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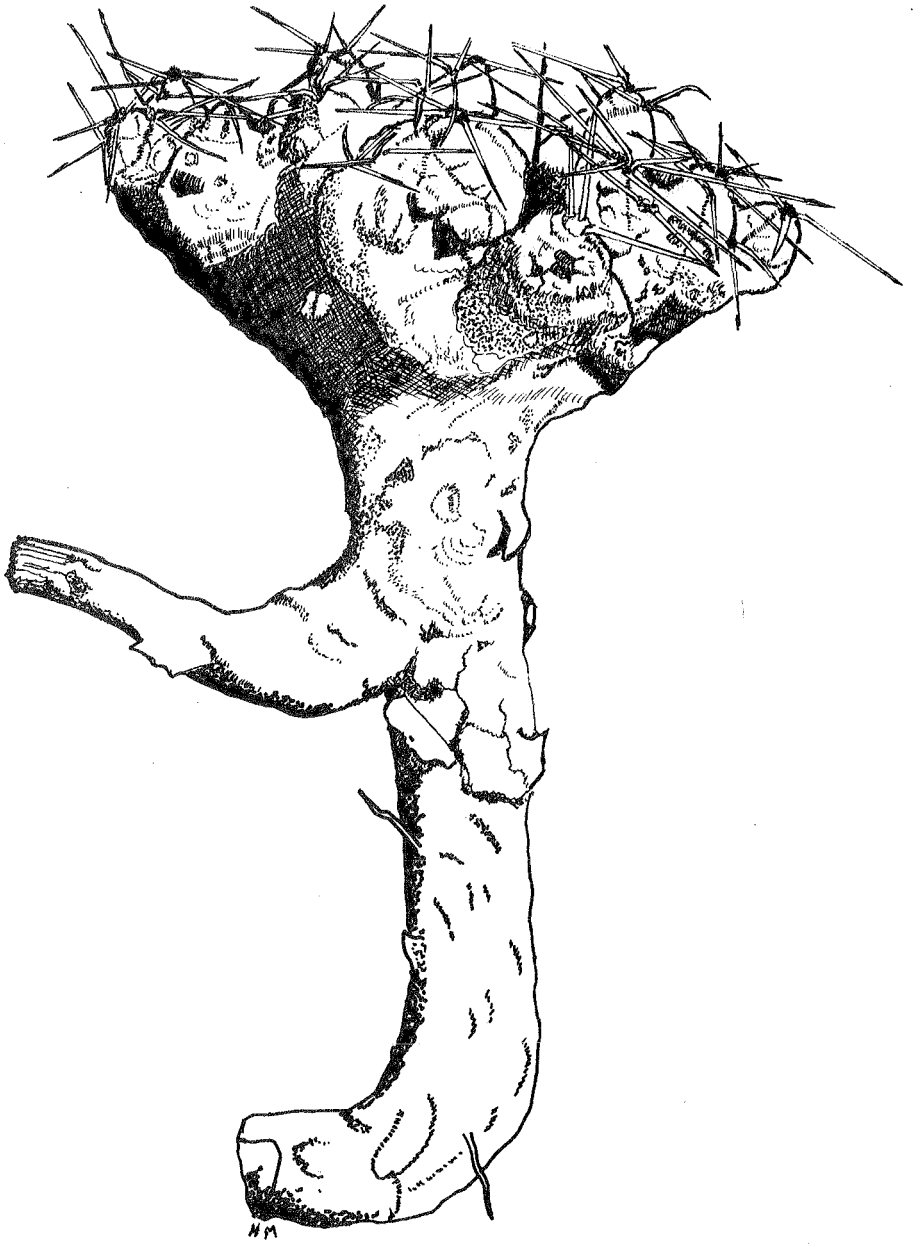
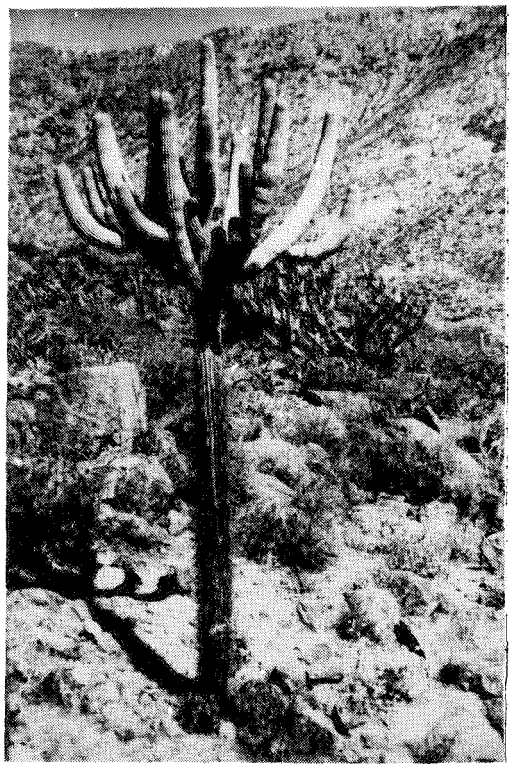


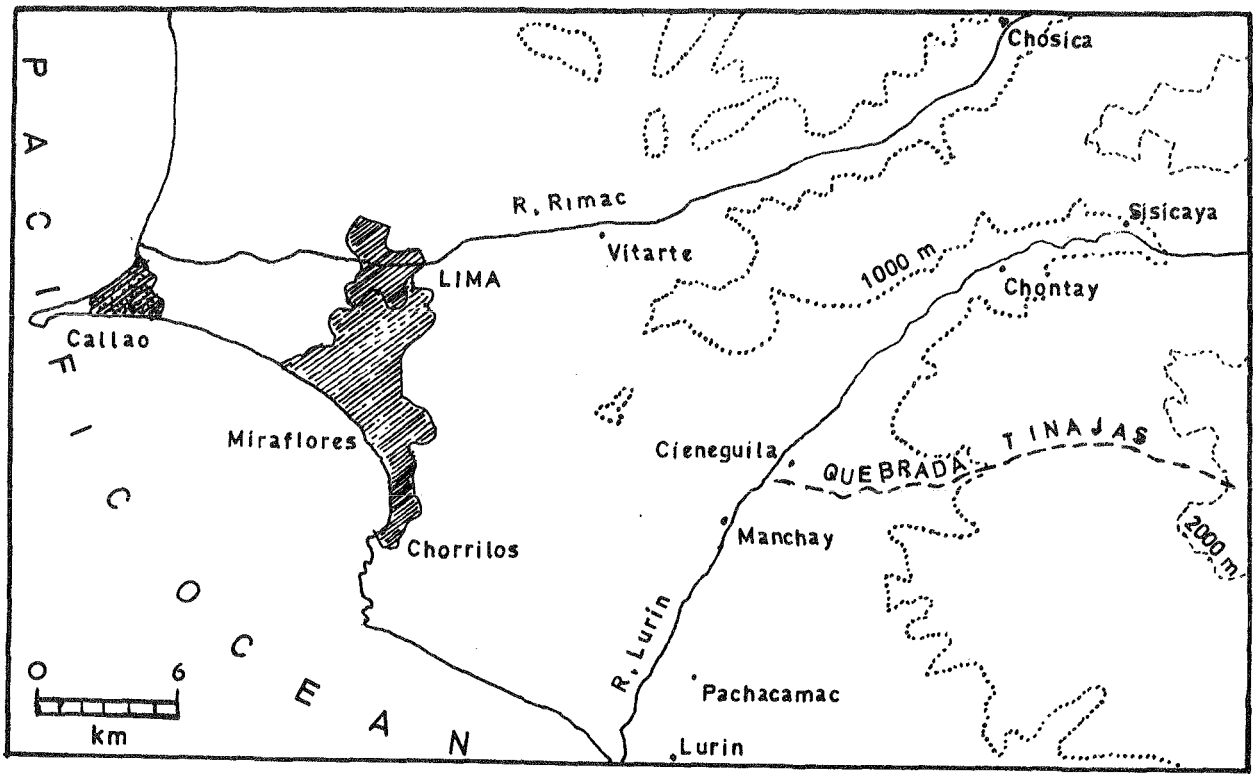
Tephrocactus rossianus



QUEBRADA de TINAJAS

BROWNINGIA CANDELARIS

Photos - R K Hughes



PERU - THE TINAJAS CANYON **From R. K. Hughes.**

On my trip to Peru in April 1984 my starting point was once again the capital city of Lima. From there I travelled into the south-eastern part of the country. This occupied most of my holiday, but I returned to Lima in time for one last outing before leaving for home.On this occasion I was in contact with Dr. Carlos Ostolaza who was familiar with many cactus growing localities, especially in central Peru. I took a hire car in company with Dr. Ostolaza in order to pay a visit to the Tinajas valley. This valley lies to the south of Lima, branching off the Lurin valley. The entrance to the Tinajas valley lies about 22km (13 miles) from the very outskirts of Lima. From Lima we passed through Cieneguilla which lies on the banks of the R. Lurin; not far beyond that place we negotiated a ford over the R. Lurin.

After becoming stuck on the ford with the water swirling into the car we had to have it manhandled up on to the bank; fortunately we were soon on our way again and shortly turned into the Tinajas valley.

This is a dry valley with no river running on its floor and it is therefore uninhabited - and hardly ever visited. The steep rocky sides of the surrounding mountains enclose a fairly narrow valley bottom which is quite flattish, into which is cut an even narrower ravine with virtually vertical walls along most of its length. This ravine seemed to have been cut by a river at some time in the remote past before the area had become the dry stony desert that it is today. The dirt road was no more than a track along the flat terrace above the rim of the ravine where the litter of rocks and stones had been cleared away. We had to travel some 35 to 40kms along this canyon that gradually narrowed as we went on. There were three descents into the ravine where we went along the sandy bottom; after each one we then had to climb out on to the opposite terrace to follow the track.

As we approached our first stopping place we were able to see just the odd cactus, usually back against the hillside.

Carlos used his altimeter to estimate how close we were to the cacti. It was just above 700m when we came round a bend to see before us the wonderful sight of a hillside covered in cacti. The flat centre of the canyon virtually ended here as did the deep central ravine. Four lines which cut diagonally across the hillside in front of us were in fact the road as it zig-zagged its way upwards. This type of one-car width narrow road, with a cliff to one side and a steep drop to the other, was to become normal from this point at 700m to our maximum altitude at 2100m.

We did meet one vehicle coming the opposite way and it was very difficult to find a place for the two vehicles to pass each other. Apart from this vehicle, and one tent, there was no other sign of life - neither man nor beast - throughout this valley.

As we stepped out of the car the first plants to be seen were Opuntia sphaerica, O. kuenrichianus, and Melocactus peruvianus. The dominant plant however was the much larger Espostoa melanostele. These plants were much better looking than those seen in the Chillon valley. Many, if not most, of the Espostoas had around ten stems of between two or three feet to five or six feet tall, that branched at the base and rose up vertically in groups. These branches had turned dark with age, only the top staying white, like the Espostoas seen in the Chillon valley, but here none of the dark part of the stems seemed to have turned black, but had remained grey. Here, many stems carried a cephalium on them which could extend for about four feet up the side of a six foot tall stem. The cephalium wool varied from a light brown to a quite dark red-brown in colour.

Often dead flower remains were seen in the cephalia and also some flower buds. As the flower is said to open for one night only, none were seen, although some buds looked as though they were due to open that night, and some closed flowers looked as though they had been open the previous night. Only one ripe fruit, which I collected, was found among all these plants. To judge by the flowers that had recently opened and those which were due to open, I must assume that it was too early in the season for fruit.

On one plant only did I find a cristate growth, and that on a single stem of two feet in height. This crest was about a foot high and about the same distance (or perhaps slightly more) across, for it had formed a rather misshapen circle. Growth along the ridge of the crest had been haphazard so it gave one the impression of an ostrich feather fan, the size varying depending upon which side it was viewed from. The ostrich feather fan effect was perhaps enhanced by the lack of the long yellow central spines that protrude through the wool and occur on the normally growing stems. I also found a seedling Espostoa which was the size of a ten-pence coin, which demonstrates that some seeds must germinate and survive.

There were two Haageocereus species at this site which were of similar appearance to those seen the previous day in the Chillon valley. Here again the larger one was also Haageocereus acranthus. The stems here were perhaps more upright and less straggling, forming much neater clumps - more like the larger Espostoas. The stems of Haageocereus also darkened in age to a grey (rather than a black) with only the shortest of yellow to brown caps of new growth at the top. In addition to H.acranthus there was another Haageocereus in this canyon which was similar to and seemed to take the place of Haageocereus aureispinus; it was a variety of Haageocereus pseudomelanostele with carmine flowers. Generally it appeared to be stouter and taller than H. aureispinus, some plants almost matching the H. acranthus in height. At the tops of the stems the bright yellow caps of dense spines were less obvious in this canyon as again the darkening with age was grey rather than black, so reducing contrast between the two sections of a stem. Only young flower buds still in the stage of developing were found on this species, and no fruits. On the other hand the H. acranthus had only dead flower remains and young unripe fruits at this location.

The Melocactus peruvianus were plentifully scattered about the hillside, usually large specimens of five or six inches in diameter, some without a cephalium, others with cephalia of varying sizes. The small bright pink flowers were found fully open on some plants, squeezing out of the bristles projecting from the cephalium. In addition, some of the bright pink berry-like fruits were seen that, when ripe, push out through the cephalia bristles; although there were not many fruits, a few were collected.

The plants of Opuntia sphaerica/kuenrichianus were also quite plentiful with some quite large clumps to be seen. In these clumps the lower joints were quite large and spherical and tightly packed together. The youngest outer joints were smaller and perhaps more ovoid in shape and haphazardly positioned giving a more open look to the clump. As I had found on a previous encounter with these plants, the spines and glochids are extremely sharp and ever ready to stick into one's boots, so detaching the joints from the clump. Most of the plants had fruits on them which were full of seed. There were a number of

fruits which carried a recently withered flower on them and occasionally an open yellow flower was also seen.

Scattered across this hillside there were also many low growing twiggy shrubs. The local name for these in Spanish was malmujer. The twiggy stems do have some very sharp small hidden thorns along them but they tend to bruise easily and release a white euphorbia-like sticky sap that is severe irritant on human skin and in some cases can cause extreme pain. In the main these twiggy stems were bare except for a few dead ones that still remained attached. However towards the ends of some of the twigs there were some small leaves or bracts and on some bushes there were flower buds or small white open flowers. There were also some large dead leaves lying on the ground below the bushes.

In the course of searching this hillside we climbed from the lower road up to the next level whilst the car followed the road by the zig-zag and rejoined us. We then continued on the long climb up the valley. We eventually spotted the tall cereiform cacti that Dr. Ostolaza had told me we should see - and there they were, Browningia candelaris, quite outside the previously accepted distribution area. There were only a few of these plants at first, then more of them as we climbed higher.

Reports of this species from the more usual habitat areas say that it starts to occur between 1600 and 1800m altitude and at this newly reported site their lower level would seem to be in agreement with this. Eventually we reached a point around 2160m altitude where the road was getting rougher and also there were less of these plants about, so we turned round to retrace our steps. Not far below this point we found a suitable place to stop where we could examine the cacti.

Here the central part of the canyon between the steep enclosing walls was made up of huge rocks and stones, generally larger than a man and some much bigger. These were interspersed with some flatter areas of smaller rocks and soil and bedrock where there were many shrubs growing up to six or seven feet in height. Of the cacti the most prominent were the Armatocereus matucanensis. Unlike most other Armatocerei this species grows into tree size plants but with a spread that is much greater than their height. In other respects they are similar to other species of Armatocereus, having 6 to 8 ribs with long spines although the jointed stem formation typical for this genus was in quite short sections compared with Armatocereus that I had seen elsewhere.

The stems were a light grey-green colour that became marked and gnarled with age. It was because of the contrast between the dark shadow cast by the great spread of branches against the light green of the stems that made these plants stand out so clearly right across and along the valley.

On the other hand it was their considerable height that allowed the Browningia candelaris to be seen almost as well. Most plants seemed to branch above the nine or ten foot level. The lower, darker, spine covered trunks blended in with the surrounding hillside but the upper green stems and branches could be clearly picked out at a distance even on unbranched columns.

On the plants seen in this canyon all the branches seemed to grow outwards and upwards, becoming nearly vertical. Even on the very large plants there appeared to be no horizontal branches, or branches growing downwards at first and then with an ascending tip, both of which may often be seen in picture of this species taken in its previously reported habitat sites further to the south, where I also saw this form of growth. When I came across this species further to the south at Puente Uchumayo, there had been a group of Browningia on a dry hill top together with others well scattered over the surrounding stony slopes, but there was very little vegetation other than the cacti. By comparison there was sufficient plant cover here in the way of grasses, thorny shrubs, and other green plants to dilute the dry stony canyon from brown to green. The Browningia candelaris were mainly grouped in the centre of the canyon but because of their size they were spaced quite widely apart. Dr.Ostolaza and a companion had previously undertaken a head-count of this species which came to around 700, half of which were juvenile without branches and the other half with branches. There were plenty of younger plants to be seen during our visit so rejuvenation appears to be good.

The healthy well-grown plants seen here indicate that there is more moisture available in this dry canyon than at the site where I found these plants near Puente Uchumayo - whether it is from night-time condensation or from rain in the wet season, I would not know. In the accompanying photograph the solitary stem of a younger plant may be seen centre foreground. One or two of the even shorter single columnar plants may well be even younger Browningia; you have to much closer to the short columns to be able to identify them. The bottom of the canyon, or more accurately the terrace, may be seen running diagonally across the top left hand side of the picture. The far wall of the ravine entrenched below the terrace can just be seen in shadow top centre-left; here the ravine is not very deep so that where it runs out half way up the left hand side of the picture it can hardly be distinguished from the terrace. The cause of the series of white lines running across the hillside at the centre of the picture, is unknown. The stony nature of the ground surface which can be seen in both photographs here is quite typical for most of the canyon.

The other large-growing species seen in this valley is a Trichocereus which is said to be a form of T. peruvianus; however, it is smaller than either the Armatocereus or the Browningia. It has robust stems which branch from the base and rise to six feet or more in height. The new growth at the upper part of the stem was a very striking blue-green in colour. This seemed to become a grey-green lower down the stem and a light yellowy-green in age. The single central spines were very long and strong, almost to four inches long so equalling those of the Armatocereus. As there were only a few of these Trichocereus and they were the first we had seen on this outing, we concluded that we were at the lower limit of their range. No sign of buds, flowers, or fruits were to be seen on any of these three species of large cereiform cacti although any examination or collection from the Browningias would have been impossible.

At this same location I was still able to find plants of Espostoa melanostele, Haageocereus pseudomelanostele, Haageocereus acranthus and Opuntia sphaerica/kuenrichianus. These species were much more widely dispersed at this higher altitude than at our first stop, which was at a much lower level. They were also perhaps not so large either; in addition to the Haageocereus pseudomelanostele was less densely spined. Our time being limited, we soon had to continue on our way back downhill, retracing our route along the canyon. We stopped firstly to photograph some large Browningias as we passed close by them and also when I spotted some Haageocereus acranthus with ripe fruits that I wished to photograph and collect. There was a final stop at our first halt, just before we left behind all signs of vegetation, but we only spotted another Espostoa crest. A few more ripe fruits were collected from the Melocacti but there were no more Espostoa fruits to be seen so we made our way out of the canyon and returned to Lima, fortunately without any problem crossing the R. Lurin, this time.

Once back home, the seeds were cleaned and there were sufficient to be able to pass small numbers on to other Chilean members. So far germination has been quite good.

. . . . . from Prof. W. Rauh, KuaS 35.12.1984

. . . to collect young plants of Browningia candelaris in the wild is difficult in so far as Browningia grows in association with Weberbauerocereus in south Peru and with Haageocereus acranthus in central Peru and the young plants of all three are difficult or impossible to distinguish one from the other.

. . . . . from H. Middleditch

This is a remarkable report by R. K. Hughes of a new growing location for Browningia candelaris. Consdering the number of cactus collectors who have travelled around in Peru you would hardly expect surprises like this which have been missed before. Not only have botanists resident in Peru, like Weberbauer, travelled their country a great deal, but visiting botanists like Rauh and Hutchinson have also worked in Peru. Amateur cactophiles from the continent, like Chalet, Markus, Zecher, and Instorfer have also visited Peru, some of them more than once. Lau has spent a fair amount of time in Peru. Ritter, who was no slouch when it came to off-highway footslogging, fills one volume of his Kakteen in Sudamerika with the plants he found in Peru. Our own Chilean members like J. Medway, D. Rushworth, and P. and M. Collins, have also been to various cactus habitats in Peru. But if we consider the routes taken by our members (apart from the outing described above) we find that they have all followed well trodden routes, taking in certain established cactus locations and relying on towns for daily provisions. From the account by Rauh in the French Cactus Journal of his own visits to Peru it is quite evident that he, too, relied on regularly travelled roads; he provided a report on the cacti of Peru which embraced more locations than any previous account and was really a monumental effort. If he had tried every byway and tramped every uphill and downdale he would never have covered a tenth of the material that appears in his book. So on reflection it may be less remarkable that this site has not been visited before — except that it can be viewed in a half day's outing from the capital city.

If we bear in mind that an Islaya has been found in the Omas valley, only 50km. further south than Tinajas which is also a great deal further north than the previously accepted boundary of its distribution, then this new location for Browningia may perhaps be less surprising. What is decidedly surprising is the gap between this location for Browningia candelaris and the previous most northerly reported location near Nazca. It is not just the dozens of dry valleys between the two places which may still harbour further unreported locations, but there are the inhabited valleys that have never seen a cactus collector, too. However, there are some valleys in the gap between Nazca and Tinajas which have been visited; Rauh's account includes the valleys of the R. Canete (apparently as far as Yauyos), and the R. Pisco, without having seen there any plants to Browingia candelaris. On the other hand, Rauh does refer to the association of Haageocereus, Espostoa, Melocactus, Tephrocactus, and Neoraimondia, in the Canta valley, the Churin valley, the Rimac valley, the Eulalia valley, and the Canete valley. So why was Neoraimondia not seen in the Tinajas Canyon?

The lower level at which Browningia occurs would indeed appear to be around 1600m.; Rauh also quotes "their upper distribution boundary lies between 3000 and 3300m. In regard to their habitat requirements, Browningia appears to occupy a wide ecological band, since in addition to extremely dry rocky wastes (vicinity of Arequipa, high valley of Chala) it also colonises locations that are reached by the summer rains". Now Ritter appears to have something to say about this last matter.

. . . . . Browningia icaensis. By F. Ritter. Kakteen in Sudamerika Vol. 4.

[Full description provided — no significant differences from B. candelaris]. Type locality — High mountains above the Canza mine, Dept. Ica, on grass plataeux. This species likewise grows abundantly on the stretch from Nazca to Puquic in Dept. Ayacucho on the Pacific side of the Andes between 1700m. up to 3000m. altitutde. It is evident that both Browningia icaensis and B. candelaris make different climatic demands. Whilsts B. candelaris always grows in extremely arid conditions towards the zone of summer rains, on the margin of the utter desert which runs from south Peru to north Chile, Browningia icaensis is found only at an appreciable distance from the bare desert in the somewhat moister and climatically less extreme vegetation zone at higher altitude. Both species grow near Quicacaha, east of Chala (Dept. Arequipa). However, whilst Browingia candelaris only grows far below this place on the edge of the bare desert, Browningia icaensis is found only above this place in a more fertile vegetation zone and is separated from the former by a zone of median altitude, lacking any Browningia. Since neither of the two species grows in the climatically median zone between both distribution belts, it indicates that Browningia icaensis can not survive there, but that it already occupies a cool moist climatae into which it has migrated in an earlier epoch, as with the Type locality above Casma.

. . . . . from H. Middleditch

This appears to be a somewhat restricted geographical survey upon which to base a separate of two species, especially when Browningia is reported from altitudes of up to 3300m. from several other locations. Are we supposed to accept that all the Browningia found above the bare desert are to be regarded as B. icaensis?

. . . . . from A. F. H. Buining. Kuas. 23.2.1972.

We set out in the morning from Nazca to go deep into and high up onto the Andes. It was remarkable that we came from about 1800m. in thick mist and drizzle up to about 3200m. where a glorious sun shone on us once more. Just between these 1800 and 3200m. altitudes we saw many Browningia candelaris and an Erdisia species that was completely swallowed up by the earth.

. . . . . from H. Middleditch

Since we saw the slides of Browningia candelaris in the Tinajas canyon, at the Chileans 1986 Weekend, I have discovered a reference to this species in Kuas for December, 1984; there is a photograph of a mature candelabra-form plant growing in the Eulalia valley at 1200m. altitude. This location is even slightly further north than the Tinajas canyon; considering the dozens of European cactophiles who have visited this particular valley, it seems quite extraordinary that the existence of Browningia there has escaped attention before now. In addition, the altitude quoted is appreciably lower than that quoted in the literature for any other habitat location of this particular species. Rauh himself in his book on the Peruvia cactus vegetation refers to Opuntia pachypus growing between 900 and 1400m altitude, which suggests that he actually traversed

that altitude; yet apparently, he too, did not see the Browningia at that time.

. . . . . from Prof. W. Rauh

I must tell you that I had already discovered Browningia candelaris in 1975 to the southeast of Lima in the valley of the Rio Lurin and to the northeast of Lima in the valley of the Rio Chillon (Canta valley). I have already published this in my big cactus book on page 125 and I accompanied that with a photograph on Plate 17. In both places the plants are growing at an altitude of between 1500 and 1700m. But in those locations there are the same ecological and climatological conditions as in southern Peru at an allllltitude of about 2700m. It seems to me that the southern Browningia candelaris, which also grows in the valley of the R. Pisco, is somewhat different from the northern one, in regard to the mode of branching of the crown. I have heard that Browningia candelaris also grows in the valley of the Rio Chancay, which lies to the north of the Canta valley.

. . . . . from H. Middleditch

In addition to this occurrence of Browningia in central Peru, Ritter in his Kakteen in Sudamerika also publishes a Browningia from the Sana valley at a place called Florida, which I have not been able to locate to date on my Peru map. So I do not really know where it lies relative to the distribution area for Browningia candelaris. Ritter also mentions Browningia amstutziae from the Paucartambo valley, but this may be a Gymnanthocereus Browningia rather than a Browningia Browningia.

. . . . . from R. K. Hughes

The Sana valley is in Cajamarca province so it is getting well to the north of Peru. The Rio Paucartambo given as habitat for G. amstutziae may be the one running through the Paucartambo that lies east of Cerro de Pasco; there is a Yaupi marked on the river downstream from Paucartambo and we know that Ys and Js can sound the same. This river runs down towards the R. Perene so it is on the Atlantic side of the divide, suggesting a more tender species than Browningia candelaris, which reaches 3000m on the Pacific side. The Browningia distrubution area on the Pacific side is separated from this location for species amstutziae by high snowy peaks with a few passes at 4400 and 4500m. altitude. I must assume th the reasons they want to join Browningia to Azureocereus and Gymnocereus is hidden in the German texts somewhere.

. . . . . from H. Middleditch

Ritter quotes a location at about 1000m. altitude for Browningia albiceps at Florida in the Sana valley. In Rauh's Peruvian Cactus book his description of the Sana Valley refers to a savanna-like vegetation with Bombax trees which extends up an altitude of around 1300m., whilst the cacti tend to be rather more prominent up to an altitude of some 900m. On that basis, Ritter's location for his Browningia albiceps is in the less arid zone where the cacti are no longer dominant. Rauh also quotes Rauhocereus riosaniensis from this valley; this genus is associated with Browningia by Buxbaum, in Kuas 14.11.1963. Presumably this is on the basis of the numerous large scales covering the pericarpel and fruit of Rauhocereus, which bear a resemblence to those on Browningia. In the Olmos valley, about 150km. north of Florida, and still on the Atlantic side of the divide, Rauh quotes the existence of Gymnocereus (Gymnanthocereus) microspermus in some abundance at about 1800m. altitude. Here a moister environment exists than in the cactus rich zone at the lower altitude; Rauh comments that Gymnocereus at this and other locations favours a far moister environment than both Browningia and Azureocereus. One cannot help wondering whether Ritter's Browningia icaensis may possibly be a Gymnanthocereus.

Rauh also observes that Gymnocereus corresponds with the Azureocereus and Browningia from southern Peru in respect of the fruit berries being covered with large, prominent, somewhat tile-like scales. At the moment I am not aware of the specific reasons for bringing these three genera together into one single genus.

MR. COX'S AUSTROCACTUS. By H. Middleditch.

Some experiences gained in cultivating Austrocactus were reported in Chileans No.39 together with selected background information on the terrain, climate, and vegetation of Patagonia.

The Austrocactus found by D.J. van Vliet in the province of Neuquen was discussed in Chileans No.40 which contained further information on the habitat conditions in central Patagonia, especially in the narrow, moister belt along the pre-cordilleras.

In connection with the Austrocactus collected by Lembcke from 'Lago Argentino' the various vegetation formations to be found in the immediate vicinity of Lago Argentino were reviewed in Chileans No.41. At the close of that review the question was raised about the origin of Austrocactus coxii.

Evidently a botanical collecting trip was undertaken by Guillermo (William?) E. Cox in 1862 under the aegis of the Santiago Natural History Museum to parts of what is now the Argentine province of Neuquen, but at that date was the undisputed territory of the nomadic indians. Botanically it was an unknown patch of ground. The material collected by Cox was presumably handed over to R.A.Philippi at Santiago who was in charge of the Natural History Museum that formed part of the University there. A catalogue of the collected material was published, a fair number being species nova. This catalogue was followed by detailed descriptions of all but three of the sp. nov.; these detailed descriptions followed the same name order as the catalogue section. Here we find reference to Echinocactus coxii Ph. and E.intertextus Ph., both of which would now be considered as Austrocactus. The name Echinocactus coxii appears in the catalogue section but in the same place in the list of new descriptions there appears the name E.intertextus. The name E.intertextus does not appear in the catalogue and the name E.coxii does not appear in the descriptions of sp. nova. A check through both complete lists, which I have before me as I write, does not reveal any similar deviation other than this one between the catalogue and the descriptions. It would seem to be a reasonable conclusion that the use of two different names has been an oversight on the part of the author. Evidently Spegazzini also took the view (Brev. Not. Cactol. 10.1923) that these two names applied to the same collected material; once the original document has been examined it is easy to see why he expressed this view.

On the other hand, Backeberg observes (Die Cactaceae Vol.4, under Austrocactus patagonicus) that 'it is scarcely possible that Philippi was so thoughtless as to provide the same species with two names so closely one after the other'. However, since Backeberg was producing his six-volume monograph in a period of four years, it seems unlikely that he would have been able to refer to the original literature in every case he cites.

Would he have expressed the foregoing scepticism of Spegazzini's views if he had indeed looked at the original document in this case? Was Backeberg aware that Karl Reiche, Head of the botanical section of the National Museum in Santiago in 1907, wrote at that time:- 'Philippi named and described possibly in excess of 3,000 new species all told. These 'species' are of very diverse validity. In addition to numerous well-founded ones, there are many which will undoubtedly have to be sunk into synonymity, particularly among those created in his later years. This can be accounted for primarily by the personal preference of the author in recognising smaller and smaller differences in characters to separate species. In addition, in the early years of his work he lacked ready access to botanical literature and finally the author admitted that on the whole he had not made use of available literature, e.g. not even the Flora Antarctica, so that he could have over-estimated many species as 'new'. Just as little can he be spared the blame for establishing many species on quite inaccurate, fragmentary, or immature examples and among the immense number of newly described species he gradually lost an overall appreciation of the situation so that he re-published under new names species which he had once described himself. In view of these failures it had become expedient from time to time to send botanical collections to Europe to allow them to be worked upon by the numerous specialists who were the best furnished with literature and comparison material; in this way botanical descriptions would be saved a depressing load of synonyms.' This would merely seem to reinforce the impression that the author had made a slip in his original publication in writing 'E.intertextus' when he should have written E.coxii, and that Spegazzini could well have been correct in expressing this same viewpoint. In that event, the name A.intertextus ceases to exist.

So we come back to the question, where was this plant found? Fortunately we do have Cox's own account of his journey and so we can establish with a fair degree of accuracy what ground he covered, and in this way we find that A.coxii must have come from a very small area in comparison with the distribution of Austrocactus as a whole.

A TRIP TO THE NORTHERN REGIONS OF PATAGONIA 1862–1863. By G. Cox.

Translated and condensed by H.Middleditch from Anales de la Universidad de Chile Vol.XXIII 1863

Padre Falkner was english by birth, starting as a student of medicine. He took a ship from Cadiz to come to America, became ill at Buenos Aires and was attended by some Jesuits. He became involved in that Order and in the twin character of missionary and medicant, started to travel in the southern part of the continent. After forty years of residence he returned to his native country in 1774, publishing the results of his observations in a book entitled 'Description of Patagonia'.

Speaking of the Rio Negro he says:- 'This is the most important river in Patagonia and is known under various names. I do not know exactly the origin of the river but suppose that it is fed from many rivers and arroyos. A Chief of the southern tribe described to me a list with some sixteen rivers. He gave me their names but not having any writing materials I was not able to record them and have forgotten them. He told me that one river coming from the north originates in a lake about ten leagues long called Heuchun-lauquen. This river leaves the lake at its eastern end and then joins the great river which runs from north to south. In turn this great river joins a powerful river which comes from the south which is called Limai-leubu by the indians. This river continues for about thirty leagues to Lake Nahuel-Huapi.

The Rio Negro is very rapid and the floods are most extraordinary when the rains and melting snow flow down the eastern flank of the Cordillera, taking in a chain of mountains many hundreds of miles long. The floods on this river are so rapid and sudden that although the rumble of rocks and stones striking against each other can be heard a considerable distance away, it hardly gives the indians chance to drop their tents, load their belongings and secure them, and lead their livestock into the hills. These floods can often cause a great deal of distress, being able to flood the whole of the valley, carrying away in their impetuous current tents, belongings, and sometimes livestock and children.'

In 1855 Vincente Gomez and Felipe Geisse crossed the cordillera from Puerto Montt to a point from where they could see the waters of Lake Nahuel Huapi. In the following year F.Fonck and his companion F.Hess travelled over the same pass and descended to Lake Nahuel Huapi. There they constructed a canoe and travelled for five leagues along the lake before they returned.

So at the present time all that has been said about these expeditions amounts to the sum of knowledge of the ground between Puerto Montt as far as part of Lake Nahuel-Huapi, without throwing any light on the eastern portion nor on the lake outlet, which thereby offers an opportunity for exploration. On 25 May 1862 I embarked from Valparaiso for Puerto Montt, in the company of Henry Lenglier, a young frenchman. Having once arrived at Puerto Montt, we were occupied in making preparations for our forthcoming journey.

We left Puerto Montt on 10 December for Lake Llanquihue, which we crossed by boat and then marched to Lake Todos Santos.

Here boats were built but our expedition was held up for a few days by strong winds. Eventually we disembarked at the mouth of the R.Puella and headed for the Perez-Rosales pass, which we estimated would take us to 877m altitude. The nearby peak was thought to rise to 3000m altitude. The heat was unbearable, reaching 35^{0}C in the afternoon. Climbing upwards from the pass we reached a point at about 1500m altitude from where we beheld a magnificent spectacle. Gazing in the direction of the valley of the R.Puella, it was possible to see a part of Lake Todos Santos set in between the mountains. To my left, the peak of Tronador covered with perpetual snow. On the opposite side, the R.Frio descending into Lake Fria and thence into Lake Nahuel-huapi, which could also be glimpsed. More to the east lay the route which I hoped to explore down the R.Negro to the shores of the Atlantic. That night we camped close to the snow; it was extremely cold and it rained slightly. We kept up a good fire to alleviate the chill.

In descending from the pass we travelled through forests of the antarctic beech. When we reached the shores of L.Nahuel-huapi we pitched our tent at about the same place where Dr.Fonck had camped, whilst the carpenters were busy felling timber for building the boat. We came across the remains of the boat used by Padre Menendez as well as the canoe of Dr.Fonck, who had reached the shores of L.Nahuel-huapi before us. On cloudy days the temperature differed little from that at night time, whereas on sunny days there was a notable difference between the two temperatures. It was impossible to take a walk as one could not take two paces into the woods without becoming as wet as a duck. On the fifth day the boat was

launched - 25 feet of keel, 7 feet in the beam, and 2 feet draught. According to the carpenters it should only have drawn one foot. Once afloat, we had to decide how to find the outflow from the lake . . . . . It was almost like being at sea. Several times the prow of the boat was quite submerged in the waves. Then freezing rain fell while the wind blew - we were frozen stiff. Eventually we made landfall for the night, at a clearing among the trees which covered all the surroundings.

On the following day we sailed further along the north shore of the lake, disembarking for a time in a broad bay. Here the terrain was quite different from that which we had traversed up until now, for it carried only scattered bushes. The yellow colour made a break from the green forests of the cordilleras.

The vegetation too had changed in aspect; we had a view of smooth hillocks, quite bare, over which miles of flowers of various colours stood up above the yellow ground of the pampas.

Eventually we arrived at a spot where the lake flowed out into a river, which we proposed to enter only by night.

At seven o'clock we set off. The river was about eighty metres broad, and three or four metres deep, the current fast; the water was perfectly clear so one could see the bed formed of rounded stones some twenty inches across. The river took numerous turns but generally followed a northerly direction . . . . . after some time we suddenly felt the boat touch bottom; some minutes of rubbing against stones was enough to fracture a plank. We had to beach the boat, unload it, and carry out a repair as best we could. Further on, at about one o'clock, the river divided into three branches for some distance before rejoining into one main channel again. Now the banks were no longer hilly, but steep and rocky.

The current increased, the turns sharpened. At one point the boat was turned completely round. At five o'clock we reached the spot attained by Villarino in 1782; we reckoned we had navigated some 75 miles. On rounding a point, the river turned into a rushing torrent, then presented great waves and eddies. Huge white crests all around denoted large rocks. To start with we kept control, with some difficulty. But the current dragged at us and the boat scarcely answered to the helm. At a patch of clear water we tried to row for the shore: impossible! We bend to the oars, but nothing avails. So we struck for the centre of the rapids and headed for the crest of the waves. At this moment everything was motion and confu on; we could hardly keep our seats. Suddenly the boat suffered a violent blow, the water rushed in at the bottom and in no time it was up to our waists. The oars floated away and then a great surge overturned the boat. The current dragged me under the water and struck me against two or three stones; I touched the bottom and was then thrown up again. I could see the boat, still floating, upside down, with our peons hanging on to it. I managed to struggle to the bank and saw other members of the party also come safely ashore.

At this very moment a chilling wind started to blow from the mountains. Drenched to the skin, without a fire, our situation would be desperate. We hunted among the objects which had been cast up on the banks from the shipwreck and found some foodstuffs, the bag containing the expeditions' papers, my guitar, and the dog. By great good fortune I found in my pocket a few dry matches. Immediately we got a great fire going and lay on the ground around it . . . . . the next day the sun shone brilliantly. Whilst we searched for remnants from our shipwreck, two indians on horseback appeared on the rim of a nearby hill. I approached them and communicated more by gestures than by words mounted and rode in company with the indians, our peons following on foot. We travelled to the northwest, over endless hills and dales; some hollows must have had rather better humidity as they were greener. Eventually we reached the indian encampment.

Three days later we rode out of this spot, called Lali-cura, ascending an extensive meseta. After crossing this meseta and then descending into a quebrada we reached the banks of a pretty voluminous river called Caleufu. We crossed this river with the water up to the horses' chests, started up a quebrada and then on to a meseta much more extensive than the previous one, over which we travelled for 20 or 30 kms, without coming across the slightest uneven-ness of the terrain. Ahead we glimpsed a great peak, which we presumed was Lagnin volcano.

Arriving at the edge of the meseta, we dropped down into a valley where a river ran; extensive pastures bordered its banks and here there was another indian encampment. This was close to the R.Quemquemtreu, some 8 or 10 km from its confluence with the R.Chimehuin.

On the following morning we set out between 8 and 9 o'clock. The dog, with paws swollen by the spines which cover the soil, followed us only with difficulty. We followed a track through the pasture, as far as a tributary of the R.Quemquemtrue.

A little later we crossed and recrossed a river, entered a quebrada at the top of which we were on a meseta where a chill wind blew . . . . . Dropping down from the meseta we entered a woodland of wild apple trees, then stopped for the night with an indian who had built a hut and was cultivating the ground. The dog, who was by now utterly weary, decided to stay behind with two of our peons. On the next day we skirted Lake Lacar; on the following day we passed Lake Queni and from there crossed over the pass en route to Valdivia.

In Valdivia I was occupied with all the preparations for my return to the indian's territory. As I had lost all my instruments in the disaster to the boat, I had at least to acquire a compass and a barometer. On leaving Valdivia we followed the R. Callecalle for an appreciable distance, coming to Futronhue on the edge of Lake Ranco. From there we skirted the eastern margin of the lake which is composed of high hills covered with dense woodland. At Futronhue the cordillera starts to increase in height. On 13 February we set out for Arsquilhue, then on some 4 km to Maihue. thence 10 km to Chihuehue.

As soon as we left Chihuehue we entered the valleys of the Cordilleras with branches straight up to the pass. First we climbed along the right hand flank, then along the left hand, separated only by the narrow quebrada where the powerful R.Follil ran. We crossed it five times, twice less than on the previous trip and with less water; the snows which fed it had already finished. The R.Follil comes up to the foot of the pass, the Cuesta de Lipela . . . . . we followed the side of Lake Queni for some time . . . . . and arrived at a ford on the R.Huahum. Now we have to go some miles along the side of Lake Lacar. We travelled about half way between the lake and the crest, here coming closer, there veering away. This ridge is an offshoot to the east of the cordillera central; it is of much lower height, in some places covered with Monte, in others the crests are bare, the results of torrents produced by melting of the snows and the floods which had carried away everything in their track. Only tree trunks remain, looking like candles on an altar.

Lake Lacar seems to be located on the other side of the watershed but undoubtedly sends its waters to the Pacific Ocean. Its eastern extremity is no more than 15 or 20 km from important tributaries to the Atlantic. The valley at the eastern

end of the lake had at its head a breadth of two or three miles. It was limited to north by a chain of mountains covered with trees and to the south by other chains of bare sterile hills. These southern mountains exhibited an unusual appearance. From the sandy ground of which they were composed, here and there emerge vertical basalt forms in the shape of ramparts, one column on top of another, which gives to the hills the veritable appearance of fortifications. Small green spots here and there look like windows. At the end of 8 to 10 km the valley widens out appreciably to merge into humid meadows. The indian encampment lay part way along this valley.

On the next day we prepared to leave the indian encampment; we mounted our horses, rode down the hill and turned to enter the valley. Here the pasture stopped, we trod the pampas soil; sand and spiny plants, scorched by the sun. To reach another indian encampment we rode southeastwards, along a valley; the banks of the stream were covered with a species of apple.

From there, we climbed a hill, then crossed a meseta for several miles, after which we descended into a valley for an overnight stop. We then continued our route over a meseta which was completely flat, of 28 or 30 square km in area, cut about by quebradas which could only be seen when right on the lip. Nothing more arid, not a single tree or bush to be seen in the whole extent, but only sand, stones, and spikes of yellow spines of 20 to 25cm in height. Eventually we reached the R.Caleufu, followed it to a ford and alighted in front of the toldo of the chief.

. . . . . the chief then told me (translated word by word) 'tell my brothers the English . . . . . that . . . . . we will take them to Carmen de Patagonia'. On 13 March we got ready for departure. On the other side of the river some clouds of dust gave away the position of some indians and horses at the gallop. They were our neighbours on the other side who were to join us at the confluence of the Caleufu and Chimehuin. Later that day we arrived at that confluence and a little further up was the ford over the Chimehuin. At that point the river was pretty wide and the water reached up to wet the saddle. We gained the far bank without too much ado.

Here the hills were pretty elevated, of a yellow colour and almost entirely without vegetation; the ground, like all the pampas, was made up of sand and stones, only allowing the development of a few gnarled shrubs. I viewed the broad panorama which lay at my feet. In front of me, well to the west, lay on the horizon the jagged crest of the cordillera which ran from south to north as far as the mountain covered with snow. To the south a line wound away from us - the valley in which ran the Limai. Prolonging this line northwards past the spot where we stood, enclosed the Chimehuin with its sand dunes. To our front, the Caleufu sprinkled with green islets, emptying at right angles into the Chimehuin. Five miles further to the south an elevation marked the confluence of the Limai with this river. At three leagues from that confluence my failure had taken place with only three leagues left before completion of travel down the Limai. That night we reached a spot where there was some water for the horses.

Next day we set off north-eastwards. On our left the white cone of Volcano Lagnin was visible and in front of us appeared a circular lake about a mile across; an indian who knew the name told me it was called Huinculmapu. We left this lake on our left and set off eastwards towards another lake which was covered with water fowl and flamingoes . . . . . on 16 March messengers arrived from the west demanding that we abandon the journey and leave the indian territory forthwith. We felt it prudent to retrace our tracks and return to Valdivia.

. . . . . from G. C. Musters, 'At home with the Patagones' 1871.

(From a camp some miles to the east of Lake Nahuel-huapi) . . . we all started on our jounrey to Las Manzonas. We crossed the gradually sloping plains covered with stunted bushes. The country became more impracticable for riding as we left the lower plains and mounted some hills broken by deep gorges and bristling in every part with rocks sparkling with unusually large plates of mica. These hills are terminated by steep cliffs, after descending which we mounted a range of hills more than 2000ft. high. From this point a magnificent view presented itself; right below us, looking quite close but really some 30 miles distant, lay the dark line of a deep cutting, marking the valley of the R.Limay.

When all were collected we prepared to descend the mountain. We halted after nightfall in a valley at the side of a small rapid stream. Before daylight, we started off again; we continued to ascend a hill of considerable height. . . . Descending from a ridge, we entered a canyon and after half an hour's ride brought us in view of the Rio Limay. Immediately opposite on the northern bank of the river were some indians and grazing on the surrounding pastures cattle, sheep, and numerous horses were visible. The river appeared to be of very considerable width but very rapid. Taking off all un-necessary gear, we descended through the trees and plunged into the river. The first part was deep, but then shallowed on nearing the first island. From that to the smaller island the current was running like a millrace; at last we all reached the banks in safety.

When all were mustered and had resumed their clothes, we started for the encampment. In one of the toldos I found an old indian who invited me to sit down; he then narrated that an englishman named Cox had formerly descended the river from Lake Nahuel-huapi in a boat, but in trying to descend under cover of night, had been wrecked in the rapids about a mile above the ford which we had just crossed. He then took refuge among the indians and subsequently returned to Valdivia across the mountains, being unable to proceed to Patagones. Mr.Cox had remained several days in the old indian's toldo.

. . . . . from H. Middleditch

In a great many of the accounts of travels in this part of Patagonia the wild apple trees are mentioned. These are not indigenous to the area but are escapees from the Jesuit mission which was established on the shores of Lake Nahuel-huapi, again via the Peres-Rosales pass. This mission station was destroyed by the indians prior to the visits made by Gomez or Fonck.

The independant confirmation of where Cox's boat was wrecked would suggest that we can reasonably rely on the accuracy of Cox's account of his travels as far as locations are concerned. It should be borne in mind that the indians were nomadic and their toldos were dismantlable and portable so it would not necessarily have been in the same location when visited by Musters as when Cox was a temporary resident. Understandably the map of his itinerary which was provided by Cox does not exactly match present day maps of the same area, but there is certainly a degree of resemblance. In addition the names of rivers and other features which are quoted by Cox may be found with little difficulty on present day maps. At the time of Cox's and Musters' travels the river running from Lake Huechu-lafquen appears to have been called Chimehuin all the

way to its confluence with the R.Limay.

In Cox's account the party travelled along Lake Lacar (Lucar) 'half way between the crest and the lake'. Only later when I saw a photograph of the woodland coming right down to the edge of the lake - and pretty dense woodland at that, quite unsuitable for riding by the look of it - did I realize why they had not followed the lake shore. By comparison photographs of Lake Nahuel-huapi abound; the shores of the western half, almost as far as Bariloche, are likewise covered to the waters edges with thick woodland, whilst the eastern end is in the arid pampas (Young, Chileans No.40 p.37; Skottsberg, Chileans No.40 p.39). As to the probable location for A.coxii, it is reasonably certain that it would not come from the forested parts. All other known locations of Austrocactus are to be found either in the foothills of the cordillera or eastwards from there, on the Patagonian plateau. Hence we can place Mr.Cox's Austrocactus from an area bounded by the eastern end of Lake Lacar, the R.Quemquemtrue, the R.Caleufu, and the R.Collon-cura (or possibly up to three days west of the ford over that river). It will be seen from the map that area is no great distance from Junin de los Andes, where van Vliet found several examples of sprawling Austrocactus (Chileans No.40 p.42). It is quite possible that the Austrocactus found by van Vliet were also A.coxii.

AN EXPEDITION TO PATAGONIA By Dr. J. V. Siemiradski

Translated by H. Middleditch from Petermann's Geographische Mitteillungen 1893. III.

(The author left Buenos Aires on 10 November 1891, took the new railway from Bahia Blanca to General Acha, then travelled in a W-SW direction to General Roca and Neuquen. Much of his journey was through territory which had previously been the home only of nomadic indians and which had been invaded not long before by the troops of General Roca) . . . . The confluence of the rivers Limay and Neuquen forms the Rio Negro. The difference between the two is that whilst at high water both rivers contribute a similar volume of water, the Limay which is fed by the moist area of the cordilleras does not wane greatly whilst the Neuquen is very low in the winter months. At each side of the valley floors the steep banks rise to the level of the Patagonian plateau, which ascends steadily westwards, reaching a height of 800 - 900 m at the foot of the cordillera Catalin.

(Further up the Limay, below the confluence with the R. Picun-Leufu . . . . .) Between the Limay and the course of the R.Collon-cura we cross a mountain range rising to 1500m, which carries the name cordillera de las Angosturas, cut about by wild gorges. Westwards from this ridge, as far as the R.Collon-cura, lies the plateau at some 800 m altitude, then the deep trench of the R.Collon-cura lies at some 620 m altitude. The river Collon-cura is some 200–300 m wide but can be forded by mules and riders at several places. Between that valley and the main Cordillera lies a region rich in flowing water. Of the affluents to this river, the Chemen-huin is the largest, originating in Lake Huechu-Lafquen. It winds through a broad, fertile valley that is fully occupied by ranch-holders, mostly officers from the Roca expeditions. Here lies the small border town of Junin de los Andes (Huinca-Melleu).

From the forests west of Junin, cypress and beechwood is sent downstream year-round to Carmen de Patagones. After the small R.Curhue comes the 50 m broad R.Quilquihue in a broad and fruitful valley. It runs from Lake Lolo, hemmed in by two ridges covered with a luxurious forest of beech, cypress and reeds. Only a low rise separates the Quilquihue valley from that of Huechu-Ehuen (Maipu), where a small stream starts in the cordillera Chapelco, which discharges into Lake Picau-Ilu (Lacar) and runs thence towards Chile. The 2400 m high Chapelco peak is the highest part of the watershed. On this ridge the first cypresses are to be seen, which cover the steep rocky walls of the Huechu-Ehuen valley together with beeches and Tacuara reed. The soil of this valley is very marshy and carries many apple trees: here lies the tented encampment of the indian chief.

The greater humidity in the valley of the Collon-cura and its tributary valleys in comparison with the patagonian desert brings about an abrupt change in the Flora and Fauna. The thorny Larrea and Prosopsis assume less significance, their place most often taken by myrtles. In the Collon-cura valley the first wild apple trees are found that appear in thick copses further towards the Cordilleras. Very typical is a fine scarlet or violet flowering climbing plant which covers the beech and myrtle bushes with a fine green net. Among the representatives of the Fauna are: the Guanaco, Rhea, Tucotuco, puma, skunk, fox, otter, and water-rat.

The climate around Lake Nahuel-huapi, like that in the Maipu valley, is quite as moist as on the other side of the Cordillera. It rains here in the valley and snows on the mountains almost all day when the SW wind blows, as was asserted to me by a north american expatriate there, John Jones. A peculiarity of the valleys is the widespread existence of strawberries. The winter should be mild; an argentinian officer stationed here years ago told me that even sheep could overwinter here.

We turned back to the Collon-cura, to its upper reaches, in order to discover something about the Catalin and Alumine rivers. From the confluence of these two rivers steep. high walls rise at either side up to the lava plateau. Between them the Cordillera Catalin rises above the plateau; on this ridge we find the first Araucaria imbricata. We descend the barrancas to the ford where the R.Alumine is over 100 m wide and one metre deep, difficult for mules. The last inhabited spot on Argentine territory is the ranch of the northamerican Andrews at Pulmari.

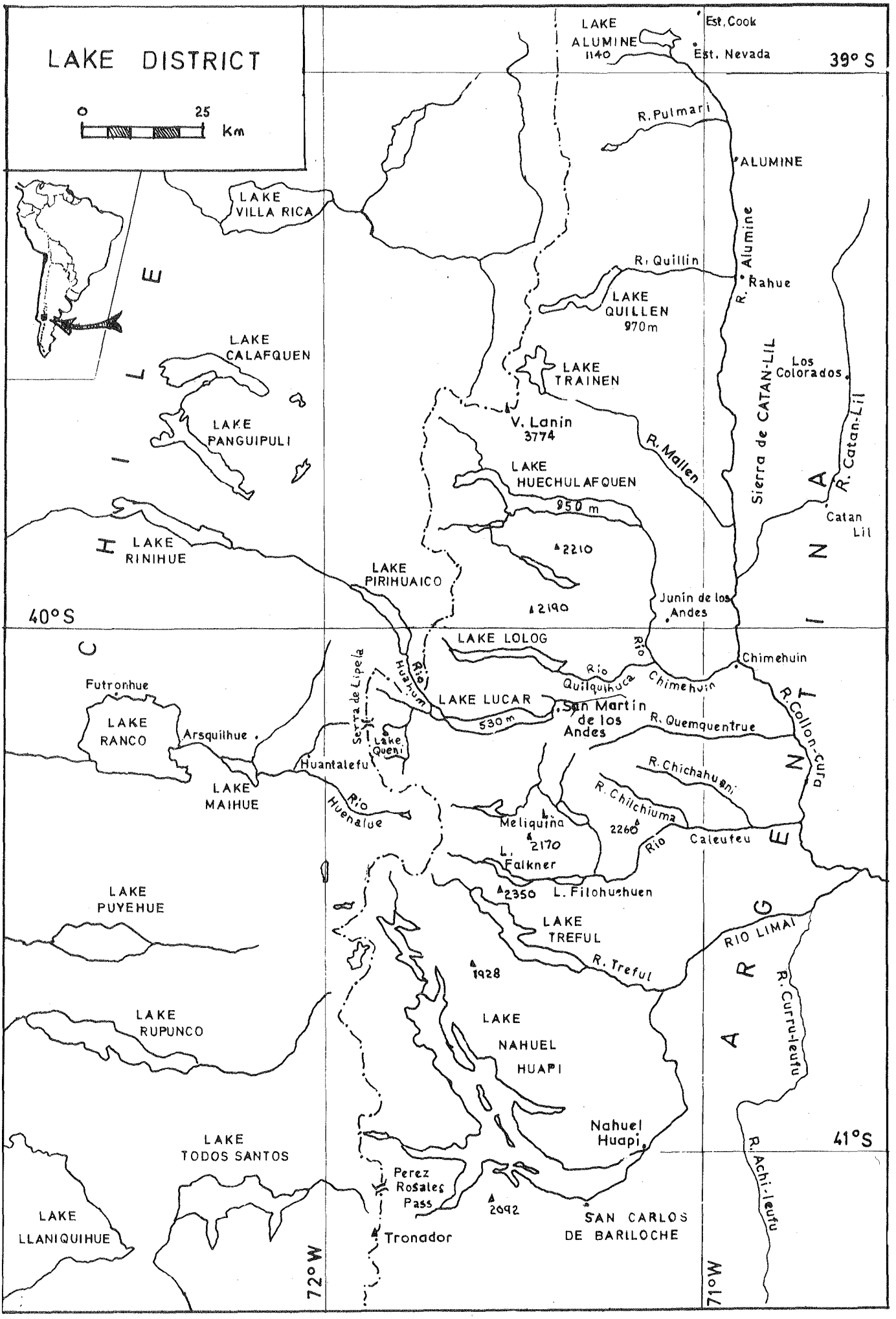
Here in winter the snow often lies a metre deep whilst in the valley of the Alumine barely 100 m lower the cattle can overwinter in the open.

THE DEPARTMENT OF ALUMINE By Dr. D. Canter.

Translated by H.Middleditch from Revista Geografica Americana (Argentina) VI - 1936

Alumine is a picturesque department in the cordillera zone of Neuquen territory, little known by the great majority of the population of the country on account of having poor access.

The climate is cool temperate. In summer the temperature occasionally drops to zero in sheltered places; the winters are raw and the thermometer often reaches 15 degrees below zero. The summers are pretty dry; on the other hand it rains and snows abundantly in winter and spring. At that time communications are interrupted, landslips close passes in the precordillera and Alumine can be isolated for several weeks. When the snows melt in spring the rivers rise appreciably becoming transformed into impassable obstacles. The humid winds from the Pacific are the source of this abundant precipitation which only affects a relatively narrow belt, diminishing rapidly from west to east, providing little at Catan-Lil. At Quila Chanquil the average over twenty years has been 1183 mm. The predominant winds are from the west but at Alumine


LAKE DISTRICT
0
25
Km
LAKE ALUMINE 1140
Est. Cook
Est. Nevada
39° S
R. Pulmari
ALUMINE
LAKE VILLA RICA
R. Quillin
R. Alumine
R. Rahue
LAKE QUILLEN 970m
LAKE CALAFQUEN
LAKE TRAINEN
Los Colorados
V. Lanin 3774
R. Mallen
Sierra de CATAN-LIL
R. Catan-Lil
LAKE PANGUIPULI
LAKE HUECHULAFQUEN
950 m
Catan Lil
CHILENA
LAKE RININUE
2210
LAKE PIRIHUAICO
2190
Junin de los Andes
40° S
LAKE LOLOG
Rio Chimehuin
Chimehuin
Futronhue
Rio Quilquihuca
Rio Hua-hum
Sierra de Lipela
LAKE LUCAR
530 m
San Martin de los Andes
R. Quemquentrue
R. Collon-Cura
LAKE RANCO
Arsquilhue
Lake Queni
Huantalefu
R. Chichahuani
R. Chilchiuma
LAKE MAIHUE
Rio Huenalue
Meliquina
2260
Rio Caleufeu
2170
L. Falkner
ARGENTINA
LAKE PUYEHUE
2350
L. Filohuehuen
LAKE TREFUL
RIO LIMAI
R. Treful
1928
R. Curru-leufu
LAKE RUPUNCO
LAKE NAHUEL HUAPI
Nahuel Huapi
41° S
LAKE TODOS SANTOS
R. Achi-leufu
Perez Rosales Pass
2092
LAKE LLANIQUIHUE
Tronador
SAN CARLOS DE BARILOCHE
72° W
71° W

between the massive north-south ranges of mountains the hurricanes of the patagonian plateau are unknown.

Ranching is the main source of wealth, for sheep and cattle. The Pulmari ranch and the Rahue ranch are important establishments.

The woodlands have been little exploited up to the present time. They are formed mainly by several species of the Nothofagus - N.antarctica, the nire: N.pumilis, the lenga; N.obliqua, the roble; and N.alpina, the rauli. The Pine, Araucaria imbricata, has quite nutritious fruits which form an important source of food for the poor countryfolk in winter. The cypress, previously widely dispersed, has been thinned down on account of its excellence for fencing posts. The ostrich, Rhea darwinii, and the guanaco have been exterminated here.

From Alumine a trail runs north to Pulmari; on the opposite side of the R.Alumine lies Quila Chanquil. Going up the Pulmari the trail runs first through dense stands of cypress.

From Pulmari the trail goes further north towards Lake Alumine.

At 28 km from Pulmari is the Nevada ranch of Francis Whitworth, near the R.Litran. A further 15 km, much of it sandy, brings sight of Lake Alumine with pine trees around its shores. From the Nevada ranch one may follow the right hand branch of the R.Litran and after a climb of less than two hundred metres, reach the Arco pass, the border with Chile.

FROM BARILOCHE TO HUECHULAFQUEN. By Dr. J. de K. Pelletan.

Translated by H.Middleditch from Revista Geografica Americana (Argentina) IV.44.1937

18 February - with the first light of dawn the last gasp of the locomotive announces the final drag up the mesetas of the Rio Negro. I am trying to establish where we are in this mountain wilderness which appealed so much to me: hills and gulleys are thrown into relief under a miserable greyish light. The sky is overcast, with low and heavy clouds which drag themselves wearily over the blunt tops which surround the canadon, yet to the east is a thin strip of blue through which struggle a few rays of sunlight.

All at once I look down, surprised. What! are there Neneos in flower here! And with white flowers? The sparse bushes on the slopes seem splashed with white paint. The further we travel westwards, the bigger the rosettes. At this point some swirled against the glass of the window and understanding dawns - snow! And now the white wind dances around around wildly like the arrival of an unexpected winter. It is not isolated patches - the white shroud covers everything.

The first cypresses announce the proximity of Nahuel Huapi. This time the Nahuel does not want to display the whole of the extent of its sapphire sheet. Barely visible under the dense cloak of clouds, a thousand metres of greenish water break against the pebbles on the beach. There is no snow here; but it rains gently and occasionally strong gusts make this disappointing morning even duller. It is discouraging at times, this climate of the cordillera. There are usually long spells of fine weather, more than generous towards the tourist; but on the other hand once the northwest wind prevails for more than four or five days, with its endless procession of clouds, it threatens to transform into infuriating rainfall.

It feels quite cold for this second fortnight of February, which in spite of that is usually one of the most pleasant in the year. It is in stark contrast with the previous month of January when the temperature stayed constantly around the 35 mark. On the day following the snowfall, the wooded hills which rise in steps above the southern shore of the lake present a spectacle the like of which the summer tourists enjoy on quite rare occasions; they look like huge meringues with thousands of flies settled on them. Finally the southwest wind, our Buenos Aires 'Pampero', which is not really a Pampero here, manages to drive away the mass of vapour and the skies clear. One of those sunsets which are only seen in the Andes promises at least a couple of calm days and in the lower hills the snow should start to melt away. In the morning I shall set off for San Martin de los Andes, making use of the new road. Before today the only means of travel between Bariloche and San Martin de los Andes was a wellmade road over the precordillera, over a much more level region than that which is offered by the undulating valley that I am making use of, and which extends the route northwards from Lake Traful.

From Mendoza to the 39th parallel, there are no lakes of importance on the eastern flank of the Cordillera. One may say that the Argentine lake district starts south of this parallel and continues as far as the Straits of Magellan. With one exception, all these Andean lakes are of glacial origin. In some places the post-glacial moraines have piled up insurmountable obstacles in the way of their natural outflow, forcing them to seek unusual outlets, such as that taken by Lake Lacar in Neuquen. In other places the glacial moraine has simply dammed the river to form a lake. Hence the bottom of the lake is a great deal lower than its outflow. In 1914, after prolonged heavy rainfall, Lake Carrilauquen in Neuquen broke its barrier, discharging almost all its waters in the course of a single night, thereby reducing from its original length of 21.5 km down to only 5.6 km, lowering its water level by no less than 95 m (app. 330ft - H.M.). The consequent flooding devastated an extensive zone along the length of the R.Colorado.

21 February. A fine morning: not a scrap of cloud in the sky. and by rare chance almost no wind. Leaving Bariloche the road crosses the R.Nirehau then passes the foot of the cerro Leones with its basalt outcrops. We continue northwards along the base of Carmen Villegas which overlooks the hamlet of Nahuel Huapi. Where the lake debouches into the R.Limay there is now a steel and concrete bridge across the river. Little by little the road climbs up to the level of the pampa. From here and for a long stretch onwards, the ground exhibits its classical Patagonian aspect, like a field sown with tufts of rough yellowish grass. There are sparse 'neneos' and it boasts some thistles in flower, which attests to the relative fertility of this zone; in places it is sandy, rolling in a series of low dunes. Now the neneos are more abundant, adorned with little yellow flowers, together with a spiny bush similar to the calafate. Gradually the river valley broadens as one approaches the confluence with the R.Traful.

The road crosses the R.Traful by a newish bridge quite close to a huge crag of volcanic rock, then follows the Traful valley among an interminable succession of hilly moraines, until it reaches the narrow Cordoba valley running to the north. The road then climbs this valley, now on the left side, now on the right. The bushy vegetation gives way to trees of greater height and a little further on enters the selva of cypress trees. Behind us the Cordoba valley displays a variegated patchwork of its meadows, copses, and crags, all colourfully intermingled. All of a sudden the forest comes to an end and the road comes out into the open a short way from the top of the pass. From here we could see a valley about 3 km wide enclosed by rocks which had been sculptured by the wind into marvellous forms. Descending by a series of hairpin bends the road

again reaches the lower level of the hilly moraines. At the R.Caleufu the valley sides carry scattered bushes and trees. After the confluence with the R.Filohuehuen the road rises along a narrow winding valley and finally drops gently into a plain covered with trees and pastures with Lake Meliquina before us. On either side the land rises gently, covered with woodland. The broad, level, fertile valley extends beyond each end of the lake. Flowing into the lake from the west is the R.Hermoso, engulfed in the forest which covers the complete length of the valley of this name, which is about one km broad.

And so we reach the final section, a high marshy plain of some 20 km in length. Because of the nature of the ground, covered with grasses and trees, it can often take up to three hours to cover this stretch. After rains it is almost impassable in places. Then we left behind the cypresses, there were only nires, dwarf trees in clumps of eight to twelve joining their branches into a common canopy. A final curve and we were in the open at the top of the pass. Further onward, going downhill, the bushes reappear and then we were back among the trees again . . . . . Round a turn and below us appeared a snippet of Lake Lacar. We wound down the hillside in and out of the woodland and finally into the village of San Martin de los Andes.

Along the streets one leans into the strong gusts of northwest wind arriving at the village from the lake. They raise up clouds of dust which cross the village from one end to the other. When the low grey clouds are combing the tops of the cypress trees, or the clouds turn into steady endless drizzle, leaden skies dispel hope of seeing the sun. Lake Lacar is surrounded by wooded slopes, more gentle on the northern side. The general body of water is connected by narrows to the head of the lake which is surrounded by high wooded cliffs to the south, west, and northwest. The water level is 645 m and at the eastern end a moraine rises to 950m, from which height the broad Maipu plain opens out. It is this relief which caused the lake to drain to the Pacific.

The Maipu plain with its woodlands and meadows rises gradually towards the east, transforming into the Chapelco plain which extends as far as the Sierra Chapelco. The fertile plain which rises from the lake towards the east gradually gives way to the aridity of the pre-andean zone. The cultivation of wheat, rye, and oats produces a patchwork of tints. Straight opposite [on the south side] is the ridge of the Sierra Chapelco with its bare basaltic slopes. Travelling northwards a climb of only 500 m from the Maipu plain surmounts the ridge separating the broad valleys extending eastwards from Lakes Lacar and Lolog. Grasses and bushes abound as a glimpse of Lake Lolog is gained. The slopes surrounding Lake Lolog are much less well wooded than those around L.Lacar.

Early the following day we set off from San Martin, under threatening skies, to travel to Lake Huechulafquen. The road ran eastwards, over the Corral de Piedra plain, now with a completely clear sky. The ground is sandy in parts and without vegetation, elsewhere with neneos and rocks in all colours. Eventually we cross the R.Quilquihue at a bridge not a long way from its confluence with the R.Chimehuin. From there we turn to the north.

After crossing the R.Curhue the increasing fertility announced the vicinity of the Junin plain. Open country and patches of woodland continually succeeded each other until we reach Junin de Los Andes. From there, a run along the course of the R.Chimehuin brings us past grass covered hilly moraines alternating with low, sandy sterile patches, to the shores of L.Huechulafquen. Here the first Auracarias face the violent series of gales. The clouds swirl over the lake and the mountains.

It was time to return: Junin de los Andes, with isolated houses in the shade of poplars lining the ditches, and not a soul on the dusty roads. We turn along the foot of the Cerro de Piedra; then from the incline descending into the vale of Maipu white shapes wreath up close to the ground whilst further down the veil of whitish mist shuts out all perspective. San Martin de los Andes, 11 at night: rain falls steadily, heavy clouds press down on the habitations. But to the east, the moon snines. . . . . from H. Middleditch

This is the very first occasion on which I have come across any mention of evening mist in the less arid zone at the foot of the Patagonian cordillera. Was it a fluke that it occurred on the one evening this tourist was passing? Or is it a regular feature of the area? Just in autumn? Is there a regular night mist and consequent dew? Does this account to some extent for the more humid conditions observed by this traveller in the Maipu valley? And possibly also for the more humid Junin valley as this traveller so describes it? Where van Vliet found his Austrocactus! Does this mean that Mr.Cox might have found his Austrocactus during the course of his short stop in the indian encampment in this same Maypu valley, not far from the present San Martin de los Andes?

ANDES EXPEDITIONS 1925–26 and 1926–27 — Field notes of collected plants. By H. F. Comber.

It was decided to make Zapala, the western terminus of the railway, the starting point and to work westward along the eastern foothills of the Andes. Upon my arrival in Argentine on July 30th in the middle of winter, a six week stay was made at Neuquen (800 ft) and I moved on up to Zapala (3000 ft) on 10 September. At Zapala the stony desert area, sprinkled with a scant 3-foot scrub, flowers wonderfully in November. From here a short trip was made northward to Chos Malal, through much the same class of desert country. On 2 December we left for Las Lajitas (3500 ft) and a week later moved up to Valle Escondido in the mountains at 6500 ft. Low shrubs and alpine meadow plants were opening their flowers in abundance and further up on the slopes and summits around Palu Mahuida we found the richest flora of all.

On 30 December we moved westward again, crossing the pass at 8500 ft in a tearing icy wind, and then down on to the Pampa Lonco Loan at 5000 Ft. This bleak grassy tableland, dotted with Araucaria groves offered but little, so we passed on to Lago Alumine and down the valley of the river of the same name to the Rio Pulmari. Here in the grassy sandy plains and surrounding hills the flora was more interesting. Further up the valley of Pulmari where Nothofagus and Araucaria forest provide a welcome change, the rainfall is considerably augmented as one approaches Chile. Finally we were driven out of the Cordillera by heavy snowfall and returned to Zapala on 17 May.

[The second season was spent in the Lake District, west from San Martin de los Andes to Junin de los Andes. Field notes include Maihuenia at Arroya Manzano - perhaps north of Chos Malal? - at Neuquen, Zapala, and Valle Escondido, a Tephrocactus, one Pterocactus and . . . . .] Pterocactus. 2 inches above ground, and one foot below. Two kinds of growth on the same plant. Sandy places, 2000 to 3000ft., Cerro Lotena (east of Zapala) and Zapala.

Echinocactus. Scattered everywhere. Nine inches to two feet high, nine inches in diameter; may branch, 15–17

ribs, 14–18 incurved spines in cluster, spines 2' to 5' long. Flower tube long. Fruit egg shaped purplish. Seeds black, minute. Common in sandy and stony places. 1000 ft., Neuquen.

Echinocactus. 4 to 18 high, 3 in diameter; may branch, 9–10 ribs, 16–24 spines, four of which are larger and may be hooked in the young plant. Spines red and white. Flowers buff and pink, 2 in diameter. Flower tube short. 1000 to 6000 ft., Neuquen to Palau Mahuida.

. . . . . from H. Middleditch

The Echinocactus with the long flower will probably be an Echinopsis. This appears to occupy the lower lying ground near Neuquen. It does not appear to have been reported by J. Lambert from this area. The Echinocactus with the hooked spines may well be an Austrocactus, as the flower data would fit, too. Austrocactus has previously been reported from Neuquen city by R. Kiesling and from near Alumine by D.J. v. Vliet, but this location reported by Comber is northwest of Alumine and appears to be the earliest record of Austrocactus from this far north in the foothills of the Andes.

THE SOUTHERN ANDES EXPEDITION 1987–88. From J. Watson.

Fifteen years had passed since Martyn Cheese, Ken Beckett and I returned from Chile with the fruits of our six months' work in the field. Since those pioneering days, plant handling techniques have improved, beginners have become experts, and the excitement of raising rare plants has been discovered by many new enthusiasts. With my new partner Stephen Pern I set out in November 1987 on a four month collecting expedition extending south from the central cordilleras of Chile to Patagonia in Argentina. While the central cordillera of Chile was expected to provide a guarenteed basis for our seed harvest, our research at Kew surprised us with the abundance of Patagonia, and so the Argentine departments of Santa Cruz and Chubut were added to our itinerary. And of course we covered the Argentinian Lake District. Our primary objective was the very best in alpines, but we were also asked if we would be willing to look out for particular groups such as cacti, alstroemerias, and pernettyas.

We also expected to collect some bulbs and taller herbaceous or annual items - schizanthus, calceolarias, tropaeolums and the like.

In the event we made a significant and varied collection of over 400 seed gatherings, with some particularly exceptional species from Patagonia. The climate in our Andean zones played the kind of extreme tricks we have become used to in Europe of late. In the mountains of central Chile 25 metres of snow fell where 15 is the norm. During late March when everything ought to have been shrivelling and in seed there were superb high spring-time displays of alpines literally two months or more late. In Patagonia the reverse happened. Exceptionally low snowfalls led to a rather poor, very early flowering season, so we missed seeing and locating in flower one or two hopefuls.

Nevertheless Patagonia did provide us with many exciting and unexpected goodies.

Collections of cacti seed were made in northwestern Neuquen and southwestern Mendoza provinces. In Neuquen conditions tend to vary locally, but the overall rainfall pattern is significantly higher than further north, and the area predominantly volcanic. The lowlands at least can be regarded as the northern limit of Patagonia. The lowland cinder plains are of roughly three types - woodland, meadow grassland, and drier Patagonian steppe outliers. (The Patagonian steppe is overall a very dry, bleak, featureless landscape, flat or scarcely undulating, treeless in effect and characterised by endless gravelly plains.) Hills and ridges and Andean foothills may be dry, stony and sparsely vegetated, or clad in lush, and often mixed meadow, woodland, scrub and bamboo brake. Alpine heights on volcanic ground - extremely well drained conditions overall; lava ridges and cliffs for rock dwellers, cinder scree and volcanic cinder or sand and pumice slopes, all rich in minerals, low in humus. Most moisture from retained underground snowmelt during early growing season. Uppermost alpine levels always ungrassed and very sparsely vegetated; mid to lower levels grading into lush foothill vegetation. Fierce seasonal winds on some mountains. These latitudes include the Argentinian side of the brief araucaria belt.

To the north of Chos Malal, lowland plains and hills are extreme semi-desert to desert, including volcanic badlands. Mainly very hot and dry in summer; some snow in winter; random storms at any time. Alpine steppe on the Andean outliers - winter snow with persistent drifts; random storms, hot sun and frequent cool strong winds throughout the growing season. Generally volcanic with sandy pumice/tuff soils.

Over this area we collected seed from a number of low hummocks of Opuntia and Maihuenia. On the road to Paso Pino Hachado we met with a smaller, more open-growing cactus, at about 1100 m altitude, and collected some seed - PW.6298. Likewise dissimilar were the solitary or few very compressed stems with straw-yellow flowers near the summit of Paso de Choique, at 2500 m - PW.6118.

. . . . . from H. Middleditch

When the seeds collected by this expedition were received, there was little difficulty in recognising the large (4 mm) seed covered with a pale brown aril as Tephrocactus, or the largish (2.5 mm) black seed as Maihuenia, even though they were without any identification. Happily this was subsequently confirmed by the collectors' own identification. But they provide no identity for 6298; to judge by the size, shape, and dull colour of the seed, I had strongly suspected that it might be Austrocactus. Considering the location of Pino Hachado, which is no great distance to the north of Alumine, where van Vliet found Austrocactus, I feel this identity is even more probable. What was the fruit like, I wonder?

. . . . . from J. Watson

I feel that I can fairly confidently give you a description of the seed pod. It was already loose, we did not have to tug it off the plant. In order to remove the seed we had to scrunge the pod open, this with some difficulty. The wall of the pod was dry, toughish, and quite rigid. The indumentum was of fairly numerous, fairly long and stiffish bristle like hairs, several of which ended up in my fingers.

. . . . . from H. Middleditch

Yes, that sound like an Austrocactus fruit, to judge by those I have seen from plants grown by A.Johnston. So we are left with the real problem, the plants with the solitary or few very compressed stems with straw-yellow flowers near the summit of Paso de Choique, at 2500 m - PW.6118. The slide taken by J.Watson is of a plant in flower. It is very difficult to see

any detail of the spination and of the body or bodies which are very small, and short. But the side view of the flower is quite clear, a funneliform shape with a shortish tube carrying several scales, with some hairy bristles in the scale axils, the longest hairy bristles in the upper axils. This can only be one of two possibilities, either Pyrrhocactus or Austrocactus. It is well north of the Austrocactus location given by J.Watson at Pino Hachado; it is equally well south of the southernmost Pyrrhocactus location at Malargue, reported by J.Lambert and by F.Vandenbroeck. There is no information available on filament disposition, which could settle the question. Which one is it?

Consider first the basic phytogeography. 'The zone between the R.Negro and the R.Colorado is where the patagonian bush steppe gradually passes into the Monte' - Frenguelli, 1980.

Like the rivers themselves, this phytogeographic boundary follows a general SE to NW alignment. Further inland where the upper courses of the R.Colorado and R.Neuquen (main feeder to the R.Negro) turn north, so does the phytogeographic boundary. As J.Watson observes, at Chos Malal on the upper reaches of the R.Neuquen, the lowlands carry typical patagonian steppe. At the foot of the Andes, the northern limit of the patagonian flora is placed at the R.Diamante by F.A. Roig (1972). The map by Frenguelli puts the northern limit roughly half way between the between the R.Diamante and Mendoza, at about San Carlos, as does A.L.Cabrera, Fitogeografia de la Republica Argentina, 1971. So the upper course of the R.Colorado still falls within the Patagonian steppe zone, within which we would expect to find Gymnocalycium, Echinopsis, Cereus, Tephrocactus, Maihuenia, Pterocactus, and Austrocactus. On the flanks of the Andes adjoining the patagonian steppe zone, we find only Maihuenia, Tephrocactus, Pterocactus and Austrocactus, plus Echinopsis in the northern part.

Hence the balance of probability for PW 6118 appears to lie with Austrocactus. This would extend the distribution of Austrocactus in the foothills of the Andes much further to the north than any previous reported finding.

WE FIND THE CREEPING AUSTROCACTUS **By D. Ferguson**

In January of 1988 I was in Patagonia for over two weeks, with over three hundred miles travelled per day, and at least ten or fifteen stops per day. The course was roughly Buenos Aires to Mendoza, then south almost to the straight of Magellan, then back north along the coast. There were many side excursions into the Andes, and into the interior, thus covering most of Patagonia fairly thoroughly, with well over 4000 miles travelled. In this way I saw Patagonia fairly completely and saw all of the known Patagonian species of Austrocactus, plus two apparently new species. I saw several species at places where they are not recorded in the literature, but in most cases R.Kiesling already knew of it. The only exception was of Austrocactus in Mendoza. In general most of these rare species are in reality extremely common and easily found, with the sole exception of Pterocactus valentinii. In the rhyolite mountains in the southeast of Rio Negro province, as in the Sierra Grande, there is an extremely abundant Austrocactus which is easily seen due to the huge clusters of stems, somewhat resembling Echinocereus coccineus. It may be just the north-eastern extreme of A.bertinii (patagonicus). Here we also found Notocactus submammulosus, Wigginsia tephracantha, Echinopsis leucantha, Opuntia sulphurea, and Gymnocalycium gibbosum.

Whilst we were travelling through southwestern Mendoza province we came across Austrocactus bertinii in moderate numbers at altitudes of about 5000 to 6000 ft. For instance it occurs to the west of Malargue and not far from San Rafael. It comes close to highway 40 again only at an area south of Manzanos, (roughly 100 km north of Barrancas). It occurs from there southeastwards to the Valdes Peninsula and southward more or less throughout Patagonia to somewhere in central Santa Cruz. I might also mention that Maihuenia was found everywhere that Austrocactus was found in extreme abundance, and vica-versa as long as the habitat was rocky. Both Maihuenia and Austrocactus apparently start where Maihueniopsis glomerata (andicola) and Soehrensia formosa cease. It was about 30 km to the south of Peraditas on the road to Agua del Toro where we met the northernmost specimens of Maihuenia. From here southward both Maihuenia and Maihueniopsis are common everywhere, except along the northern lower river valleys, as at Barrancas. We went south from Barrancas to Chos Malal and thence directly to Zapala. From Barrancas to Zapala, Maihuenia, Maihueniopsis darwinii and A.bertinii are everywhere common - you just have to stop at the right places and get out of the vehicle and look. This was a most interesting stretch, with many interesting flowers and shrubs; I nearly made myself sick from gorging Ephedra berries. Maihuenia, like all these other plants, has many species names, but appears to be one, highly variable, but continuous species.

At higher elevations in the dry mountains of Mendoza, Austrocactus bertinii is replaced by A.gracilis, which is a thin, creepy, rhizomatous plant. The most northerly location where we met this plant was at Las Lenas, which is a ski resort not far from the border with Chile. From Sosneado we travelled up the valley of the R.Salado (an affluent to R.Atuel) up highway 222 past Banos de los Molles. Las Lenas is roughly at 8000 ft and I estimate that A.gracilis climbs the drier slopes to about 9000 ft. there. Maihuenia was still found here, where they are planting Populus sp. and ornamentals such as tea roses. To the south of Zapala, A.gracilis became common on the higher stretches near the Andes. In the Lake District it occurred only to the north and east; as soon as the Nothofagus trees disappear, the Maihuenia and A.gracilis appear.

We did go through Esquel where we found A.gracilis on the hilltops. We spent the night in Esquel, where it was just above freezing in town - where Aloe aborescens and Phormium are growing in the open air! The next morning there was snow on the same hills that we had climbed the day before! And this in January! Austrocactus gracilis continues to occupy the drier eastern edge of the mountains and the colder plateaus south into southern Santa Cruz. It always occurs on colder, higher places than A.bertinii and in Neuquen it reaches across into Chile.

We made some trips into the interior further south and near Sarmiento we came across a whitish spined A.bertinii growing in company with Maihuenia, Maihueniopsis darwinii, Pterocactus australis and Pt.hickenii.

. . . . . from H. Middleditch

The 'area south of Manzanos' where D.Ferguson found plants of Austrocactus is the very same area in which J.Watson found his 6118 at Paso Choique. This would appear to confirm PW 6118 as an Austrocactus.

In this account we have a reference to an even more northerly occurrence of the prostrate type of Austrocactus.

The location at Las Lenas is even further north (in Argentina) than the location of Ritter's A.hibernus on the Rio Maule in Chile. Together with the other observations by D.Ferguson on the occurrence of A.bertinii, it extends the distribution of Austrocactus even further to the NW of Patagonia. However, it is important to note that Maihuenia, which is a regular feature of the Patagonian vegetation, is well reported from this same area of SW Mendoza province.

This creeping Austrocactus is regarded as A.gracilis by D.Ferguson, who also applies this name to plants from the eastern margin of the Lake District and to those found near Esquel. However it seems that the first name for these plants is A.coxii, which probably came from the vicinity of San Martin de los Andes on the fertile plain at the eastern end of Lake Lucar where the nomadic indians had a semi-permanent encampment. The plants which were found by D.J.v.Vliet near Junin de Los Andes, near Alumine, and near Bariloche (on Lake Nahuel Huapi), can hardly have differed greatly from A.coxii.

The description of Cereus dusenii by Spegazzini in Nova Addenda ad Floram Patagonicam 1899 was based on a plant collected in 1897 by Dr.J Valentin near Trelew, close to the Atlantic coast of Chubut. It was described as 20–60 cm tall and 3–5 cm broad, 'strongly resembling Cereus bertinii Cels'. In Part 4 of the same review, published in 1904, Spegazzini amplified his first description of A.dusenii in respect of other than body sizes, quoting a further collection made in 1899 in 'very dry meadows along the R.Chubut' and in 1900 in 'mountains along Rio Alumine'. He then mentions an etiolated prostrate worm-shaped form 15–35 cm long and 0.8–0.15 mm [sic!] thick from Teka-choique mountain.

. . . . . from R. Kiesling

Teka-choique (or Teka-choike) is in Chubut, SE of Esquel, on route 40.

. . . . . from H. Middleditch

This seems to be the same spot that is mentioned above by D.Ferguson. The Spegazzini plant from Teka-choique is noted by Backeberg in his Die Cactaceae as 'undoubtedly the same plant' as his A.gracilis, which he first described in 1942.

. . . . . from J. Lambert

Yes I would be inclined to agree with the location given by D.Ferguson for the northernmost locatio of Maihuenia. I probably met with it at the same place, about 35 km to the north of Agua del Toro. In the opinion of R.Kiesling, practically all the heavily spined Maihuenia from Patagonia belong to one and the same species, namely M.poeppigii, offering a wide range of variability. This may be so, but from what I have observed, there are at least some differences sufficient to justify varietal separation. For instance a plant from Vaca Muerta (which lies between Zapala and Bajada del Agrio) has a thinner and more erect spination, the spines also being more yellowish. This is probably the form which Ritter called M.cumulata. Still further south, between Zapala and Neuquen, I found a form with very long central spines and young spines of a reddish-brown, 'fleshy' colour. This would of course suggest M.patagonica. Both these names would be considered synonymous with poeppigii by Kiesling.

We pushed into the higher valley of the R.Atuel above El Sosneado where we met with another biotype of Maihuenia, which may well belong to another species altogether:- M.philippi, with smaller and softer spines, and more spherical stems. This species grows in Chile and in the extreme northwest of Neuquen province, both quite close to the higher R.Atuel, so it would be definitely plausible to encounter it here.

We met with more Maihuenia on the Cuesta de Chihuido where the road surmounts the ridge between the Campos de Afilar and the valley of the Rio Grande, or upper Rio Colorado. We stopped to see more clumps of Maihuenia between Barrancas and Chos Malal.

The first Maihueniopsis darwinii var. hickenii was discovered just a bit to the south of Malargue town, at the R.Malargue. It carried a yellowish orange flower with a dark red stigma. We met with more of these plants at the Puntilla de los Huincanes, before we reached Barrancas. In this case the flowers were of a more reddish orange and the colour of the stigma was green. In the Sierra de Portezuelo, we encountered another form of this species. Here the spines were more flattened, and the flower of a lighter yellow, whilst the stigma was green. This would perhaps correspond to Tephrocactus platyacanthus.

. . . . . from H. Middleditch

The location given by J. Lambert for Maihuenia philippi in the upper reaches of the R. Atuel is not far from where the Austrocactus gracilis and the Maihuenia was found by D. Ferguson at Las Lenas. Maihuenia is also reported from Cordillera Linares which contain the headwaters of the R. Maule and also the Descabezado del Maule, another reported location for Maihuenia; this is the area where Ritter found Austrocactus hibernus. This data supports the observation by D. Ferguson that Maihuenia and Austrocactus tend to be found growing in association.

The northernmost location for Maihuenia, about 30 km to the south of Perditas, which is given both by J. Lambert and by D. Ferguson, would suggest that this may be the northern-most boundary of the patagonian phytogeographical area. It is so marked on the maps of both Frenguelli and Cabrera.

. . . . . from F. Ritter, Kakteen in Sudamerika, Vol. 3.

Maihuenia philippi is distributed from the mountains of the R.Maule in the north to the upper reaches of the Bio-Bio river close to the Argentine border in the south, in the latitude of 3835'S, which is the southernmost habitat location for cacti in Chile.

. . . . . from H. Middleditch

If it is accepted that Austrocactus and Maihuenia grow in association, then it might be conjectured that Austrocactus could also appear in the upper reaches of the R.Bio-Bio, which are an hour or two's ride over an easy pass from the headwaters of the Rio Alumine. Maihuenia is also reported from the Argentine side of the Paso de Cruz, which I find lies between the headwaters of the Diamante river and the headwaters of the Rio Maypu. This location is outside the distribution area for Maihuenia quoted by Ritter. But Adrianna Hoffmann has reported the finding of Austrocactus at Chile Chico, on the southern shore of Lake Buenos Aires, some 7^0 of latitude south of Ritter's 'southernmost occurrence of cacti in Chile'. So a Paso de Cruz location for Maihuenia should not be rejected out of hand, just because it conflicts with Ritter's statement. This location is closer to the intergeneric RMF 101 and RMF 86 than to any known Austrocactus.

Does anything interesting grow in association with this Maihuenia? Perhaps we should hold the next Chileans' Weekend there?

. . . . . from 'A journey over the Planchon Pass to Mendoza' by P. Strobel. Petermann's Geographischer Mitteilungen 1870.

I climbed over the Planchon pass in the full summer, in the second half of February, yet the volcano [Planchon] somewhat over 3,800 m high, was covered in snow and ice. On the pass itself, 800 m lower, it was necessary to ride over small snowfields. Two days later I saw the last patch of snow in a hollow on a peak that towered above the Valley of the Lenas Amarillas, in the source of the Rio Salado. On my trip from Mendoza to Chile and back, undertaken in the summer months of January and February 1866, I was daily harassed by a more or less fierce periodic wind which howls over the Andes from the Pacific to the Pampas. Gillies has already spoken about it.

The mass of the Andes, preandes, and the outlyers running into the Pampas, consist mainly of volcanic rock and principally of varieties of trachyte. Basalt is only found in the hills which form the last slope of the preandes into the Pampas. In the valley of the Lenas Amarillas I came upon red sandstone and limestone which appeared here and there adjacent to each other, from here as far as Pampa Laguna Blanca [near Sosneado]. I was only able to collect fossils at one place, namely in the scree of the alluvial cone, Laderas, in the Angostura gorge..

When the watershed of the Andes is crossed, such as at the Planchon, there is a marked contrast in the vegetation between the two flanks. On the Chilean side, luxuriant forest; on the Argentine side bare rocks and treeless valleys. Only at places on the banks of regularly flowing streams are there meadows. Bushes and the low growing Lena amarilla (Adesmia pinifolia Gillies) were first encountered in Valle Hermoso and then in the neighbouring valley of the Lena Amarillas. Further down the valley of the Rio Salado appeared the Retamo (Bulnesia chilensis Gray) and the Molle, forming stands near Agua amarilla.

A PROBLEM PTEROCACTUS - or A PTEROCACTUS PROBLEM? From M. Lowry.

My own collection includes a small plant of Pterocactus australis which I obtained from I.S.I. in 1986. The data on this plant given in the I.S.I. list was as follows: 'ISI 1619 Pterocactus australis (Web) Back. This tuberous rooted opuntioid has spherical to club-shaped stems and terminal yellow flowers. Rooted cuts of a plant (Rausch 537 Abbey Garden 78/529) originally collected near Neuquen, Dept. Neuquen, Argentina'. Now Backeberg in his Kakteen Lexikon states that this species comes from 'between the Magellan Straits and Santa Cruz' which is about 700 miles further south than Neuquen!

The newest stem on my plant is 4cm tall by 1.5cm wide, of a deep purplish-brown. The areoles are arranged in ten nearly vertical spirals, and are about 7 to 8mm apart. Each areole carries a fair amount of buff coloured wool, about 8 short radial spines 2–5mm long and 1–3 centrals some 13–18mm long. The central spines are quite flat, about 1mm broad at the base and where there are three they are arranged in a 'T' formation. They have quite a curious curvature, particularly where they join the areole at which point they bend downwards through nearly 90^0! One feature about this plant, which I have noticed through the summer, is that the older stem tends to follow the sun across the sky! This stem is much longer than the new growth and quite a bit thinner - 70mm by 7mm. I wondered if this was an aborted flowering stem.

It seems that there is very little at all in print about plants of this genus.

. . . . . from H. Middleditch

The legend given to this plant by ISI appears to be open to question. According to the Rausch Field number list, R.537 is Pt.fischeri Br.& R. from Prov. Neuquen and was collected between Zapala and Neuquen. Britton & Rose state that the original plant was collected by Walter Fischer in Rio Negro Province. In the G.B. C & S J Vol.44 No.3 1982 Roberto Kiesling gives the distribution of Pt.fischeri as 'the low and dry zones of the south of Mendoza, Neuquen and Rio Negro' which would include the location for both R.537 and the Fischer collected plant. This article by Kiesling includes a map of southern Argentina on which is plotted the recorded finding places for several species of Pterocactus; the distribution for Pt.australis is shown as Prov. Chubut and Santa Cruz. Thus the name for the ISI plant is from the southern half of Patagonia whilst the field number and location are from the northern part of Patagonia. The plant could be either Pt.australis or R.537 but on the basis of available information it can hardly be both.

. . . . . from J. Arnold

My own plant of Pterocactus australis was obtained from the I.S.I. offering. On arrival it looked as though it had been growing in transit as it had a couple of really etiolated stems. In due course these were removed and put to root up on their own whilst the remaining portion now has three separate new stems, each between two and three inches tall and a good half inch thick. These stems are distinctly tuberculate although of course the tubercles will only be about a couple of mm high.

. . . . . from T. Lavender

It is several years since we acquired a cutting of a plant labelled Pterocactus glomeratus but it has not put on a great deal of growth. In spination and mode of growth it is easily distinguishable from Pt.kuntzei. The new growth is now showing the stronger spination. There are three spines in a 'T' formation at most areoles. The central spine is the longest, some 15 (-20)mm long; it is definately flattened and appears to be pointing downwards. But when the areole is examined with a hand lens the central spine is seen to start by projecting outwards and then turns sharply downwards just as it leaves the areole wool. In addition it is also possible to see with the hand lens that right at the top of the areole there is a bunch of yellowish glochids, all equal in length, which I suppose might be two mm long.

In addition we have a small plant of Pt.fischeri which originated from I.S.I. There are a considerable number of fine white spines at each areole between 8 and 11mm long, whilst at the tips of the new growth these spines are brown and only some 6mm long, but they change as the plant grows. The areoles are somewhat elongated, filled with dense white wool and at the top of the areole there is a cushion of what may well be short white glochids.

. . . . . from A. Johnston

I have a segment from each of the two plants described by T.Lavender; quite different to these two plants is a rooted cutting off a plant of Pt.australis which came from A. C. J. Hall. The segments of Pt.australis were more or less globular when received but now they are rather more egg shaped to cylindrical. There are two central spines a good 6mm long, distinctly broader than they are thick, flat on top and convex below, one above the other, curving upwards, white. There are about a dozen fine white radial spines about 2mm long. There is no sign of any glochids.

. . . . . from R. Kiesling. C. & S. J. G. B. 44.3.1982.

Pt.australis. Stem segments globose or obpyriform, greenish-brown to purple. Central spines 1–2, developing only at the apices, upward pointing, 2cm long, thick, flattened, whitish to brown or blackish. Radial spines 10–15, 3–4mm long, white. Glochids few and inconspicuous.

Pt. fischeri. Stem segments cylindric, up to 10cm long, 1 to 1.5cm diameter, tuberculate, greenish brown. Central spines about 4, sometimes only developed in the upper part of the stem, 1 to 3(-5)cm long, subpapyraceous, brown to black with base and tip yellowish, usually basipetal [growing or developing downwards - H.M.], radial spines 12 or more, 6mm long, setaceous, whitish. Glochids numerous, 3–4mm long, yellowish.

Pterocactus fischeri is very close to Pt.australis, both having flattened central spines and a similar arrangement of the spines in the areole. They are differentiated by the stem habit, by the number and direction of the central spines, papery in Pt.fischeri and thick in Pt.australis, and by the presence of numerous glochids in Pt.fischeri (almost non-existent in Pt.australis).

Pt. valentinii. Tuberous roots relatively small, 2–4cm long, 1–2cm diameter. Stems 4–8cm long, 1 to 1.5cm diameter, green. Spines 25–30, 4–5mm long, radiating hyaline. The species is little known. In addition to the herbarium collections from Peninsula Valdez and Pto. Piramides, I have seen two other specimens from the south of Mendoza and one from Neuquen.

Pterocactus valentinii is well differentiated from all the other species by its very numerous radiating spines with no difference between radials and centrals.

. . . . . from H. Middleditch

Based purely on the descriptions given by Kiesling, it would appear that the plant received by T. Lavender under the name of fischeri could be called P. valentinii having regard to the numerous, short white spines, with radials and centrals indistinguishable. The plant distributed by I.S.I as australis and the plant received by T. Lavender as 'glomeratus' could be named P.fischeri on the basis of the papery central spines which turn abruptly downwards close to the areole. The ex-C.Hall P.australis would seem to merit that identification on the basis of the two upward curving central spines.

. . . . . from T. Lavender

The plant we have labelled as Pt.fischeri does not seem to compare well with the description of Pt. valentinii. In Kiesling's description of Pt.valentinii the spines are stated to be 4 to 5 mm long, whereas the plant which we have labelled Pt.fischeri has spines twice that length, which is quite a difference.

. . . . . from H. Middleditch

But the spines are very numerous, white, centrals and radials indistinguishable; the glochids are inconspicuous. Based upon Kiesling's treatment of the genus, this could only fit Pt.valentinii. If we wish to disregard the 'yellowish spines with brown base to black throughout' the spine length would fit hickenii. So we have either a Pt.fischeri both without basipetal central spines and without glochids, or a Pt.valentinii with spines longer than the original description, or a Pt.hickenii with white spines. The more probable choice might lie with valentinii. My own plant of JL-103 Pt.valentii which was collected in habitat by J.Lambert at Sierra de Portezuelo, province Neuquen, has spines up to 1 cm in length and on the flowering stem they are up to 2.5 cm long. As spine length is such a plastic feature, the general habit of the spination would seem to be of more importance than specific length.

. . . . . from L. Davis, I.S.I.

In regard to the I.S.I. Pterocactus australis I have now been able to examine closely my plants of Pterocactus. The query which has been raised about identity is obviously based entirely on location and not by looking at the plants. There is more difference between these two species (australis and fischeri) than with other Pterocactus species. Pterocactus australis is thick stemmed, twice that of other Pterocactus species, and short, whereas all others are thin and long. The spines are also very short so that the plant does not look 'white'. Also Pt.australis has one central spine, flat, long and curved, downward pointing, while the radial spines are very short indeed.

On the other hand Pterocactus fischeri has tall thin stems and numerous white spines that make the stem appear white, so that the conclusion is that our I.S.I. plants are correctly labelled. As for field location we have to rely upon the integrity of the field collector.

. . . . . from H. Middleditch

The foregoing comments were helpfully accompanied not only by slides of both plants, taken in the I.S.I. collection, but also by a thumbnail sketch of the spination on the I.S.I. 'Pt.australis'. From the slide of 'Pt.australis' the most mature stem growth appeared to have tubercles in the form of very slight humps. The areole is situated just above the centre of the tubercle, so it does not face directly outwards but very slightly upwards. with the areole sunken into the tubercle so that the surround of the areole looks just like a miniature volcano crater. The stems are a greyish green colour but (especially on the mature stems) a thin dark green line runs round the base of the tubercles, defining the outline of the tubercle; the lower half of the tubercle is shield shaped, the upper half being the shape of a brandy bottle neck. It is possible that this thin line outlining each tubercle represents epidermis which lacks stomata and lacks a cuticle, whilst the overall grey green epidermis looks that colour because of the cuticular layer. There appears to be some tiny glochids at the very top of each areole that face almost upwards. The central spine is indeed directed downwards, but does it have a very sharp bend just as it emerges from the areole? From the thumbnail sketch on the slide, it appears that it does. This matches the basipetal spines in Kiesling's description of fischeri and does not match the upward pointing spines in Kiesling's description of australis.

The length of the radial spines on the I.S.I. 'Pt.australis' is barely sufficient for spines from adjacent areoles to touch each other, whereas the far greater number of radial spines on the I.S.I. fischeri not only overlap the spines from the adjacent areoles but frequently reach as far as the adjacent areoles themselves. On the I.S.I. fischeri the tubercles form a very slight hump and the areoles are placed just above the crown at the centre of the tubercles, so that the areoles do face slightly upwards although at first glance they seem to face directly outwards. There do not appear to be any glochids and it is just about impossible to distinguish central and radial spines.

. . . . . from J. Lambert

On my visit to south america in the course of 1983, I was able to extend my itinerary into parts of the provinces of San Juan, Mendoza, and Neuquen, where I was most fortunate in encountering quite a number of specimens of Pterocactus. We first met with Pterocactus on the Llanos de Chita, province San Juan, an extensive and almost level plain. The surface was gritty or stony, with very sparse vegetation, the bushes of Larrea growing a couple of metres to several metres apart and with almost bare ground between them. Because of the altitude and the wind, these bushes grew in a nearly horizontal fashion. It needed a sharp eye to find Pterocactus and before it could be photographed we had to move away some of the bush; it was Pterocactus kuntzei with the characteristic dark bars below the areoles, with the caespitose habit of this species, and with a coppery brownish shade to the flower petals.

Sympatric with this species at this place are two more Pterocacti. The first is Pt.gonjianii, described by R. Kiesling. This species seems to be closely related to the third one, which is Pt.reticulatus which has the reticulate design of tubercles and a very rudimentary spination. Further to the south, en route from Villa Nueva to Barreal, we approach the Pampa Yalguarez. Like the Llanos de Chita at 2300 m the Pampa Yalguarez at 2150 m is flat and level, again with low growing bushes two or three metres apart, so both locations have a similar environment. Here the surface was mainly of stones and pebbles but the ground itself was more of a sandy nature. We have to search assiduously to find Pterocactus reticulatus amidst small stones and pebbles of similar size and colour to the plant.

Between Uspallata and Mendoza city, about 10 km before reaching Potrerillos, we discover some more Pt.kuntzei. This was on sloping ground, now with comparatively dense vegetation of bushes, but not growing so close together that one could not walk around and between them. Because of the environment the subterranean parts of the plant remain smaller here. Roughly 100 km to the south of Mendoza, in the valley of Manzano, it is rather humid in comparison with what is normal for these regions. On a dry hill-slope, laterally from the main valley, we came across further Pterocactus kuntzei, together with a Pyrrhocactus sp. and Notocactus submammulosus. Further south again, between Agua del Toro and San Rafael, we met with another Pt.kuntzei, this time with a fully opened flower that displayed a dark brown stigma. They were growing here on a fairly steep slope, accompanied by Denmoza, Pyrrhocactus, and Trichocereus candicans, other vegetation being pretty sparse.

From San Rafael we ascended the Cuesta de los Terneros on to the Campo de Afilar, then passed the salt crust of the Salinas de Diamantina and went on to Sosneado. From here we pushed further up the valley of the R.Atuel, still on a broad level floor with gently rising hills at either side. Once again we met up with Pt.kuntzei, in the more sandy, flatter parts, together with a meagre vegetation of herbaceous plants and very scarce small bushes. The next stop was not far to the south of Malargue, at the R.Malargue, where we came across Maihueniopsis darwinii v.hickenii, a Pyrrhocactus, and another Pterocactus, this time Pt.fischeri. This species is less caespitose and more erect than the ones we met with earlier on this trip, and it is more heavily spined, with flattened spines only on the upper part of the segments. This character is retained in cultivation, but is not present on young stems. The flower has the coppery brown shade of most Pterocactus flowers and here the stigma looks carmine red.

Further to the south again, a stop at Zapala and a short trip from there to Bajado del Agrio and back. First we explore some hills at Vaca Muerta where we find hummocks of Maihuenia as well as another population of Pterocactus fischeri. This was the only place where we found Pterocactus growing in somewhat stony ground, rather than in sandy material. At Bajada del Agrio we meet up with yet another species of Pterocactus; this is Pt. araucanus, with short caespitose stems, of which the young shoots somewhat resemble the shape of a pine cone, their tubercles being arranged in spirals.

Between Zapala and Neuquen, in the Serra de Portezuelo, we encounter a pretty sensational discovery for here is yet another Pterocactus - Pt.valentinii. Its flower is actually brown, with orange filaments and style, yellow anthers, and a light brown stigma. The spines are numerous, thin, and brush-like. In addition the tuberculate root is thinner than in most Pterocacti, not potato-like, but more like a carrot. The surroundings are basically similar to those in which we found other Pterocacti, except perhaps for the presence of a few higher bushes.

. . . . . from J. Watson

On our 1987/88 Southern Andes Expedition we came across some small, dark, finger-like stems - solitary or few, of plants with a deep, bright pink flower, at 800 m above Laguna Coigolauquen, Mendoza. When photographing 6114, S.Pern noticed with great interest and drew attention to the extremely sensitive stamens, which apparently closed like a Touch-me-not. My feeling is that both 6114 and 6118 were Pterocactus. We returned to this same site at a later stage of our trip with the objective of collecting some seed from this plant. I cannot tell you how long and hard we searched on our hands and knees for seed of 6114 and 6118, but all in vain. Even then we barely found any plants at all, let alone seed. The ground around was certainly covered with stones of various sizes, with very few signs of any sandy patches.

. . . . . from H. Middleditch

Most fortunately I have received from J.Lambert a piece of his JL-99 Pt.fischeri which he originally collected at Vaca Muerta, which lies just to the north of Zapala, province Neuquen. At the very top of the tubercle is a short, almost horizontal, step on which the areole sits, facing almost upwards. In consequence the majority of radial spines do not radiate up, down, and sideways from the areole but form a nearly horizontal fan, projecting outwards. The radial spines are very fine, almost bristle-like, white, about 4mm long; many areoles, but not all, also have a 10 (-12)mm long, white spine, which may point almost straight upwards, or as far downwards as the tubercle shape permits, occasionally outwards. This 'central' spine is just as fine as the radial spines and shows no sign of being flattened. At the top (or back) of the areole is a tight bunch of fine white spines or glochids, 2–3 mm long, that is nearly pressed against the body of the plant. On the short, older piece of stem (last season's growth?) only a dense bunch of glochids is carried on each areole; these spread out slightly in a narrow funnel shape. The body colour is pale grey, rather than greenish-grey, whilst immediately below the areole the sloping face of the tubercle is a much darker grey colour, forming a blunt triangular patch.

On receipt of this plant of JL-99 there were no flattened central spines to be seen on this plant, a feature mentioned by J. Lambert for the Pt.fischeri which he found near Malargue and which is also mentioned for this species by Kiesling. These projecting, flattened central spines are very obvious in the photograph taken by J.Lambert near Malargue, but

they look quite white in colour, not 'brown to black' in accordance with Kiesling's description. However, one of the new stems (and only one) which grew from this plant did produce the flattened central spine, directed obliquely downwards from the areole and curving back obliquely upwards. Again this would appear to indicate caution when it comes to identification on the basis of spination.

Also received from J. Lambert was a specimen of JL 103 Pterocactus valentinii. The root of this species is described by J. Lambert as not so much of the typical 'potato' form as more 'carrot' like, with a diameter of merely a couple of cms. Yet on the plant which he has sent to me, the top of the root measures 49 by 37 mm! On close inspection of JL 103 the tubercles are found to be quite shallow humps, with the areoles lying just above the crown of the hump so that they face almost outwards. On the old growth there were very flimsy spines, 3 to 6 mm long, display no differentiation between radials and centrals; the spines from one areole reaching as far as the adjacent areoles. But subsequent spine growth was appreciably longer.

A piece of Pt.kuntzei, which had originally been collected at Hualfin, was also received from J. Lambert. The aerial stem is carrot shaped, attached by its narrow end to the root. This stem is 65 mm long, tapering from 18 mm to 6 mm in thickness. I imagine that the plant may well grow in this manner in nature and not with the long stringy stems that we tend to look upon as the usual mode of growth in cultivation. This stoutish stem form would seem to merit the 'thick as opposed to long and thin' description applied by L. Davis to this species.

. . . . . from M. Lowry

The I.S.I. data sheet says that their 1528 was collected by Victor Turecek locally on bluffs along the Rio Negro valley near Villa Regina. I see from my map that this place is about half way between General Roca and Chelforo. It is beginning to look as if I.S.I. 1528 and I.S.I. 1619 may both be Pt.fischeri.

. . . . . from D. Ferguson

Whilst in Patagonia I came across Pterocactus tuberosus south of Perditas, where Austrocactus and Pyrrhocactus grew together. Between Chos Malal and Zapala we met with Pterocactus hickenii (skottsbergii, araucana), fischeri, and australis. At Sarmiento we again found Pt.australis and hickenii. On the Valdez peninsula there was Pt. valentinii (pumilis) growing together with Austrocactus bertinii, Opuntia sulphurea, and Gymnocalycium chubutense.

. . . . . from H. Middleditch

Now Kiesling's 1982 review of Pterocactus attributed Pt.hickenii with 'stems globose to short cylindrical, numerous (ca.20) straight spines 10–20 mm long, glochids numerous' and attributed Pt.araucanus with 'stems of globose to superposed obpyriform segments, spines c.8, 3 mm long. The structure of the areole indicates that it is related to Pt. hickenii'. This last observation would suggest that Kiesling has been examining the cross section of the areole in the same way that he has looked at the areoles on Tephrocactus (see Chileans No.45 p.180). Why has D.Ferguson put hickenii and araucana synonymous?

Kiesling's distribution map has Pt. australis occupying an area in southern Patagonia bounded by Trelew, Sarmiento, Lago Argentino and Santa Cruz. However the location given by D.Ferguson for Pt. australis to the north of Zapala is well away from the previously accepted distribution area, but it does match the location given for the I.S.I. plant of this name. But this still leaves us with an I.S.I. plant which has (as I.S.I. say) one of the flattened central spines bent sharply downwards at the exit from the areole i.e. basipetal, which is in accordance with Kiesling's description for Pt. fischeri.

. . . . . from A. W. Craig

When Kiesling was in this country on detachment to Kew he met with quite a few members of The Chileans. I obtained from him a cutting of a Pterocactus which he identified as ?fischeri/?hickenii from Lago Falkener, Canodao Rivad, southern Argentina. This has grown exceedingly slowly, with some of the new segments stouter than others, the stoutest one being more or less globular and about an inch thick, markedly tuberculate. The areoles do not face outwards, but stand on the 'top step' of the tubercle and face more or less upwards. The spines form a shallow cone and it is difficult to distinguish between centrals and radials. There is an occasional 20 mm long spine pointing away from the plant, the remaining spines being arranged in a fan. There are possibly four spines which might be taken as spreading centrals difficult to distinguish that have a brownish tint which is not uniform all along the spine, together about 8 to 10 finer, white radials. There are definitely no glochids.

. . . . . from H. Middleditch

The only Lake Falkner that I can find is the one shown on the map of the Argentine Lake District, in this issue. I must admit that I am astonished to think that a Pterocactus might be found in that locality, as the surroundings of the lake must surely be clothed with trees, and the treeline will be determined by the incidence and severity of night frosts at altitude. But if Pterocactus can survive at over 2000 m altitude on Llanos de Chita and Pampa Yalguarez, then presumably they can equally do so near Lake Falkner. But what are we to make of Kiesling's apparent dilemma in the naming of this plant? Added to the other Pterocactus problems noted above, is this beginning to suggest that there are perhaps variations in spination in habitat which are difficult to accommodate within the compass of existing accepted descriptions? Or do we have to accept that in habitat there are now being found growing not far apart, forms of Pterocactus which have previously gone under various specific names? Or forms that are transitions between those represented by existing names?

PYRRHOCACTUS - SOME SEEDS OF DOUBT By H. Middleditch.

A number of species of Pyrrhocactus Berger grow in the west of Argentina, in the provinces of Mendoza and San Juan, in localised areas which together represent only a tiny fraction of the total area of the two provinces. A map covering almost all the habitat locations was included in Chileans No.45. The provinces of Mendoza and San Juan comprises a lowland area, almost all of which is exceedingly arid and virtually desert, whilst much of the remainder is mountainous. In both the desert areas and on the higher mountain slopes the Tephrocactus is almost the only representative of the cacti, whilst the Pyrrhocactus are confined to the lower mountain slopes.

Not all the lower mountain slopes in Mendoza and San Juan provinces carry Pyrrhocactus. The main distribution

zone for Pyrrhocactus is a narrow belt just to the west of Mendoza city and San Juan city, running north to south on the lower slopes of the Andes where they meet the desert. This belt extends from near Jachal in the north to Malargue in the south. In addition there are very isolated pockets of Pyrrhocactus on the Sierra Famatina, at Mazan, at Los Colorados, at Marayes, and at Barranca de los Loros which is just north of 25 de Mayo on the R. Colorado. The question arises as to what specific names should be given to these various populations.

The first Pyrrhocactus to be described was P.strausianus K.Sch. which appeared in the Nachtrag (supplement) to Gesamtbeschreibung der Kakteen in 1903. This was found at or near Barranca de los Loros. Next, two species were published in 1905 by Spegazzini in his Cactacearum Platensium Tentamen, these being P.catamarcense and P. sanjuanense. The former was said to be common in the 'very arid rocky preandine hills in Mendoza and San Juan. . .' whilst the latter was 'rare in the very arid mountains of San Juan'. From the literature on this subject, reviewed in Chileans No.45, one might deduce that Pyrrhocactus are 'common' where the Andes met the desert, between Malargue and Jachal. Confirmation of this is to be found in a report in the Austrian Cactus Journal for March 1983 covering the visit made by O.Instorfer to Chile and Argentina; the travellers state that 'Pyrrhocactus are to be found as the most frequent globular cactus in the province of San Juan'. The itinerary followed by these travellers took in the self-same lower mountain slopes near Mendoza and near San Juan; thence to La Rioja, with no diversions to outlying Pyrrhocactus locations.

It would be expected that the name catamarcense would be given to those Pyrrhocactus which are found closest to Catamarca, that is, those from Sierra Famatina, from Mazan and from Los Colorados, whilst the name sanjuanensis would be expected to have been applied to the Pyrrhocactus found on the lower mountain slopes of Mendoza and San Juan. However it appears that it is the Pyrrhocactus found between Jachal and Malargue that are relatively common, whilst it is those from the isolated locations further to the east which are relatively scarce. We know this now, but the question really is - did Spegazzini know that? If he did, then his choice of names is peculiar.

In addition, the word 'preandine' evidently means different things to different writers. In writing of his journey from Chile to Argentina in 1866, crossing the Planchon pass, Strobel descends the valley of the R.Salado towards its confluence with the R.Atuel. He approaches Sosneado from the west through 'the last hilly outliers of the pre-Andes'. Strobel also noted that 'the european geographers usually understand the term Cordillera as the whole chain of the Andes, whilst the natives apply it only to the line of peaks.' Hence to the natives, the Cordillera de Los Andes are the line of peaks and the ascent up to those peaks is through the pre-andes. Between Jachal and Malargue lie the very feet of the slopes which have to be ascended to reach the Cordillera de los Andes, and it is on these pre-andine slopes that Pyrrhocactus are most common. These two factors taken together would seem to materially outweigh the etymology of the specific names, so that we might consider Spegazzini's view of the situation as P.catamarcense for the plants common on the pre-andine slopes between Jachal and Malargue, and P.sanjuanense for the plants at isolated locations further to the east.

Strictly speaking the lower mountain slopes which lie to the west of Mendoza city and San Juan city are not even the foothills of the main chain of the Andes, but of an outlying ridge, the Sierra Paramillos, which runs north into the Sierra Zonda and other spurs. These may possibly also be described as 'preandine' mountains. It was Britton and Rose who erroneously attributed the name strausianus to these plants found near Mendoza city, to be followed later by Spegazzini himself. It appears that Ritter has also come to the conclusion that the Pyrrhocactus from near Mendoza city should be called catamarcense, to judge by his comments on this point in his Kakteen in Sudamerika and which are also reviewed in Chileans No.45. By what route Ritter came to his conclusion is a matter for conjecture, but at least his conclusion is the same as that derived in these pages.

The discussion on Pyrrhocactus in Chileans No.45 was accompanied by a sketch of various sorts of Pyrrhocactus seed, together with a sketch of Austrocactus seed for comparison. On the basis of the material then to hand, it was suggested that the Pyrrhocactus which possessed an Austrocactus-like seed were to be found at the southern end of the distribution area for Pyrrhocactus i.e. geographically closest to the distribution area for Austrocactus. Between going to press and the time of our 1988 Chileans' Weekend, further samples of seed were obtained both from Mesa Gardens and from F. Kattermann. The seed from Mesa Garden, received under nine species names, was collected from plant stocks in the nursery, which had themselves been raised from seed, whose origin was stated to be, respectively:- Lau 505 and Lau 582 seed; atrospinosus and megliolii from habitat seed; R.542 from Austria; the others from De Herdt and Uhlig. With two exceptions, all this seed conformed well to that obtained from other sources. The seed received from F. Kattermann was collected in habitat either by himself, by R.Kiesling, or by Dr.Meglioli and again matched the respective samples from other sources, collected or cultivated.

Both the habitat collected seed and the Mesa Garden seed were photographed both under the scanning electron microscope and by F.Fuschillo, just in time to be reviewed at the Chileans' 1988 Weekend. For comparison, seeds of Austrocactus were also shown on slides; there was an obvious similarity between the seeds of Austrocactus and the seeds of certain species of Pyrrhocactus Berger. Under the scanning electron microscope the surface of the seed of Austrocactus as well as of certain Pyrrhocactus spp. was seen to be covered by a deeply-wrinkled cuticular layer which for practical purposes completely obscured the seed testa. However the very bumpy nature of the underlying testa cells could be deduced from the macro-undulations. The seed collected by R.Kiesling 'near 25 de Mayo' matched that collected by J.Lambert at Barranca de los Loros. Both these samples are similar in several respects to Austrocactus seed and from their location they would be expected to represent P.strausianus. However, seed collected by Dr.Meglioli under his field number ME.740 is also of this 'Austrocactus' type; it was found between Jachal and Huaco. This site, as may be seen from the map of Mendoza and San Juan provinces in Chileans No.45, is on the north-western fringe of the distribution area for Pyrrhocactus Berger. It is separated by an appreciable distance from Tupungato where JL 86 was collected which also has seed of the 'Austrocactus' type. Hence we are now no longer able to say that the 'Austrocactus' type of Pyrrhocactus seed is only to be found at the Austrocactus end of the distribution area for Pyrrhocactus.

The seed received under the names of marayense, megliolii, dubius, bulbocalyx, Lau 505, and FK 706 from Los Colorados, all conformed to the bulbous, smooth, more or less glossy seed type. The reported locations for these names are all one or other of the isolated pockets of Pyrrhocactus which lie well to the east of the 'rocky preandine hills'. In addition, the

seed of JL77 from Termas de Talacasto, north of San Juan, and ME830 from Zonda, southwest of San Juan, are also of this type. The seed of R542, named strausianus by Rausch, continues the saga initiated by Britton and Rose of presenting us with problems. Both the sample received from R.Ferryman under this number, as well as that received from Mesa Garden without field number, were of this same black, bulbous type. However, the second sample from Mesa Garden received as R.542 was of 'Austrocactus'-like seed.

Thus the distribution of the two main Pyrrhocactus seed types may be considered in three areas. Firstly, the southern part of the distribution area where those plants which grow geographically closest to Austrocactus have an 'Austrocactus'-like seed. Secondly, the isolated populations at Los Colorados, Mazan, and Marayes which have a bulbous, smooth, shiny black seed. And thirdly the belt between San Juan and Jachal in which both sorts of seed appear to occur. In addition, the Pyrrhocactus growing on Sierra Famatina have a different type of seed again. It should be born in mind that this generalisation is made without having studied seeds from Malargue, from Cuesta de Terneros near San Rafael, from Sierra Villicum, or from Pachaco, nor from any of the R542 collecting locations. Even seed from cultivated plants of ST 128 would add to the picture.

When we come to the question of flowers, we can at least latch on to the very distinctive urn-shape flower of P.bulbocalyx. In his description of P.megliolii, which also grows near Marayes, Rausch says the flower is narrow at the base and then opens out urn-like. This suggests that it is probably very similar to the flower on bulbocalyx. In this same description Rausch also says that P.marayense, which grows in the same locality, can be distinguished from P.megliolii by its fresh-green epidermis and paler flowers. In this manner he infers that P.marayes also has an urn-shaped flower i.e. of the bulbocalyx type. The Pyrrhocactus at Los Colorados were also identified as bulbocalyx (Chileans 45.p.158), although no firm evidence of flower form is available. Likewise information is lacking on the flower form of plants growing near 25 de Mayo and on the Lau 505 from Mazan. Will that information confirm that the smooth, shiny, black, bulbous seeds come from bulbocalyx type flowers? And conversely that the 'Austrocactus' type seeds come from more funneliform flowers with filament inserted most of the way up the inside of the tube wall?

Then we have the comment from R. Ferryman about the fruit on Pyrrhocactus either remaining soft and indehiscent or drying up and dehiscing at the base. (Chileans No.45 p.156). The former type is found on both bulbocalyx and marayense; does this type of fruit always occur on flowers with a bulbous tube and bulbous seed? Conversely do the Pyrrhocactus which have an 'Austrocactus' type of seed have fruit which eventually dries up and releases their seed from a basal opening? Do the plants grown by R.Ferryman under the name of strausianus, which have soft, indehiscent fruit, also have black bulbous seed and a bulbous flower? Did the bulbous flower of P.strausianus published in Buxbaum's Die Kakteen (reproduced Chileans no.45 p.170) come from a plant which produced bulbous black seed from a soft indehiscent fruit? Does the Pyrrhocactus from near 25 de Mayo or from Barranca de los Loros, which we know have 'Austrocactus' type seed, also have a funneliform flower and fruit which dries up and dehisces from the base? Is this how we start to identify the real P.strausianus?

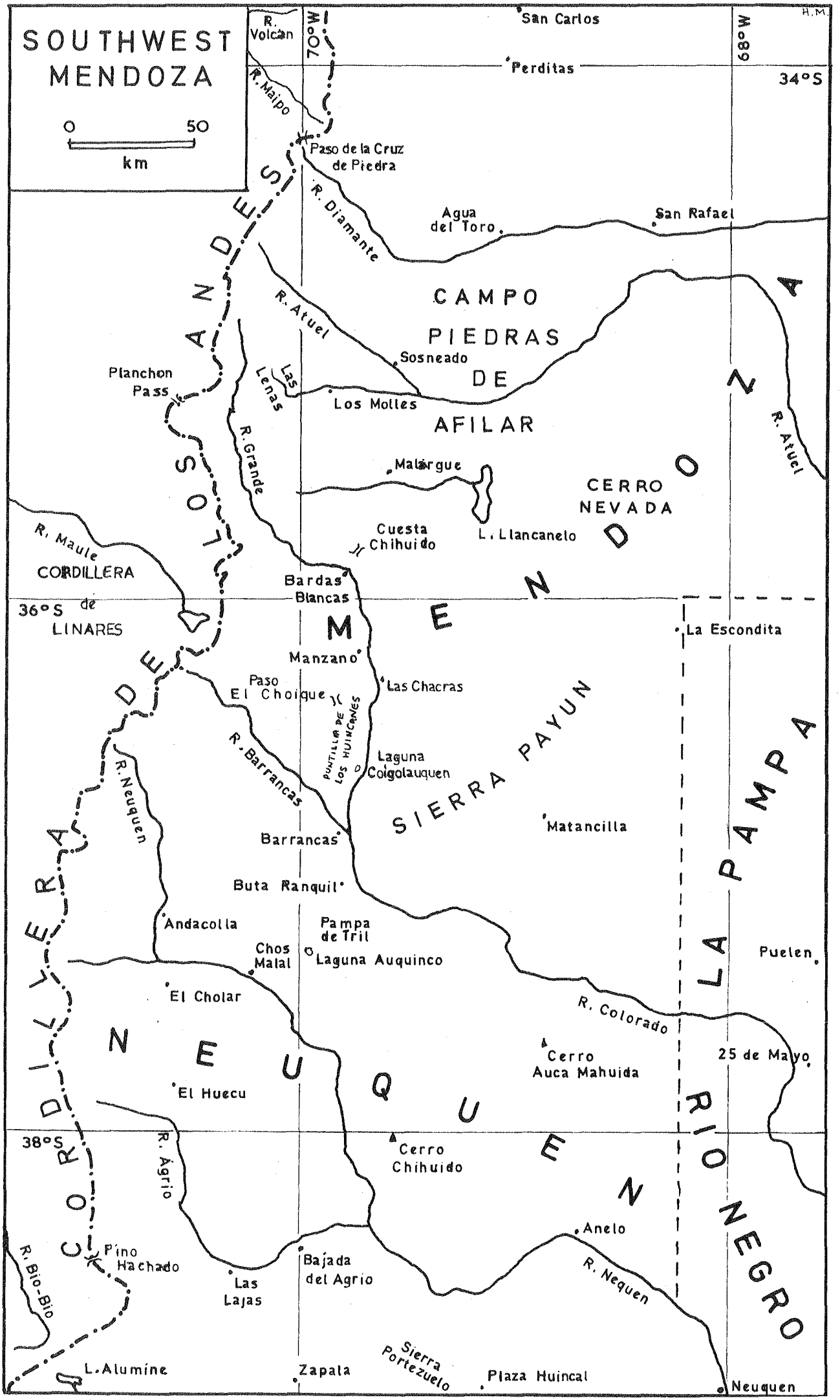
PYRRHOCACTUS - AT HOME AND ABROAD. **From D. Ferguson.**

I have been interested in the group which contains Pyrrhocactus for some time, as it seems to me to be the most primitive of the south american members of the subfamily Cactoideae. This group has relatively unspecialised rotate flowers and seeds which have the primitive trait of the micropyle being excluded from the hilum.

As a result of my trip to Patagonia in January 1988 I have come to the conclusion that there is only one species of Pyrrhocactus to be found southward from Mendoza city. This is a fairly slender, straightish-spined plant with 'Austrocactus'-type fruit. rough brownish seed, and a relatively large funneliform flower. The flower is grossly similar to the flowers on A.bertinii, but smaller and having a pale stigma. I have not compared stamen insertion, and do not doubt that it could be somewhat different. Several related genera are somewhat variable between species as to the presence or absence of the upper ring of stamens. In Ritter 'Kakteen in Sudamerika' 1980 Vol. 2 Fig. 269 & 270 he shows flowers on supposed P.catamarcense which are large and funneliform. These photos are of a plant from Potrerillos, near Mendoza, the type locality for P.atrospinosus, an absolute synonym of P.strausianus. I have seen the plants there in nature and they are a typical P.strausianus.

Pyrrhocactus strausianus is extremely abundant through most of Mendoza anywhere a rocky habitat occurs, but not high up into the mountains, for example at Mendoza, Potrerillos, Tunuyan, Paracitas, San Rafael, El Sosneado, Malargue, 25 de Mayo, and everywhere in between, mostly below about 5000 ft, elevation. It also occurs in the lowest parts of Neuquen, mostly near the rivers, such as at Barrancas. It is likewise found in northwestern Rio Negro province south to the vicinity of the R. Limay. It tends to occupy hotter, lower stations than Austrocactus bertinii in this region, but they are occasionally found together. For example, travelling south from Mendoza along highway 40, we passed through Tunuyan, San Carlos and Pareditas, About 30km south of Pareditas, at an altitude of some 5,600 to 6,000 ft., we found both P.strausianus and A.bertinii, together with Maihuenia, Pterocactus tuberosus, and Maihueniopsis darwinii, all growing in the same area. In the vicinity of San Rafael there were a few A. bertinii growing with the Pyrrhocactus and Denmoza. Even when they are growing side by side P.strausianus can be separated from A.bertinii. On P.strausianus the spines are never hooked, the spines are more slender, the seeds smaller, a slightly different spine arrangement, flowers smaller, pale stigmas. On A.bertinii the spines are sometimes hooked, heavier, seeds larger, flower larger, stigma reddish.

In the vicinity of San Rafael we met with Denmoza rhodocantha and a typical P.strausianus, in company with another species of Pyrrhocactus. These plants were very difficult to distinguish from young Denmozas and if there was no fruit, or it was not the flowering season, they would probably go un-noticed among the Denmozas. They have the typical Austrocactus-like fruit with large greyish seeds, but regrettably I was not able to get any seed specimens home with me. This plant grows to at least a foot in height with stems roughly 5 to 6 inches thick and although it is quite close to P.strausianus, yet I believe that it must be distinct. The largest plant of P.strausianus which I saw was perhaps 10 inches tall, and was at best still only about 3 or 4 inches thick.


SOUTHWEST MENDOZA
0 50
km
H.M.
70°W
68°W
34°S
36°S
38°S
R. Volcan
R. Maipo
San Carlos
Perditas
Paso de la Cruz de Piedra
R. Diamante
Agua del Toro
San Rafael
R. Atuel
CAMPO PIEDRAS DE AFILAR
Sosneado
Los Molles
Las Lenas
Planchon Pass
R. Grande
Malargue
CERRO NEVADA
L. Llancanelo
Cuesta Chihuido
R. Maule
CORDILLERA de LINARES
Bardas Blancas
MENDOZA
La Escondita
Manzano
Las Chacras
Paso El Choique
PUNTILLA DE LOS HUINCANES
Laguna Colgolauquen
SIERRA PAYUN
Matancilla
R. Barrancas
R. Neuquen
Barrancas
Buta Ranquil
Andacolla
Pampa de Tril
Chos Malal
Laguna Auquinco
Puelen
El Cholar
R. Colorado
LA PAMPA
Cerro Auca Mahuida
25 de Mayo
El Huecu
NEUQUEN
RIO NEGRO
Cerro Chihuido
R. Agrio
Anelo
Pino Hachado
Bajada del Agrio
R. Neuquen
R. Bio-Bio
Las Lajas
L. Alumine
Zapala
Sierra Portezuelo
Plaza Huincal
Neuquen
CORDILLERA DE LOS ANDES

The fruit which we set on Pyrrhocactus here in New Mexico falls into two quite distinctive categories. Firstly there is the fruit on P.strausianus R542. This fruit does not have a basal pore because the actual base of the fruit, the part which is actually attached to the plant, remains as part of the fruit, unlike Neoporterias where the loss of this part at ripening creates the basal opening. In P.strausianus, as in Austrocactus, the opening is more properly lateral, but near the base. The opening is somewhat variable, even on one plant, but usually consist of one 'U' shaped slit which has short lateral slit from each side of the base of the 'U'. From another point of view it might be described as an irregular, partially basal circumscissile slit with two slits running a short distance upwards from it. This leaves the base of the fruit hanging as a sort of ill-fitting closure. In nature, and here in our dry climate, this fruit is completely dry and somewhat brittle, although rather tough and firm. The seeds show no inclination to stay in the fruit, and in nature it can be very difficult to find any seeds, even if there are thousands of fruit about.

This type of fruit is always accompanied by the rough dull-coloured brownish or greyish seed, the funnel-shape flowers are off-yellow with pale stigmata, and the plants have spines which are straighter than those of the urn-flowered types, the centrals being very dark and the radials fairly light. These are the plants that I would consider to be all typical Austrocactus. The flower of R542 is not quite like that of other Pyrrhocacti, being structurally more like that of Austrocactus than any of the others. Our atrospinosus and Lau 582 also have this type of fruit, and spination, although the sculpturing on the seed of Lau 582 is a bit different.

The species with the smooth bulbous black seeds all have the little urn-shaped flowers, all bloom somewhat later, and all have the same soft, thin-walled,indehiscent sticky-pulped fruit, usually somewhat reddish, whilst the spines are all noticeably curved upwards, of variable colours but usually tan or light brown, occasionally deep brownish, but always all of a similar colour on any given plant. Young spines are obviously richer in colour and perhaps a bit darker. Flowers have pale stigmas. Within this group P.meglioli is somewhat different in having less substantial black spines, a bluish body, and red stigmas to the flower.

At the time of our visit, in January, it was perfect for collecting seeds as the fruit was just ripe and often ›t yet quite open. Unfortunately we lost almost all of the collected seed and data in customs at Miami on our return.

. . . . . from H. Middleditch

This information about habitat locations for both Pyrrhocactus and Austrocactus is really quite astonishing. In his *Kakteen in Sudamerika Vol.2* we find Ritter saying, about Pyrrhocactus, 'At one spot between the Rio Barrancas and Chos Malal in Neuquen Territory I noticed, whilst passing through in a truck, a dark-green Pyrrhocactus that seemed to be similar to P.platyacanthus but larger, stouter, and with longer, denser, golden-yellow spines . . .' Now we have D.Ferguson commenting that he. too, came across Pyrrhocactus near Barrancas. This is by far the most southwesterly point from which this genus has been reported (see accompanying map).

In August 1980 we heard from R.Kiesling that 'Austrocactus is common in the whole of Patagonia, as well as in Rio Negro, the east of Neuquen, and south Mendoza province.' At that time there were plants in cultivation in this country which were of DVV origins from the east of Neuquen together with recorded locations for Austrocactus in Rio Negro province. In the absence of other data supporting the statement by Kiesling that the distribution area for Austrocactus extended into the south of Mendoza province, it was tacitly assumed that the plant collected by Castellanos at Media Luna, between Tupungato and the Cordillera (BA 37006) was a Pyrrhocactus Berger. The northernmost location for Austrocactus quoted by D.Ferguson is 30 km south of Perditas, still south of Tupungato, but in the south of Mendoza province, as stated earlier by Kiesling. But now we see that the distribution areas for Austrocactus and Pyrrhocactus Berger overlap in the southern part of Mendoza province, a situation which was certainly not evident up to now from a study of available literature.

In using the name P.strausianus for plants coming from near Mendoza, D. Ferguson may be following the Britton & Rose misconception of P.strausianus. Or he may be assuming that the plants from Barranca de los Loros, the original habitat location for P.strausianus, will be virtually no different from the P.catamarcense Spegazzini 1905 which come from the mountain feet west of Mendoza and San Juan cities. But it would appear that D.Ferguson is not aware of the flower or fruit or seed on plants from Barranca de los Loros and in these circumstances it is difficult to see the justification for equating them with or differentiating them from P.catamarcense. Thus for the time being it may be advisable to suggest reading P.catamarcense for P.strausianus in the foregoing comments. It may also be as well to check if the collecting site of 25 de Mayo mentioned by D.Ferguson is the better known place of that name on the banks of the Rio Colorado not far from Barranca de los Loros, or the place of the same name situated a few km west of San Rafael.

. . . . . from A. Johnston

I do not have any Pyrrhocactus in my collection so I do not know the fruit, but from the descriptions given here of the fruit on Pyrrhocactus it does not seem to me to be a 'typical Austrocactus-like fruit'. I have no difficulty in getting fruit to set on Austrocactus and by the end of the season I can have two dozen or more Austrocactus fruits full of seed. They are practically all the same irrespective of the species. At the Chileans' Weekend I showed a slide of a unripe fruit cut in section. This showed the fairly thick walls of the fruit, the seeds very dark but still attached to the inside of the fruit wall by thick white strands. All this material dries up and by the end of the season no moist material remains. By that time the fruit has detached itself from the body of the plant but is held in place by the spines. There will be one or more vertical splits which come perhaps half way up the fruit, but this does not release the seeds. The fruit never has to be pulled off the plant, just lifted off, and even then the seed does not run out. The lower part of the fruit walls stand open like flaps; they are very tough, not brittle, and can be bent back and will regain their shape when released. There are numerous bristles sticking up out of the dead flower remains. The seed will remain in place if the fruit is handled carefully but it will come away quite easily when rubbed between the fingers, and it is not sticky.

So far I have not been able to acquire an Austrocactus under the name of bertinii, but the colour of the stigmas on the flowers certainly does vary from species to species. On A.patagonicus the stigma lobes are maroon; on an ex-Bulthuis plant of A.dusenii they are red; on the sp. Lago Argentino which came originally from Prof.Schreir in Germany, they are red; and on the plants with DVV origins they are yellow.

. . . . . from F. Kattermann

During my visit to Argentina I had a look round the vicinity of Marayes where I was able to collect a plant of FK-709 which is somewhat similar to bulbocalyx, for it has the many upswept pale grey-brown spines which envelope the whole body of the plant. It also has the typical small urn-shaped flower. But unlike P.bulbocalyx, the stigma on this plant is red. Of course P.meglioli has a purple-red stigma, but this species has a much more open spination and the body has a whitish coating, possibly similar to P.villicumensis. So I think that my plant of FK-709 could be P.marayense.

I will have to take a close look at the flowers and fruit on the Pyrrhocactus in my collection during next season in order to be able to comment accurately on any correlation between flower shape and fruit characters.

TEPHROCACTUS PENTLANDII - A SHORT STOR(E)Y?

. . . . . from Salm-Dyck, Allgem. Gartenzeitung No. 13, 1841.

Opuntia of low growth, jointed branches of bright green with elongate segments tapered at both ends with flattened tubercles, with scattered tubercles which carry corn or grain shape leaflets, rapidly deciduous, and small areoles, which are felted above and spiny below, with 4–6 slender, fairly rigid, whitish, spreading deflexed spines.

. . . . . from Salm-Dyck, Hort. Dyck 1850

[As above plus. . .] The stem of this strange plant extends to half a foot or more in age, with upright segments 1–2 inches long. Spines dainty, bristle-like, 6–10 mm long, deflexed, spreading, from pale yellowish wool felt gathered in the upper part of the areole. Habitat in the highest mountains of Bolivia.

Without flowers up till now.

. . . . . from Forster-Rumpler 1888

Habitat Bolivia, from high mountains. Stem low growing, 15 cm high, jointed, branching, bright green colour, segments 5 to 6 cm long, upright, thinner at the top, shallow tuberculations. Tubercles elongate with a corn-ear shape leaflet, rapidly deciduous, and a small areole with dirty yellow felted wool at the upper end and carrying spines below. Spines 4–6, slim, rigid, almost bristle-like, white, 8–10 mm long, spreading, deflexed.

. . . . . from K. Schumann 1904

[Latin] Low branched caespitose shrub, pale green becoming ash-grey green; segments ovoid to ellipsoid; spines usually nil below, above 1–2, puny, not everywhere.

[German] Shrublike, low growing, profusely branching from the base. Segments ovoid or ellipsoid, tapering above, terminated with an areole with pale yellow felted wool, spineless here, rounded below, pale green in new growth, later becoming greyer, tuberculated, up to 5 cm long and 4 cm at the greatest diameter.

Areoles reverse egg-shape, up to 2 mm at the longest diameter, clothed with sparse yellowish felted wool; together with an up to 3 mm long ovoid, pointed, deciduous leaflet. Glochids very small, yellowish. Spines 1–2, small scarcely up to 5 mm long, straight, awl-like.

Geographic distribution - In Bolivia, on the highest mountains - Pentland.

. . . . . from C. Backerberg, Die Cactaceae Vol. 1, 1958

With low growing stem (in old age a half foot high; presumably this is the 'stem-like thickened root-stock'); segments tapered both sides, tubercles shallow, elongate; glochids minute; spines 4–6, almost rigid, whitish, variously bent downwards, up to 8.5 mm long. The plants grow in small clumps. When grafted. . . . flowers. . . . Bolivia, found again by Frau Wilke north of Tupiza at 4000 m on the Pampa Mochara.

. . . . . from C. Backeberg, The Kakteeulexikon 1966

Body dwarf cushion, root thickened; segments small, globular to slightly tapered both sides; tubercles shallow; glochids tiny; spines 4–6, dainty, up to 8.5 mm long, whitish, variously bent downwards. Flower . . . Fruit red within, dry 1.2 cm long, deeply depressed on top, some spines above.

. . . . . from F. Ritter, Kakteen in Sudamerika Vol. 2, 1980

With Cumulopuntia pentlandii we have a species rich in forms regionally as well as locally, corresponding to its very widespread distribution without isolating barriers. Backeberg sought to bring order into this diversity by erecting an appreciable number of individual species names, but that is not really possible, since these forms intergrade so much from one to another that all segregation becomes arbitrary and identification on the basis of Backeberg's diagnoses is impossible. It has contributed significantly to this confusion that juvenile and abnormally-growing forms of Cumulopuntia pentlandii are quite different from the usual mature form. Backeberg considered such forms, which lacked the development of typical mature characteristics,as typical species distinctions. Furthermore plants of this species can retain their juvenile habit into maturity, especially in adverse conditions for development, but also from hereditary factors, so that typical mature distinctions, in particular with v.dactylifera, may often not be manifest even when it can be latent. [Criticism of Backeberg's 'species' which Ritter considers as vv. of pentlandii, and of Backeberg's groupings].

According to Salm-Dyck's description his Opuntia pentlandii can only be referred to a fine spined form of the types which have previously gone under this name. Backeberg falls into an error if he believes that this name must be included in another species, which I have described as Cumulopuntia rossiana. The data from Salm-Dyck of segments up to 5 cm long with shallow tubercles contradicts the Backeberg interpretation, as does the statement of 4–5 spines [sic], (an exception according to Backeberg's interpretation of this species name), which especially cannot then be correct, if the spines are only of 6–10 mm long, as Salm-Dyck states. This very short length must be regarded as an effect of cultivation. It is then comprehensible for pentlandii sensu Br. & R., not for pentlandii sensu Backeberg. Moreover it should still be borne in mind that this plant is among the first Bolivian cacti to be described, and that it comes from the most accessible area between La Paz and Lake Titicaca. Cacti from the habitat of Cumulopuntia rossiana came to the notice of europeans only at a much later date.

The description by Salm-Dyck was based upon only a single cultivated specimen; we will regard this - with some amplification - as the Type variety of the species pentlandii. The hummocks can be very dense to very open, the offsetting

takes place more sideways than upwards. The prominence of the tubercles on the segments is very variable, even the shape of the tubercles is variable, from more rounded to elongated. The segments shape is generally more markedly tapered above than below; roughly the lower half to the lower three-quarters of the segment is spineless. The spines are generally from 1 up to several cm long, normally not flattened; the thinner they are the more they are bent downwards, which becomes of particular significance in young specimens which have finer spines. Quite often the spines can even be completely absent, whilst at the same time the glochids are then more prominently developed. All gradations occur from multiple spines to complete absence of spines. In Backeberg Die Cactaceae Vol.I there appear 27 photographs under various species names, (here placed under pentlandii v. pentlandii, v.dactylifera, or v. colchana), which display the great breadth of variation in this species . . . . Where both v.pentlandii and v.dactylifera grow together all degrees of the forms are usually found so well intermingled that a perfect allotment to one or another variety is not possible for most specimens, such as for example those near Villazon - La Quiaca on the border between Bolivia and Argentina, and in many other places. They would both have been taken as varieties of a single species.

. . . . . from R. Kiesling, Darwiniana 25 (1-4) 1984

Hemispherical cushions, more or less compact, of 10–30 cm in diameter and 5–15 cm in height. Segments ovoid or elongate, of 3–4(-7!) cm in length and about 2 cm in diameter, with barely defined tubercles. located in the upper part of the segments, epidermis bright green. Areoles with the glochids distributed in a ring, pale yellow, wool-felt whitish or yellowish; the lower ones unarmoured, the 3–5 uppermost with or without spines. Spines mainly 1–3 per areole, divergent, in general curved towards the base, more above straight, horizontal to basipetal, rarely some erect, of 0.6 to 2 cm in length, of opaque yellow colour, becoming whitish with age, Secondary spines 2–4 per areole, adpressed, more or less flexible, of 3–7 mm, more or less disposed in pairs, whitish. Flowers with thick outer petals . . . with central part reddish and yellow margins, inner petals . . . . Fruit fleshy, indehiscent, deciduous, truncated ovate, of 1 cm in diameter and 2 cm long, red, with the flower scar and depression.

Distribution. The original description is short and does not mention the origin. In the amplified description of 1850, Salm-Dyck makes mention of 'the high parts of Bolivia'; in addition it is met with in Argentina, in the Puna of Jujuy. Material studied from Dept Yavi, collected by C. Hicken, by J. Shafer, by A. Castellanos and by R. Kiesling; and from Dept. Cochinoca, collected by A. Castellanos.

. . . . . from H. Middleditch

There is one plant of the hummock-forming sort of Tephrocactus which must have been growing in my collection for well over ten years as it is now occupying a twelve inch diameter pan. After it was pointed out to me that the spines only grew from the upper areoles on each segment I realised that this was apparently a common feature of many of the hummock-forming Tephrocacti. We have seen habitat slides at the Chileans' Weekends, from R.Kiesling, from J.Lambert, and from R. Ferryman, of hummock forming Tephrocacti that had segments packed very closely together indeed, so much so that there was little or no room for spines between the segments. As a result, the spines had little alternative but to grow where space was available, that is upwards and outwards from the upper areoles of the new segments, just as they do on my own largish plant. On this account I am puzzled by the part of Salm-Dyck's description in the 1845 Allgem. Gartenzeitung which describes the areoles as 'felted above and spiny below'. Why should it be the lower areoles which are spiny? Or did Salm-Dyck mean something else by this turn of phrase? Although the precise wording is not identical in the description of this feature by Forster-Rumpler, the same sort of question arises.

There is also a point of translation which bothers me. The original latin description includes the words 'utrinque attenuatis' in reference to the segments, which literally means attentuated on both sides. There can hardly be 'both sides' to a segment of circular section! In his Kakteen in Sudamerika Ritter renders this in german as 'beiderseite verdunnten', which again means literally, attentuated on both sides. Backeberg uses the expression 'beidseitig verjungt' which literally means tapered both sides. It is also unclear whether Salm-Dyck's 'attenuatis' can justifiably be related to Lindley's definition of 'Attenuate', which appears in Stearn's Dictionary of Botanical Latin pp.330–331. I suppose that one could go along with Backeberg and stretch the meaning of both 'attenuatis' and 'verdunnten' to mean tapered. But how about the 'both sides'?

Backeberg follows the general drift of previous descriptions but interjects his comment about the stem previously described as 'half a foot high in old age' presumably being the stem-like thickened root-stock. It has already been noted in Chileans No.45 that a lengthy thickened rootstock is to be found on fairly small plants of the hummock-forming Tephrocacti, Even cuttings which consist of only one or two segments quickly generate a thickish taproot. In the wild a rootstock half a foot deep would occasion no great surprise on even a small or young plant. Backeberg latches on to this fact and provides illustrations of hummock forming Tephrocacti with markedly thickened rootstocks of half a foot or more in length. However it does seem much more probable that Salm Dyck meant what he said and it was the stem that reached half a foot high in age. Having misdirected himself in this way, Backeberg then selects those Tephrocacti which possess an especially stout rootstock, to carry the names pentlandii, pentlandii v. rossiana, and pentlandii v. fauxiana. If it is accepted that these represent a group of plants which can be distinguished from the rest of the hummock-forming Tephrocacti, then the Ritter name of rossianus may be a convenient identification here.

In the Kiesling description for pentlandii one of the features most obviously different from boliviana or glomerata is the size of the cushions or hummocks. Kiesling gives a hummock size for both glomerata and boliviana of one metre high and a diameter of one metre or more; for pentlandii he gives a height of 5–15 cm and a diameter of 10–30 cm. A virtually hemispherical shape is attributed to boliviana and glomerata, a much smaller and lower cushion form is attributed to pentlandii. Backeberg also refers to pentlandii as a 'dwarf cushion', but pentlandii sensu Backeberg includes, and is possibly weighted towards rossianus which by all accounts is indeed a dwarf cushion. Ritter quotes no size for the pentlandii hummock, but merely says that v.dactylifera 'makes a larger hummock than pentlandii, hemispherical', thereby inferring that his conception of pentlandii may have a low hummock. But how low, and how small? In the original descriptions by Salm Dyck, O.pentlandii is said to be 'half a foot and more' in height, O.boliviana is said to be 'a foot or more' in height. From Salm-Dyck, from Backeberg, from Kiesling, and from Ritter, we gather that pentlandii has the shorter storey.

Unfortunately Kiesling does not appear to have had any opportunity of travelling in the Tephrocactus growing area

of Bolivia and so he will not be familiar with the Tephrocacti there. Nor is he likely to be familiar with typical hummock sizes in the part of Bolivia from which Pentland made his collections. On the other hand, Ritter has travelled up and down and across Boliva on many occasions and he will very probably be familiar with the Tephrocactus growing area in which Pentland collected.

However, Ritter is far from clear in his brief statements about the size of hummock attained by the Tephrocacti in Bolivia. We are still left with the question, how relevant is the dwarf hummock form quoted by Kiesling and Backeberg to O.pentlandii S.D.?

TEPHROCACTUS PENTLANDII. **From J. Iliff.**

Your questions about Opuntia pentlandii are important. For a start, I would like to get a firm foundation in the shape of Salm-Dyck's diagnosis and I do have certain reservations about the translation. I would prefer to rely on the latin, which is I believe identical in A.G.Z. and in Cact. Hort. Dyck. Now 'utrinque attenuatis' literally means 'tapered on both sides' but in the present context refers to the shape of the segments and must of course be understood as meaning 'at both ends'. There is a frequent german term 'beidenseite' which with these plants must obviously be understood in the same way. 'Plano-tuberculatis' is a neat phrase for which there is no compact English alternative: I suggest 'levelled-out'.

Now 'tuberculatis remotis' is perplexing. It hardly seems possible that the tubercles could be remote or distant on such a small segment. This is a good example of Salm-Dyck's obscurity and imprecision. He is very painstaking but seems to have a gift for obscuring essentials and magnifying inessentials. Obviously something caught his fancy and he does not see that it needs further explanation or measurements to be given. In theory it could be taken to indicate tubercles with divided margins and areas of flat segment-surface between them, but I do not think that that can apply here. It is a rather perplexing point, but we should remember that his repertoire of comparisons was much smaller than ours. My guess is that he is making an implied comparison with another plant (very probably O.glomerata) upon which the tubercles, and therefore the areoles, are more closely set.

The whole question of phyllotaxis is neglected and may, I think, be important. There were some very interesting colour prints of Tephrocacti which were on display at your Chileans' Weekend and one of these was of a plant numbered 2176 which was practically etuberculate, Plants of this type are quite common in collections and are, I feel, representative of O.pentlandii. On the two segments which are visible on this photograph I can count 6 and 9 visible areoles which would suggest totals of about 10 and 14/15 respectively. You might try counting the areoles on this plant and taking an average - my guess is that it would be somewhere between 12 and 15. By comparison, O.glomerata, especially of the kind identified as 491 in the photographs on display at the Chileans' Weekend, can easily run to over 20. Thus on O.pentlandii the areoles which mark the centres of the tubercles could perhaps be said to be more distant, given the size of the segments, than they are on some other plants. I am not pretending that this explanation justifies the expression used by Salm-Dyck, I am only trying to think why it should have been used at all in the first place.

I will leave the diagnosis for a moment in order to consider your question about the distribution of the spines. I think it can be taken as axiomatic that in all these plants when the branching is very tight and dense, the spines are confined to the upper areoles. They would be self-destructive otherwise! In the original Salm-Dyck diagnosis 'Spines below' undoubtedly means in the lower part of the areole, not in the lower part of the segment. It is true that in theory spines will arise symmetrically about the growing point of the areole, together with hairs, just as leaves do, and might thus be expected to stick up in the midst of the hair. Indeed there are many plants where this happens. But Buxbaum in his 'Morphology of Cacti' Vol.1 p.13 column 1 gives instances where there is gradual development of the areole on the abaxial side (the side away from the stem axis), causing it to elongate. (In this context, the word 'symmetry' in line 13 must clearly be read as 'asymmetry'). The spines then tend to be concentrated in the lower (outer) part of the areole. This seems to be particularly so in Opuntia. Doubtless it is connected with the tendency for the glochids to be concentrated above. There is a good photo of this in the same publication on p.15. If then, as in O.pentlandii, the spines have a tendency to be deflexed as well they are very likely to emerge at the lower margin below the wool, as Salm-Dyck observes.

Returning to the diagnosis, I have left one phrase till last, 'articulatis elongatis'. I discount this expression completely. I am convinced that it records an artifact of cultivation. Salm-Dyck himself implies that he has observed the result of some years' growth in cultivation and I have established from my own specimens that this biotype is one of the most susceptible of all to elongation in cultivation. I have had two separate specimens both of which arrived with literally globose segments and whose new growth in both cases assumed proportions of about 1 to 4. I imagine that this means the plant reveals its cylindropuntoid ancestry very easily. I am surprised to hear of Roberto Kiesling recording segments of up to 7 cm and it may be that it has occasional elongate growth even in habitat, but I think there is no doubt that the typical form is globose. I am even more surprised that Ritter does not spot this obvious misunderstanding on Salm-Dyck's part (he is keen enough to expose cultivated characters elsewhere) but uses the 5 cm length as a stick to beat Backeberg with.

. . . . . from H. Middleditch

It must surely be accepted that unless we make an effort to understand clearly an original description, then we lack a common basis for identification and comparison. This is not always easy with an early nineteenth century publication, as has already been noted in these pages on more than one occasion. The foregoing comments shed helpful light on certain aspects of the original diagnosis by Salm-Dyck, but obviously J.Iliff finds himself perplexed by the term 'tuberculis remotis'. Yet he provides a clear indication how this may be clarified - by considering the repertoire of material available at that time for comparison.

Let us try and put ourselves in the position of Salm-Dyck in the year 1841, writing his description for Opuntia pentlandii. This plant is formed of a series of connected segments, in a similar manner to the series of pads well known on platyopuntia at that time, so he tells his readers that. The dwarf leaf, rapidly deciduous, at the edge of each areole, is a fairly novel feature for cacti known at that time. Salm-Dyck is sufficiently observant to add the detail of the spines appearing at the

lower part of the areole, again a somewhat uncommon (if not unique) feature among the cacti known at that time. What else was a novelty that he would wish to mention? Wipe all the later discoveries out of your mind. Among the cacti known at that time were some Gymnocalycium, some Echinopsis, some Melocactus, all with a well defined pattern of ribs and with areoles set along them at regular intervals; also known were some Mamillaria with an equally well defined and regular pattern of tubercles; there were cereiform plants with distinct ribs and regularly disposed areoles; as well as flat-padded Opuntias with areoles distributed in most cases so regularly that you could join up all the areoles with two sets of criss-crossing parallel straight lines. Then for the first time you see a Tephrocactus. What is it that strikes you about the disposition of the areoles? What sort of regular pattern do they follow? But of course they do not seem to be laid out in a nice neat regular pattern; they are closer together at the top of the segment and become further apart the further down the segment they occur.

Salm-Dyck could have said just that: but in those days such explicit terminology was unheard of - the short, sharp, phrase was the done thing, not greatly unlike the description used for identification prior to this new-fangled binomial system that had been introduced by Linnaeus. How would you have described this non-regular areole distribution in few words - in two words? 'Tuberculis remotis'? My classical latin dictionary certainly gives 'remote' or 'far away' as a meaning for remotis, but Stearn's Botanical Latin dictionary gives 'scattered'. Scattering does not produce a regular pattern. By comparison with the other cacti known in 1841, which all possessed a regular pattern of distribution of the areoles, were the areoles on this very early Tephrocactus 'scattered' in a non-regular pattern? Was this phrase particularly used to distinguish areole disposition from Mr.Haworth's T.glomeratus with its 'Areolae ordinariae' - which my Latin dictionary tells me is 'according to the usual order'.

I tend to get the impression that rather than Salm-Dyck being obscure and imprecise in his description of O.pentlandii, he confined himself to those features which positively distinguish this plant from others known at that date, It is our misfortune that this description does not separate whatever plant Salm-Dyck had for reference from the broad range of Tephrocacti that we know today - or possibly we should acknowledge, those that Ritter knows better than anyone else. It may help slightly if we knew the area from which the original plant was collected; Schumann states for geographical distribution 'In Bolivia, from the highest Cordilleras: Pentland'. I take this to mean that the plant was brought back to europe by Pentland. In which case, whereabouts did Pentland travel in Bolivia?

ON THE GENERAL OUTLINE OF THE BOLIVIAN ANDES **By J. B. Pentland.**

Journal of the Royal Geographical Society 1833.

At the period of my journey (1827) . . . the western cordilleras offer several snow capped peaks, well known to navigators who sail from Cobija to Arica. I have no precise data on the western cordilleras between the parallels of Ancomarca (17^0 32') and Arequipa (16^0 24'). I visited Arequipa during October and November of 1826 . . . I have not visited any part of the Andes between Arequipa and Lima . . . The limits of the great mountain depression embracing the valley of the Desaguadero and the celebrated Lake of Titicaca extends . . . to Concorde at 19^0 30' in the south . . . . Owing to the total want of boats, other than the rude canoes of the natives, I was not able to obtain deeper soundings than 120 fathoms .. in the Lake of Titicaca. . . . I determined the longitude of the city of Cochabamba . . . In the parallels of 19^0 and 20^0 I determined the longitude of Tarapaca and Chuquisaca (Sucre, H.M.).

A few observations upon the limit of perpetual snow in the Andes between 15^0 and 20^0 latitudes . . . [to the south] the lowest patches were 1500 feet higher than at the pass of Los Altos de Toledo. I have had occasion to determine the height of snow on the extinct volcano which towers over the village of Tacora . . . On the eastern cordillera observations were made on Illimani . . . the road from the port of Cobija to Oruro and La Paz crosses the western cordillera near where some snowy peaks rise upon it . . . the season prevented me examining the nevadas of the provinces of Carangas, Atacama, and Lipez. . . . . from H. Middleditch

The mention of the line of peaks that are visible when navigating along the northern coast of what is now Chile would suggest that Pentland went to Bolivia by sea, the accepted method of the day. The references to Cobija and to Tacora suggests that Pentland also used the well established routes from the coast into Bolivia. The reference to the Altos de Toledo suggests that he used this old mule route to Arequipa when he visited Peru.

Pentland was secretary to the consulate-general in Bolivia from 1827 and consul-general from 1836 to 1839; he read the above paper to the Royal Geographical Society in London in March of 1835, so he would be involved in more than one journey into and out of Bolivia. In addition to the area around La Paz where he was stationed, it appears that Pentland also visited Sucre and Cochabamba; this would involve using the old-established route from La Paz to Oruro and on to Potosi. It might be conjectured that the original Opuntia pentlandii came from within that well-travelled stretch of Bolivia. It is reasonably certain that Pentland did not travel into the Otavi-Cotagaita-Tupiza area, which was indeed only visited at a much later date by europeans, exactly as Ritter states.

Knowledge of his first posting to Bolivia would probably be confined to Pentland's own circle of acquaintances. After he had given the lecture to the Royal Geographical Society in 1935, Pentland's name would be far more widely known and in all probability the fact that he would be returning to Bolivia would also be known to many more people. He may well have been approached to obtain specimens of plants whilst he was on his second posting. If indeed he brought some cuttings of Tephrocactus back to this country in late 1839 or early 1840, one of them could have got to the ears or eyes of Salm-Dyck in time to be put into print in the Allgem. Garten. Zeit. in 1841. Thus it seems to be quite probable that Opuntia pentlandii was originally collected by Pentland on or near the eastern margin of the altiplano somewhere between La Paz and Potosi.

Do we suppose that the references in the original descriptions to pentlandii being half a foot high and bolivianus being a foot high was simply due to the size of the particular specimens that came to Salm-Dyck's acquaintance? A more compact clumping form from Bolivia is equated to pentlandii by Ritter, whilst the markedly compact clumping form which can be called rossianus does occur in the part of Bolivia which was not visited by Pentland. A compact clumping form is evidently also found in northernmost Argentina (a southern extension of the part of the Bolivian altiplano not visited by Pentland) where again it was equated to pentlandii by Kiesling. Does the compact clumping form which is Kiesling's conception of pentlandii

have anything to do with the original plant collected by Pentland and described by Salm-Dyck?

. . . . . from J. Lambert

On my visits to Argentina I found Maihueniopsis bolivianus to be quite common at high altitudes, such as on the road above Purmamarca, the Cuesta de Capillitas, the road above Cachi, at Abra El Infernillo, in the Quebrada de Humahuaca, etc. It is quite a variable species, especially in the colour of the spines; its local name is 'puscaillo' above Tilcara. Maihueniopsis pentlandii not only makes smaller and lower hummocks, but the segments themselves are smaller, the spines shorter, and the outside tepals of the flower are strongly tinged with red. In M.bolivianus only a few smaller plants have flowers with this feature; apart from this, the flowers in this species are completely yellow.

. . . . . from F. Ritter, Kakteen in Sudamerika, Vol. 2

Cumulopuntia pentlandii. Flowers . . . . petals deep citron yellow or golden yellow, paler towards the base . . . the outermost petals with red.

. . . . . from R. Kiesling, Darwiniana 25 (1–4) 1984.

Maihueniopsis pentlandii. Flowers . . . exterior petals with central part reddish, margin yellow; interior petals yellow.

. . . . . from R. K. Hughes

It was as a part of a package tour to Peru in 1978 that I made a short trip from Puno on Lake Titicaca to visit Sillustani. This place consisted of a stone building situated on a small hill which forms the head of a peninsula jutting out into Lake Umayo. The surroundings were used as grazing and not far from the building I came across some hummocks or mats of Tephrocactus, from which I was able to remove a few segments which subsequently came back home with me. Within the stone hut there was not only examples of pre-inca stonework, but someone had actually planted a few segments of what I suppose would be this same Tephrocactus. Of course in the greatly reduced light they had grown terribly etiolated, so long in fact that they looked like Opuntia cylindrica.

Of the segments which I brought back home with me, three grew well, just like typical Tephrocacti. From my own observations near Sillustani I would regard 2in. as a typical length of a segment, although segments of 3in. in length are not abnormal, but only rarely did I see a segment reaching a length of four inches. One of the segments which I brought back with me has extended to 4in. tall, like a very elongated joint. Two plants left in 70mm square plots have grown more elongated still so that they look more like Backeberg's illustrations of Tephrocacti with cylindrical joints. Yet another one managed to get its root out through the drain hole in the pot and into the peat below; this one grew very long indeed and drooped over before I had discovered where its roots had got to, so I eventually beheaded it. So there is no doubt that these plants will produce very untypical growth if they do not receive suitable conditions.

. . . . . from H. Middleditch.

It is suggested by J. Iliff that the number of areoles per segment may be a useful aid to identification, but this would only be so if the figure was consistent, or reasonably so, on any one plant. In order to examine whether this was the case, I picked out four of my Tephrocacti where it was possible to get a felt pen between the spines and put a mark against each areole on three segments per plant. By marking each areole in this way as it is counted it does not matter if you turn the plant and in so doing lose sight of the areole you have just counted. The results were as follows in areole count per segment: a seedling raised RKH 10 from Sillustani - 25,24,27; a collected sp. ex Kiesling from Arrequentin - 27,26,26; a large plant bought on the Riviera in 1962 - 15,14,16; an unknown sp. which may be aff. darwinii - 22,28. From this I would be inclined to accept, for the time being that areole count might well exhibit some degree of consistency on a given plant. A cutting from R.Ferryman of a Tephrocactus collected near Cuesta del Diablo, north of San Pedro de Atacama, tends to give the appearance of a piece of Pterocactus because of the number and closeness of the areoles, so it would not be surprising to find a larger areole count than any of the foregoing. It turns out to be 55 areoles on one segment which is just over one inch in length.

. . . . . from R. K. Hughes

Although counting areoles is a difficult task and is also probably pointless on a very variable species, I have tried to do this on a number of plants. First of all, segments which are packed tightly together may have hidden areoles within the contact area, so it is quite possible that the higher counts may be the more accurate. However, I also noticed that some smaller, less mature looking segments had more areoles than some of the mature ones! Secondly, elongated segments had double or triple the number of areoles counted on typical segments, which would indicate two or three years of growth with a growing point, as occurs with seedlings.

Of my thirteen plants which I would class as Tephrocactus dactylifera, from Puno and Sillustani, eleven were grown from collected seed, the others from collected cuttings. Presumably these would be classed by Kiesling as Maihueniopsis bolivianus (S.D.)Kiesling. Areole counts (excluding elongated segments) were; RKH 10, three plants, 18,20,19,17; 20,20,20; 20,18,22,29,33; RKH 11, four plants, 18,19,17,19,19; 22,22,23,24,25; 19,18,19,23; 22,16; RKH 12, three plants, 19,21,21,21,21; 25,21,22,27,24,23,24; 17,14,15; RKH 58a 14,15; RKH 78b, 17,18. The spineless RKH 129 from above Chivay: 24,22,21,29,22.

DIGGING UP WHICH TEPHROCACTUS? From F. Vandenbroeck.

During the course of 1988 we were able to make a trip to Bolivia. Immediately on our arrival we ran into a piece of bad luck; even though we had done all our previous travels in south america with the same credit card, it was not acceptable in Bolivia. But Bolivia seems to be different. Although the delay whilst we were waiting for funds could have been frustrating and exasperating, we were able to hire a 4WD Ford pick-up at a reasonable price, as well as obtaining the services of a young taxi driver who undertook to do the whole travel with us as driver and mechanic. He turned out to be quite capable. As most of the roads we used not only wind, climb, and verge on precipices, but are also in such an abominable state, I would not have had the energy to drive and to search for plants amidst the spiny bush and under a scorching sun. So it turned out that we

were lucky to have had a driver.

The period in which we were in the country, during July and August, is not always the best for finding plants in flower or fruit. We found a fair number of cactus species but many plants had withdrawn into the ground, or looked shrivelled up, or were laden with dust. During the seven weeks we were there the sun was scorching in an absolutely speckless sky, every day except for two mornings when for a few hours there were some clouds. Our tour started and finished at Santa Cruz but we spent most of our time in the highland areas. From Tarija we went to Escayachi, from where we travelled to Villazon on the border with Argentina, and back. Then we went via Cieneguillas to Carreras, thence north to Camargo. From here we went over to Cotagaita and back to Camargo.

From Camargo we started off northwards along the main road which goes via Otavi to Potosi. Between Padcayo and Otavi we passed through the tiny hamlet of Lecori, where there is a hotel and restaurant that is good by local standards. Lecori is on the verge of the altiplano, where the plains consist of fairly level ground and extensive flat areas with only a slight slope. Low hills and ridges abound, seldom rising more than 50 m above the plain, some sloping gently down to the plain, some falling more steeply. The main road, a track from which the larger stones had been removed, winds up and down and round the hills and ridges, missing the steeper slopes. For many kms in all directions there are no mountains towering up above the general level of the hilltops. An occasional introduced eucalyptus tree can be seen, often quite some distance away, rising above a patch of plain. Here and there a quebrada cuts a winding trench across the plain, usually quite narrow and steep sided, seldom more than ten or twenty metres deep, almost always dry. The ground is mostly grit with not infrequent stones, but little or no sand, and quite firm.

Before we reached Lecori (and nowhere else) when we had stopped to look at the Weingartias, we came across a few plants - ten at the most - of a Tephrocactus whose clumps remain very flat and the plant bodies hardly project above the ground. The segments are more or less globular but covered with tubercular humps. The spines are flattened about 30–50 mm long and in new growth are divergent, a golden yellowish brown colour. With age they become white and also spread out like a star so they look as though they are pressed close to the body where they emerge from the areole. Only the topmost two or three areoles carry any spines, the rest are spineless. The topmost areoles have four or five spines and the next lower areoles have two or three spines. I consider it to be Ritter's Cumulopuntia rossiana, as his description conforms fairly well to the plants as I saw them. Here we did succeed in digging up a typical young specimen, which proved to have a long, thick, cylindrical tap root. We also found a number of dried up fruit pods and the seeds within were a wrinkly black.

CUMULOPUNTIA ROSSIANA Ritter comb. nov Kakteen in Sudamerika. 2. 1980.

Translated by H. Middleditch.

Synonym — Tephrocactus pentlandii v. rossianus.

Tephrocactus pentlandii sensu Backeberg.

The following description is based upon specific identifications:- dense clumps with basal and sideways branching and with long cylindrical hard swollen rootstock. Segments globular to ovate, usually 10–40 mm long and 10–25 mm thick, dark green, now and then reddened in the sun, distinctly tuberculated.

Tubercles roundish to somewhat elongated, large, several mm high, becoming flattened towards the base of the stem, only 5–7 tubercles on one stem cross-section. Areoles white felted, on the tubercles, round to oval, increasing in size towards the end of the stem, 1–4 mm diameter; bunches of yellow glochids; deciduous pointed or stout triangular green scale ca. 1 mm long. Spines usually bent sharply downwards, however near Iturbe Prov. Jujuy usually straight, spreading, or only slightly bent; the lower areoles spineless, most of the spines in the upper areoles yellow, less often brown or almost white, 1–6, rigid, sharp, thick needle-shape, round to fairly flattened, 1–5 cm long, in addition more often a further one or two tiny spinelets; on clumps with very small segments the spines can also be shorter and finer, rarely entirely absent or only isolated ones developed. Flower . . . . . Filaments golden yellow, pale yellow, carmine or reddish brown, paler below, . . . Flower petals varying considerably in colour according to the locality, pale yellow, golden yellow, orange, brownish orange, brownish scarlet to carmine or ruby coloured, the colour tint becoming more yellow towards the base . . . Fruit often seedless, when with seed usually 1–2 cm diameter, spherical, occasionally broader than tall, yellowish red or more reddish, with or without a green tinge, paler below, faintly tuberculated; depression at crown a few mm deep, a few areoles on the upper half of the fruit, tiny, white, numerous areoles around the rim of the depression, O.5 mm diameter, deciduous scales 0.5 - 1 mm long, reddish brown; areoles often with pale glochids, occasionally with a white or pale brown, often downward curved slender spine; fruit interior not fleshy. Seeds black near Culpina, blackish brown at Iturbe, or yellowish brown at San Antonio, appearance varying very appreciably regionally; fairly globular, 2.5 to 5 mm diameter, exterior irregularly bulged into large humps, the bulges can reach up to nearly 1 mm high (thus near Culpina), at many places the bulges are weakly developed. In contrast to the other Cumulopuntia species with which I am familiar, the arillus hoop is flimsy and very tortuous between the humps and it often becomes outwardly imperceptible.

The type locality was given as Huari-Huari by Backeberg. It was found by me in many places between Yamparaez, Prov. Sucre, and Iturbe in Prov. Jujuy, at elevated locations from about 2800 to 3800 m. Now and then a natural hybrid with O.pentlandii is to be found, which displays its hybrid nature in the seed as well. FR 892 and FR 892a, the latter from Iturbe.

As the seed specifically proves, this species occupies a special position within the genus Cumulopuntia. The flimsiness of the arillus ring on the seeds as well as the robust and large tuberculation of the stem and the green colour unites it well with the pronounced short forms of Austrocylindropuntia; in other respects however this species displays a typical Cumulopuntia habit. It is to be supposed that it is a relict of the transition area from Austrocylindropuntia to Cumulopuntia. Despite the great variability of these seeds, the tuberculated seeds are a youthfully acquired special characteristic of this species.

. . . . . from H. Middleditch

The slide taken by F. Vandenbroeck and reproduced on the front cover would be about seven or eight inches (190 mm) across the body but it would only project barely two inches above the surface of the ground. About a foot of post-like root has been unearthed with the plant. The segments are approximately globular, some 30 or 40 mm thick, with very humped

tubercles.

Only the uppermost two or three tubercles on each exposed segment carry spines, three (-4) robust spines, flattened, brownish yellow when new, soon becoming greyish white, sharply bent as they exit from the areole so that they lie more or less tangential to the segment.

My own plant of what I imagine to be Tephrocactus rossianus is in a 3in. square pot (but I labelled T.atroviridis, which it is not), and the individual heads are only 8 to 12 mm across. By comparison with other Tephrocacti the segments on this plant are so short and squat that I tend to call them cubical. An areole count gives 12, 11, and 11 per segment. Because so many of the segments are literally up against each other it is quite impossible to see (and count) all the areoles on many of the segments. Apart from spinelets, there are decent spines in only the top 2,3,or 4, areoles and only on the two uppermost segments are there spines on five areoles.. One main spine per areole up to 12 mm long and up to two further shorter spines. all yellowish, flattened, tapering, initially growing almost upright but shortly turning to lie close to the body.

. . . . . from A. C. J. Hall

The plant which you describe with almost cubical segments sounds like a plant that is illustrated in Die Cactaceae Vol.1 as T.pentlandii v. fauxianus, or possibly v. rossianus. The plant has sunken areoles, ash green-grey epidermis, and glochids only on old segments. The spines are usually in pairs but occasionally 3, stout and often tight to the body. It does flower, with a yellow flower about 20 mm in diameter with fairly hairlike spines 20 mm long on the ovary and tube. Of the colour prints of my Tephrocacti which were on display at the 1988 Chileans' Weekend I would think that both 910 and 1095 fell into the category of v.rossianus.

. . . . . from J. Iliff

I am less familiar with this sort of material so what I say will be more off-the-cuff. I think that I can count 4 visible areoles per segment on the print of 1095 so this would suggest a total of about six per segment. The very protruding tubercles and the glaucous green epidermis are rather against it being in line with the original Salm Dyck material for pentlandii. In my own mind I would particularly connect this material with pentlandii sensu Schumann precisely because of the tubercles and the colour.

In this case I would be stuck for a name for it. The trouble is we have no word for a shape which is hemispherical (or nearly so) underneath and having a fairly sharp hummock on top. Actually only those segments which have one predominant tubercle on top are like this. Some have two. I think on balance that it is fair to call the segments of 1095 globular. I tend to use the word 'globose', hoping that it is a bit more non-commital. The O.E.D. says this means 'spherical or nearly so'.

All I can say for certain is that the O.pentlandii which I collected in the high pass on the main road south of Abra Pampa is near to 1095, although it has a higher areole count, an average of 14.5. It had seeds which displayed a somewhat verrucose surface and contorted ridges, approaching those of O.chichensis but smaller and more compact, and thus very different from the smooth regular seeds of O.boliviana. We were told at the time that that the name of this pass was 'Abra Azul Pampa' but this does not appear in any map or gazeteer.

. . . . . from H. Middleditch

The place name of Azul Pampa appears on the map of Quebrada Humahuaca which was made available at our 1988 Chileans' Weekend. It is located between Iturbe and Tres Cruces. According to Ritter the distribution of Cumulopuntia rossiana extends as far south as Iturbe, so on a geographical basis only, the plant noted by J. Iliff at this location could have been rossiana. At the northern end of the distribution area quoted by Ritter, there is a Tephrocactus pentlandii HS95 from Yamparaez.

. . . . . from W. Gertel

Yes, there is a Tephrocactus on the Heinz Swoboda field number list, HS95 from Yamparaez. We might even have seen this already ourselves in 1986 when we found a very nice Tephrocactus near Lloques which is in between Sucre and Yamparaez. It carried a dark brownish-red flower. When we pass that way in September I will look out for it again.

. . . . . from G. Charles

Yes I do have a plant which may possibly be the same sort as that unearthed by Vandenbroeck in Bolivia. It carries the label Tephrocactus viridis and I have seen it in other collections under the name pentlandii. The segments are pretty small as Tephrocacti go, and they could indeed be described as hummocky globular. The overall appearance of the plant does seem to fit the descriptions for Cumulopuntia rossiana. I acquired this plant several years ago from a collector at Wolverhampton who was not enthusiastic about his Tephrocacti and kept them under the staging. They were all a bit tatty. He did not need a great deal of persuasion to part with this particular specimen, which was in a 6 or 7 inch diameter pan. It was kept for quite some time on my top shelf, fairly close to the glass. When the new centre bed was ready, it was planted out with a free root run and has never looked back since. It is at the south end of the greenhouse where it gets plenty of sun.

The plant forms a hummock just over a foot across and about six inches high. It must have well over a hundred segments, if not a couple of hundred, which will be about 15 mm across. The segments are packed so tightly together that there are no gaps to speak of between one segment and another. This makes it impossible to make an areole count on any of the segments. There will be only three or four areoles on each segment which remain exposed above soil level. The areoles are rather unusual as they give the appearance of being a slit with little or no areole wool or glochids. Not all the exposed areoles carry spines; usually there are but one or two spines per areole, which lie back against the plant. There have been no flowers so far.

GYMNOCALYCIUM SCHICKENDANTZII By J. Lambert.

Abstracted from commentary given at Chileans' Weekends.

When I announced my intention to make a trip to search for cacti - and more specifically for Gymnocalycium - I was warned not to engage in this kind of expedition without extremely precise information about the habitat location of the species, which was to be obtained from experienced field collectors. Valuable help was indeed provided by some of those, especially by J.Piltz, but if an itinerary was restricted to revisiting localities already prospected, this would automatically exclude any discovery, not only of possible new forms, but also of a better understanding of the distribution area of a given species.

Many older descriptions of Gymnocalycium species simply mention names such as Cordoba, Tucuman, or Catamarca as the origin of the plants. Of course this does not mean that the cacti are found in the cities concerned, but merely that the species originates from the province of that name. However, when one realises that a province like Cordoba. for example, measures roughly 600km in length and 340km in width (350 miles by 180 miles) it immediately becomes clear that an origin of this kind completely lacks precision and is much too vague to be of any value for the study of the plant biotype.

Fortunately I did have some experience of field-work in African ichthyology, so I took advantage of this to successfully extrapolate its principles to the search for cacti. This consists in the first place of a thorough observation of the surroundings, or to use a fashionable term, of the ecology of the plant. As soon as the first Gymnocalycium is discovered, it is essential to note the characteristics of the environment in which it flourishes: nature of soil, of orientation of the terrain, accompanying plant-growth, etc. In this way one quickly becomes able to distinguish between hunting grounds offering a fair chance of successful finds, and on the other hand places which one knows in advance that it would be useless to search there. My observations finally allowed me to establish some general rules which are, however, only valid for the Gymnocalycium from the hills, and do not apply to species from the Chaco or Pampas:-

1. Most Gymnocalycium grow at a height of more than 600m. For example, I happened to go through a terrain which looked favourable from every point of view, without encountering a single Gymnocalycium - but the altimeter indicated only 550m elevation. A little further on, after the road had climbed and the height read 700m, the same type of terrain harboured no less than three different Gymnos.
2. Gymnocalycium do not like sand. I never found any in pure sandy soil, which is the province of Tephrocactus and Opuntias.
3. Gymnocalycium are not found amongst dense grasses, or under too heavy a vegetation of bushes or trees.
4. On the contrary, most Gymnos like a stony or pebbly soil, together with an open vegetation of bushes and/or herbs and other plants.

There may be some exceptions to these rules, but they are scarce. Indeed, most Gymnocalycium pro t themselves against excessive isolation by three characteristic devices:-

1. They shelter under a bush.
2. They shrink into the ground; one may observe, at a given place, plants which are more or less deeply withdrawn into the ground, according to the greater or lesser shadow they receive from the surrounding bushes.
3. Some species actually grow in full sunshine but they develop an especially strong protective spination.

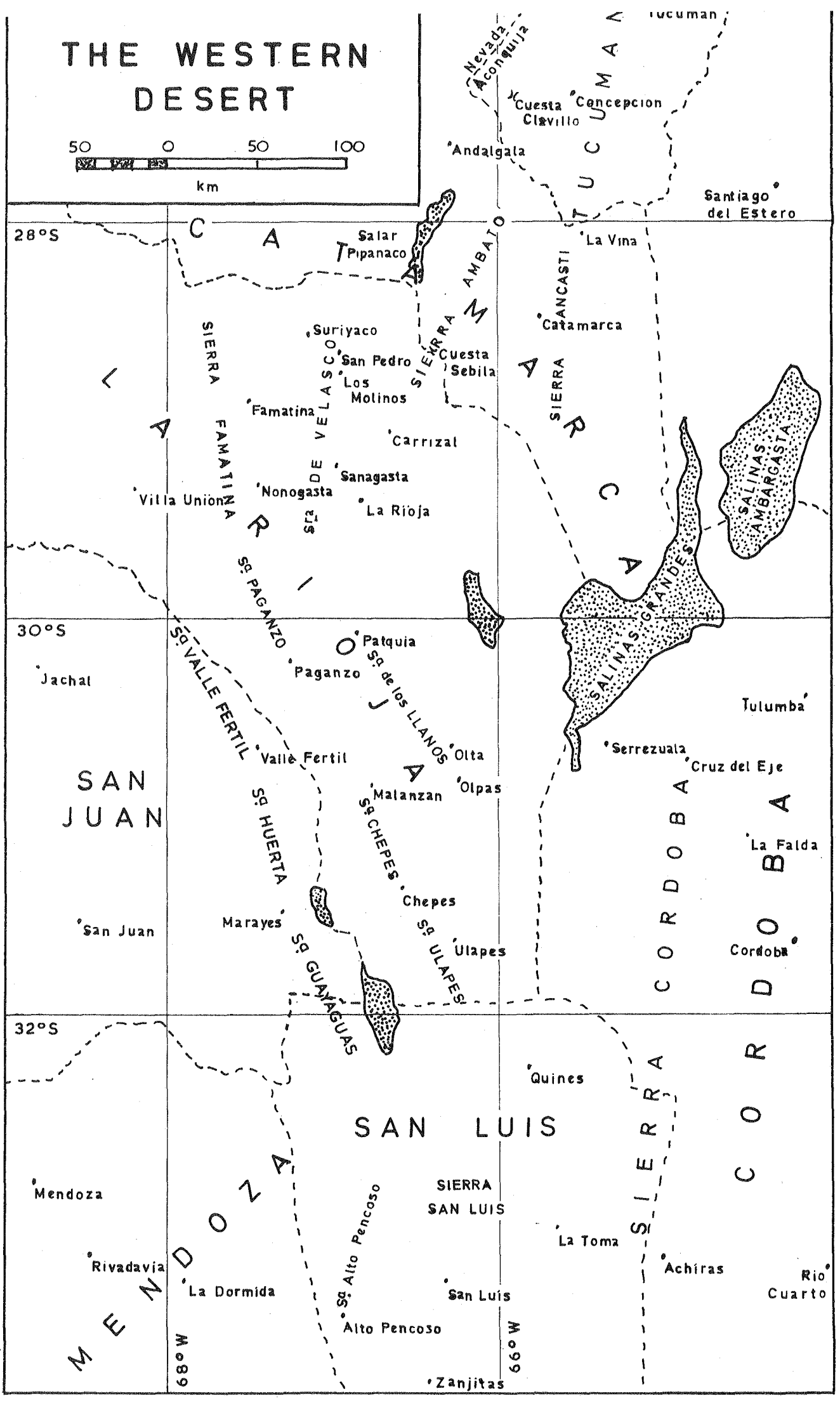
My trip in 1981 covered some 4300km, from Cordoba to San Juan, thence north via Famatina and Cafayate to Salta, returning via Tucuman and Catamarca. After this first journey, which could be considered as the more or less classical tour of the northwest of Argentina, and was devoted mostly to a quest for Gymnocalycium, I decided to go back in 1983 and chose this time to prospect the more central-west regions. Starting once again from Cordoba, I first visited some more locations for Gymnocalycium in Cordoba, Catamarca, and La Rioja, whilst near the end of my trip I prospected some Gymnocalycium sites in San Luis. Then in 1986 I was able to visit Paraguay, the Argentinian Chaco, and northwest Argentina, whilst in 1988 I started from Misiones, through Corrientes and Santiago del Estero, to Catamarca, Salta and Jujuy, to end finally in Tucuman.

So my first two journeys to search for Gymnocalycium started in Cordoba from where we travelled west, crossing through the Sierra Cordoba. We came to Serrezuela where we met a fine example of Gymnocalycium schickendantzii, which is a very widespread species. We found it again further to the west, as we approached the Sierra de los Llanos. Here, between Olta and Olpes we found G.schickendantzii growing practically on the edge of the road. Somewhat further to the south we came into Ulapes, which lies at the foot of the small Sierra of Ulapes. Not far from here the locality supports a form of Lobivia aurea, of G.castellanosii, G.saglionis, and G.schickendantzii. Slightly further north brings us to Chepes Viejo at the foot of the Sierra Arganarcar; a little higher up, along the stony slope, we discover a very nice specimen of G.schickendantzii, similar in appearance to the one at Ulapes. This is probably the same form as the one collected by Piltz under his field number P.17s. Still more to the north, at Los Molinos, on the eastern slope of the Sierra Velasco, a sympatric species is G.stellatum; however G.schickendantzii and G.stellatum do not really thrive under exactly the same conditions, the first being found in stoneless soil, whilst you have to look for stony spots to find G.stellatum - a difference which is reflected in the root system - ordinary roots in schickendantzii and a taproot in stellatum.

Now G.schickendantzii is a very widespread species, apart from which it also appears to be polytypical, meaning that one may distinguish several varieties, depending upon the geographical origin. Whilst the southern specimens correspond rather well to the type, which is white-flowered, with acuminate tepals and greenish-yellow edged scales on the pericarpellum and the fruit, the plants collected more to the north, from the Sierra Medina to the southern parts of Salta province, belong to the variety delaetii, with pink flowers, rounded tepals and rounded purplish-edged scales.

The form from Los Molinos seems to be more or less intermediate, in that it had pale-edged scales and whitish flowers with rounded tepals. There is, however, another character which distinguishes the form from Los Molinos from the other varieties, and that is its peculiar spination. Whilst in the type, as well as in the variety delaetii, the spines are spread open like the arms of a starfish, here the laterally directed spines remain close to one another and nearly parallel, like the teeth of a comb. This is why I propose the provisional name of G.schickendantzii v. pectinispinum n.n. I was able to check the constancy of this character in the population under review, but as I also wanted to verify if it remains so in seedlings, I needed some more plants to carry out proper cross-pollination. It was for this reason that, having visited this place in 1981, I payed another visit to the spot in 1983. Another population of this same variety was observed in 1986 in the vicinity of Villa Sanagasta.

Generally speaking, I think that the shape of the scales and tepals is more important as a varietal character than the colour of the flowers. The same plant may indeed produce complete white flowers and others which are more or less tinged with pink. Moreover the plants which display these distinctive characters have all been collected in the wild, with a well defined geographical origin. In my experience cultivated strains have quite often become hybrids, without any taxonomical value, as for example a dark pink-flowered form, which otherwise shows every characteristic of the acuminate type. Old


THE WESTERN DESERT
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Santiago del Estero
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Salar Pipanaco
La Vina
SIERRA AMBATO
SIERRA ANCASTI
Catamarca
Suriyaco
San Pedro
Cuesta Sebila
Los Molinos
SIERRA DE VELASCO
SIERRA FAMATINA
Famatina
Carrizal
Sanagasta
Nonogasta
Villa Union
La Rioja
Sra.
LA RIOJA
Sa. PAGANZO
SALINAS AMBARGASTA
SALINAS GRANDES
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Patquia
Paganzo
Sa. de los LLANOS
Jachal
Sa. VALLE FERTIL
Valle Fertil
Olta
Olpas
Malanzan
Tulumba
Serrezuela
Cruz del Eje
SAN JUAN
Sa. HUERTA
Sa. CHEPES
Chepes
La Falda
San Juan
Marayes
Sa. ULAPES
Ulapes
Cordoba
CORDOBA
Sa. GUAYAGUAS
32°S
Quines
SAN LUIS
SIERRA CORDOBA
MENDOZA
Mendoza
SIERRA SAN LUIS
La Toma
Rivadavia
Sa. Alto Pencoso
La Dormida
San Luis
Achiras
Rio Cuarto
Alto Pencoso
68°W
66°W
Zanjitas

specimens of the species become more elongate and take on a gurkin-like shape, just as in G.saglionis. From what I observed so far, this seems tc be a characteristic of long-lived species only whilst others, like G.multiflorum for example, die whilst they are still spherical.

I am neither a splitter or a lumper, but I prefer to reason every case on the basis of the facts established from observations in the field. This is why I am convinced there are a number of good varieties of G.schickendantzii.

. . . . . from H. Middleditch

The reference to elongated plants of G.schickendantzii may possibly suggest the normal conception of a plant with a height somewhat greater than its diameter; but in this case the elongation is very much greater. At two different Chileans Weekends we have been fortunate to see slides of just such forms. One of JL-14 found near Los Molinos, Sierra Velasco was half a meter long and almost six inches in diameter. The other of P.17o from the Sierra Ambato, to the southwest of Catamarca, appeared to be of similar dimensions. In both cases the plants were effectively lying on their sides with the growing end of the plants curving slightly upwards. When we were shown these slides at the Chileans' Weekends neither speaker suggested that there was anything greatly unusual about G.schickendantzii growing to this sort of size. On the other hand, the variety delaetii appears to retain a depressed globular form.

. . . . . from F. Vandenbroeck

We travelled along the foot of the Sierra Valle Fertil from Valle Fertil to Marayes, where the road goes through flat, endless maquis land. It is the home of the pampas hares (maras) and the black legged Seriema bird. The neighbouring Sierras seem to be devoid of cacti. Near Marayes the vegetation becomes much more open and the landscape takes on the appearance of a semi-desert. Here we found numerous specimens of Gymnocalycium schickendantzii, displaying a somewhat reddish spination; most of them had grown so tall that they leant over or lay down on the ground. Most of these plants were growing at the foot of a bush. The seeds must germinate better in this situation and possibly the plants lean over when older to get into the sunlight. Here the bushes would be more or less five metres apart and almost every bush sheltered one or two plants of G.schickendantzii.

Undoubtedly this was the most impressive population that we found and it was the only place where we found the plants growing in such large numbers. However it was difficult to tell just how widespread was the distribution of this population, although the landscape was of a very similar appearance over a very extensive area. We probably saw a couple of hundred plants here.

South of El Portezuelo, near Malanzan, on the Sierra del Porongo, we came across a group of barely half a dozen plants, growing columnar (although they did not compare with the magnificent specimens near Marayes) and with a typical open pungent spination of 5 or 6 spines per areole. Between Villa Sanagasta and Cuesta de Huaco, on the flanks of the Sierra de Velasco, we found a population where we were at first uncertain about their identity, because of their flattened spination and spherical bodies; we saw no columnar growing plants. These plants were growing mostly under or at the foot of bushes, sparsely distributed.

. . . . . from L. Hoeven

In the province of San Luis, G.schickendantzii was found in the Altos de Pencoso, whilst between San Luis and Mendoza it occurred at La Dormida and also at Rivadavia. At Rivadavia it was growing on sloping hills where there was no grass, but some shrubs or bushes up to one metre high which are fairly scattered, averaging some 2 to 3 metres apart. The ground here is gritty sand of a dark to purple colour. The other cacti there were Trichocereus candicans and Echinopsis ampylacantha.

. . . . . from F. Fuschillo

One of my own plants of G.schickendantzii fitted quite comfortably in a four inch pot but it was growing like a short column, about half as high again as its diameter.

. . . . . from J. Lambert

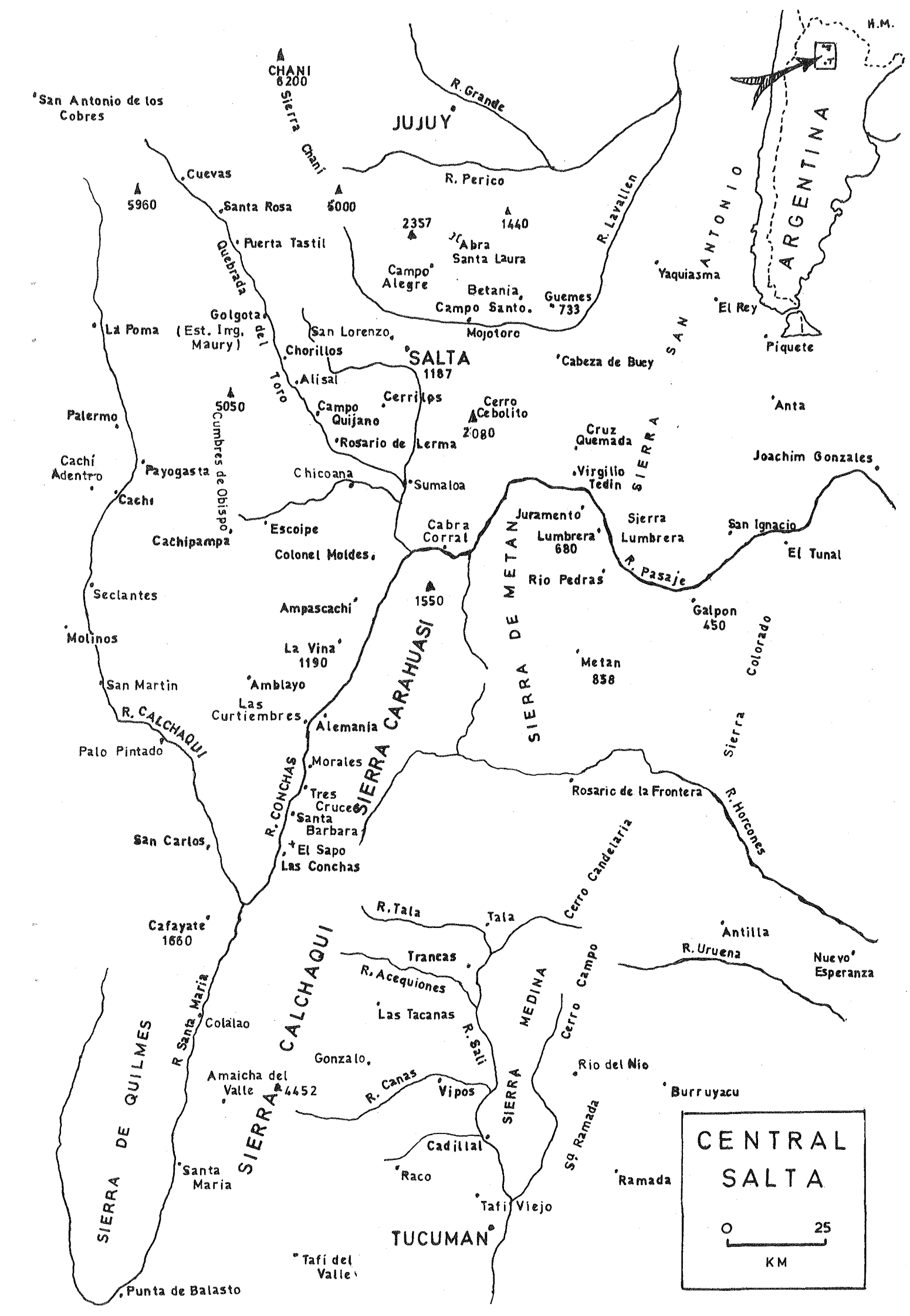
In the wild Gymnocalycium schickendantzii is an ubiquitous species. It is encountered in all sorts of situations and seems to possess the necessary flexibility to adapt itself to them. It grows in the company of bushes which may be barely a metre high in one locality or over two metres tall at another place. Where there are bushes they are so spaced that is it easy to walk round them. At other places G.schickendantzii may be growing near a bunch of tussock grass. When it does have some choice, it will elect for less stony rather than more stony soil, and slightly sheltered spots against more exposed ones, but this is by no means absolute. Dispersion of the plants may vary but they are never growing in large numbers close together. Sometimes Trichocerei may be growing in the same locality, sometimes not; there is no particular association between the two species.

. . . . . from J. Piltz

We came across G.schickendantzii at various locations which we collected under different field numbers as follows:

P17..... Catamarca, Salinas Grandes 400m
P17a..... Sierra de Velasco 1650m
P17b..... Sierra de Velasco 1300m
P17c ..... Quebrada Sebila 1100m
P17d..... Nonogasta 1500m
P17e..... Paganzo 1000m
P17f ..... Sierra de Malanzan 800m
P17g..... Serrezuela 700m
P17h..... Zanjitas, San Luis 700m
P17i..... Cruz del Eje
P17k ..... Sierra Tulumba 900m
P17l..... Tres Puentes, near Catamarca
P17m ..... Suriyaco 1200m
P17n ..... Carrizal 900m
P17o ..... Salar de Pipanaco 900m
P17p ..... Cuesta de Clavillo 1000m
P17q .....Route Cruz del Eje to La Falda 700m
P17r ..... Near Serrezuela
P17s ..... Chepes Viejo 750m
P17t..... Sanagasta 1100m

Many of these collection numbers are now growing here in europe where they flower and regularly set fruit. The fruit displays all sorts of colours of greens, blues, reds, and purples. There is not just one fruit colour for any specific collection number or population, but the fruits of each population display quite a variety of colours.


H.M.
CHANI 6200
Sierra Chani
San Antonio de los Cobres
JUJUY
R. Grande
Cuevas
5960
Santa Rosa
6000
R. Perico
2357
1440
Abra Santa Laura
Puerta Tastil
Quebrada
Campo Alegre
Betania
Campo Santo
Guemes 733
R. Lavallen
Yaquiasma
SAN ANTONIO
ARGENTINA
El Rey
Piquete
La Poma
Golgota (Est. Frg. Maury)
San Lorenzo
Mojotoro
Chorrillos
SALTA 1187
Cabeza de Buey
Alisal
Cerritos
Cerro Cebolito 2080
Campo Quijano
Rosario de Lerma
Cruz Quemada
Virgilio Tedin
SIERRA
Anta
Palermo
5050
Cumbres de Obispo
Cachi Adentro
Payogasta
Chicoana
Sumaloa
Joachim Gonzales
Cachi
Escoipe
Cachipampa
Cabra Corral
Juramento
Lumbrera 680
Sierra Lumbrera
San Ignacio
El Tunal
Colonel Moldes
Rio Pedras
R. Pasaje
Seclantes
1550
Ampascachi
Galpon 450
Molinos
La Vina 1190
SIERRA DE METAN
Metan 858
Colorado
San Martin
Amblayo
Las Curtiembres
R. CALCHAQUI
Alemania
SIERRA CARAHUASI
Palo Pintado
Morales
Sierra
Rosario de la Frontera
R. Horcones
R. CONCHAS
Tres Cruces
Santa Barbara
San Carlos
El Sapo
Las Conchas
Cerro Candelaria
R. Tala
Tala
Cafayate 1660
Antilla
Trancas
R. Uruena
Nuevo Esperanza
R. Acequiones
Las Tacanas
R. Santa Maria
Colalao
SIERRA DE QUILMES
SIERRA CALCHAQUI
R. Sali
MEDINA
Cerro Campo
Gonzalo
Rio del Nio
Amaicha del Valle
4452
R. Canas
Vipos
Burruyacu
SIERRA
Sq. Ramada
Cadillal
Santa Maria
Raco
Ramada
Tafi Viejo
TUCUMAN
Tafi del Valle
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CENTRAL SALTA
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. . . . . from J. Lambert

In my own greenhouse G. schickendantzii flowers regularly and also readily sets fruit if cross-pollinated. The fruits are big (up to 30mm and more), green at first, becoming slowly more pinkish on ripening. However, ripening is very slow; it may take one year and more, the fruit remaining pulpy and juicy over this period. Even so, the seeds will not germinate the first year, but have to be kept until the next season. I suspect that in nature, the fruits are eaten by some animals - birds or rodents - and that the seeds are distributed with their excrement after passing the digestive tract. I tried to treat some seeds with hydrochloric pepsin, but the experiment was not conclusive.

. . . . . from H. Middleditch

At a Chileans Weekend some ten years ago we were treated by J.Piltz to a set of slides of G.schickendantzii taken in the wild and there was a surprising range of diversity in their immediate surroundings. These places where J.Piltz came across plants of G.schickendantzii are spread over an area extending from Sierra Cordoba in the east to the Campo de Velasco in the west, and from the Sierra Ambato in the north to the southern outlyer of the Sierra San Luis. This area measures over three hundred miles from north to south, a large part of it mountainous with poor vegetation cover and an equally large part of sandy plains which are almost desert. Both the higher parts of the mountains as well as the desert plains carry a sparse vegetation which is also poor in species. Where the foot of the mountains meets the plains there is a distinctly better vegetation cover, which also contains quite a wide variety of species. It is usually at such places where G.schickendantzii is to be found.

To the north of Catamarca are the three parallel ranges of the Sierra Alto, Graciana, and Machado. These three ranges spring from the Nevada Aconquija; with the sole exception of one reported location, the conditions suitable for G.schickendantzii apparently do not exist here, Immediately to the north again, the mountain ridge of Aconquija drops abruptly down to the level of the Chaco plain; these slopes support thick forest at their foot, above which there is thinner woodland and finally bunch grass. This area again does not support G.schickendantzii. To the north of the pla of Tucuman we meet the Sierra Medina and other frontal ranges which rise at the foot of the main mountain chain, but now in a climatic regime which is quite different to that enjoyed by the type G.schickendantzii. Instead of the unending Pampas grassland, palms now dot the plains where vast stands of Quebracho are exploited for tannin; the bottle tree grows profusely where the plain joins the foothills. The mountain slopes are clothed with a multiplicity of bushes and trees which do not occur further to the south where G.schickendantzii grows. Yet in this area a few localised populations are to be found of a variety of schickendantzii:- in the valley of the Rio Sali, in the vicinity of Lumbrera, and near Alemania.

IN THE HIGHLANDS OF SALTA **By Brigette & Jorg Piltz.**

Translated by F. Fuschillo from K.u.a.S. 29.4:1978

This was the day for our trip from Cafayate through the Quebrada Cafayate to Alemania. This 65 km long gorge belongs to one of the most scenically attractive regions of Argentina. Here the river has cut itself a deep trench in the red sandstone of the mountains, whose walls rise almost vertically and in these the wind, sand, and water have cut bizarre shapes. Here and there huge chunks of rock tower up 50 to 60 metres high. Rock towers hewn out by wind and weather give the impression of a giant impregnable citadel. Even more impressive is the place called by the natives 'Garganta del Diablo' (Devil's throat). Here within the rock wall a chimney rises vertically to the top, which has the same shape and proportions of length to cross section as a narrow drum. The ring in the throat is caused by layers of stone being sometimes more, sometimes less, resistant to erosion. When the wind begins to blow, one can well imagine how the place came by its name.

Immediately on entering the quebrada we found Acanthocalycium thionanthum and Gymnocalycium spegazzinii. Then for a long time we gazed on scenery of grandiose rock formations and fine red dust, but no cacti. Not until Santa Barbara did we see any more cacti. Next to Opuntia sulphurea stood a very old branched specimen of Denmoza erythrocephala in steep boulder cliffs alongside the road. A short time later we found in a small side valley an isolated population of a variety of Gymnocalcium schickendantzii. The few plants that we counted in this valley were already very old. They were distinguishable from the familiar schickendantzii forms on account of their more or less flattened globular to disc shaped growth form. These plants were up to 30 cm broad and from 10 to 15 cm high. The sunken crown remained unarmoured here as in cultivation during the growing period. The fine red dust of the surroundings which covered all the plants, conferred a violet tint to the blue-green epidermis. The flowers, described in the meanwhile, confirmed for us the supposition that it was undoubtedly here a matter of Schumann's original Echinocactus delaetii. Standing isolated near to the Gymnocalcium was an equally dusty specimen of Lobivia calochrysea.

Beyond the top of the pass of Tres Cruces, the landscape changed. The cliffs up to now had been almost dry and bare, but the nearer we came to Alemania the more and more the vegetation increased. Dense shrubbery and trees greater than the height of a man made access into the hills very difficult. Goat-trails made it easier to look round the steep slopes. Close to a golden-yellow spined Cleistocactus and an Echinopsis sp. we found a Parodia sp. in moss-covered clefts in the rock which were filled with humus. The identity of this Parodia is still not yet clear. Here and there immense columns of Trichocereus terscheckii towered up out of the dense vegetation. Close to the banks of the R.Conchas we saw the largest columnar cactus that we came across on this trip, a Trichocereus terscheckii about 12 metres high, in whose many-branched crown countless Tillandsias were growing.

. . . . . from H. Middleditch

The city of Salta lies at the northern end of a plain which is effectively surrounded by high mountains. Into the southern end of this plain flows the R.Conchas or Guachipas, emerging from a deep canyon which gradually widens into the plain. It is joined by the R.Lerma and other affluents and under the name of R.Pasaje or Juramento it escapes from this mountain-girt basin by cutting its way through the easternmost chain of the Andes where it rises above the basin. In the Guachipas valley, at Colonel Moldes, is found JL-27; not far from here came P.55a. A little further upstream is Ampascachi, where WO28 was found. Between La Vina and Alemania P.55 was encountered. From the same length of this valley comes R46.

In the north of province Tucuman the Sierra Medina has a lee slope which falls through some 1000m in height, producing a dry valley in which the Rio Sali flows. Both Lau 445 and Lau 446 were found here, originally identified solely as from Sierra Medina, but subsequently as G.schickendantzii v. delaetii and G.schickendantzii form respectively. At the northern end of the Sierra Medina, at Trancas at 780 m, was found JL-31 G.schickendantzii v. delaetii. Further still to the north, the Sierra Lumbrera also rises a good 1000m above the surroundings and on its lee side, near Lumbrera, Bort found a plant of the schickendantzii group. A little further to the north, Knoll also found similar plants between Cruz Quemada and Virgilio Tedin.

All these field collections initially appeared to belong to the variety delaetii, which can be separated from the schickendantzii type by the disposition of the flowers and fruit from the side of the plant, rather than from the crown. The city of Salta lies on centuries-old trade route, and all the reported locations for v.delaetii are within easy reach of life-support facilities; nevertheless information and documentation on these particular plants seems to be unusually meagre.

. . . . . from F. Fuschillo

But you must remember that when he talked to the Chileans' Weekend, J. Piltz told us that it was impossible to walk into the bush where he found these plants (P.55) 'it was so thick that to walk in ten yards would have taken half a day.' So this could be the reason why we know so little about this particular group of plants.

. . . . . from H. Middleditch

Now that certainly compares well with the observations by Dennis about the difficulty of ascending the lower slope of the Sierra Lumbrera, due to the nature of the undergrowth. Looking at the slide taken near Colonel Moldes by J. Lambert, there are a couple of plants of v.delaetii on virtually bare earth a good metre away from the nearest bush whilst a tract of bare earth virtually unencumbered by branches appears to run about a hundred yards in to the bush. Although the adjacent bush looks as though you would require a machete and all day to cut into it, perhaps some cacti will grow in the partial shade between the bushes, and not all in the more shaded depths of the bush?

. . . . . from N. Wilbraham

The I.o.S. 1986 meeting was held at Salta and we made several trips which started from this point. Salta itself is fairly closely surrounded by high ground to the west, east, and north. Travelling north out of Salta on our way to Jujuy, we passed through what I would describe as wet forest or 'jungle' in the region either side of the border between Jujuy and Salta province. To the south of Salta city it was more or less an open valley, which joined the broad Lerma valley before we reached Colonel Moldes. Until we reached La Vina there was very little to see except cultivated land. From the road it was not possible to weigh up the cactaceous or other vegetation on the hillsides. As the valley narrowed to Alemania the cultivation faded out almost completely except for small local areas. Here we disembarked from the coach to have a look at the hillside. The overall impression of the vegetation was that it bore similarities to an undisturbed patch near Salta where there were columnar cacti (which I took to be Stetsonia), bushes, and quite a bit of bare ground. But I suspect that most species (cactaceous and otherwise) were different near Alemania, except for the ubiquitous Gymnocalycium spegazzinii. Here there were Trichocereus werdermannianus standing out above the trees and as we scrambled up the hillside Trichocereus thelegonus was found growing in the broken shade of the trees.

. . . . . from F. Vandenbroeck

On my way from Salta north to Jujuy I was halted by flooded roads on the route via La Caldera and Abra Santa Laura. The narrow winding road runs among densely wooded mountains. The magnificently luxurious vegetation provides evidence of periodic heavy rainfall. The type of forest we saw to the west of Salta (the route via La Caldera) can be found on most of the lower slopes of the eastern Andes in the provinces of Salta, Jujuy, and Tucuman. It may also be seen very well when taking the road from Tucuman to Tafi del Valle. Once above 2000m and over the clouds you come into dry sunny regions where rainfall is scarce.

Entering the Quebrada del Toro we met with the same phenomena; getting out of the lush clouded plains we were heading towards speckless blue skies leaving a white blanket of clouds down behind us. There was a wooded zone at this exit from the Lerma valley, though not very impressive. I think that human activity, such as the railway, has destroyed a lot of forest here. The forests near Alemania where we found Gymnocalycium sp. aff. delaetii (antherosacos Ritt?) were not so luxurious as those near Salta. The trees were growing rather low and gnarled, there were lots of bushes, more clearings, fewer epiphytes. I suppose these localities are less exposed to the rains because of their being sheltered by the nearby Sierra de Carahuasi. This explains the presence of terrestrial cacti such as Gymnocalycium, Parodia, Echinopsis, and Eriocereus. Travelling from Cachi to Salta via the Cuesta del Obispo one meets with similar climatic conditions. I think it was far from exceptional that once we started getting down the steep cuesta we suddenly got into dense fog and lower down the valley it was raining over thickly wooded country, at Esciope.

. . . . . from J. Lambert

Before reaching Salta we went to search the region of Colonel Moldes, well known for its Gymnocalyciums. We are not disappointed, for this more vegetation-rich patch of the subtropical zone offers us no less than three interesting species. The soil consists of brown forest earth, without stones or pebbles, so that the Gymnos concerned have ordinary roots, as opposed to tap roots. The first species proved to be G.schickendantzii v.delaetii, with deep and sinuous furrows between the ribs, and quite eccentric disposition of the flower buds. We also found this species in the area of Lumbrera, as well as in Trancas, where it no doubt accounts for the erroneous mention of 'G.knebelii' at this spot by Fric. On my third visit to Argentina, in 1986, we left Salta to travel southwards and once again stopped at Colonel Moldes. Both G.saglionis and G.schickendantzii v.delaetii occur all along the road from here to Alemania.

Lastly one encounters a third form, of which all specimens are curiously coated by a crust of lichen, letting the light green shade appear only in the furrows between the tubercles. This was originally considered to be G.schickendantzii v. delaetii, although it may well be G.antherostele. However, as we did not succeed in establishing this species in cultivation, the question remains open.

During our stay in Salta, it rains the whole night, as if to underline the change of climatic regime. The landscape is also very different, with completely wooded hills of green, which does not deter the Trichocereus from emerging here and

there from the foliage. The stunted Platyopuntias are replaced by big Opuntias with little spines and fleshy segments and pretty bright red flowers (O.quimilo). Instead of small Trichocereus one meets impressive bushy plants of Stesonia coryne, as here at Cabeza de Buey. In short, a more generous nature allows a much more luxuriant vegetation. Later on, progressing southwards from the border between the provinces of Salta and Tucuman, we meet up with more Trichocereus terscheckii along the Rio Rearte, which is a tributary of the Rio Sali. Here G.delaetii is growing in woodland of a similar overall appearance to that at Colonel Moldes.

From my observations, I concluded that G.schickendantzii v.delaetii is a good variety, easily separated from the typical G.schickendantzii which is found further to the south. Definite localities for the v.delaetii are JL-27 Colonel Moldes - actually slightly to the north of this place, along the road to El Carril; JL-30 at Lumbrera, and JL-31 at Trancas. I also looked up the localities mentioned for 'G.delaetii' in the herbarium of the Lillo Institute at Tucuman, but except for 'alrededores Salta', which is quite plausible, some others, like Belen or Catamarca, were more than doubtful. Of course it was impossible to draw any conclusions from the remaining dried material, but an accompanying note read 'flor blanco-sucio con estambres algo rosados' which points more to the hybopleurum complex, a group which is indeed well represented in the Belen and Catamarca districts.

Another species occurring in the same region is a close relative of G.schickendantzii, namely G.marsoneri, which is however distinguished by its much shorter spination. It occurs in Salta province at Campo Quijano - on the rubbish dump! - and I collected it at Vipos in the northern part of Tucuman province, under my number JL-32. I also observed it at General Guemes. It is distinguished from G.delaetii by its dark shade, which may turn a deep blackish green on some plants. The soil where the species was found was actually moist.

. . . . . from R. Kiesling, Field Trip Guide, XIX I.o.S. Congress, Salta.

Three species of cacti used to grow in Campo Quijano: Gymnocalycium marsoneri, Echinopsis ancistrophora and E.silvestrii. Because of the expansion of the town they are found there no longer, and only in similar habitats fu. .er away . . . . from H. Middleditch

Here we have several travellers providing us with various informative observations which provide an indication of the other plants that are to be found in company with Gymnocalycium delaetii in the area of Alemania and Colonel Moldes, But we do not have much in the way of detail observations for the localities of Lumbrera, Trancas, or Vipos which would enable us to appreciate the degree of similarity or difference in the surroundings.

THE ISOLATED FOOTHILLS OF TUCUMAN **By H. Kanter.**

Translated by H. Middleditch from Der Gran Chaco und seine Randgebeite, Abhandlung an dem Geb. der Auslandsk 1931.

North of the Tucuman plain there extends the mountain country of Tucuman, a compact mountain area of several ridges, which is separated from the higher and more easterly lying mountain chain of the Sierra Calchaqui and Sierra San Javier by a long and broad valley. These mountains consist of several short chains which attain 2020m at their highest parts. The southern ridges are the Sierra Medina in the west, with the Sierra Ramada, Cerro del Campo, and Cerro Negro to the east, separated from each other by a broad plain. North of the Sierra Medina and separated by a broad gap is the Sierra Candelaria. North of this mountainous areas lies the elongated isolated ridge of Cerro Colorado which borders the intermontane plain of Metan to the east. Only short dry stream beds descend from this Sierra.

Between Rosario de la Frontera in the north and Cadillal in the south, there stretches an elongated valley in the form of a broad plain, between the Sierras of San Javier and Calchaqui in the west and the Sierras of Candelaria and Medina in the east. Broad, flat alluvial fans come down from the western Sierra and fill up the basin with stones, sand, and silt. Dwarf dry bush forest to thornbush steppe of low-growing Algarrobo, Garabato, Chanar, thornbush and numerous cacti cover the ground, interspersed with sterile patches. Only in the immediate vicinity of hamlets on the Tucuman-Metan road is there any agriculture. The streams flowing from the west into the R. Sali, itself descending from the Sierra Calchaqui, i.e. R. Zarate, Alurralde, Vipos and Tapia, are deeply entrenched. On the steep valley sides lie layers of stones between thick silts, also even green marl occurs occasionally, often interspersed with layers containing gypsum. There, where this outcrops, the vegetation is scantiest, with only a few cms thickness of grey coloured weathered surface. In several flat terraces the terrain descends to the valley floor of the R. Sali, which makes its way southwards alongside the Cerro Medina.

Above Cadillal, where the river bends into the canyon, the valley bottom of the R. Sali is about 1km broad. The water runs right against the slope of the Cerro Medina, whose flank is repeatedly undercut, so that the red weathered earth becomes conspicuous. The 100–200m wide river bed is filled with large stones and boulders which have been brought down from the western Sierras. Usually only a little water flows downstream in the network of narrow arms. A low terrace of 1m height rises at the west of the broad valley floor, upon which stand grass plains and scattered islands of forest at damper patches. On the western valley slopes which rise some 25–30km partly in benches, partly as steep slopes, the scanty thornbush begins with the outcropping marly bed. Short, steep, dry furrows cleft the slope. Occasionally salt effloresces in the marl; numerous thickets of Jume are developed in the continuation of the gulleys from the marl to the valley floor of the R. Sali. North of the confluence with the R. Tapia is an abandoned steam powered salt evaporation plant.

East of the basin the Sierra Medina rise straight up from the bank of the R. Sali by just short of 1000m (up to 1950m altitude). Their length attains some 45km. The fairly steeply sloping sides are thickly forested and interrupted by three broad terraces, which lie at about 100, 150, and 180m above the R. Sali. Steep boulder filled dry gullies also cut into this slope and divide up the terraces. In the forest here taller trees again occur, such as Quebracho colorado, Quebracho blanco, Palo Blanco, Cebil, Guayasan, as well as Laurels. With increasing altitude it became thinner and lower and at around 1800m changed to turf, together with occasional shrubs and clusters of bushes. The slightly undulating, level, crown is about 1km broad. The somewhat less steep eastern slope is similarly forested almost to the top.

At the southern end of the Sierra Medina the R. Sali turns away sharply, cutting a narrow gap between the Sierra Medina and the adjacent block, then continuing its southward direction. The decomposition of the red breccia and porphyry

produces a fairly good reddish-brown soil. High forest covers this block to its peak, similar in its composition to the subtropical summergreen rain forest. The downstream canyon sides have a scanty vegetation; readily distinguishable are three terraces at 5, 10, and 15m above the river. The boulder filled river bed shrinks to 70m wide in this canyon.

The eastern flank of the Sierra Medina continues as a level, undulating plateau at about 1100/1000m altitude bounded in the N.E. on all sides by higher ridges. Over its broad grassy plain are scattered only a few groups of trees and bushes. Trees and bushes stand more densely in dry channels and gulleys cut flat into this plain, which gives the plateau a hilly appearance. The rivulets flowing down from this plain are the Calera and the Tajamar. They enclose between them the small forested Sierra Ramada. In places the rivulets cut steeply into the the edge of the mountains. A subtropical summergreen to evergreen forest is found in the valleys and on the lower eastern slopes, since sufficient moisture is available there. Cebil, Cedro, Tipa, Pacara, Nogal, Laurels, tall Quebracho blanco and colorado etc occur there together. The undergrowth is dense, interwoven with lianas, whilst ferns, epiphytes and cacti coat the trunks. Outside the mountains the forest changes quickly - candelabra cacti appear in greater numbers whilst Guayasan, Algarrobo, and Chanar soon gain predominance. On the Sierra Ramada, in the valley of the R. Calera, within the confines of the forest, occur low cliffs of red sandstone interbanded with limestone.

The R. Tajamar is lost in a dry bed in the plain to the east. North from there arises the Cerro Campo (or Cerro Burruyaca) up to 1800m altitude, cleft by numerous dry gullies (quebradas), of which the largest is the R. Uruena which can reach the R. Salado when in flood. Extensive grassy plains are encountered on the summit of the mountain, whose flanks and quebradas are covered with subtropical forest as far as the foot of the slopes. To the northwest lie the Sierra Candelaria which attains 2020m altitude at the Cerro Fuente de Plata, the highest point of these mountains. They are in their appearance, form, and forest cover very similar to the Sierra Medina, and like those support a grass turf on their crown. To the northeast of the Sierra Candelaria, and to the east of the plain of Metan, arises the 40km long ridge of the Cerro Colorado, up to 1080m high at its highest point. Towards the plain of Metan it slopes gently with a cover of poor dry forest, on the eastern side by comparison it drops steeply, occasionally in almost vertical cliffs. Looking from the eastern plain the steep slope has some 500 to 600m of height. Pale oolitic limestones lying over red sandstone projects above the thickets and thornbush forest as almost bare, scree-strewn limestone slopes, visible when approaching from the easterly lying hilly land. These cliffs are divided up by the short, steep, dry gullies; to the north and south it becomes lower and descends into undulating hilly land. In the south it continues in some low-lying ridges, also of projecting limestone, which interrupt the generally gradual descent towards the east. They are the Lomas de Mojon, the Cerro Ramate, and the Cerro Cantero which at 50–70m elevation is the highest. To the north the small limestone range of Cerro Curucuru arises between the Cerro Colorado and the Rio Pasaje.

Between the Cerro Colorado in the east, the Sierra Metan in the west, the Sierra Candelaria in the south and the Sierra Lumbrera in the north, lies the plain of Metan covered by a dry forest. Quite gradually the furrowed hilly eastern slope of the Sierra Metan changes into the flat plain. Mountain slope and plain are both densely covered with thornbush forest, which is only cleared along the railway line, close to settlements, particularly near Galpon, Metan, and other larger places. In deeply entrenched beds a series of rivulets descend from the western mountains, of which the Rio Pederas in the north of the plain turns into the R. Salado. The more southerly waters flowing subsurface either join the R. Medina which loses its waters in the plain, but is to be encountered further to the northeast as a dry bed, or they terminate in their own alluvial fans. Their waters reappear in voluminous springs close to the R. Pasaje. The southernmost river is the R. Horcones, which starts off in the mountains to the west of Rosario de la Frontera and after it has lost its water in the vicinity of Nueva Esperanza, continues as a dry bed into the plain to the southwest.

The only river flowing permanently through the basin of Metan is the R. Pasaje-Juramento-Salado, which comes out of the Calchaqui valley and turns to the west at the southern foot of the Sierra Lumbrera. It flows in a narrow bed between marl and limestone; later it widens out and the banks then consist of red marls, coarse rubble, and silt. One high terrace, covered with rubble mainly from ancient rocks, runs alongside the river in the south as far as opposite to Galpon. South from there, broad sandy areas with sparse vegetation lie on the plain, but lack dunes.

Near to San Ignacio the wide bed of the Pasaje is accompanied to the north by an approx. 10m high bank of silt, upon which stands a dense dry forest of Quebracho, Algarrobo, Palo borracho, etc. The river flows in numerous arms, twisting over the 450m broad valley floor which is filled with sand, gravel, and boulders. It is crossed by the railway bridge near El Tunal. On the valley floor in the neighbourhood of Galpon and also further upstream are to be found some irrigated cultivated patches between sparse thickets of Algarrobo, Espinillo and Chanar.

South of Galpon, in addition to some high-volume springs close to the bed of the Pasaje, there is also a small thermal spring whose waters flow into the R. Medina, whose dry bed, as noted above, is from time to time filled with groundwater. Some small lagoons in the vicinity of these beds, probably old watercourses, also hold groundwater.

The broad depression of the R. Horcones, which runs out towards Antillas on the plain, consists of a reddish-yellow sandy clayish soil with rubble at the mountain foot and on the banks of the dry beds, in which water appears in pockets here and there. After it has received the Rio Blanco running from the Sierra Candelaria, the dry bed of the R. Horcones winds out towards the east between the Lomas del Mojon and the Cerro Cantero, into the great plain. A groundwater stream turning more southerly, the water-rich Brunnen, seems to start off between Antilla and Unquillos. Otherwise the whole area is lacking in water, with few settlements, and covered only with a lowgrowing thorny dry bush forest of Algarrobo, Chanar, and some Quebrachos, etc.

. . . . . from H. Middleditch

It is of course one thing to have a picture of the topography and vegetation, but quite another matter to see how and where the cacti fit into the picture. Are the 'numerous cacti' which make up the steppe in the valley of the R. Sali, columnar cacti? Or lower growing sorts? Or even both? And if columnar, are they Stetsonia, Cereus, or Trichocereus? If the 'candelabra cacti' seen where the foothills of the Sierra Ramada sink into the Chaco plain really do branch from above the base, can we take it that they are Stetsonia? If there are columnar cacti to be found in the valley of the R. Sali, why are there none reported by this author from the plain of Metan?

There are a number of very intriguing Gymnocalcium which are found around this area; they would not really be

expected to grow on the slopes of the mountains where the forest is described as dense. Do they grow in the ground made up of fine silt, or in the sandy ground, or where gravel or rubble is to be found? Do they grow by preference at the foot of a bush, as we have seen in many of the slides taken at around 28^0 to 30^0S in Argentina and shown to us at the Chileans' Weekends by J. Piltz and J. Lambert, where the bushes are perhaps one to one and a half meters high and spaced far enough apart to walk between? Or do they grow within the shade of an open forest, with trees or tall bushes several meters high that can be walked through with little difficulty, such as we saw in slides taken in the Paraguayan Chaco at 24^0N which were shown to the Chileans' Weekend by C. Rodgers?

THE SIERRA LUMBRERA **By P. Denis**

Translated by H. Middleditch from Annales de Geographie XXI Paris 1913

The route through N. Argentina, from Tucuman to Guemes and on to Embarcacion (Oran), is a sort of corridor between the first of the high Andean ridges to the west and a series of isolated and less elevated massifs which separate it from the vast Chaco plain to the east. The eastern chain of the Andes, which exceeds 5000m in altitude at Aconquija to the south and in the Sierra Santa Victoria on the Bolivian frontier, decreases notably in height between Jujuy and the trench cut by the R. Juramento. The route to Jujuy crosses it without meeting bedrock, on the surface of the alluvial cone spread by the Rio Grande de Jujuy. Some 50km more to the south, the route to Salta, in the section along the Mojotoro gorge, crosses a narrow band of high rock, which holds back immense masses of flood-borne alluvia to the east. From the crown of this saddle, which is used by the historical trail between the pampa plain and the Andean plateau, there may be seen standing the east of the railway a 170km long massif, which runs from the plain of the Rio Pedras in the south to that of Embarcacion in the north. The bend of the R. Juramento turns round the southern end; the R. San Francisco, which unites with the R. Tarija to form the Bermejo, turns round the northern end. It is known in the north as Sierra Santa Barbara; in the south are Sierra San Antonio and Sierra Lumbrera.

In November 1912 I had the opportunity of making a six day excursion to cross the Sierra and its southern margin. Leaving Guemes, we crossed the plain of Campo Santo, and after travelling 30km to the northeast we reached the foot of Sierra Lumbrera, which we ascended. At the altitude of Guemes the plain of Campo Santo is about 25km broad. It is composed of abutting alluvial fans coming from the west, descending steadily to the east-northeast by 80m in 6km. The soil, of grey alluvia and large stones, sustains a scanty Bush. That vegetation flourishes until reaching the flat floor of the R. Lavallen, half a league wide, which separates the Sierra from the foot of the alluvial cone. This horizontal zone, a large part being exposed to periodic flooding and imperfectly drained, originally supported a forest of very tall trees (e.g. Tipa) but is now mainly fields of maize. Further away, the soil is impregnated with salt - the water from the region of red sandstones has a strongly saline content. Beyond the river, the grey silt gives way to a red sand, often coarse, which has originated from the sandstone hills to the east of the road. The bushes are tall and conceal the view entirely.

Cacti abound and sometimes make up almost the entire vegetation. Every couple of leagues a dry gulley was crossed, obstructed by boulders of sandstone and limestone, brought down by torrents which come from the Sierra to the southeast. In the vicinity of these streams alone does the brushwood become greener and display veritable trees, above all the Cebil (Acacia cebil) and the Palo borracho (Chorisia insignis) with a swollen and spiky trunk. The spots where these streams are crossed are the most elevated on the plain (740m at the crossing of the R. Yaquiasme). From their beds, which open large gaps in the brushwood, the Sierra may be seen to the east and southeast, of which we skirt the foot. The red sandstone of which they are formed rises to the southeast and to the south. In the direction of the source of the R. Yaquiasme, the summit of the Sierra is formed by a great limestone cliff, which looms over the escarpments of red sandstone; on the margins of the massif, the same limestones reappear at a new, much lower, level, in the first hills where the streams pass out towards the plain. One great cliff, the rim dipping towards the west, follows the western edge of the Sierra.

At La Esquina (690m) the road turns towards the east and enters the Sierra by a ravine. At first it rises between alluvial terraces, then between the limestone hills, as far as the estancia of San Luis (850m). At that spot a sort of hollow was dominated by an immense cliff of red sandstone to the east, which dropped gently eastwards and presented the edge of the bed to the west. A few km more along the base of the ravine, in the red sandstone, there then commenced the rapid ascent of the flank of the Sierra. Above the red sandstone, a great limestone escarpment surrounds the erosion hollow which terminates the ravine. Higher still, in the second half of the ascent, the red sandstone again appears, surmounted by another limestone cliff, which forms the top rim of the Sierra. In the base of the ravine there are some fine trees, but on the sides the bushes are stunted and scattered, without leaves at the start of November. On the shoulder which follows the first limestone escarpment at c. 1300m, the brushwood is left behind to enter a forest of slender trees, close together, with dark leaves, and moss-grown trunks.

This forest terminates abruptly at around 1600m and gives way to a prairie composed of large clumps of grass, yellow, close to each other so that no ground is visible between them. In crossing this prairie the summit is reached at 1800m. Behind there opens a most extensive panorama, at first over the gorges in the flank of the Sierra which cut through the red sandstone to a depth of several hundreds of meters, then over the broad plain of Campo Santo and the R. Francisco, which is bounded to the northwest by the mountains of Jujuy.

The crown is quite narrow. The road crosses this prairie on the black soil formed by decomposition of limestones and marls. At 1700m it runs into the forest which is finer, denser, and more extensive than on the other flank. The descent is rather less rapid than the ascent. . . . .some distance before El Rey the forest opens, the terrain becomes more regular; it changes to an uneven brushwood, broken at intervals by prairies. . . . ..From El Rey at 990m, the Sierra to the south was hidden in clouds; only the lower slopes were visible. . . . ..lower down still, from Piquete to El Yeso, one again comes across a real forest, but now with deciduous leaves. It is the zone of the Cebil (Acacia cebil), Guayacan (Caesalpina melanocarpus),

Algarrobo and Quebracho colorado. After El Yeso the vegetation is sparser and lower. In places the brushwood is composed exclusively of Guayacan, Algarrobo, Espinillo and cactus. The contrast between the vegetation of the plain and that of the Sierra can be largely accounted for by the permeability and aridity of the soil. . . . .from El Rey to Piquete is a descent of 400m in about 30km. Here the beds of the Sierra drop below the alluvial cover which alternates between silt and gravel. The river water rapidly infiltrates into the alluvia; nearer to the Sierra the river valleys are dominated in places by terraces at several levels, cut into elongated hills (lomas) by erosion.

The road southwards continues over the alluvial zone, dominated by silt and red sands; rounded stones of sandstone and limestone are frequent. At 20km before reaching the R. Juramento, the rounded stones exhibit more diversity, mainly granites, andesites, yellow sandstone and blue schists, evidently from the Andes. The road reaches the Juramento at San Ignacio. From Galpon to Rio Pedras it rises 720m in 30km. To the southeast only some low hills separate the plain of Metan-Rio Pedras from the Chaco; the southern margin of the Sierra Lumbrera is covered with a dense forest. In the plain the vegetation grows more flourishing as one approaches the mountains, but close to the river the timber has been cleared for cultivation. Midway to R. Pedras a large, regular, alluvial terrace to the south rises some 50m and is covered with woods.

From the station of Rio Pedras I descended the 5km eastwards to the Juramento and tried to climb up the southwest corner of the Sierra Lumbrera, difficult of access since the slope is sharp and the forest spiny and inhospitable. In following a ravine which ran into the Juramento, where the bedrock could be seen below the alluvial cover, there were a series of soft red sandstones, then red and green marls, just as on our route to Piquete. At some 200m above the river, the limestone outcrop forms a scarp facing the interior of the Sierra, From this viewpoint, looking west over the area round Rio Pedras, one is struck by the analogy with other Andean depressions, such as the valley of the Lermas near Salta. They are similarly characterised by the huge volume of alluvia which occupies them, and which really was conveyed there by the work of water. The depression is fairly undulating, with hills of alluvia, and elsewhere bedrock appears to emerge from the cover of flood-borne deposits, which cover virtually the whole surface right up to the foot of the mountains. It is covered by a meagre forest.

The relative dryness of the climate, which has allowed the preservation of the structural characteristics in the topography and which becomes more pronounced towards the northeast in the zone of the headwaters of the Juramento, also readily explains the thickness of the alluvial mass which has buried the roots of the Sierra Lumbrera, to the west as well as to the east. These continental deposits extend at the foot of the Andes from the region of Tarija to as far as Patagonia, whilst the Pampean plain is only their prolongation to the east. It would be very wrong to picture this alluvia as distributed in successive zones of which the material would be segregated progressively, the largest first. If this regular succession is produced elsewhere, it presupposes very specific conditions of deposition. On the western edge of the Sierra Lumbrera, if the larger of the rounded stones do decrease as one goes further away from the Sierra, then on the other hand the silt impalpably abundant at its feet directly covers the bedrock. The coarser sands are much more frequent between El Yeso and Galpon, at some distance from the mountains, than between El Rey and Piquete. The variations in the regime of the torrents following the seasons and the rains, the displacement of their beds, the part that wind can play in rehandling the fluvial alluvia during the months of drought, all contribute to the irregularity of the deposits.

The yellow silts, without surface humus, which cover the greater part of the ground, are very much more like the silts of the provinces of Cordoba or Buenos Aires than the grey clays which form the plain of the Chaco close to the Parana, in the same latitude. These differences of soil are in evident correlation with the differences of climate and of vegetation, the xerophytic bushwood at the margin of the Andes exerting upon the formation of the soil a similar role to that of the steppe further to the south. The forest of the eastern Chaco is completely different to this brushwood, despite the transition from one to the other being very gradual. In addition it would be absurd to study the alluvia without taking account of the nature of the rocks from which it originates. The red sandstone yields friable pebbles and a sand which becomes converted very slowly into a very fine silt; on the other hand, limestones yield very durable pebbles and silts, never sands. The diversity of the bedrock of the Cordillera also partly determines those of the alluvial formations in the piedmont zone. The mountain schists of the province of Tucuman, for example, have produced a soil of fine micaceous sand, quite different from the silts and the red sand that alternate with each other around the Sierra Lumbrera.

. . . . . from P. Denis, Annales de Geographie, Paris, Vol. XXX 1921.

Since my above notes on an excursion to the Sierra Lumbrera were published, a new and important contribution to the knowledge of the sudandine chains of the provinces of Tucuman and Salta has been made by R. Staffenbeck. The chain which I have called Sierra Lumbrera is, according to Staffenbeck, in reality the Sierra San Antonio and the name Lumbrera should be reserved for the isolated massif forming a prolongation of this chain which is located to the northeast of Rio Pedras. The observations by Staffenbeck extend to the south of Lumbrera where a series of parallel chains extend some 100km to the north and northeast of Tucuman - the Cerro Medina, Cerro Burruyacu, and Cerro Candelaria; there limestones and sandstones surround islands of precambrian schists which form the culminating heights, elongated like a crease, crowned at varying altitudes by narrow peneplains.

Between the Sierra Lumbrera and Sierra Candelaria, at the elevation of Metan, these folds disappear below the surface over a distance of some 60km. It is bounded to the east and separated from the Chaco plain by a more eastern ridge than the fore-mentioned, the Cerro Colorado. The Cerro Colorado at 1100m is less elevated than the Sierra Lumbrera, but it is closely reminiscent of it on account of its structure. The highest point is formed by a limestone cliff capping the lower red sandstone. The R. Juramento or Salado curls round the Sierra Lumbrera at Rio Pedras than flows west to pass to the north of the Cerro Colorado, afterwards turning once again to the south.

WO28 - GYMNOCALYCIUM DELAETII? By W. Knoll.

Translated by H. Middleditch from Austrian Cactus Society Bulletin, Sept. 1976.

At the crack of dawn on the 20th January, 1973 my nephew Oscar and I drove out of Resistancia with my jeep in the direction of Salta. In the morning we reached Pampa del Infierno, where the fine asphalt road came to an end and after

that we had to suffer a dreadfully squelchy earth road. As rapid progress was no longer achieved, we occupied twelve hours for the 200km to Joachim Gonzales and fell into bed dead to the world. At least the next day compensated us for all the hardship; streaming sunshine accompanied us along the marvellous road in the direction of Salta. We stopped somewhere in the vicinity of Cruz Quemada, allowed ourselves a short break and then struck into the bushes to look for cacti.

Our good fortune was in, for besides some columnar and procumbent Trichocerei we also came across a sort which I took to be Gymnocalycium delaetii. Growing in groups of up to 10 plants the globular, dark green bodies displayed a thin black spination standing out from the body. We could not see any flowers and even the number of plants discovered left much to be desired. Although we dashed uphill and down dale we were only able to collect a few examples.

Some weeks later we found ourselves on the trail from Cafayate leading towards the provincial capital town of Salta, during which we had to cross over a dried up river bed in the vicinity of Ampascachi. A cry from Oscar left me standing on the brakes and to my question, what is the matter, he pointed out excitedly to an ox-like animal which lay basking on a couple of stones. It had discovered a small lizard, here called iguana, and would undoubtedly kill it, since its flesh is one of the finest that the hunter can find here. To cut the story short, the lizard was more cunning and above all quicker than both of us. After half an hour we had to give up, since our grill had taken leave of us for good. Nevertheless our chase after the lizard had done us a good turn, because as we made our way back to the jeep we came across a number of cacti in a clearing which were still complete with ripe fruits.

Usually growing solitary, the heads reach a diameter of up to 30cm generally matt grey-green coloured. The few (5–7) short spines appeared a deep brown close to the crown, older spines were horncoloured to grey. Noteworthy was the fact that the fruits were to be found more to the sides of the body, which suggested that the flowers appeared not close to the crown but more to the sides. There were not many small plants; we had to search a long time until finally we had together a small number; then we turned about back to our jeep and set off in the direction of Salta.

Now in comparison with the plants from Cruz Quemada it appeared that appreciable differences do exist in both body form and spination. Even in Vienna it was the opinion that it was a matter of these two being different species. So I then gave the plants from Ampascachi the collection number WO28 whilst the species from Cruz Quemada was given the number WO30. Additionally I believe that WO28 in all probability is G. delaetii whilst WO30 represents a species unknown to me, perhaps it is even a new discovery.

A couple of extra words concerning the cultivation of both these species: sandy, slightly loamy soil with only a little humus may be suitable for both species, also a half shaded location appears to be appropriate since these plants in their habitat are almost always to be found under bushes and trees. One must not be miserly with the water, for relatively abundant rains fall in the habitat.

. . . . . from H. Middleditch

It is most interesting to see that a these Gymnocalycium which bear a resemblance to G. delaetii were collected at Cruz Quemada in the riverless valley between Lumbrera and Guemes, and again at Ampascachi, a few km to the south of Colonel Moldes. I wonder if there was much vegetation growing at either of these places - trees, bushes, or grasses - and whether there were cattle kept in the area? Would there be any bare exposed ground I wonder - would it be earthy, gritty, or sandy?

. . . . . from W. Knoll

In my sketch map you can see where WO28 is to be found - but I have to add something further. I collected WO28 in a spot near the road, thinking that it was G. delaetii. Now I know that WO28 from this locality is not G. delaetii, it is a new species.

The real G. delaetii I collected near the road from Alemania to Salta in a wood with trees and bushes. On the ground there is no grass, only some plants with small leaves. The bare ground is largely sand and stones, and there are no cattle thereabouts. The plants from the other locality have my number WO30. They grow at the foot of hills in a wood with little trees and bushes, but there is no grass. There within the mountains there is no real rainy season - it is very dry and the ground allows the water to pass through very quickly.

. . . . . further from H. Middleditch

The explicit location provided with this response places the collecting point of WO30 between Cruz Quemada and Virgilio Tedin. This location lies barely ten miles to the north of Lumbrera; it was near this latter spot that Bort stated he found Gymnocalycium schickendantzii. Does this mean that WO30 is also G. schickendantzii?

. . . . . response from W. Knoll

Yes indeed, the place where I collected WO30 near to the road to Salta is just to the north of Lumbrera, where Mr. Bort found his G. schickendantzii. But I am sure that my WO30 is not G. schickendantzii for there are great differences. The spines of WO30 are more thin, short, and almost black, standing away from the body. Moreover WO30 reaches only a diameter of 12–15cm, whilst G. schickendantzii grows columnar, up to 5O cm high and a diameter of 30cm.

. . . . . from J. Lambert

On my first visit to Argentina we stopped at Colonel Moldes, to the south of Salta where we met with a Gymnocalycium JL-28 which I took at first to be G.lumbrerasense, but which in reality compares well with Ritter's description of G.antherostele. On my third visit to Argentina, in 1986, we left Salta to travel southwards and once again stopped at Colonel Moldes. Both G.saglionis and G.schickendantzii v.delaetii occur all along the road here, whilst the JL-28 form is only found in places devoid of stones. Now JL-28 was a most interesting discovery; the disposition of the fruits was definately away from the crown but this plant differed from schickendantzii and its varieties by the presence of a central spine (never observed on any schickendantzii, even on very old specimens). Unfortunately I was not able to observe the flowers, and did not succeed in establishing the species in my collection. As opposed to the views of Ritter, basing himself on the convergence of shapes, this species does not seem related to G.schickendantzii, but rather to G.mostii, which is confirmed by the type of seed which belong to the microsemineae.

. . . . . from F. Fuschillo

The seed from JL-28 (initially received as G.lumbrerasense) G. cf.antherostele is very interesting. It is black and

so is no Muscosemineae. It is perhaps rather on the large side for a Microsemineae. If anything, it might fit into the mostii group.

. . . . . from J. Lambert

The Sierra de Lumbrera hasn't anything in common with the barren hills of the west either. The soil is covered by a carpet of moss, a plant which also indicates a higher degree of moisture. A Gymnocalycium JL-29 which I took at first to be G.lumbrerasense grows here in abundance; only later after flowering it and setting seed was I able to establish that they were G.pflanzii. This species was also collected by Piltz in the same area, under his field number P.154.

The vicinity of Cruz Quemada, cited by Knoll, is the exact area where I collected both G. pflanzii JL-29 and G. schickendantzii v. delaetii JL-30. Could it be that WO30 is a G. pflanzii?

BORT IN ARGENTINA

Translated by K. Wood-Allum from the Austrian Cactus Society Bulletin 1976.

On my one-man expedition this year I chose Route 9 for the journey from Tucuman to Salta. This was the wildest trip by car I have ever had in Argentina. This is a Route Nacionale, corresponding to our autobahn. Construction must have begun many years ago but was then stopped because out there in the plain or in the uplands there exist essentially better connections. I suppose they will not extend the construction on route 9; there are no cars, nothing. A bus runs from the other end, from Salta, but only about half way. It was the most outstanding example of a mud road and river crossings in my experience. I had to cross the river on innumerable occasions. Twice it was so high that the water ran into the spare wheel compartment from the side. But the R4 with its front wheel drive pulled through the water splendidly. The problem was when I was through the water. There was always a slope up from the river of slippery clay. On the steep bits I was thrown about. Sometimes I slipped right back into the water. Twice I thought that I was stuck there until someone chanced to come along and haul me out. Eventually I overcame these steep banks.

I slept in the car, having created space by removing the rear seat and the passenger seat. So I had only the driver's seat and by moving the boxes of plants out I had room to sleep. As a mattress I used thick foam rubber sheets, with thinner ones as cover, plus bedding. Then I hit on the idea of putting the foam rubber under the wheels to get a grip on the steep river banks. The two encounters I had with the natives were very comical. They looked at me as if I had come from the moon. I doubt if they had seen a car for years, or even ever.

When I stopped to look round, the vegetation was so thick that it was hopeless to look for cacti, but higher up the slopes were somewhat less overgrown. Picking what I thought was a suitable spot, where the slopes were less overgrown, I searched here for two days, thinking that there must be something around. Well, I did find something, but it was not very exciting. Pseudolobivia ancistrophora and something else. Many people would say that it was also a Pseudolobivia, but I think that it is an Acanthocalycium and it could be a link with other Acanthocalycium habitats. These specimens were in poor condition, covered in woodlice or some such, hence their yellow spotted appearance.

Prof. Thiers of Colougne drew my attention to the fact that on the eastern side of the road, travelling back from Salta, near to Lumbrera, there is a fairly unknown Parodia [sic-K.W.]. So on the way back to Tucuman from Salta I spent some time near Lumbrera looking for it. Here you can see the Tabaquillo, Cerei, pasacanas, and also this steep slope. From the road I could see the slope up to the ridge, covered in boulders, agaves, and bromeliads. This is typical cactus habitat. I got out and looked around. Then I realised that I would have to work my way for 700–800m up through this thick underbrush. In among the underbrush were a few Palo borrachos - translated that means drunken trees or bottle trees, from which kapok is obtained.

It was extremely hard going. I was eaten alive by the garapatos, a kind of tick. The locals and everyone I spoke to, in previous years and on this occasion, said that garapatos were attracted to dogs, horses and cattle only. Apparently when there are no dogs about they go for man. In my urge to find plants I did not notice the ticks until I got tc my lodgings that night. It was difficult to clean myself up because I was covered with them. My patience was put to the test here and only when I got to the ridge did I find cacti.

This is my 119, a Parodia. I do not know if it is the one that Prof. Thiers mentioned. I saw spherical and elongated forms. The slope is so steep here that the plants grow in curved columns. Also interesting is the soil which I have never come across before - it looks like gypsum. The surface is grey-black from being weathered. When it is dug into with a pick it is all soft and crumbly; it feels like gypsum taken from a sack and crumbles to dust in your hands. Here are one or two detail photographs. I think that it is perhaps only a form or variety of P.setifera; it looks very like it, but unlike setifera it has these terribly long central spines. I did however find one or two specimens which had very short spines. If you get hold of them they feel like fur whilst the others stick to you by their hooked spines if you get too close to them.

Before considering G.schickendantzii, another explanation. As I travelled down the road to Tucuman I had another piece of bad luck with the car. My windscreen was shattered by a stone thrown up by a lorry coming from the opposite direction. I thought that I would not be able to get it fixed until I got back to Tucuman. But I was fortunate. In Rosario de la Frontera, a relatively small place, there was a petrol station where I got the windscreen fixed; then I could proceed. This business with the windscreen delayed me and night fell which brought the next incident. On an asphalt road something like one of our own [Austrian] 'A' roads, you do not anticipate trouble. I ran over a stone that projected sufficiently that the sump, which on the R4 has a protective metal plate, hit it. I was able to drive on, apparently no damage had been done. When I next stopped to fill up, I turned the engine off. When I tried to start it again it sounded as if the engine was being torn apart so I turned the ignition off and had to be towed. To replace the engine cost 6000.- Austrian schillings and to carry out other repairs throughout the trip, together with the engine replacement, cost almost 10,000.- Austrian schillings. Since I was already short of money, this meant that the second part of my projected itinerary had to be severely curtailed.

But now a word on Gymnocalycium schickendantzii. In Backeberg's Kakteenlexikon G.schickendantzii is entered as a species with a single variety - delaetii. The entry reads 'Distribution Cordoba to Tucuman'. I found schickendantzii near Lumbrera, in Salta Province, and also in San Luis, a distance of 2000Km between them. Let me now give you a view of some

forms of schickendantzii from my experience. What is interesting is that these two forms, separated by 2000km, are the most similar. The crown is somewhat sunken, somewhat spine free, whilst the forms which I found at the Medanos of La Rioja, roughly in the area of Mazan where G. mazanense grows, have a crown which is fully spined. The whole spination, or thorns as one really ought to say, is tangled in a confused way whilst, in the others, the spines were slightly curved to the plant body with the exception of course of the central spine. The forms I found on the edge of the Salar de Ambargasta were the least spined, most naked, and completely bare in the crown - and there were even elongated forms among them.

Another schickendantzii form, my no.70, was discovered last year in the Sierra de Ulapes, that little Sierra in the south of La Rioja province which is rich in cacti. Amongst these you can distinguish one form which has somewhat longer spines and which has more ribs. Gymnocalycium schickendantzii is described in the Lexikon as having 7–14 ribs. These examples have 13. Then there are others, far from single examples, which have ten ribs, which also fits. But interestingly, those with fewer ribs have shorter spines. Well, those are the external characteristics which can be observed with the naked eye, but that does not justify a new form. They all have to be submitted to a comparative study of the flowers.

Here is the long spined form. The flower is a slender bell shape, the perianth elongated, the tube sparsely scaled and the scales are white edged only. The stigma lies deep and the first ring of stamens consists of one row. This next is the lighter spined form with shorter spines, a form in which the tube is relatively more heavily scaled, the scales are coarse and are almost entirely white. The flower is somewhat stumpier, the stigma lies relatively higher and the first ring of stamens is in two rows. The stamens as we see on our next slide of the long spined form, spiral together to the centre whilst in the shorter spines specimens they remain straight and radiate to the centre.

Of course this perhaps does not justify the erection of a form, but under no circumstances the erection of a variety. However I can imagine that a further careful comparative study of the flowers of these different and so widely separated groups of G.schickendantzii could lead to some new findings.

. . . . . from J. Lambert

In regard to the form of G.schickendantzii observed by Bort in the vicinity of Mazan with the 'sunken almost spine-free crown' this is most probably G.schickendantzii v. pectinispinum n.n., i.e. the same form as at Los Molinos on the edge of the Sierra de Velasco.

. . . . . from H. Middleditch

This account by Bort is the commentary to a slide show given to the Austrian Cactus Society; one can only lament the brevity of detail in the comparisons of different forms of G.schickendantzii and the absence of pictorial data. To judge by the context, the Pseudolobivia ancistrophora location would probably lie to the west of the Sierra Medina. To judge by Kanter's account, this may well be a fairly arid spot. However, Bort's reference to Chloris insignis or Palo borracho on the ascent of the Sierra Lumbrera suggests a somewhat less arid regime. This is corroborated by the account given by Denis from further north on the same flank. In addition the comment by Bort about the bromeliads on the southwest slope of Sierra Lumbrera does explain why Denis found the undergrowth 'spiny and inhospitable' at this same locality. The reference to crumbly earth 'like gypsum' has me puzzled; I am obviously not sufficiently familiar with this material to understand this reference and to be able to compare it with the other soils mentioned by Denis and Kanter.

From other accounts we expect to find Trichocereus pasacana growing at fairly elevated altitudes along a stretch of the eastern Andes from Belen to the rim of the Quebrada Humahuaca. According to Kiesling in his review of this genus it is found at altitudes above 2500m . Hence it would seem that the reference to pasacanas on the Sierras Lumbrera, which does not even rise to 2000m, is open to question. But in that case, just what are these columnar Cerei?

. . . . . from J. Lambert

It would not seem to me that Trichocereus pasacana are confined to altitudes above 2500m. I have photographed quite a big specimen near Santa Maria at an altitude of about 1900m, and a smaller one near Hualfin at about 1500m. when travelling along the road from Tinogasta to Cafayate via Belen and Hualfin, it is near this last place that I noticed the first T. pasacana. Before that the tall columnar Trichocerei branching from above the base belonged to T.terscheckii.

. . . . . from H. Middleditch

According to Kanter there are cereiform cacti to be found in the Sali valley. Blossfeld mentions Trichocereus terscheckii growing near Trancas which lies in the north of the valley of the R.Sali. In describing his journey by rail from Tucuman to Salta, J.M. Chalet observes that cereoid cacti are to be seen not far north of Tucuman- presumably in the dry valley of the R. Sali.

According to Bort there are also cereiform cacti near to Lumbrera, and T.terscheckii has been reported and photographed between Alemania and Colonel Moldes. However it is not certain that tall cereiform cacti always accompany plants of the delaetii group.

The comments from Bort about the flowers of G.schickendantzii appear to apply to the species as a whole and not just to those plants which Bort met with at the foot of the Sierra Medina and at Lumbrera. In those flowers where Bort says that 'the stigma lies deep' does he mean that almost all the anthers lie above the stigma i.e. as described for G.antherostele Ritter? In those flowers where Bort says 'the stigma lies relatively higher' does he mean that there are some anthers below the stigma and some above i.e. as described for G.antherosacos Ritter. Does this mean that these two flower forms are really to be found in the general run of schickendantzii anyway, and possibly in v.delaetii as well? Was Ritter familiar with the form of the flowers and the stigma placement relative to the anthers in the general run of G.schickendantzii and G.delaetii? In his Kakteen in Sudamerika, Ritter has a one-line acknowledgement of G.schickendantzii - does this mean that he did not concern himself to any degree with the general run of this species? Does it mean that he was not familiar with the occurrence of the two flower forms reported by Bort as a typical feature of G.schickendantzii? Does it mean that Ritter's two names simply represent typical forms of G.schickendantzii anyway? To what extent do the two flower forms reported by Bort represent the general run of G.schickendantzii? Is this report by Bort of the two flower forms reliable? The immediate question then is, what are the general run of flower sections like on G.schickendantzii and G.delaetii?

It appears that we are sadly in need of information about these flowers — existence of a ring of stamens at the base of the tube, colour of anthers, stigma opening, stamen disposition relative to stigma; fruit shape, ripening, colour, mode

of dehiscence, and internal filling. To cap it all, we do not even seem to have a flower sections of schickendantzii type and delaetii for comparison.

. . . . . from G. J. Swales

To my surprise I find that in my Gymnocalycium records I do not have a sketch of the flower section of G.schickendantzii. These plants have bloomed for me on many occasions and this is an omission which I shall have to try and repair at an early opportunity.

. . . . . from F. Fuschillo

Certainly I have taken a flower section of the Gymnocalcium B54 which does have flowers from the sides of the body, rather than from the top, and so would presumably fall within the group of plants around G.delaetii. But I do not have any flower sections of G.schickendantzii as such.

. . . . . from J. Lambert

You may be able to make a comparison between the enclosed slides of the flower sections of G.schickendantzii JL-06, a typical form which is from Chepes Viejo, of JL-14 G.schickendantzii v.pectinispinum, and of G.schickendantzii v. delaetii JL-27 from Colonel Moldes. In the flower section of my G.schickendantzii JL-14, you will see that the stigma lobes are above the few lowermost stamens which curve in towards the style and lean up against it; most of the stamens curve the other way, over the top of the stigma which is left in the space between the lower and upper set of stamens.

. . . . . from G. J. Swales

The references in the literature appear to place Gymnocalycium delaetii in the northern parts of Tucuman province and the adjacent part of Salta, but the field location for JL-05 is Ulapes which is not in this area at all. Yet on the slide of JL-05 you will see that the flower buds are definitely coming from areoles at or just below the shoulder of the plant. I feel that it is quite different for a Gymnocalycium to have flowers appear laterally and so I would feel that this plant should be considered distinctive from G.schickendantzii. In addition, the tube is almost completely covered with quite large scales which are almost overlapping. This too is a feature which I would have associated with G.delaetii and not with G.schickendantzii. The similarity may be seen if you care to compare the slide of JL-06 with the original illustration of G.delaetii on p.187 of M.f.k. for 1901.

. . . . . from H. Middleditch

But the illustration of G.schickendantzii Fig.181 in Briton & Rose The Cactaceae also displays flower buds arising from well below the shoulder, and this on a plant stated to have been collected in Cordoba, which is within the accepted distribution area for G.schickendantzii, and outside the accepted distribution area for G.delaetii.

. . . . . from J. Lambert

I am very puzzled that you should be surprised by the lateral location of the flowers on these plants. This is indeed a general feature of all the G.schickendantzii which I have seen so far. It is more or less pronounced in some populations, or even in individual plants in any specific population. Also the scales cover the tube completely at the early stages of a flower, but are more or less spread out at a later stage. What seems important to me to distinguish the varieties is the shape of the scales: either pointed in the typical form, or rounded in the var.delaetii and var. pectinispinum.

. . . . . from F. Fuschillo

Another of my G.schickendantzii came as B.16 and although it is very difficult to find out whereabouts plants with a B field number had been collected, this one appears to come from La Rioja at 800m altitude. But it is a flattened globular plant, similar in shape to my B.54 G.delaetii from Salta, at 1700 m, and on both numbers the flowers come from the shoulder or even slightly below the shoulder. But when I look at my slides of the flowers on these plants, I tend to get the impression that the outer row of petals do have rounded tips on B.54 whilst they are more pointed on B.16 and on my elongated plant.

. . . . . from J. Piltz

We did not see any flowers on G.schickendantzii in Argentina because we aimed to be there when seed could be collected. But we certainly saw fruits which were situated below the shoulder of the plants and they also appear there in cultivation. This feature is not peculiar to G.delaetii but is found on plants in several populations of G.schickendantzii, which grow together with plants carrying fruit on the crown and shoulders. I can recollect finding both sorts of plants in a population near the Salinas Grandes, for example. It is possible to separate G.delaetii from further to the north, for example from Alemania, by the body shape which is always flat, never elongated, and by the bluish-green colour of the epidermis.

. . . . . from F. Vandenbroeck

You will have seen from a slide taken at the foot of the Sierra Velasco, which I showed to the Chileans' Weekend, that fruit can be found half way down the body of the plant, so perhaps the flowers appear there as well as from the shoulder.

This particular plant is growing in the shade of a bush and the body is quite green, whilst the thin dark brown spines in the crown do not cover up the growing point. Of course the spines become much more robust and turn white by the time they reach the shoulder of the plant.

. . . . . from H. Middleditch

My own plant of G.delaetii regularly puts out several buds in late summer, but the flowers come out one after the other, two or three weeks or more apart, starting about the end of August. The last bud usually fails tc mature, probably on account of inadequate sunlight and falling temperatures. To say that the flowers open is really a misnomer, as the petals barely open beyond the vertical. Indeed the innermost petals scarcely part, just enough to be able to see the bunch of anthers crowded between them. It hardly seems worth while to cut off a flower and section it when it is not properly open.

. . . . . from J. Lambert

I am not altogether sure that I can go along with this idea that the flowers on G.delaetii are not fully open when the petals are standing more or less upright. This very feature is displayed by the flower sections of JL-06, JL-14, and JL-27 each of which may represent a fully opened flower.

. . . . . from H. Middleditch

At first sight it does seem difficult to accept that the flowers on this species are fully open when the petals are standing more or less upright. On the flower sections received from J.Lambert, the wide tube is surmounted by innermost petals which curve more or less inwards, to form a brandy-glass shape, whilst the outer petals bow slightly outwards. Thus the

width inside the tube is greater in diameter than the gap between the innermost petals. Looking straight into the flowers of both JL-05 and JL-06, a ring of uppermost anthers can be seen with a small central aperture. In the flower section, the anthers do not close together over the stigma, but there is an open column of space above the stigma, unoccupied by anthers. This appears to be similar to the arrangement described by Ritter for G.antherostele - a column of anthers. Perhaps J.Lambert may have seen flowers on G.schickendantzii with a wider opening?

. . . . . from J. Lambert

The flower on G.schickendantzii may open out a little more than you see on my slides but they always remains beaker-shaped - it never opens out broadly funnel shaped. The flowers on these plants always have an urn shape tube but when the flowers are fully open on my own plants, the petals do take up a broad funnel shape so that it is quite easy to see the stamens standing well above the margin of the tube. The top of the filaments bend over towards the centre of the flower so that the anthers are clustered close together in such a manner that they form a hollow column above the style.

PHYSIOGRAPHIC STUDY OF THE SIERRAS OF TUCUMAN **By F. Kuhn & G. Roehmeder.**

Abstracted and Translated from Universi. Nacional Tucuman Mono. Institu. Est. Geog. 3 l943, by H. Middleditch.

Climate

In any study of the climate of the Argentine republic the whole of the sierras of Tucuman attract the attention of the investigator. They interrupt in pronounced fashion the more or less uniform distribution of precipitation, the circulation of the winds, and logically, the temperature and the cloudiness. This arises from a particular circumstance; the effect of these sierras extends more easterly in relation to the sierras themselves than general theory would suggest. Thus these form in sure manner an individual climatic unit, separate from the prairie at their feet and also different from the bolsons to the south and in the west. The sierras really have an effect upon the climatic conditions of these marginal zones, in spite of th mountainous zone exhibitng features which in general terms are also met with in the surrounding prairies.

The individual climatic character of the Tucuman sierras arises from the fact that they face the general system of atmospheric circulation in the north of the Argentine republic. The winds originating from the Atlantic, moist and hot, which cross the Chaco region in a south and south-westerly direction, are forced to rise up the eastern flank of these sierras, producing the well-known phenomena of the condensation of their humidity. Thus, as indicated above, the amount of rainfall increases as elevation increases from the prairie to the east of the foot of the sierras. Particular topographic conditions can bring about a local increase in the general rise of rainfall.

Naturally the eastern flank of the sierras is favoured by the rains, the western flanks almost lack them. Within the system of parallel chains in the northern part of the sierras, this typical distribution is repeated. In these minor elevations, the eastern slopes receive a greater amount of precipitation than the western slopes, a feature which is exactly mirrored in their vegetation, in a manner which also produced within the general E to W reduction in rainfall, a gradation with ascents and descents in quantities.

The rainfall reaches its maximum amount in the lower third of the external eastern flanks, most commonly between 1000 and 1500m altitude, where it falls as persistent drizzle, often of several days' duration. Further uphill the precipitation takes on the character of 'garua' as it is called locally, a dense and humid fog, the rising portion of the pall of humid condensate below. It occupies a zone between 1500 up to 3500m above sea level and sometimes remains settles for whole days at a time, limiting the visibility to 200m or less. The next zone above is much drier and generally lacking in rainfall. This horizon between 2500 and 4500m receives only occasional rainfall from the uppermost pall of condensation, but does not benefit from proper rainfall. It is a transition zone for ascending currents and is distinguished by drier air and more hours of sunshine than that enjoyed by the other two rainfall zones.

The uppermost condensation zone rises from 4500m upwards. At these altitudes precipitation occurs as garua, snow, sleet, or hailstorms. A second source of moisture for the Tucuman sierras that should be noted is the frontal rains which are produced as a result of invasions of polar air as far as the region of low barometric pressure in the central part of the country. These fronts advance northwards from the south and southeast over the prairie, accompanied by storms and gales ('pamperos') precipitating moisture particularly over the southern and south-eastern slopes of the Nevados Aconquija and the eastern precordilleras.

There has already mention been made above of the influence of local and general winds upon the quantity and disposition of rainfall. Over the Tucuman prairie winds of S and SE origin predominate, which form a belt of incoming air above the ground, with a thickness of some 400 to 600m. At approximately 800–1000m altitude is the zone of contact with the north-easterly airflow, at which horizon is generally formed the pall of clouds which extend from the slopes of the eastern sierras across the Tucuman prairie. This direction of the moisture bearing winds is possibly one of the causes for he exceptional local increase in rainfall. Above this zone of contact at some 1000m altitude, the NE winds definitely predominate.

This pall of clouds, horizontally disposed, occupies a depth of about 2000m. Its upper surface is usually much more level than the lower. In conformity with the topography, tongues of cloud reach up the valleys in such a fashion that the western front becomes toothed by these extensions, at the same level as the main body of the cloud. Often this pall remains in existence for several days together, reducing in its extension and thickness in relation to the diurnal variations in temperature in the prairie.

This development of the weather in the Tucuman sierras does not vary greatly between winter and summer in its typical daily regime. Only during the months of autumn and winter, stability is more evident than in summer, due to the diminished heating of the Tucuman plain, with its consequent effects upon the horizontal and vertical movements of the air masses.

Vegetation

It is natural that a vegetation so rich and varied as that of Tucuman has attracted the attention of explorers. There are not only the classical works of Lorentz and Hieronymus but the more modern studies by Lillo. However, the data from

different authors does not coincide. Much data is still lacking to be able to state clearly and accurately the distribution area and altitude limits of the the main species and associations which may be observed in the vegetation of these sierras.

The Tucuman sierras afford excellent opportunities for studying local variations and their dependance upon climatic conditions. The reduction of temperature in step with altitude generates belts of different forms of vegetation superimposed one above the other. The tall luxuriant selva, in which evergreens predominate, with a layer of undergrowth; the deciduous mountain woodland; the alpine meadows; and the puna. But this vertical distribution by temperature zones is not repeated in regard to humidity. The greater or lesser amount of humidity depends upon the degree of exposure of the site to the rains, i.e. to the predominant winds which originate condensation in the form of clouds; in turn that depends upon the topography of the terrain. However one such area is not separated from the next, but intermingles. According to the local topography, one area penetrates into another. This variety in the phytogeographic picture is one of the more characteristic features of the nature of Tucuman and affords an important contribution to making this countryside so attractive and picturesque.

To recapitulate the general situation in regard to atmospheric humidity, the basic rule is that only the eastern slopes of the Tucuman sierras are favourably disposed in regard to rainfall, whilst the western slope is dry, with the division along the highest peaks of Aconquija and Cumbres Calchaqui. This line likewise represents a division between hygrophylic and xerophytic vegetation. In addition to this different exposure of the flanks on a grand scale, there exists a reduced scale within the eastern flank as we have seen, of relief subdivided by secondary sierras which run more or less parallel to the main cordillera, each ridge having one flank more humid to the east and the other flank less humid to the west. But the distribution of humidity is even more specialised: along the same flank of any one sierra are local changes in the character of the vegetation.

This is explained by the relation between the direction of the winds which produce the rainfall and the lie of the transverse valleys into the eastern slope. The winds which generate the condensation, which is responsible for the clouds and the rains, predominate from the SSE direction, whereas the transverse quebradas run mainly in an west to east or northwest to southeast direction. This results in those valley slopes which face towards the south to south-east having a more favourable situation in regard to the amount of precipitation that they receive, than the opposite slopes which face to the north or north-east. So in those quebradas a notable difference may often be seen in the vegetation of the opposing slopes. Then these same south-facing slopes enjoy a greater shade than those which face north and north-east; in this way the two favourable effects add up - more humidity and less evaporation.

. . . . . from F. Vandenbroeck

In the lowlands around Tucuman at about 650 m altitude there is sufficient rainfall not only for agriculture but also to support quite dense forests on the slopes to the west of the city. There are epiphytic plants on the trees - Rhipsalis, Pfeiffera, tree ferns, and orchids. When we were there in May, which is the dry season, the clouds were rolling up against the mountainside and then go no further. The clouds were up to a height of 2000 m but in the wet season they rise even higher. It is above the cloud level where the cacti start to appear.

. . . . . from from N. Wilbraham

During the I.o.S. convention at Salta in 1986 there was a coach trip via Cafayate and the Calchaqui valley from where we took the road to Tafi del Valle which goes on to Tucuman. Some way over the crest of the Cumbre Calchaqui we stopped to have a look round. Below us we could see the top of the cloud layer which extended as far as the eye could see . It completely obscured any sight of the ground further below.

. . . . . from H. Middleditch

The climatic regime described by Kuhn & Roehmeder extends southwards almost as far as the borders of Tucuman province, but it is not restricted to the mountain flank to the west of Tucuman - it also extends northwards to the border of Argentina and further into Bolivia.

From Tucuman to Bolivia the mountains rise abruptly from the Pampas-Chaco plain and bring about a much heavier precipitation than that enjoyed by either the plains to the east or the mountains to the west. Where there are ridges and mountain ranges of a lower altitude to the east of the main mountain flanks, the pattern of precipitation with its associated vegetation becomes repeated. The eastern slopes of the front ranges are well watered and forested whilst the western slopes of the same front ranges are fairly arid. This occurs, for example, in the Sierra Medina, the Sierra Lumbrera, and on the low northward extension of the Sierra Carahuasi which closes off the Salta valley. This barrier ridge is low enough to permit the rain-bearing winds to generate a further belt of forest growth in the foothills of the Salta basin. This forest belt is most prolific at the northern end of the Salta basin, where the rising slopes face south, just as Kuhn & Roehmeder describe. Similarly, it appears that at the entrance to the Quebrada del Toro, the flanks on the northern side of the quebrada i.e. south facing, are moister than those on the south side.

CACTUS HUNTING IN SALTA PROVINCE **From E. Vatter**

Translated from Kakteenkunde I 1940 by K.Wood-Allum.

For a long time I had intended to visit the cactus regions of NW Argentina. I was finally able to start the journey in 1938. After travelling for 24 hours I arrived at Tucuman, from where the journey led through regions that I did not know at the time.

The endless plain of Santa Fe and Santiago del Estero stretched as far as Tucuman. I was therefore pleased when the first Andean foothills rose up near Tucuman because the journey became more interesting and variable. As far as the eye could see the sugar cane fields stretch up the valleys. Scattered among them lay the crushing mills. The landscape changes again and again in rapid sequence. The railway leads directly up the mountains and at Tafi Viejo enters the valleys of the Cordilleras. The journey through the gorges and valleys is far too rapid to permit sightings of the cacti which I longed for and I was very pleased when I was able to observe a few Cerei and Echinocacti scattered in the shrubby growth. I have doubtless passed many beautiful plants without seeing them because you have to learn how to spot plants in habitat from a

moving train. Not until we got to Trancas and Volpi where the railway runs through very narrow valleys could I spot a whole range of various species on the valley slopes. Soon the valleys widened, the slopes became less steep. Here I observed the first giant cacti, with branches and stems of 3 to 6m high. To the right and left the eye swept across the slopes of the Andes, covered with dense forest. The scenery became more beautiful, the further north I went. Although I could not reach my destination quickly enough, the journey through this region passed far too quickly. Then the railway divides, one branch goes to Salta, the other to Jujuy. It was evening when I reached Salta after a ten hour journey from Tucuman. I did not really sleep well that night, for I wanted to get started on my first collecting day as early as possible.

I caught the early first bus from Salta to Campo Quijano, a town at the entrance to the grandiose Quebrada del Toro, right at the foot of the cordillera. I soon found somewhere to stay and got settled in. And then I was off. The soil at the exit of the gorge was coarse gravel, with a poor covering of grass and low bushes. Here I found the first cacti - a yellow flowered Echinopsis, close to Pseudolobivia aurea, but with stronger and lighter coloured spines. On the next day I aimed for the nearby mountains. The ascent led through a zone of luxuriant vegetation.

Then I reached a rocky plateau, the slopes of which were covered with huge Caibo trees; from the branches of these primeval giants hung Pfeiffera and Rhipsalis saglionis and a further rhipsalis species which was unfamiliar to me, forming large clumps. The region has a heavy rainfall; the clouds pile up against the 3,000 to 5,000 m high mountains and heavy rainfall is the consequence. Everything was moist here.

The mountains on the opposite side were bare, apart from grass, and there were no signs of cacti. Finally I found an Echinopsis with a white flower in a little hollow. It had a small round blue-green body with yellow and brown spines. Later, when I had them in cultivation in Buenos Aires, I was able to determine four forms with different coloured spines - whitish grey, yellowish, light brown, and darker brown. From here the trail led into the Quebrada del Toro. First I came across a different Echinopsis. Further into the ravine there was thick scrub, punctuated by odd trees on the low ground. There is no room here for the cacti that need so much light. Where the road had been blasted through virgin rock, the rock faces are exposed. In the crevices of the rocky walls I found at last the Rebutias I had sought for so long, their roots deeply anchored in the damp soil in the crevices. The deeper I penetrated along this monstrous ravine, the drier the earth became and the poorer the well-being of the vegetation.

Between Alisal and Chorillos the ravine divided and forms an island at the fork. Would there be nothing to be found there? To my joy and surprise, the slender, many-branched silver white columns of Cleistocactus strausii were growing in the rocky walls, and what is more carrying masses of red fruits. High up in this area Trichocereus pasacana occurred for the first time with its stout columns, as Cleistocactus strausii petered out, but its stems were never more than 2 to 3 m tall. The deeper I penetrated into the Quebrada del Toro, the stouter and more impressive became the columns of pasacana.
[The journey continued along the Quebrada]
. . . . . from "Journey to one of the richest cactus areas in the world" by A. V. Fric (Succulenta)

. . . I used the not yet completed railway line that will connect Salta and Chile. On arriving where the line meets the foothills, I found a botanically unknown area of great extent. So I turned about at the end station and went back a little. I saw a mule-cart which I followed up towards the hills and the Tastil.

Where the hills became enveloped in the cloud layer, giving a permanently humid atmosphere, one finds a a luxuriant vegetation; below, ferns and tradescantias; above, the pendulous Begonia boliviensis known by the natives a 'fire-rain'. Higher up, above the cloud layer - and below it as well - is a dry desert where it rains very little. During the journey we had a fierce, cold rain shower.
. . . . . from J. Lambert

When I visited the Quebrada del Toro, the weather was bright and clear all the way along and there was no trace whatsoever of any band of clouds. However, the lower section of that Quebrada is indeed more humid than it is higher up. Bear in mind that the mouth of the Quebrada runs into the region round Salta where the lower hills are covered with woods, but it also connects at its upper end with the higher and much dryer area of San Antonio de los Cobres. I would say that the change, though progressive, occurs roughly around 2000 m. But there is an additional factor, for although the biotype has become much dryer by Puerta Tastil, the quebrada here no longer presents the aspect of a gorge, but opens out into broad flat areas with the mountain slopes rising at quite a distance away at either side.

ECHINOPSIS KRATOCHVILIANA? **From J. Lambert.**
Abstracted from commentary given at Chileans' Week-ends.

My first visit to Argentina took place in 1981, starting at Cordoba, reaching as far west as San Juan and as far north as Salta. During the course of this trip we travelled from Salta to Tucuman, using the main road through Metan and Rosario de la Frontiera. Just as we were about to cross the border between the provinces of Salta and Tucuman, between El Tala and Trancas, this small plant with a remarkably elongated flower attracted our attention. It is one of those famous in-betweens, classified by some botanists under Echinopsis and considered by others as Pseudolobivia. Of these two alternatives I am inclined to accept Friedrich's view and so call this plant Echinopsis ancistrophora.

Of course Piltz has also collected an Echinopsis from Vipos, under his field number P-166, which may belong to the same species as my own collection.

In due course I was able to revisit Argentina, starting this time in Misiones and then travelling to the northwest of the country, where I found myself once again in Salta. From here we headed northwards in the direction of Jujuy and the Quebrada Humahuaca. Our first stop was at Abra de Santa Laura, near the border of Salta and Jujuy, where a steep rocky cliff harboured numerous Echinopsis ancistrophora. This particular locality was rather humid and the plants grew amidst a carpet of moss. The flower was a typical elongated white Echinopsis flower.

We stopped for lunch at San Salvador de Jujuy and during this short halt a thunderstorm of great violence burst out, changing the streets in to real torrents, and bringing all traffic to a dead stop. A little further on we climbed into the hills at

Leon and discovered there a somewhat different form or variety of Echinopsis ancistrophora. The steep slope of the hill made it quite difficult to take a photograph and one had to be careful not to lose one's footing and take a tumble. Somewhat later we alighted in Volcan but in the meanwhile it had started to rain and as we were already at 2000 metres altitude it had become really chilly with the disappearance of the sun, so I was glad to put on my warm belgian raincoat! After returning to Salta we made an excursion to the famous Quebrada del Toro. At El Alisal, in the lower part of the Quebrada at an altitude of 1700m, we came across an interesting species of Echinopsis which thrives here, characterised by a rather short spination. It was growing on a grassy slope with sparse bushes and some Trichocereus pasacana, on the NE side of the valley. Later on during that trip Roberto Kiesling identified the plant for me as E.silvestrii. The flowers on the spot were faded but the plant which I photographed there and collected under my number JL-147 has now flowered in my own greenhouse. Some seed has also been sent to F. Fuschillo for photographing.

Next morning we left Salta, travelling southwards, and not long before entering the Quebrada Cafayate we made a stop in the hills of Alemania. Here we discovered a pretty Parodia tuberculosi-costata and under the branches of an Algarrobo tree (Prosopsis turcata) we find ourselves face to face so to speak with the hanging stems of Pfeiffera ianthothele. Here we came across another short spined Echinopsis which I collected as JL-156. It is a form with heavier and somewhat longer spines, few radials, short and dark centrals, and acute ribs. After considering the identification of my JL-147 from the Quebrada del Toro over a period of almost two years, I find that I am no longer satisfied with the name of E.silvestrii. Indeed my specimen of JL-156 from Alemania matches much better to E.silvestrii. It also displays short central spines but bears a flower of 21 cm height, whilst my JL-147 from Quebrada del Toro has flowers which do not exceed 11 cm.

It now seems highly probable that my JL-147 is Echinopsis kratochviliana. Indeed, the place where I collected this form, at El Alisal, at the very entry to the Quebrada, is quite close to Campo Quijano, where Piltz collected his P.231 E.kratochviliana. The plants also match very well the pictures given by Lamb (Page 84) and even by Backeberg in his Lexikon, Fig.341. Nevertheless, the description given by Backeberg shows some discrepancies when compared with my JL-147, namely: central spines up to 5 cm long (always short on the observed plants) and flowers at most 5 cm long (7 to 11 cm on the observed plants). Does this mean that there are shortcomings in Backeberg's description?

I have now made a more detailed description of my plants of JL-147 from El Alisal; Body of a rather light leaf-green, diameter 60 mm, height 35 mm (still young specimens). Ribs straight, high, rounded. Tubercles elongated, confluent, without transverse furrows. Crown depressed, spiny, little woolly. Areoles triangularly rounded, 2.5 x 3 mm, yellowish white. Radial spines fine, short (up to 6mm), projecting to tangential, straw coloured with brown tips. Central spine(s) light brown with darker tip, erect, but barely stronger or longer than the radials. Radial spines (7-)9(-11); central spines 1–2.

Flowers (in cultivation) lateral, height 11 cm, diameter 7.5 cm. Tube olive green, with small elongated pink scales, becoming larger and brownish towards the upper part of the tube. Axils of the scales with greyish white wool, more blackish above, the latter shade becoming preponderant in the upper part of the tube. Outside tepals narrow, lanceolate, pinkish brown with whitish edges. Intermediate tepals more broadly lanceolate to spatulate, mucronate, with a residue of brownish middle stripe at the upper end. Inside tepals spatulate, shortly mucronate, completely white. Throat light green. Stamens in two series; filaments white, anthers creamy yellow. Style light green; stigma white, with 7 lobes. Scentless. Fruit ovoid to slightly pear shaped, 20 mm high and 16 mm thick, light green, bearing very small yellowish brown scales, ending in an elongated point, and with small tufts of white wool from the axils. Lateral dehiscence, flesh white, consisting mainly of the funicles, not very juicy. Seeds numbering 270 in a single fruit, slightly elongated into a bonnet shape, 1.2 x 1 mm; testa black, verrucose, shiny, hilum broadly oval, flat, crateriform, yellowish.

. . . . . from H. Middleditch

A seedling of JL-147 which is only 40 mm in diameter and about 30 mm high has been in flower. Finding the flower open late one evening, I resolved to try and catch it for a photograph before it wilted the following morning. Next day was bright but very cloudy and the flower stayed open. The following day was sunny, with little cloud, and the greenhouse thermometer stood at 110^{0}F for most of the day. By dusk, the flower still showed no sign of wilting. Either I have missed where it has been written or said, or else no one has bothered to mention that Pseudolobivia flowers stop open for three evenings. (Do they, all of them?) The flower was just over 11 cm tall when it first opened and was just over 11.5 cm tall on the third evening, with a diameter of 7 cm. The tube itself was 7 cm long, what I would call a washed out pale green colour. The scales near the base of the tube were so tiny that it was difficult to put a colour to them, but they appeared to be brownish green. The hair on the tube is certainly not one uniform colour, but I found it difficult to decide just what colour it really was. Holding the flower up against my hand, then against the black velvet photography background, and against the white of the staging frame, all tended to give a different impression of the colour of the hair, but I came to the conclusion that the hair was white on the lower half of the tube and black on the upper half.

The outermost petals (the 'saucer') were a washed out brownish green with a greenish-white mid-stripe; there was no sign of a white margin. At just over 1.5 cm wide the remaining petals (the 'cup') struck me as remarkably broad for their length, the outermost petals of the 'cup' having a thin pinky-brown midstripe in their upper half. Otherwise the body and flower matched the details given above by J.Lambert, with the addition that the central spines were curved or hooked at the ends.

. . . . . from M. Muse

The opening remarks made above by J. Lambert touch upon the question of Pseudolobivia. Many of you will perhaps consider the issue was long since laid to rest. Backeberg erected Pseudolobivia for almost all the wrong reasons and his case was not well constructed. Despite a plethora of personal abuse and empty rhetoric (which to me seems unprofessional) there seems to be no balanced and argued refutation which takes account of at least two anomalous groups of plants and the observed facts regarding them, none of which can be seriously disputed. The traditional straight ribbed plants with a long flower are clearly what Zuccarini had in mind when he described the genus Echinopsis. Throughout their area of distribution, which encompasses a diversity of climate, topography, and geology, these plants display a range of variation which may represent or include a genetic component.

However in the ancistrophora and obrepanda complexes we encounter a varietal mix of what I would term both

echinopsoid and lobivoid characteristics. Thus we find a long white echinopsoid flower on a lobivoid body having oblique tuberculate ribs and offset podaria with strongly hooked spines, or on the other hand red, orange, or purple flowers - long or short - on echinopsoid bodies having straight ribs and in-line areoles carrying straight or twisting spines, together with virtually every other combination possible. In the Echinopsis sensu stricta of Zuccarini all these readily observable characters are constant, any differences being quantitative and not qualitative.

It is my opinion that these two groups (ancistrophora and obrepanda) represent a trans-generic development towards Lobivia. The altitudinal distribution range of these two groups - pricipally from 1800 m to 3200 m - provides some circumstantial evidence for this development. I would envisage the following broad trends in the historical evolution of these groups. We cannot be certain about the origins of the Cactaceae but it is believed to have taken place during the last 2 to 5 million years of the present era. The lower figure corresponds to major orogenies which resulted in a significant uplift of the Andean Cordillera and the development of secondary sierras to the east of the main cordillera. Parts of the cordillera are still rising at rates in excess of 40 cm per thousand years but geological evidence shows periods of much more dramatic uplift. The combined effects of such movement over the period(s) envisaged would result in at least some foreseeable evolutionary consequences for hitherto lowland forms. These would, in my view, include the development of the lobivoid rib structure which from a design standpoint is able to cope more effeciently with the extremes of temperature common at high altitude, as well as the evolution of daytime flowers where the principal pollinators are likely to be bees or other day flying insects, and perhaps other characteristics whose functional nature is not so obvious. This is a grossly simplified view of what may have happened - it may even be quite incorrect - but this kind of cross-disciplinary integrated approach seems to me more likely to lead to a better understanding of this group than the various alternatives put forward as paper botany, especially in recent years.

Having had an opportunity to see two plants of JL-147 I took them immediately to be from the ancistrophora complex - there is no possibility of confusing them with E.silvestrii. My own plants of this group comprise E.kratochviliana MLV.1, MLV.1a, P.231, and P.231a; E.ancistrophora P.68, Lau 558, R.237; E.polyancistra P.68a; and E.l natacantha R.233. All these ancistrophora forms have hooked centrals and tap roots, which separates them from virtually all other Echinopsis. By tap root I mean a main root which is slim, tapering and carrot like, which like a carrot may sometimes be divided, but with only a few attached fibrous secondary hair-like roots. The flowers are without doubt very variable in length.

. . . . . from J. Lambert

I do not think that the hooked character of the central spines has any value when it comes to defining Echinopsis ancistrophora. Indeed, among my E.ancistrophora JL-128 from Abra de Santa Laura, some plants have recurved or hooked centrals, whilst in others they are straight - in the same population. I would rather distinguish ancistrophora from kratochviliana by the sharper ribs (against rounded), the more deeply embedded areoles, the longer flowers (18cm against 7–11 cm) and the green median stripe on the outer tepals, against pinkish brown.

. . . . . from H. Middleditch

The definition of the components of the ancistrophora group poses one or two problems. Thus in his B.f.K. Backeberg gives E.kratochviliana with 'ca. 17 slender, sharp edged 5mm high ribs, slightly depressed around the areoles, ca. 10 radial spines up to 7mm long, 1–2 central spines up to 15mm long, more or less hooked, flower 5 cm long, tube covered with blackish hairs'. In his Die Cactaceae Backeberg emphasises the slabsided ribs for this species but gives central spines '1–2, occasionally four in a cross, up to 5 cm long, dark or darker tipped' - no mention of hooked centrals. Are we to assume from this that in the period between the two descriptions, Backeberg had become acquainted with short-flowered plants which lacked hooked centrals but otherwise fitted his initial description for E.kratochviliana? Thus after the original publication of kratochviliana in 1934 there was a change in 1954 from hooked centrals to undefined centrals. The original description of Echinopsis ancistrophora by Spegazzini in 1905 did include hooked centrals and this feature was not altered when Backeberg converted it into Pseudolobivia ancistrophora in 1942. The flower length was given by Spegazzini as 12–16 cm and this too was repeated by Backeberg. It is not entirely clear how J.Lambert settles upon a range of flower length of 7–11 cm for kratochviliana, but if we compare this with Spegazzini's figure of 12–16 cm for ancistrophora, then the dividing line between the two becomes quite fine.

For Pseudolobivia polyancistra, Backeberg gave 'very variable . . . ribs only 3mm high, slightly rounded and tuberculate,. . .spines numerous, bristly, the central often curved or hooked, occasionally quite short, straight, up to 12mm long. . . Flowers scented. . . .up to 10cm long'. This might be taken to imply that the two other foregoing species have non-scented flowers.

'BORT IN ARGENTINA'

Translated by K. Wood-Allum from Austrian Cactus Society Journal for December, 1973.
(An illustrated lecture given to the Attersee Cactus Week-end).

Recently I went on my seventh trip to the spiny wilderness of south america. Since the first of my seven visits I have travelled through northern Argentina four times in summer and three times in winter. So now I know the seasonal weather and climatic sequences almost completely.

Between the main cordilleras of the Andes and the eastern region where subtropical plants spread over the lower landscapes, there lies the minor cordilleras, the minor sierras, and the foothills. In between these lie massive deeply eroded valleys. Here botanic-geographic formations of cacti are to be found as especially modified, specialist forms. In the transverse valleys - there are several very large ones - at least some components of the subtropical vegetation have reached fair heights, for example in the Quebrada del Toro.

My first trip to the Quebrada del Toro was in 1969 when you had to cross the river bed fourteen times from the beginning of the gorge to Puerta Tastil. This time, thank goodness, the lower end of the road had been remade; it runs here round the back of the mountains and the river crossings higher up are no longer so difficult. Where there is water in these transverse valleys you do not find, as you might think, flora from the arid zone, but on the contrary a fairly hygrophyllic flora with reeds, Cortadera, Totora, and willows. The Quebrada del Toro and some other transverse valleys are ideally suited for

cattle raising. In many of these valleys you find Karakut sheep. Behind them, however, where there is no water or only water at particular times, is the area of the arid flora, the realm of the cacti.

One of the first plants which I collected in the lower part of the Quebrada del Toro when Rausch was with us in 1962/62 and we had Puch mopeds, was Pseudolobivia kratochviliana. As you can see, this Pseudolobivia grows on slopes in grass and our linen bags were to collect fruits to be able to get seed from them. When you dig out a plant you often do not know what species it is - often you guess. But you learn, you are often surprised when you get home! We thought that this one was Pseudolobivia ancistrophora. This year it flowered - Herr Kopp photographed it because I was not there at the time - and from the flowers it was evident that our assumption was correct. It is Pseudolobivia kratochviliana.

. . . . . from H. Middleditch

In the list of Rausch field numbers published by the Austria Cactus Society there are a few notes written by Walter Rausch which give some outline information about specific years in which he went collecting in south america, who he went with, and where they went. 'In December 1962 it became possible for me to start my first expedition. I went with my friend Hans Borth from Buenos Aires to Salta, equipped with two mopeds. Unfortunately my companion had soon to give up, for health reasons . . .' Further trips made by Rausch to South America between then and 1975 were undertaken with other travelling companions, not with Bort. Further on in his account of his seventh trip, Bort refers to an event which took place in January 1963, so that this trip reported above by Bort may be reasonably dated as 1962. Hence it will also be the first Rausch visit to south america. The Rausch field number list starts off with ten numbers from the Quebrada del Toro, of which R2 is Echinopsis kratochviliana and R2a is Echinopsis polyancistra. It may be reasonable to assume that these are the field numbers whose collection Bort describes above.

Bearing in mind the comments made above by J.Lambert in regard to the variation in the spination of the plants which he met with at Abra Santa Laura, what do we make of the situation with R2 E.kratochviliana and R.2a E.polyancistra? Does this form of field number allocation suggest that the two sorts were collected from the same population? Some with hooked centrals, some without? That this is the extent of the variation in this particular population? The flower length is mentioned by Bort as the basis of identification, but this is similar for both species.

. . . . . from P. Allcock

My own collection includes a score of flowering plants from this group. To start with there are the normal ancistrophora with typical largish Echinopsis flowers, represented by P.68a and P.231a and MLV.1. Then there is P.231 which is a much smaller plant with a smaller flower - about 4½ inches long which has pink outer petals. All five E.kratochviliana MLV.1 have fewer ribs than the ancistrophora but all have central spines that are curved, bent over, or hooked, at the tips. Finally there is E.polyancistra with much longer spines, up to 30 mm long, some with tips curled right round on themselves.

. . . . . from R. Allcock

When I attended an open day at the collection of H.Gaulton a few years ago I obtained a plant of Echinopsis ancistrophora which had long curly spines and several hooked centrals sometimes as long as 2.5 cm. Even when I acquired this plant it looked very dessicated and upon unpotting it my suspicions were confirmed - it had no live roots. After two years of nursing it has now regrown something of a root system - as yet inadequate, and has also made some new growth. This new growth has short spines barely half an inch long, just like all my other ancistrophoras. This suggests to me that the plant may be a habitat import and that the better spines have been produced in habitat - a familiar phenomenon of course. There remains the challenge to restore the original vigorous growth pattern and a really good root in cultivation.

In addition I have a plant of E.kratochviliana raised from Kohres seed, as well as several plants of ancistrophora and polyancistra which came into my collection under these and other names. Indeed I probably have more forms than names and I must assume that in the past there has been a lot of mis-named seed as many of my labels have had to be changed. I think that I have them all sorted out now, except that there exists both short spined ancistrophora and also forms with longer spines. Indeed the photograph on p.138 of Rausch Lobivia 3 is not only exceedingly interesting, it is also rather puzzling, as it appears to show both long,twisting, and short spination on the one habitat plant, depending upon which head one looks at. Maybe the spines grow in length as the head matures, as it is the most mature head in the picture that has the longer spines.

In my experience plants of ancistrophora have to be about 4 cm in diameter before they first flower, plants of kratochviliana about 3 cm in diameter, and of polyancistra about 2.5 cm across. On kratochviliana the flowers frequently appear in a ring, several small flowers with a short tube of only 5 cm or even less in length. The flowers on ancistrophora are much longer, longer even than on polyancistra, with a tube exceeding 8 cm long and buds 12–16 cm long before the flower opens. The flowers on polyancistra are very graceful, very slender (more so than the flowers on ancistrophora), very long for the size of plant. with narrow petals. I am quite sure that some of the flowers are fragrant, but I have no record of this at the moment.

. . . . . from P. Allcock

Yes the flowers on my own P.68a are beautifully perfumed, but I would need to check the flowers on the other field numbered plants for this character.

. . . . . from H. Middleditch

Are we really entitled to use flower size as a means of identification in this group? Is it not very probable that the separation of R2 and R2a, both from a common population at the entry to the Quebrada del Toro, was only made after flowers of different sizes were subsequently observed in cultivation? Both P.231 and P.231a were collected at Abra Santa Laura and clearly differ appreciably in flower size. Did Backeberg know whether long and short flowers occurred in the same population when he erected the names of kratochviliana and polyancistra? Do we simply have here a similar situation to that which exists with Lobivia aracnacantha? Is there really any distinction in hooked or straight spination? Is there any real dividing line on flower size? Is there any difference in the flower scent?

REPORT & ACCOUNTS Nos. 43–45 (inclusive)

INCOME		EXPENDITURE	
Subscriptions	£1979.19	Printing of Journals	£2663.43
Back number sales	£1450.66	Postage of Journals	£204.18
Sale of other publications	£61.80	Other postage and expenses	£1154.81
	£3491.65		£4022.42
Piltz visit	£17.00	Purchase of Photocopier	£400.00
Annual Weekends	£36.71		
Miscellaneous income	£199.42		
Bank interest	£641.31		
	£4386.09		£4422.42
Balance carried forward from previous account	£1144.15	Balance brought forward	£1107.82
	£5493.53		£5493.53

There has been a limited but continuing demand for back issues of The Chileans. With each additional number the storage of back issues becomes an ever-increasing problem. Reprinting of half-tones is now quite uneconomic. To discontinue the back-number service would involve scrapping the existing stock of individual pages of back numbers, which would amount to several cwts of paper. The purchase of a photocopier has permitted the back-number service to continue coupled with an easement of storage problems. It will be some time before this outlay is recovered from back number sales.

The notional profit on the Annual Weekends does not take into account the cost of notifications, postage, etc nor of display material obtained specifically for these events, which would amount in total to about £150 (included in the general heading of postage and expenses).

The high proportion of the income from back numbers being spent on postage was highlighted by the Membership Secretary and due account has now been taken of this in the revised charges for back numbers.

For all three numbers, the text was supplied on disc for translation and direct printing and this has materially assisted in controlling costs. The inability of the printers to come to grips with embedded printing commands has caused a tremendous volume of work in correcting proofs. It is also unfortunate that one or two materially valuable contributions have taken many months to arrive and so added to the delays in the appearance of the journal.

It is always a pleasure to be able to acknowledge the active assistance, great and small, given by so many members. This takes many forms in addition to the contribution of comments and observations. Without this support, publication of The Chileans and other activities simply would not be possible.

CHILEANS 1990 WEEKEND

We will be able to welcome J. Piltz on his third visit to one of our Weekends. The date of the Weekend has been settled as 27th-29th July, 1990 to suit our visiting speaker, who expects to be not long back from a return trip to Paraguay at that time. It has been possible to book our Weekend at Cavendish Hall, Nottingham University, once again, but charges for 1990 are not currently availabale. However, an increase in the order of 10% over 1989 charges unfortunately appears to be within the bounds of possibility.

It is anticipated that we will be able to hear from D. Aubrey-Jones on Matucana, from J. Arnold on Lobivia, especially the chrysantha group, and from A. Hill on Rhipsalis.

Further details will be sent to those members who attended the 1989 Weekend and to anyone else who wishes to participate.

INDEX — CHILEANS No. 31 to 45 inclusive

This has been compiled by M. Holland and is available at a cost of £3 (U.K.) and £3.40 (overseas) post paid, from the Membership and Back Numbers Secretary. Indexed subjects include not only specific plant names, but also maps, travellogues and illustrations, etc.

SOUTHERN ANDES 1990-91

Following the visit of J. Watson to our 1989 Chileans Weekend we understand that he is planning to make further collections of cactus seed during his forthcoming proposed visit to South America. It is anticipated that this will take place over the 1990-91 season and the route is expected to be between Mendoza and Lake Nahuel Huapi. Any cactus seed collected from this area will probably be Tephrocactus (Maihueiopsis), or Maihuenia, possibly some Austrocactus, and a faint outside chance of some Pterocactus. At this juncture a figure of £1.50 per portion of seed may be involved as an alternative to a subscription to the Expedition. further available details will be announced at the 1990 Chileans Weekend. It is anticipated that experiences in raising the seed from the 1987-88 Pern & Watson Southern Andes Expedition will be included in a future issue of The Chileans.

CHILEANS MAPS

We have been asked if a separate publication could be made of all the maps which have been included in present and previous issues of The Chileans. This would consist of some 28 maps and would be priced at about £4 (post paid, U.K.). Some of the early maps are no longer in a fit state for reproduction, but in most cases the area concerned has been included in a later map. One or two of the maps already published have been updated by the addition of place names brought to our notice, e.g. by visiting continental speakers to The Chileans Weekends as locations for certain cacti and it would be the updated versions that would be included in any such publication. If you would be interested in purchasing this item, please advise the Membership and Back Numbers Secretary, so that the practicality of undertaking this proposal can be established.

FORTHCOMING ARTICLES

Information on habit, flowers, fruit, and growing experience with Cleistocactus, pallidus, palhuayensis, and viridiflorus would be welcome. Comparisons of habit, flowers and fruit on Lobivia grandiflora (Trichocereus rowleyi) with either Lobivia purpureominiata, or Helianthocereus crassicualis, would be welcomed. Experience with fruiting Melocacti would also be welcome. Seeds are sought from any Rebutia of the einsteinii group; from Lobivia famatimensis (Reicheocactus reichianus) and its vvs.; and from Lobivia jajoiana, marsoneri, or chrysantha, or any names attached to this complex by Rausch. Seeds are sought in quantities of 8 to 10 only per species for study purposes and not for sowing, so that the method of setting the seed is irrelevant. It would greatly be preferred to have seed from plants which are either imports or carry a field number, so that the seeds can be put on to a slide and then used to support discussions at The Chileans Weekends and in these pages.

ROBERTO KIESLING — SEEDS

When R. Kiesling came to The Chileans Weekend whilst he was on detachment to Kew, he distributed several packets of habitat collected seed. It would be a considerable interest to hear of any plants surviving from those seed sowings.

ERRATA No. 45

p. 155: Delete 'Year' from top of left hand column and add 'Year' to top of right hand column.

p. 160: Contribution from D. Hunt should have read: "There was hardly time to photograph all the species, let alone make detailed observations! From my photograph, I estimate the diameter of the plants as c. 14-15 cm. As I recall, I saw 10-20 plants in all, most of them subglobose and about this size".
In the same paragraph the location should be Los Colorados.

p. 166: Table of Pyrrhocactus spp. Delete 'Terneros' from left hand column.

LATE NEWS — 1990 CHILEANS WEEKEND

In addition to our visiting speaker, J. Piltz, we now understand that he will be joined at our 1990 Weekend by D. Metzing, who has been out to Paraguay. He will be talking about Frailea, including those plants which he has met with in habitat.

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SPECIAL INTERESTS

Austrocacti	A. Johnston, 11, Malvern Road, Scunthorpe, DN17 1EL
Cleistocacti	T. Lavender, 'Kalanchoe', Market Place, Tetney, DN36 5NN
Copiapoa	A. W. Craig, 32, Forest Lane, Kirklevington, Yarm, TS15 9LY
Echinopsis	M. Muse, 32, Fielding Road, Birstall, Leicester, LE4 3AJ
Frailea	J. Forrest, Spring Garden, 2, Darngaber Road, Quarter, Hamilton
Gymnocalycium	F. Fuschillo, 55, Emberton Court, Torpion Street, London, EC1V OEP
Lobivia	R. Purslow, 130, Brighton Road, South Croydon, CR2 6AE
Matucana	P. Allcock, 49, High Street, Burford, OX8 4AQ
Melocactus	J. Arnold, Suffolk House, 2, Oak Hill, Washingborough, LN4 1BA
Neoporterianae	R. Ferryman, 'Nichelia', The Street, Stonham, Aspal, IP14 6AH
Notocactinae	G. J. Charles, Briarsbank, Fosterbridge, Ketton, Stamford, PE9 3UU
Opuntia	R. Crook, 35, Cardinal Close, Worcester Park, Surrey, KT4 7EH
Tephrocactus	R. K. Hughes, 16, Ashbourne Avenue, Bootle, L30 3SF
Uebelmannia	S. Stringer, 27, Oaklands Way, Winklebury, Basingstoke, RG23 8LU

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