description "is not perfect, because the shape of the fruit is never discus-like or spiny. It is difficult to find out where a mistake has been made in this case." But, my dear translator, there is no real difficulty; just refer to "Botanical Latin" by W. T. Stearn in which you will find: "Fructus — fruit" and "Fruticosus — shrubby." As we have pointed out in The Chileans, it is ever-necessary to keep a weather eye open for what is leading in the right direction and what is misleading, when looking at literature. Nevertheless, although my greenhouse conditions would be instant death to Discocacti, this book has a well-deserved place on my shelves.

# NECTAR IN LOXANTHOCEREI From P. Conrad

On four different occasions, I have sectioned flowers on Seticereus icosagonus and in all cases, I found the nectar chamber to be completely full of nectar. The occasions were: at the end of May (two flowers open), in early June (four flowers open), one week later (twenty flowers open), and towards the end of June when there were forty-eight flowers open. My plant is well watered and fertilised and was in full lush growth. I wonder if the growing condition of the plant may be a major factor regarding the quantity of nectar that is present in the nectar chamber? (Later). Further checks by periodic sectioning of flowers on Seticereus icosagonus have shown no change in the copious amount of nectar.

. . . . . From Mrs. L. McIntosh

I have caught some of the buds on my Seticereus in order to slice them into two, before they open. By watching to see how much they grow in the last two days before they open, it is possible to pick out a bud that will probably be another day before it opens, or another two days before it opens. When a bud is sliced two days before the flower opens, there is no nectar to be seen at all; there is some nectar to be seen in a bud on the day before the flower opens. The flowers usually stay open for two days, and on both the first and second day of opening, there is a copious amount of nectar in the nectar chamber. If the flower is sectioned on the day that it is wilting, the nectar has gone — overnight so to speak. This really intrigued me, and so to prove my findings, I noted six flowers all on one stem at the same stage of bud and followed them through slicing, one of them each, one after the other. The results were just the same. This seems to correspond with the findings reported by Mr. and Mrs. Lavender on Cleistocactus flowers. Perhaps the nectar is re-absorbed by the plant?

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#### From H. Middleditch

Two winters ago we had an extremely bolsterous gale about one week before Christmas and I returned nome at tea time to find that there were about forty cracked, broken, or completely missing panes in the greenhouse. There was so much broken glass on the floor it sounded like a carpet of cornflakes when I walked in. It was still blowing hard with squalls of rain, and pitch dark. It was not even practicable to run up some polythene sheeting as a temporary protection as it would have been torn off by the wind. There was no where else for the plants to go so they simply had to stay where they were, open to the elements. It rained, blew, and froze off and on whilst repairs were made when the weather permitted, and a fortnight later, the greenhouse was more or less enclosed once more. The Parodia and Haageocereus were decimated, but the Eriocactus remained, including E, magnificus. They are not normally treated in that fashion, but the heating i only on when outside temperatures fall below freezing, and not every time at that, so I suppose that they would not be strangers to a pretty low temperature.

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#### CHILEANS 1981 WEEKEND

As we go to press we hear from a German cactophile who has been out in Brazil that he will come to show slides of his trip to our 1981 weekend. Our 1980 visiting speaker from Germany has expressed a wish to come back again and he will be talking further about his trips to various parts of Argentina. We have a few slides of Austrocacti in habitat from van Vliet and other information on this genus. David Rushforth will be showing slides of his trip to Peru. There will be discussions on some photographic problems, queries on Cleistocacti from G. Charles, comments on flowers' scents, some thoughts on C3. C4 and CAM plants, and how the cacti fit in, plus various other discussions. Estimated cost for the weekend, covering meals and accommodation, is £31 subject to receipt of College charges. The event will be held September 4th/5th/6th. Bookings, preferably with £10 deposit, to Mrs. M. Collins, 11, Tudor Gardens, Upminster RM 14 3DE.

#### FORTHCOMING DISCUSSIONS

We have received from D. J. van Vliet an article describing his experiences on the hunt for Austrocactus in Patagonia. We should like to hear about any imported Austrocactus patagonicus/bertinii/dusenii which have offset in cultivation: or about Austrocactus hibernus cultivated up to flowering size. Comments about presence or absence of scent in Austrocactus flowers. In Islaya, Notocactus, Trichocereus, Copiapoa or Discocactus flowers would be welcome, or where scent was found unexpectedly in a flower — most especially if this can be associated with a rising or falling barometer. Some of the plants which our 1980 weekend visiting speaker showed us on slides, will be featured; also a miniature Soehrensia, a Rausch discovery, which has flowered in the U.K. Information on flower sections of Gymnocalycium of the Trichomosemineae group, other than G. ragonesei, would be very welcome. Experiences in growing Pterocactus, particularly in rooting top cuttings; with growing erect Seticereus; with Parodia mesembrina or any similar-looking Parodia; or with Thelocephala grown from seed, would also be welcome.

#### BULBOUS SPINE BASES From P. Bint

I had been reading the article in Chileans No.34 about the Parodias of the schwebsiana group; the reference to the swollen base of the spine on P. schwebsiana itself interested me so I went into the greenhouse to investigate. My plant is 14cm tall and 7.5cm wide, but due to intense wool growth I could not discern any spine base at all. However, when I came to do an enlarged sketch of the spines on one areole of Sulcorebutia alba I had a great surprise, as there were bulbous bases on the spines. I wonder how many more plants will reveal this when subjected to examination under a magnifying glass?

I would not be surprised if you were able to find bulbous bases to spines on quite a wide range of cacti, if you look hard enough. The spines on cacti do not appear to increase their length by adding more growth at the tip, but rather to grow at the base and so push the existing spine growth further out from the plant body. The bulbous base may quite possibly be the spot at which the actual growth is taking place.

# ..... From H. Middleditch

I have a slide of a new spine on a plant, which has a slender dark upper half which changes abruptly from a pale. much thicker growth, below. Presumably the upper half is 'last years' growth, which has dried out and hardened off whilst the lower half is 'this years' growth. As Geoff Swales observes, the only way of achieving this result is for the spine to put on its new growth at the base of the spine. The enlarged spine cluster sketches produced by P. Bint, incidentally, were on display at the 1978 Chileans weekend when Sulcorebutia were discussed and plants were laid out on a floor map.

In the German K.u.a.S. Journal there have appeared sketches of spine clusters on Notocactus linkii with bulbous bases to the spines, likewise of spines on Gymnocalycium valnicekianum with bulbous bases. I suppose that if one really set about to make a careful examination, there might well be quite a number of plants on which bulbous spine bases may be found. If Geoff Swales is right in his belief that the spines grow at the base then the search should not be fruitless.

However, I am fairly certain that the spine bases are not swollen on Trichocereus fulvilanus: when these spines are growing the upper (and presumably older) part is dark brown but the lower part is glassy greenish-yellow. Although the dark part of the spine seems to be quite stiff and strong, the whole spine detaches all too easily at the base if it is inadvertently deflected. Perhaps the upper part consists of lignified cell walls, whilst the lower part has cell walls not much stronger than a paper bag full of water.

#### . . . . . From R. Mottram

Most Corryocactus do have swollen spine bases — and not just the main central, but in many instances one would need to dig into the felted areole to observe it. The species in our collection with prominent bulbous based spines are C tarijensis (very prominent), C, brevistylus and C, purquinensis, and a procumbent species intermediate to Erdisia which is un-named. Other species which are either without bulbous bases or only occasional or generally indistinct are C melanotrichus, C, brachypetalus and C, aticensis, and all Erdisia. The interesting thing about Corryocactus spines is the occasional nectiferous spine on young areoles, the nectar appearing as a bead usually about one third the length below the spine tip. I have also seen the same thing on Yungasocereus.

#### .... From F. Wakefield

I have occasionally noticed droplets of liquid on the extreme ends of the spines of some of my plants. I cannot remember which ones but I think that they have always appeared in the early spring and summer when the plants are growing vigorouly and their water uptake is at a maximum. The droplets have always been apparent in the mornings and I have thought that they were due to the plants exuding excess moisture when the transpiration rate has been lower due to the lower temperature (and hence higher relative humidity) before the sun was well up. I never thought of the liquid being nectar, although I have noticed these exudations on many other plants — notably tomatoes — on similar occasions. Next time I see these droplets I will look at them a bit more closely.

CACTUS SEEDS - A QUERY ON TERMINOLOGY From F. Fuschillo

I am having more than a little trouble with some German translation from Die Kakteen. In the descriptions of the sections of the genus Gymnocalycium, when he is describing the seeds. Buxbaum keeps writing "hilum basal". In describing the series Saglionis he writes "hilum basal to sub-basal". He then goes on to describe the testa as having "Zwischengruben" and "Lakunen". Can you give me a good translation of these terms?

# . . . . . From G. J. Swales

Zwischengruben are "holes between" or "pits between". Lakunen is translated as Lacuna (plural lacunae) which has virtually the same meaning and refers to the depressions in the testa bounded by a number of testa cells. Presumably this will refer to a testa such as that seen on the seeds of Gymnocalycium buenekeri, taken by electron microscope, which was displayed at one of the Chilean weekends and has also been published in the G.B. Journal Vol.40, No.4, page 100, Figures 10 and 11.

#### . . . . . From H. Middleditch

This particular feature of the testa on Gymnocalycium buenekeri seems to be rather uncommon in the Gymnocalycium. It is now some time since G. J. Swales observed the appreciable differences between the seeds of G. horstii and G. buenekeri. These were discussed in Chileans No.30 where an enlarged sketch of the testa surface of G buenekeri displayed the fairly large "black hole" which is the lacuna. As F. Fuschillo observes, Buxbaum notes that this feature is also to be seen on the seeds of the Gymnocalycium of the Saglionis group. G. J. Swales has already commented on the fruit of G. buenekeri having a jelly-like filling containing the seeds, in the same fashion as G. saglionis. The only other Gymnocalycium seed to exhibit lacunae on the testa, according to Buxbaum, is G. horridispinum and the seeds of both G. buenekeri and G horridispinum are similar in outline — the hilum is not arranged at approximately 90° to the long axis of the seed. but rather at an acute angle to the long axis of the seed.

This brings us to the second question from F. Fuschillo, concerning the hilum "basal". The majority of cactus writers who utilise illustrations of seed show the hilum at the bottom of the seed. In Buxbaum's "Morphology of Cacti", there are one or two seeds drawn with the hilum at the top of the seed, but by far and away the greatest number are drawn with the hilum at the bottom. Presumably Buxbaum is used to seeing sketches of seed with the hilum at the bottom and so he describes the hilum as basal. Most of his seed sketches are also drawn with the long axis of the seed vertical, so when the hilum is arranged at approximately 90° to the very vertical long axis of the seed, the hilum does appear at the very bottom, or base, of the seed. If the hilum is not arranged at 90° to the long axis of the seed, but at an acute angle to it, and the long axis of the seed continues to be taken as a vertical line, then the hilum is no longer right at the very bottom or base of the seed. Here Buxbaum describes it is sub-basal. Other writers use the term "oblique" to describe this sort of hilum disposition.

An alternative way of displaying seeds is to draw them in an attitude with the hilum substantially horizontal: the sketches of Lobivia seed types by J. Hopkins in Chileans No.23 p.83 are shown in this way. Other writers also adopt this practice, where the hilum is always depicted as the "bottom" of the seed. Let F. Fuschillo be assured that. If he found some problem in correctly interpreting the term "basal", it has taken me a considerable period of time to comprehend the situation outlined above.

# STUDY GROUPS/REFERENCE COLLECTIONS

T. Lavender, 62, Finchdale Avenue, Billingham, Cleveland, TS23 2EB.
J. Forrest, Spring Garden, 2 Darngaber Road, Quarter, Hamilton, Scotland.
G. J. Swales, 5 Hillcrest, Middle Herrington, Sunderland, Tyne & Wear.
J. Hopkins, Primrose Cottage, Monks Lane, Audlem, Cheshire, CW3 0HP.
P. H. Sherville, 51 Park Road, Enfield, Middlesex, EN3 6SR.
J. Arnold, 11 Greenbank Drive, Middlebank, Lincoln, LN6 7LQ.
R. Ferryman, Nichelia, The Street, Stonham Aspal, Suffolk, IP14 6AH.
G. J. Charles, 138 Whitehouse Common Road, Sutton Coldfield, Birmingham, B75 6DT.
J. W. Bagnall, 22 Perlethorpe Avenue, Mansfield, Notts.
A. W. Craig, Davela, Forest Lane, Kirklevington, Nr. Yarm., Yorks.
P. Smart, 5 Tomlinson Avenue, Gotham, Nottingham, NG11 0JU.
J. R. Gooch, 51 Bourn Avenue, Hillingdon, UB8 3AR.
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# Frailea Gymnocalycium Lobivia Matucana/Borzicactinae Melocactus/Discocactus Neoporterianea Notocactinae Opuntia/Tephrocacti Photographing Cacti Rebutia Sulcorebutia & Weingartia Trichocereus

Cleistocacti