TEPHROCACTUS

Incl. Maihueniopsis, Puna and related genera plus other small Opuntias

***Tunilla corrugata* and *Cumulopuntia chichensis* growing sympatric with *Oreocereus celsianus* and *Echinocereus ferox ssp longispina*.**
Photograph by Paul Klaassen.
2008-12-17 14-05-02

STUDY GROUP

Vol. 15
No. 1 March 2009

SECRETARY'S PAGE.

All articles and comments should be sent to the Editor.

Subscriptions for 2009 were due on the 1st January 2009

Subscriptions and any other correspondence must be sent to the Secretary.

Subs for 2009 remain at £10.00 per annum for the U.K and Europe (European members please note that no Euro-Cheques are accepted by our banks – but you may send £ Notes). The subscriptions for Overseas Members is £14.00 or $25 (in $bills only). Please make all cheques payable to: "The Tephrocactus Study Group" (not individuals).

May I please remind you to let me know of any changes to your address, telephone number or e-Mail address.
If you write to any Officer and expect an answer, please to include a S.A.E..

Members may advertise their "Wants" and "Surplus Plants" free in the Journal, in no more than 30 words.

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THE 2009 TSG MEETING.

As stated in the December issue this will be held on Sunday 10th May 2009 at the Great Barr Ex Service Men and Women's Club, Birmingham, which is very near Junction 7 of the M6. A loose sheet inserted in this issue for UK members provides directions to the meeting place. The room will be available from 10.15 and a buffet lunch costing £5 will be provided. To help the Caterer notification of the number of people having lunch is needed by April 24th. I would be grateful if people intending to attend will let me know by that date and whether you will have the provided buffet lunch. Contact details are inside the front cover. There is no charge for attending the meeting and guests who are not members of the TSG are welcome. Please will members promote the meeting at local BCSS branches? Please bring any plants of interest or for identification. Plants for sale are also very welcome and there is no commission charge.

The location is the same as last year and the date remains changed to avoid the meeting being held on the day before the May Bank Holiday Monday as was the case in previous years. The programme will start at 11.00 am with a short businesses meeting. The speakers will be Geoff Bailey who will be discussing the Opuntias he has seen on his several journeys in North and South America and Ivor Crook who will also contribute to the programme.

A. Hill.

SOIL pH - WHAT DO THE PLANTS REALLY TASTE?

Elton Roberts' discussion of acid v. alkaline soils (Roberts 2008) brought back poignant memories of over 60 years ago when I entered my first paid job hopefully aiding the war effort by analysing soils. Samples collected from farms in the south of England were prepared and analysed for pH, chalk content and essential nutrients. A simple test for the presence of chalk (or other carbonates) is to add acid which causes fizzing and release of carbon dioxide. I always enjoyed pottering with chemicals in a laboratory, but my pride was dashed when I was summoned to the boss's office to explain how I came to record some samples as having a slightly acid pH (below 7) but also substantial chalk content? Surely there had been an error? After frantic retesting the truth came to light: it is quite possible, when a soil sample is dried and ground up, for chalk granules to co-exist alongside acidic humus and other organic matter.

A general bulk soil sample such as this does not necessarily indicate that the plants growing on it "prefer" limestone, or even tolerate alkalinity. What really counts is the pH adjacent to the feeding roots: the rhizosphere or area directly around the rootball. A simple parallel would be the temperature inside one's winter woollies as compared to that outdoors on a cold day.

As long ago as 1958 Franz Buxbaum drew attention to misconceptions arising from assumptions that the overall mass of soil had the same pH as that directly surrounding the roots. In his excellent book that contains much research still valid today he went on to show that a high pH on a soil sample does not necessarily indicate limestone. In the hot dry areas frequented by succulents evaporation from the surface draws up salts in solution from below that dry out to form a crust,

similar to that on porous flower pots given hard tap water. This when wetted can show an alarmingly high pH.

A classic instance is the extensive survey reported in 1969 by Professor D.Cole on the pH value of soils collected from 143 localities inhabited by *Lithops*. When the dry samples were ground up and wetted for analysis, 45% of them gave pH readings from 8 to 10, which are lethal to most vegetation. Remarkable as they are, *Lithops*, I think, never experience such high alkalinity with their roots confined to pockets of humus among quartz.

Probably the most alkali-tolerant succulents are the halophytes; those found in salt pans and on cliffs or salt marshes near the sea. Few of these are favoured by collectors. Indeed, it becomes increasingly difficult to find any examples of succulents that have been scientifically proved to thrive better at a pH above rather than below 7.It is noteworthy that in the extensive research in the 1930's to produce one ideal standardised potting compost for the plants of horticulture, the John Innes Potting Composts settled for an optimum pH of 6.5, with a more acid blend for Ericaceae. An added warning was given that in time this became alkaline, especially if hard water was used for watering.

There have been many reports of growers noting a marked improvement in their succulents after acidifying the water. In a small way I found this to be so with my few gymnocalyciums. Especially at risk are bowl and trough gardens where excess water cannot drain away, but eventually concentrates the salts. Less is written about how best to do the acidifying. Ideally one needs to test the pH of the growing medium, the tap- or rain-water used, and that of added fertilisers. The cheap and simple pH probe that I bought is useless. And how best to acidify? Vinegar and citric acid are cheap and easy to use, but how much? Sprinkling sulphur is a safe and slow-acting remedy: bacteria eventually oxidise it and lower the pH of the soil. Perhaps experienced readers can come up with their advice here. Let's make 2009 "The Year of the Rhizosphere".

G.D.Rowley.

REFERENCES

BUXBAUM, F. (1958) Cactus Culture based on Biology. Blandford Press.

COLE, D.T. (1969) Soil pH values in some Lithops habitats. Nat.Cact.Succ.J. 24(2): 27-30.

ROBERTS, E. (2008) Austrocylindropuntia vestita and acidic water. TSG 14(4): 59-61.

After a meeting one night in the 1970s five men went to a pub. As they sat around a table one man produced a bottle of concentrated nitric acid and the acid was poured into five small bottles, one for each man. The group left the pub shortly after eleven o'clock and walked a short distance together before intending to disperse to separate locations. Suddenly one of the men had a thought and said "If we are stopped by police how are we going to explain why we are walking through the streets of Sheffield at night each carrying small bottles of concentrated nitric acid?" "Say that we are going to dilute it

and water cacti" replied a second man. "Do you think they will believe us?" asked a third man. Fortunately they were not stopped so the explanation was not tested.

One of the bottles still remains in my greenhouse unopened. Amongst the reasons for this is because of vague memories of science lessons at school where it was said that mixing acid and water was dangerous and there could be an explosion if one added acid to water, or was it water to acid? Another was because although we had been told the plants benefited from acidic water made up from concentrated nitric acid no one had been informed of the ratio of dilution and obviously there was fear of damage to the plants if we made the mixture too strong. There was no feed back of any of us using the acid. In fact when I helped to clear the greenhouse of a deceased member I found his unopened bottle under the staging. I was therefore very pleased to read Elton's recommendation to use vinegar which can be handled safely. However, there still remains the question, as Gordon points out, as to the required strength for one's own compost/water. Reports of members' experience with acidic water will be very welcome. Ed.

A REPORT ON PART OF A GUIDED CACTUS TOUR TO NORTH WEST ARGENTINA AND CHILE.

In November last year I went on a guided Cactus tour to North West Argentina and Chile put together by Willy Smith of Cactus Tours. This was my first visit to see Cacti in habitat, my first visit to South America and my first visit to the southern hemisphere. I was particularly drawn to this trip as it promised the chance to see a large number of the 'small' Opuntias and allied genera in habitat and because it was in the South American Spring the promise that many should be in flower.

This article is an account of a stop at a particularly interesting location during day 4 of the trip when we were en route for the Chilean border crossing at the Paso de San Francisco. The area in question is called Rumi Ryan and lies on National Road 60 in the west of Catamarca province, Argentina, a few miles from the settlement of Chaschuil. The following plants were found growing on the hillside all within a few hundred yards of the road*: Puna bonnieae, Tephrocactus geometricus, Maihueniopsis minuta* **and *Pterocactus kuntzei.* We started the day at Fiambalá (this being the last town before the crossing into Chile on this route) and began the slow climb into the mountains. On the road between Fiambalá and Rumi Ryan we stopped at Las Angosturas to see *Maihueniopsis boliviana,* an unidentified Tunilla species, *Soehrensia formosa, Denmoza rhodacantha* and *Opuntia sulphurea.* The latter was a plant we encountered every day in Argentina in many different forms. Although not a small Opuntia by any estimation I found it appealing because of its variation form location to location. The spine length and shape varied from an inch long to five inches or more and from straight to curled. As we climbed higher into the Andes the mountains became more spectacular, the vegetation more limited and the air thinner. When we eventually reached the site in question (Fig.1) we were at an elevation of approximately + 2,900m.**

The hillside we explored at Rumi Ryan was a gentle north facing slope littered with rocks of varying size and colour interspaced with fine gravel and sand. (In fact not unlike some of the Martian rover shots I have seen.)

Fig. 1 Rumi Ryan.
Fig. 2 *Puna bonnieae*

Both photos by M. Partridge.

Figs 3 & 4. *Puna bonnieae* in flower and fruit.
Photos by Willy Smith.

Fig. 5. ***Pterocactus kuntzei*** **or** ***megolithilii.*** **Both photos by**
Fig. 6. Maihueniopsis ***minuta*** **M. Partridge.**

Fig. 7. ***Tephrocactus geometricus.*** **Photo by M. Partridge.**

Fig. 8. ***Cylindropuntia californica or Opuntia parryi v. serpentina.***
Photo by E. Roberts.

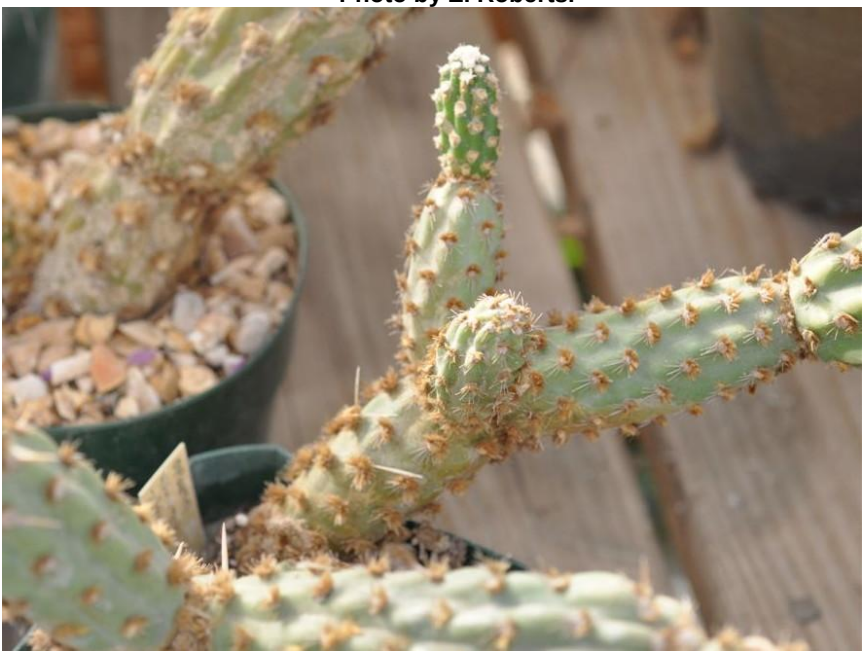


Fig. 9. The "Blossfeld site". BB589 S1064. Along the ridge. Note the top, the slope, the flat bottom and Suripujio in the distance. Photo by P. Klaassen.

Fig. 10. *Tephrocactus nigrispinus*. DSC 0175. Photo by Brian Bates.

Fig. 11. ***Tunilla corrugata*****. 14-27-41**
Fig. 12. ***Cumulopuntia chichensis*****. 12-54-33**

Both photos by Paul Klaassen.

There was some obvious vegetation in the form of low scrubby bushes and the tough yellow grass which we saw at several locations including at the high point of the crossing into Chile.
The nature of the terrain and the small size of the plants sought meant that initially I was unable to find anything resembling a cactus and wandered around peering at the ground until our guide located some specimens. I then realised what it was I should have been looking for - this was a recurring theme for me when searching for small plants in a large landscape.
The first group located consisted of five plants of *Puna bonnieae* which lay almost flush with the surface of the sand and were coloured to almost exactly match their surroundings (Fig. 2) Once the first group had been found several others were soon located nearby, often partially buried in the sandy gravel and all of a fairly uniform appearance.
They did not much resemble the plants I have seen in cultivation and did not seem to form the multi headed clumps that are normally encountered. They were around ½ to 1 inch in diameter and were rather flattened as can be seen from the photo. The majority of the plants were solitary or had two / three heads maximum and although one or two were showing signs of buds / new growth these were not very far advanced.
Unlike the plant I grow under this name these specimens did not have any sign of spination (I understand that the plants most often seen in cultivation come from collections made lower down in the area around Fiambala.) I have seen references to a form called 'nudum' which may be the same as the plant we saw. I was struck by the obvious similarities in appearance between the *P. bonnieae* and the form of *T. geometricus* we saw.
Willy has kindly emailed me two additional images of the plants at Rumi Ryan to accompany this article illustrating the plants in flower and fruit (Figs 3 & 4.)
Close by to these the first plant of the Pterocactus was located (Fig. 5). This was projecting from under the shelter of a stone and had a well developed flower bud. Willy noted that this plant is thought by some to be a type of *Pterocactus kuntzei* but was not certain of this. I have since consulted Rene Geissler over this and he thought it bore a closer resemblance to *Pterocactus megolithii*. (Anyone else an opinion? Ed)
Close inspection of the area revealed more of these plants almost all growing in the shade a rock which led me to conclude that they needed shelter in order to become established.
A little further along the slope several clumps of *Maihueniopsis minuta* were located. These were growing in close proximity to the larger rocks – either sheltered at the base of them or actually growing in cracks in the rocks themselves. The plants had very small segments between ½" and 1" long and exhibited two very different forms of spination. The majority of the segments in the small clumps had between 2 and 4 short, curved downward pointing spines per areole, whilst the largest and most recent growth on the plants had, in addition, a very long straight downward pointing spine (Fig. 6). The plants bore a strong resemblance to plants I have seen in cultivation under various names including *M. minuta* and *T. mandragora*.

After a little more exploration plants of *T geometricus* were located (Fig. 7). They were growing in small groups and, in the area I searched, several dozen of them were dotted around between the rock outcrops. I had been looking forward to seeing these and they did not disappoint. Although they were nowhere more than two segments high they were very pleasing, having neat spination and a ruddy red colouration. I assume that the harsh environment keeps them from growing tall as they can do in cultivation.

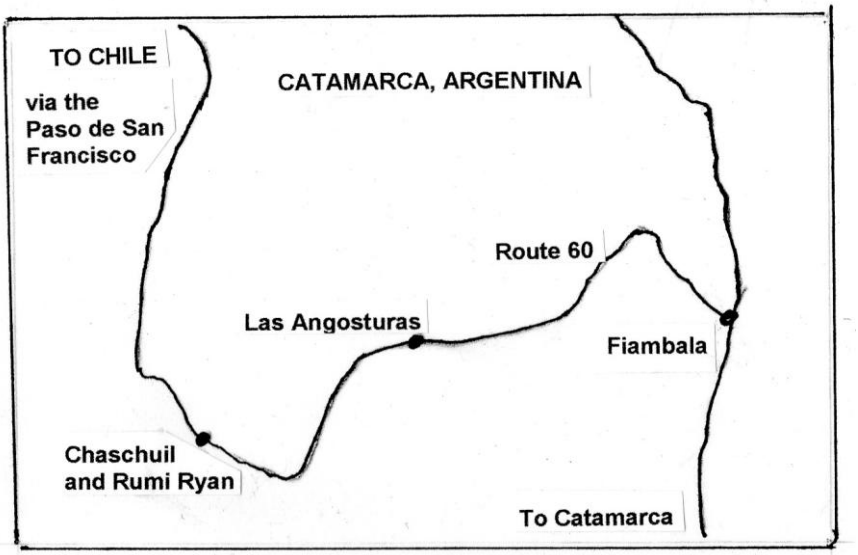
The plants were somewhat shrunken from the dry winter season and the size of the craters they sat in indicated that given water they would have been about 25% larger than they now appeared. All the plants I saw bore similar spination being black, curled, downward pointing and held tight to the body of the plant. Unfortunately none had open flowers but as can be seen from Fig. 7 most plants had more than one bud. There was no trace of any seed pods.

There seemed to be no soil as such at this location the plants growing instead in a mixture of sand and gravel. The rocks seemed to be mostly granite with a large amount of quartz being evident in the gravel.

All in all it was a very interesting location and provided me with the opportunity to see four species, in which I am interested, growing side by side in their native environment.

Mike Partridge, London.

The sketch map provides an idea of the route for this section of the tour. It will be noticed that this route is one traveled by several cactophiles. For example the map shows the road between Fiambala and Chaschuil which is where Graham Hole found his "mystery plants" (See TSG Vol. 13 (4) p79) and is a route where Graham Charles traveled last year. Ed.



Map by A. Hill part based on information from Willy Smith via M. Partridge.

OPUNTIA OF NORTHERN ARGENTINA (PART 1).

Brian Bates, Casilla 937, Sucre, Bolivia, email cactus@cotes.net.bo

Northern Argentina, near the Bolivian border, is very rich in Opuntiae. I have visited this area seven times, but only on the last two visits in mid December 2008 and mid January 2009 have I concentrated on the Opuntiae, with a view to informing the TSG membership of the species that occur in this area.

This first part is about what I call the "Blossfeld site" BB 589, S1064. This was photographed by Harry Blossfeld in the early 1930's and a report with a photograph was published in the Cactus Journal (GB) Dec. 1935: 31 and also in Kakteenkunde 1936(5): 85. The photograph shows a forest of *Oreocereus celsianus*. A single photograph cannot do justice to this wonderful, "must see" site. The site is some 20 km south of the town of Yavi, and a couple of km past the village of Suripujio. In total, it is a ridge of about 5 km (I haven't measure the exact length) at an altitude of 3900m (Fig 9). I've listed 11 cacti from this single site; *Oreocereus celsianus, O. trollii, Echinopsis ferox, x.Oreobivia (O. celsianus x E. ferox), Neowerdermannia vorwerkii, Rebutia pygmaea,* and the Opuntiae *Airampoa corrugata (a.k.a. Tunilla), Cumulopuntia boliviana, C. chichensis, Maihueniopsis glomerata ssp. hypogaea* and *Tephrocactus nigrispinus.*

The *N. vorwerkii, A. soehrensii, M. glomerata ssp. hypogaea* and *T. nigrispinus* grow on the flat area before the actual ridge. The Rebutia are on the flat top, but also sometimes on the flat bottom, whilst the rest of the species are on the slopes.

The *Tephrocactus nigrispinus* (Fig.10) and *Airampoa corrugata* (Fig 11) are fairly plentiful on the flat with the *A. corrugata* also pretty common on the slopes. On the slopes there are also hundreds if not thousands of *C. chichensis* (Fig 12). *C. boliviana* (Fig 13) and *M. glomerata ssp. hypogaea* (Fig 14) are not so common and are mostly on the slopes.

I would like to thank Paul Klaassen for permission to use his photographs. Roy Mottram for help with determining the validity of the genus Airampoa and other "discussions" about taxonomy. Paul Klaassen, Cliff Thompson and Juan Acosta for allowing me to travel with them in December 2008. Tomasz Blaczkowski, Leszek Kasperski, Mariusz Mieczakowski and Andrzej Mucha for allowing me to travel with them in January 2009.

Figs 9 - 14 and front cover are a selection from fifty photographs that Brian has supplied of the site. It is hoped that space can be found later for publication of some of the others. A sketch map in TSG Vol. 13 (1), P10 2007 indicates the location of Yavi. Ed.

"OPUNTIA HAMILTONII" - A REPLY

In The Opuntia Index in Bradleya 16/1998 p129 R. Crook & R. Mottram state that the species name "*hamiltoniae*" or "*hamiltonii*" has never been validly published. In response to Alan James' query in TSG Vol. 14, No. 4 Dec. 2008 p 52 about the taxon Elton Roberts gives below an outline of the names with which the taxon has been associated as a synonym. Ed.

The species name first appeared in 1935 and was published as Grusonia *hamiltonii* by H. E Gates in W. T Marshall & Brock, 1941. In 1958 Gordon Rowley moved it to *Opuntia hamiltonii.* Neither was validly published.
The first name given to the taxon (Fig. 8) was by Torrey and Gray in 1840 and that name was *Cereus californicus*. In 1852 Engelmann named a taxon *Opuntia parryi,* which in 1935 Knuth moved to Cylindropuntia. In 1852 Engelmann also published the name of *Opuntia serpentina*. In his book "The Cacti of the United States and Canada" Benson placed the taxon under *Cylindropuntia parryi var. serpentina*. The NCL has the taxon under *Cylindropuntia californica* (Torrey & Grey) Knuth 1936, as does Anderson. But there is an interesting footnote in the NCL, p. 70, which reads 'When Cylindropuntia is included in Opuntia, the name of this species is *O. parryi* Eng". To me that is a very interesting statement as I thought that Cylindropuntia has always been a part of the Opuntia family of plants! * Anderson lists the taxon as *C. californica* and says that there are four varieties: *californica, delgadilloana, parkeri and rosarica*. Here he is following Rebman who in 2001 listed the names as varieties of *C. californica*. Lindsay described *Opuntia rosarica* in 1942 and Backeberg moved it to Cylindropuntia the same year. Anderson shows that the variety *parkeri* was named by a J. M. Coulter but does not say when, just that Rebman listed it under *C. californica*. The NCL gives a description of *C. delgadilloana* then as a footnote says that it is doubtfully distinct from *C. rosarica*. Then I had to laugh because when I looked up *C. rosarica* it says that it is *C. californica*. There is no mention at all of a *C. californica variety parkeri* or even a mention of a *C. parkeri* in the NCL. Why give a description of *C. delgadilloana* and three lines to *C. rosarica* if they are considered just nothing more than *C. californica*? Also why mention those and totally ignore the variety *parkeri?*
Going back to the Benson book on page 912 it says that Engelmann named a plant as *Opuntia serpentina* in the American Journal of Science 14: 338. 1852. In the CSSA Cactus and Succulent Journal 41: 33. 1969 Benson renamed *O. serpentina* as *Opuntia parryi var. serpentina*. If you have access to the Benson book mentioned above you can find (p282/3) very good black and white photos of the plant in habitat and showing a stem in flower as well as stems of young and mature plants. There is also a photograph of the plant growing in the Botanical Garden at Rancho Santa Ana Claremont, California. Elton Roberts. California.

*** I am very grateful to Elton for tracing the various names and especially for drawing attention to the footnote in the NCL. Cylindropuntia is a subgenus of Opuntia. If one discards Cylindropuntia and lumps the taxa into Opuntia the species names do not alter unless there is another taxon with the same species name already in Opuntia. If so the clash needs to be resolved by changing one of the names. In 1848 Engelmann erected the name *Opuntia californica* (although this was not valid) for a different taxon to *Cereus californicus* Torrey & Grey. I <u>assume</u> that this is the clash. The NCL solves this by selecting what they consider to be the oldest synonym for *Cylindropuntia californica,* which is *parryi*. I would be very grateful to be informed whether my assumption is correct. Ed.**

Fig. 13. *Cumulopuntia boliviana*. 12-47-43 **Both photos by**
Fig. 14. *Maihueniopsis glomerata ssp hypogaea*. 14-30-56 **P. Klaassen.**

TEPHROCACTUS

Incl. Maihueniopsis, Puna and related genera plus other small Opuntias

Cumulopuntia multiareolata PH760.04 Caraveli, Arequipa, 1860m.
Photograph by P. Hoxey.

STUDY GROUP

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THE TSG MEETING ON 10TH MAY 2009.

As usual we opened with a short AGM during which all the previous year's officials were re-elected. This was followed by a talk by Ivor Crook on the *Austrocylindropuntia floccosa* complex. Ivor surveyed all the names that he could find that had been used for the taxa within this group and discussed their validity. The afternoon talk was given by Geoff Bailey who showed us superb digital slides of plants he had seen in Argentina and Bolivia.

It was very pleasing to see the support of attendance from members who had attended previous meetings at the venue plus some extra members and non-member visitors.

I wish to thank Alan James for all the work he did in preparation for the meeting and his wife for again providing an excellent buffet. I also thank the speakers for their interesting and very informative presentations. Members who attended are also thanked. Finally I thank the Officers of the TSG for the work that they have done for the group over the year and thank all those members who have contributed to the Journal.

The same venue has been booked again for a TSG meeting on Sunday 9th May 2010.

Alan Hill. Chairman.

UNUSUAL GROWTH.

In TSG Vol. 14 No.4 2008 p.54 & 55 Roger Moreton reported the unusual growth on a *Maihueniopsis conoidea*. Roger brought the plant to the above mentioned Birmingham meeting. It was interesting to see the way the plant had unusual growth last year but this year was developing the more normal growth on the elongated segments. No one has yet put forward any explanation as to why the unusaul growth last year developed. As Roger pointed out the phenomenon was only developed by two of the plants in the collection. Ed.

APOLOGY.

I am unable to explain how/when my carefully typed *Echinopsis ferox ssp longispina* name turned into an *Echinocereus* but I apologise for the transformation on the front cover of the last issue. Ed.

WANTED.

Does anyone have any Pereskia plants/cuttings to spare? I also would like surplus small South American Opuntia cuttings. Postage paid etc. Please contact Richard Prentice, Manor Farm, Church Street, Radstock. Somerset, BA3 3QG.

AUSTROCYLINDROPUNTIA SP. BAKER 5130.

In TSG Vol. 14 No. 2 June 2008 p18 Elton Roberts wrote an illustrated article on *Austrocylindropuntia* sp. Baker 5/30. This led to a query for more information about "Will Baker" and Brian Bates (Vol. 14 No. 4 p53) suggested that the name referred to William "Bill" Baker who had travelled

in Bolivia but had been living in California. In his original article Elton quoted Michael Kiesling stating that the plant originally came from Will Baker/England but I drew Elton's attention to Brian's comments and asked Elton to try to find more about Bill Baker in California. I give below Elton's reply. Ed.

Elton wrote:
When Alan emailed me with the thought that Will Baker could be Bill Baker from California I had not heard of him and so did not know what to do about it. A friend was over and I showed her the plant and told her the problem with it. She said that Bill Baker was a good friend of hers and agreed to see if she could get any information on the plant. About two weeks later I received a letter from Mr. Baker. He had given me permission to share it, plus his travel information, with the TSG.

Dear Mr. Roberts,
I am pleased to answer your inquiry via M. M. The plant in question is truly #5130, not 5/30. Collected on 1-18-83 with Caryn Ecker. Its locality would be 23.5 km from Capinota on road to Apillapampa or 6.3 km below Apillapampa on road to Capinota. Enclosed is a copy of my field journal. Although it was over 26 years ago I still remember the plant clearly growing on an outcrop with some 30+ heads, it was stunning! ---- I logged it in as *Tephrocactus boliviensis* on the spot. Certain it was a Tephrocactus where the name boliviensis came from I don't recall. I did not make it up! I have a 6" pot with 9 heads here in my collection. I believed that it only flowered once a long time ago. - - - - - - Did I collect more than one clone? I do not recall. I seem to remember that there was only the one plant and I took cuttings. The elevation and long./lat, can be obtained from maps. The finca@ Playa Ancha was @ 2500 feet a bit above Capinota. From there it was a long climb to Apillapampa so perhaps it was growing at 3,500 feet or higher. - - - I distributed only a few of this species and am surprised to see it coming back to me. It, for me, is a painfully slow growing species. Sincerely William Baker
(Please note that there is no such name as *Tephrocactus boliviensis*. Ed.)
****

Now here is his part of his travel journal.

01-17-83 km 62397
Playa Ancha Dairy Finca, owned by Mike & Gloria Stephensons. Casilla 775, Cochabamba Bolivia. To go on we must ford the Rio Caine @ this pt. but the River is wide 100 feet 2-3 feet deep and moving swiftly. Mike says there is no way to cross it at this time and if it doesn't stop raining will show us the way in the morning. We have dinner w/the Stephensons and spend the night.

01-18-83
We cross the River below the ranch on a diagonal to a sand bar then cross again thru a section of mud over to the sandy shore on other side, cross the RXR tracks and join the main Rd into Capinota.

01-18-83 km 62404.8

CAPINOTA – We have been warned that to cross the Rio Argue @ this time is hazardous and with the first indication of rain we must return or the jeep might be stranded on the other side of the river for a week or more. We cross Rio Argue and continue on narrow rd. toward the Indian settlement of Apillapampa.

Km 413.6 coll. # 5128 Trichocereus sp. sand & rock of River Wash.

Km 428.3 coll. # 5129 Lobivia sp. appressed spines on a rock knoll

With stone animal corrals sm. Adobe house below rd. on other side.

Coll. #5130 <u>Tephrocactus a.f. boliviensis</u> – spineless.

(Based upon the above information perhaps someone can find the site. Ed)

Elton Roberts, California.

A later email from Elton contained the sad news that William Baker had died soon after Elton sent me the above information. Ed.

A BRIEF REVIEW OF CUMULOPUNTIA SPHAERICA Part 2

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The first installment of this article appeared in TSG Vol. 14 No. 3 September 2008. In this second installment I will continue reviewing names associated with *Cumulopuntia sphaerica*. A third and final part will follow to complete the review and I will propose a new species level classification with a full list of synonyms.

***Cumulopuntia multiareolata* (Ritter) Ritter**

This plant was originally described by Ritter as *Tephrocactus multiareolatus* in 1964 and then subsequently moved into *Cumulopuntia* by Ritter in 1981. The type locality is given as Convento in the province of Caravelí in the northern part of the department of Arequipa in habitats on the eastern edge of the desert belt.

The description calls for bluish green segments to 5cm tall and 3.5cm thick with large woolly areoles which extend to the base of the segment. Spines number 8 to 20, central spines to 2cm long and finer radials to 1cm long.

I encountered plants close to the town of Caravelí, due east and at similar altitude to Convento, growing in very arid conditions on the edge of the desert belt, just as Ritter describes. The illustration on the front cover of this issue shows a plant found in this area with very densely spined segments and with the large white areoles. Generally the plants were well adorned with spines but not always as extensively as this example. Plants tended to form isolated small clumps on the rocky slopes but larger colonies grow on flat sandy areas, possibly due to the ease at which detached segments root.

This plant is notable for the high number of spines which have the untidy appearance of the type form from Arequipa. Tentatively I place it as a synonym of *Cumulopuntia sphaerica.*

Nasca Valley Taxa

The Nasca valley, which starts west of the town of Nasca and rises to over 4000m into the Andes, is a rich source of *Cumulopuntia* with no less then three taxa having their type localities within it. There is possibly a fourth taxon of uncertain status. Unfortunately I have not travelled the full length of the valley and I have only visited the area around the town of Puquio where I have seen one of the four.

***Tephrocactus mirus* Backeberg**

The type locality for this plant is given as the Nasca valley at 1200m and with a description which calls for a close relative of *Cumulopuntia sphaerica* with small segment size, densely spined (up to 18) with abundant wool on young growth.

I have not visited the type locality but I have seen one population (PH576.02) located in the Río Omás valley at 1840m which matches the description and the accompanying illustration in Rauh (1957:199) quite closely. I tentatively place it here although it is a considerable distance (~200km) to the north of the type locality. The plants consist of a sprawling clump of segments in the range 2 to 4cm in size, usually slightly elongated (Fig. 1). The areoles on new growth are particularly woolly and nearly obscure the body. New spines are straight, needle-like and brown but fade to grey on older segments. Fruits are globular and much less spiny than the segments, with a few weak spines on the upper half.

Rauh considered *Tephrocactus mirus* to be close to *Cumulopuntia kuehnrichiana* and Ritter places it into synonymy beneath that species. It is clearly a *Cumulopuntia* but it has never been formally placed in that genus at the species level, hence my use of the generic name *Tephrocactus*. The large woolly areoles and straight needle like spines all point to a closer relationship with the small segmented forms of *Cumulopuntia unguispina/Opuntia leucophaea* rather than *Cumulopuntia sphaerica.*

***Tephrocactus bicolor* (Rauh & Backeberg) Rauh**

Originally named in 1957 as a variety of *Tephrocactus fulvicomus* which is probably a *Cumulopuntia boliviana* form, it was upgraded to a good species by Rauh a year later. It is reported from between Nasca and Puquio at 3400/3500m. I am unfamiliar with this species in habitat. Iliff (2002:180) refers it to the *Cumulopuntia sphaerica* group but with reservations. Its description calls for a loose clump of segments 3cm long and 2cm think, deep green but often reddish. Areoles small 3mm in diameter with yellow glochids. Spines rigidly erect, 6-8, unequal length, the longest ~3cm long. There is an illustration in Rauh (1958:224) of a dehydrated plant which is reproduced in Backeberg (1958:T29).

Cumulopuntia galerasensis Ritter

This species was described in 1981 by Ritter from material (FR1045) found at Galeras on the Nasca to Puquio road at 3500m. His description calls for

Fig.1. *Tephrocactus mirus*.? PH576.02 Rio Omas, Lima, 1840m.
Figs 1 - 8 photographs by P. Hoxey
Fig. 2. Cumulopuntia sp (Puquio). PH747.03
East of Lucanas, Ayacucho, 3930m

Fig. 3. ***Cumulopuntia sp (Puquio).*** **Ph74.03 East of Lucanas, Ayachucho, 3930m.**
Fig. 4. ***Cumulopuntia corotilla.*** **PH710.03 Pampa de Arrieros. Arequipa. 3820m.**

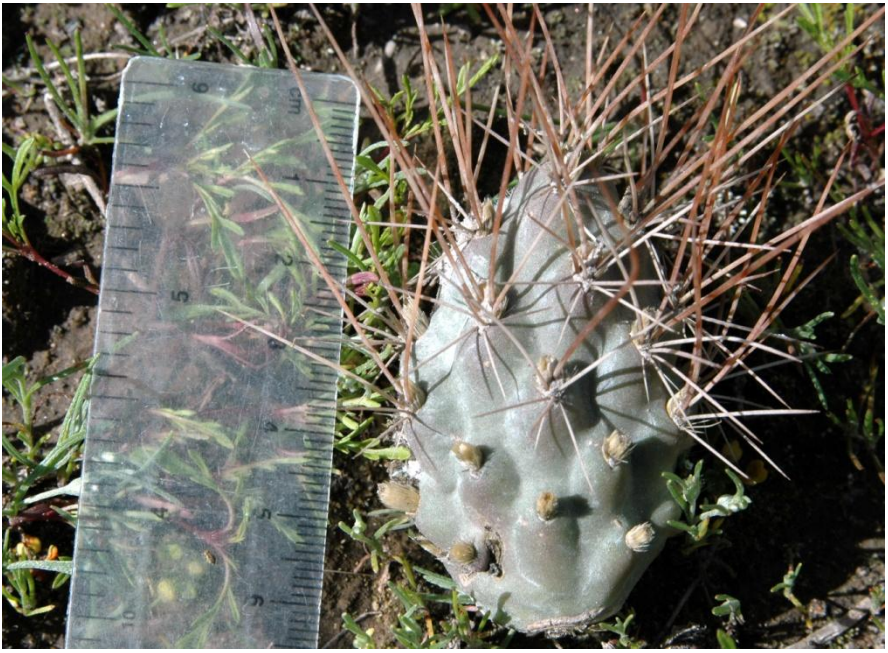

Fig. 5. *Cumulopuntia corotilla* . PH710.03 Pampa de Arrieros. Arequipa. 3820m
Fig .6. *Cumulopuntia corotilla.* PH794.03. Between Huambo and Huacan, Arequipa, 3720m.

Figs 7 & 8 *Cumulopuntia corotilla* PH794.03.
Between Huambo and Huacan, Arequipa, 3720m.

small dense cushions with grey-green segments 3-4cm long and 1.5-2cm thick. They are fairly strongly tuberculate with the areoles situated near the upper end of the tubercles. Areoles are yellowish 2-5mm in diameter with yellow glochids. Only areoles on the upper two thirds of the segments have spines. Spines are straight and upright, orange-brown to brown in colour, 5-12 in number and 15-50mm in length. At the lower side of the areole they are weaker, backward facing and paler. The locality and description both point to *C. galerasensis* being a re-description of *Tephrocactus bicolor*.
I have not visited the locality of *Cumulopuntia galerasensis* / *Tephrocactus bicolor* but Martin Lowry (personal communication) has seen this taxa in habitat growing as small densely spined clumps with tuberculate bodies. The spines are limited to the top half of the segments with plentiful glochids on lower areoles. Red as well as yellow flowering plants were seen. The tuberculate nature of the segments, small areoles and the glochids point to it being related to *C. corotilla*. Further study is required to determine the exact relationship of these Galeras plants.

Cumulopuntia sp. (Puquio)
From a small area just west of Lucanas to as far as Puquio, a *Cumulopuntia* species can be seen which does not fit comfortably with any other *Cumulopuntia* taxa. I believe Ritters concept of *Cumulopuntia ignota*, is in part, this taxa. His FR560 is reported from two localities; "south of Misti at 3400m" and "road to Lucanas at KM103". The first of these localities is possibly *C. corotilla* (see later discussion) but the second is clearly the *Cumulopuntia* species which I have seen near Lucanas where it grows with *Oreocereus ritter*i at 3930m. I have also seen it at a second locality near Puquio at 3250m.
This plant forms low loose cushions of elongating segments, 2-3cm wide and 5-6 long, which are very slightly tuberculate but on fully hydrated segments this character is all but invisible (Fig. 2). They are slightly club shaped, wider at the upper end with a rounded top (Fig. 3). They are usually grey/green but sometimes tinged with red. The areoles are small (but a little larger on the upper half of the segment) with a little white wool and distributed evenly over the segment. The spines are light brown 3 to 8 in number, spreading evenly and limited to areoles on the top half of the segment only. Lower areoles are naked and generally devoid of glochids but occasionally a few are present. The fruits are similar to new segments but globular. Only areoles around the rim have 2-3 spines, the rest are naked. Of two unripe fruits sectioned both contained one seed each.
Ritter's classification of this plant as *Cumulopuntia ignota* is understandable as the brief description and sketch by Britton and Rose (1919:99) fits quite well but the segments are described as small, narrow and only 2-3cm long. The type location for *Opuntia ignota* is at Pampa de Arrieros yet there is no evidence Ritter visited it and was acquainted with the true *Opuntia ignota*. Until recently Pampa de Arrieros was only accessible by train and possibly not easy to reach. *Opuntia ignota* as described by Britton and Rose is a different plant which I will discuss in the third instalment of this article. We should disregard Ritter's interpretation of the name which leaves the plant at Puquio without a valid published

name. It is possibly a relative of *Cumulopuntia corotilla* with which it shares the small areoles but lacks the numerous glochids.

***Cumulopuntia corotilla* (K.Schumann ex Vaupel) E. F. Anderson**

***Opuntia corotilla* was described by Schumann in 1913 from material collected by Weberbauer in 1902. Shortly after this publication Britton and Rose (1919:96) reduced it to a synonym under *Opuntia sphaerica*. The combination as a good species in *Cumulopuntia* was made by Anderson (1999:324) although in the new Cactus Lexicon it was left as a synonym under *Cumulopuntia sphaerica*.**

The type locality is given as between Airampal and Pampa de Arrieros at 3200-3400m on the Arequipa to Puno road. Despite the existence of a herbarium sheet which is illustrated in Iliff (188:2002) and accurate locality details it has remained a misunderstood and misapplied name. Even Weberbauer (1945) himself may have not understood it correctly as he mentions it growing in other places besides the Arequipa to Puno railroad, including in the Chuquibamba valley and further south inland from Tacna. At Chuquibamba I only found *Cumulopuntia crassicylindrica* and at Tacna I found the high altitude small-structured *Cumulopuntia sphaerica* form. The name corotilla is a Quechua name for small, low growing, opuntioid-like cacti and most likely includes a number of different taxa. Ritter followed Britton and Rose and considered *Opuntia corotilla* a synonym of *Cumulopuntia sphaerica (*Ritter used the name *C. berteri* for *C. sphaerica*; a name we should dismiss). (Please see TSG Vol. 3 No. 4 Dec. 1997 P201-3 Ed.) However to add to the confusion, he considered Backeberg's concept of *Cumulopuntia corotilla* to be different and placed it under *Cumulopuntia ignota*. However Backeberg did have the correct plant under the name *Cumulopuntia corotilla*, although he illustrates a form devoid of central spines, Backeberg (1958:Abb 280 & 283). Nearly spineless forms are seen in habitat and most likely cultivated material is also going to be less spiny.

The description summarized from Leighton-Boyce & Iliff (1973: 80) and Iliff (2002:188) calls for a small, loosely branched plant to 15cm high. Stem segments globular to longish-ovoid to 6cm long, lightly tuberculate. Areoles fairly distant, round, up to 3mm across, somewhat woolly, with numerous erect glochids up to 3mm long, and 0-7 unequal spines on the upper half of the segments of which the longest is sometimes over 3cm long. The spination can be sporadic and sometimes entirely absent. Flowers are at first cream coloured, later rose. Fruits have glochids and a few weak spines on the rim.

As Iliff states it is quite a distinctive plant and the description has a number of features which immediately distinguishes it from *Cumulopuntia sphaerica*, including tuberculate segments, small widely spaced areoles, large numbers of glochids and white/rose flowers (all *C. sphaerica* taxa have consistently yellow flowers which fade to orange/red).

I encountered this species on hills above the small village of Pampa de Arrieros at 3800m on the road out of Arequipa in February 2008 during the short rainy season. The plants form low clumps no more than 3 or 4 segments high. The segments are globular to slightly elongated to 6cm

long, blue/grey in colour, occasionally slightly purplish, clearly tuberculate with numerous glochids. The spination between plants is very variable. Figure 4 shows a large fully developed segment with very well developed spination. Spines are straight, spreading and limited to areoles in the top two thirds of the segments whereas areoles below have glochids only. At the other extreme (Fig. 5) plants have segments with only weakly developed spination. The high number of glochids is a more consistent characteristic but the occasional plant was found with a relatively low number. Unfortunately no flowers were observed in February 2008 although developing fruits were present. They are very similar to young segments but globular 20-25mm wide, with areoles contains glochids and the occasional weak spine around the rim.

Further plants were found to the west between Huambo and Huacán, adjacent to the Cañón de Colca, in January 2009. At this time of year the rains had yet to arrive and the plants looked very different to *C. corotilla* with a deep purple body (Fig. 6). This population exhibited a very high number of glochids with variable spination which was often weak. Ripening fruits contained dry seeds within the pulp-free cavity which is typical for *Cumulopuntia* (Fig. 7). On this occasion a plants was excavated and the roots were examined. Surprisingly they are highly tuberous in nature and in excess of 30cm in length (Fig. 8). The above ground growth is attached through a relatively thin neck. Initially I felt I had found a new distinct species but I wanted to compare it with the plants at the habitat at Pampa de Arrieros. These plants were also found to grow a large tuberous root and exhibited a deep purple colour on shrivelled bodies due to the lack of water. I now believe the Huambo plant is not new and should be included in *Cumulopuntia corotilla,* extending the range approximately 80km to the west.

***Cumulopuntia corotilla* is clearly distinct from *Cumulopuntia sphaerica* (and all other *Cumulopuntia*) and not a synonym of that species. It is unusual in growing a tuberous root and having white flowers, both characters usually associated with the genus *Maihueniopsis*. I retain it in *Cumulopuntia* due to the dry fruit cavity and seed structure which more closely fit this genus. Backeberg's *Tephrocactus mistiensis* is probably a spineless form of this species.**

***Opuntia campestris* Britton & Rose**

This name was erected by Britton and Rose for plants found at Pampa de Arrieros by Dr Rose in 1914. The description calls for a much branched, low forming plant, 30 to 60cm in diameter. Joints are globular or a little longer than thick, 3 to 5cm long, with numerous prominent areoles and conspicuous turbercles when young. Numerous yellow glochids. Spines only on upper areoles and missing on lower areoles, the longest to 3.5cm. Flowers rosy white to light yellow, 2-3cm long.

This is clearly a re-description of *Cumulopuntia corotilla* with the key characteristics of tuberculate segments, numerous glochids and rosy white flowers. The type location is also consistent with *Cumulopuntia corotilla* and it should be regarded as a synonym of *C. corotilla*.

To be continued.

OPUNTIA CHAFFEYI

Opuntia chaffeyi **is a fun plant to grow, as it does not get too much out of hand. That is to say the above ground portion doesn't get out of hand but the roots are another thing all together. Here in part is the description of the plants I guess in habitat. 'Roots large fleshy, deep in the ground, to 35 cm long, 4 cm thick; stems to 15 cm long, ----- often flaccid, prostrate, freely branching'. The roots are deep in the ground; I have to wonder how deep in the ground they are. For me deep would mean like a foot or so down. I do not think this is how deep they are. I would have to think that they might be several inches, as the plant seems to grow new stems every year. In cultivation: the plants grow stems that can be 1.5 cm in diameter and to 26 cm long (Fig. 9). As this is an Opuntia it is not a plant you want to snuggle up to! It has one main spine at the areoles and can have one or two smaller spines. Even though the spines are no more than 3 cm long at the most and the glochids are not much to look at they are nasty and quite irritating. I know for I have had several broken off in my fingers and they have been a bother all night long. After I got up and washed dishes the water seems to have either dissolved them or softened my skin enough so that they came out. The flower is about 4 cm in diameter and is a shallow bowl shape. All the flowers on my plants have been a pale yellow (Fig.12). One description calls for lemon yellow flowers but I do not think that is right. The plant will bloom several times a year in cultivation.**

The stems are annual and die after the plants set seed. When the monsoon rains come the plant again grows stems. I think the most interesting thing about this plant is the roots. In the photo of the dead stems (Fig. 11) is a plant that is in a 10-inch pot. I took the plant out of a 6-inch pot and put it in the 10 inch because the plant was falling out of the pot. The roots are quite large compared to the stems. They can be to about 4.5 cm in diameter and fill a pot. I have to wonder about the size of habitat plants and their roots. In cultivation the roots will grow round and round in the pot and lift the plant right out of the pot. The roots in the photo were pushed up 5 inches above the pot and the reason it is up like it is because there is that much root below the soil and it could not be potted any lower. I have had the plants in 12 inch pots and they still grow so much root that in about a year something has to be done. I usually take some of the roots apart. Some seem to break off the main roots any way and become separate plants. There are what looks like two kinds of roots, one kind is smooth and the other has soft glochids covering them. You can see this in the photograph (Fig. 10) as the main roots are in the most part smooth and the roots at the top right are covered with fine glochids. There are several places on the main roots that have some glochids also. I do not remember these root glochids ever bothering me. They are not nasty like the glochids on the roots of *O. pulchella*.

If watered regularly in the summer the stems will not die back and the roots also will not shrivel. In the photo of the dead stemmed plant it is easy to see the roots that are shrivelled. They are not dead as they still have moisture in them and when given a good drink the roots will fill out again. I have seen several show plants with the roots raised and have to admit they can make a handsome plant. The plants have lived through temperatures in the teens. I have not paid that much attention as to whether the roots suffer frost burnt or not. I give the plants my regular soil mix and keep the plants

dry over the winter. The plants do not like alkaline water and so need the acidic water or in time they will just wither and die.

Elton Roberts. California.

***Opuntia chaffeyi* was named by Britton & Rose in 1913 and was named after Dr Chaffey who collected it from the type locality on the Hacienda de Cedros, near Mazapil, Zacatecas, Mexico in 1910. They gave the distribution of the species as the state of Mexico. In their book "The Cactaceae" Vol. 1 P213 they place it as the only species in their series 29, Chaffeyanae, stating that it differs from all the other Opuntias in having an annual stem which arises from a large fleshy root or rootstock. (However, on p 30, when discussing Pterocactus, they remark on similarities of growth with *Opuntia chaffeyi.*) The NCL entry for the taxon accepts it as a valid separate Opuntia name.**

The species was offered for sale by the ISI as number 1237. The propagations originated from material collected by Glass & Foster in 1974 under their number 4038 from near the type location. Mention was made in the catalogue that the taxon developed a caudex. This was an obvious encouragement to collectors to purchase an unusual plant and at least two of us in Sheffield succumbed to the temptation. Although I persevered for a long time with my plant my friend soon disposed of his, remarking that he was very disappointed in that no caudex was formed. My experience was that my plant produced what I can only describe as thick knobbly roots and I too was disappointed about no caudex appearing. At that time I did not posses a copy of Britton & Rose. However, I now realise that the roots that were produced by my plants are what are illustrated by Britton & Rose on page 213. Their description of the taxon simply states "caducous" without any descriptive details given of what to expect. I would not use the word caudex to describe the roots illustrated by Britton & Rose. However, Elton is to be congratulated that his cultivation of the taxon has produced what can be regarded as a good caudex.

My plant did produce the fine glochids (mentioned by Elton) on the exposed roots which sometime appeared above the soil surface and at least once through the drainage hole of the pot. I don't think that I ever tried to touch them but in appearance the exposed roots looked to be covered in a grey velvet. I do not recall any glochids on the subterranean roots. The appearance of the glochids must have been a reaction on roots exposed to light. If I had read the information in Britton & Rose I would have had more success with the cultivation of *Opuntia chaffeyi*. The original description mentions "stems normally annual". I did not realise this and when the very few stems on my plant began to go yellow and wither I frantically tried to save them, not realising my cultivation was not at fault. Eventually I threw away the few knobbly roots that were in the pot thinking that I should recognise my failure. One can imagine my surprise on read Elton's opening remarks about *Opuntia chaffeyi* being a fun plant to grow. I am grateful to Elton for sharing his knowledge on how to grow the taxon. I can now see that I could have thought of it as a fun plant instead, in my ignorance, finding it caused me so much worry. I now regret that I disposed of the plant. Does any one have a cutting for sale?

A. Hill. Sheffield.

Opuntia chaffeyi.
Britton & Rose.

All photographs by E. Roberts

Fig. 9

Fig. 10

Fig. 11

Fig. 12

TEPHROCACTUS

Incl. Maihueniopsis, Puna and related genera plus other small Opuntias

***Tephrocactus articulatus* forms. Near Chamical, Argentina. Photograph by M. Partridge**

STUDY GROUP

Vol. 15

No. 3 September 2009

SECRETARY'S PAGE.

All articles and comments should be sent to the Editor.

Subscriptions for 2009 were due on the 1st January 2009

Subscriptions and any other correspondence must be sent to the Secretary.

Subs for 2009 remain at £10.00 per annum for the U.K and Europe (European members please note that no Euro-Cheques are accepted by our banks – but you may send £ Notes). The subscriptions for Overseas Members is £14.00 or $25 (in $bills only). Please make all cheques payable to: "The Tephrocactus Study Group" (not individuals).

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IS THAT ANOTHER *TEPHROCACTUS*?

This article relates to days 1 to 3 of the Willy Smith Cactus Tour which I outlined in the article on Rumi Ryan in the 2009 March Edition of the Tephrocactus Study Group Journal Vol. 14. No.1. It covers the route from Cordoba to Fiambala (see map Fig. 8) a journey of approximately 500 miles.

Day 1 – Cordoba to Chamical.

Day one started with a 'crack of dawn' flight from Buenos Aries and by 9:00 or so in the morning we were on route 38 heading west out of Cordoba. We stopped several times to look at various *Gymnocalycium, Trichocereus* and *Lobivia* species before we arrived at a roadside stop near Serrezuela to look at *Stetsonia, Cleistocactus, Echinopsis, Cereus, Trichocereus* and *Opuntia sulphurea*. (Fig 1)

I was surprised to discover that very different species grew together in a relatively small area and wandered around in the very spiky undergrowth finding plant after plant hidden amongst the shrubs. Eventually I caught sight of a small spineless cactus lying amongst the leaves and there was my first 'wild' *Tephrocactus*. It was in a fairly desiccated state and showed little sign of life. The plant had no discernable spines (Fig 2) and I concluded that this was probably *T articulatus* 'inermis'. I took a few photos and set about looking for more.

Ignoring the comments to the effect that these plants were not worth looking for I wandered off and succeeded in finding a couple of other loose clumps all very similar to the first. Despite the very dry condition of the plants the segments were quite firmly attached to each other unlike the plant I grow under this name which seems to disintegrate towards the end of its dry winter rest. I have pondered this since and now tend towards the conclusion that the propensity of this species to fall apart is not solely due to lack of winter moisture and may be related to other physiological aspects generated by the British winter. (Cold and high humidity, lack of sunlight and even lack of UV) Eventually I was dragged away from my search for further specimens and we boarded the bus for the last stop for the day. This was at a site called Monte Negro where we stopped to see a crested *Stetsonia* which was very impressive. I was just as taken by a much healthier *T. articulatus* 'inermis' growing beside the gate into the scrubby wood containing the Stetsonia. This clump actually showed signs of new growth and was far plumper than the earlier specimens. The whole area looked 'fresher' than the previous stop and suggested a recent shower of rain. I was pleased to have encountered a *Tephrocactus* on day one and looked forward to the next day when the itinerary promised more.

Day 2 Chamical to Chilecito

Day 2 dawned also started early and we were off again along route 38 heading towards Petunia and the road to Los Colorados. Almost as soon as we left Chamical we began to notice large patches of *Tephrocactus* lining both sides of the road and after a little cajoling we persuaded Willy to make an unscheduled stop to look more closely at them. (Front cover).

Many of these plants looked much like the 'inermis' variety from the day before but amongst them were plants much closer to *T. articulatus var. articulatus*. (Fig 3). They grew in the sandy soil in the margin between the road and the scrubland beyond and seemed to be present in very large numbers. There was no evidence of any seedlings but instead there were quite a few plants which consisted of one or two segments and were obviously the product of recent vegetative reproduction. I could have spent a couple of hours wandering up and down examining the variety of spination on show here but after half an hour or so I was again dragged back on the bus and we headed for Los Colorados.

Los Colorados turned out to be a magical location where we saw upwards of fifteen species of cacti in a fairly small area. (Fig 4) The cacti included two species of *Tephrocactus (articulatus* and *alexanderi*), *Pterocactus kuntzei (tuberosa), Lobivia aurea, Opuntia sulphurea, Trichocereus terscheckii, Gymnocalycium riojense, Gymnocalycium schickendantzii* and *Echinopsis leucantha*.

The *T. articulatus* found here were much more heavily spined and to my obvious joy sported seed pods some of which I duly collected. The *T. alexanderi* looked much like those you would encounter in cultivation and on the whole looked quite healthy. They formed low mats upwards of a foot across but unfortunately none were in flower. Eventually I found some with seed pods and after a struggle (they were very hard and woody) opened one to find it packed with seed. Some of these were also collected.

The *Pterocactus kuntzei* had recently finished flowering and most plants sported only one or two shoots. These shoots seemed to be this year's growth and terminated in a spent flower lending credence to what I had read regarding them being essentially deciduous. Willy excavated one so that we could examine the tuber and found it to be about the size of a duck egg. It was growing in what appeared to be pure sand and unfortunately lost its top growth during the process. (Figs 5 and 5a) A day could have been spent here wandering amongst the rocks but we were on a tight schedule so after a couple of hours it was back to the bus and onwards. I think at this stage Willy was beginning to think my tastes somewhat 'odd' as we were surrounded by splendid specimens of the other species and I was expressing most interest in the plants he referred to as 'weeds'.

After a lunch of empanadas we visited a well known cactus garden at Chirau Mita which contained dozens of very well grown plants – both native and non native- including some impressive Tephrocacti selected by the owner for their fine spination. After eyeing up a very impressive *Tephrocactus alexanderi* with large segments and white spines and making very impressed noises to the owner I was delighted when he presented me with a segment to take home.

It was then off to the hotel (part of a chain of hotels owned by the Argentinean equivalent of the RAC) for a good meal and some rest.

Day 3 Chilecito to Fiambala

Day three started with a visit to the dried up bed of the Rio Capayan. This was a very broad, shallow river bed with what would have been numerous islands had the water been present. The flotsam and jetsam indicated that the islands were covered with water at some period in the year and yet several species of cacti grew on them and on the edges of the river.

Again there were half a dozen of so species of cacti to be seen within a few hundred meters of the road including a great profusion of *Tephrocactus articulatus*. At this location they sported very wide white papery spines reminiscent of clones I have seen in the UK bearing the name 'papryacantha'. Again there was no sign of seedlings but a vast number of rooted segments spread along the course of the river. The conclusion drawn was that the water broke the plants up and they rooted and grew where they washed up.

The next stop was at a location called Cerro Negro again to see several species of cacti growing in close proximity to each other. The highlight here was a profusion of *Tephrocactus alexanderi* most of which had open flowers. (Fig 6). They were in very good condition and as elsewhere seemed to be growing a in a mixture of sand and gravel. There were also several variations on *Tephrocactus articulatus* to be seen some of which were five or six segments high. Growing with them were *Gymnocalycium glaucum, Echinopsis leucantha* and *Opuntia sulphurea*.

The last stop of the day was at La Puntilla where we saw *Tephrocactus weberi* growing on a granite rock face along with *Gymnocalycium catamarcense var. schmidianum, Tephrocactus articulatus* (I was by now getting the idea that this was a *very* common plant indeed) and *Lobivia huascha*. The *T. weberi* (Fig 7) were reassuringly like one of the clones I grow (the long white spined type) and seemed in very good condition.

By now the sun was quite low in the sky and it was time to call it a day. I felt very fortunate to have seen the *T. alexanderi* in flower and generally to have seen so many of the plants I am interested in growing in habitat. The next days visit has already been covered in my previous article so when I resume the account we will have crossed the Andes into Chile.

Mike Partridge.

HOW FUSSY ARE *OPUNTIAS*?

Over the years, I have read many articles in the horticultural literature on how to grow cacti, wherein authors fussed about growing mixes, watering regimes, and fertilization. I don't claim great expertise in the matter, but have always taken my cue from how cacti grow in habitat. My observation is that as long as they have good drainage, low humidity, and bright light, they will do alright, regardless of what the soil mix recipe is. By way of substance to back my assertions, I have long noted that the *Opuntias* of southern Alberta where I live will grow in anything. Over the years I have seen them growing in cow droppings, pure clay, pure gravel, pure coal and

Fig 1

Near Serrezuela.

Fig. 2.

***T. articulatus f. inermis* near Serrezuela**

Fig. 3.

***Tephrocactus articulatus* form North of Chamical.**

Fig 4. Los Colorados.

Figs 5 & 5a. *Pterocactus kuntzii* and its later excavated tuber.

Fig. 6. *Tephrocactus alexanderi* at Cerro Negro.
Fig. 7. *Tephrocactus weberi* at La Puntilla.

Figs 1 to 8 by M. Partridge.

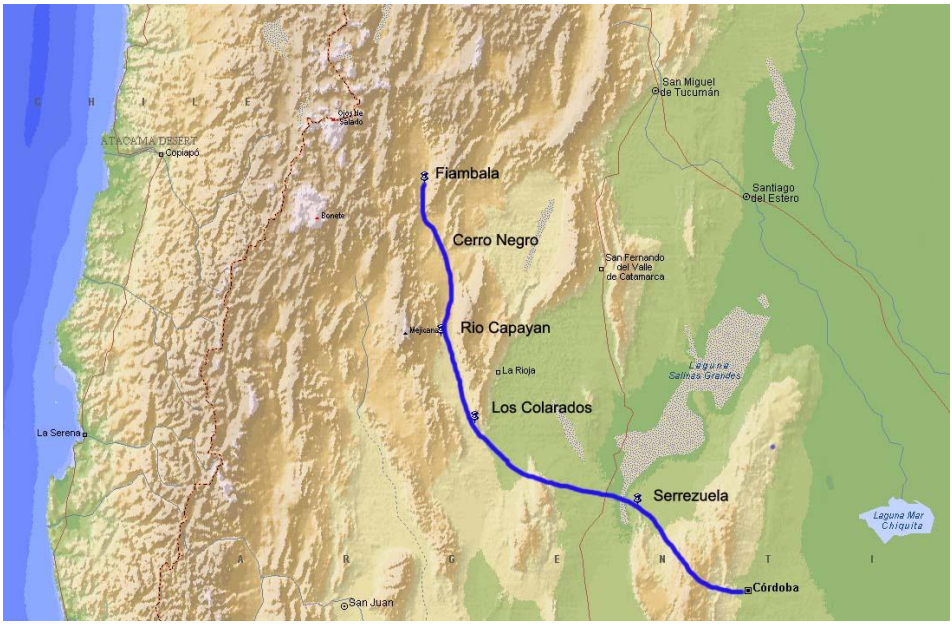
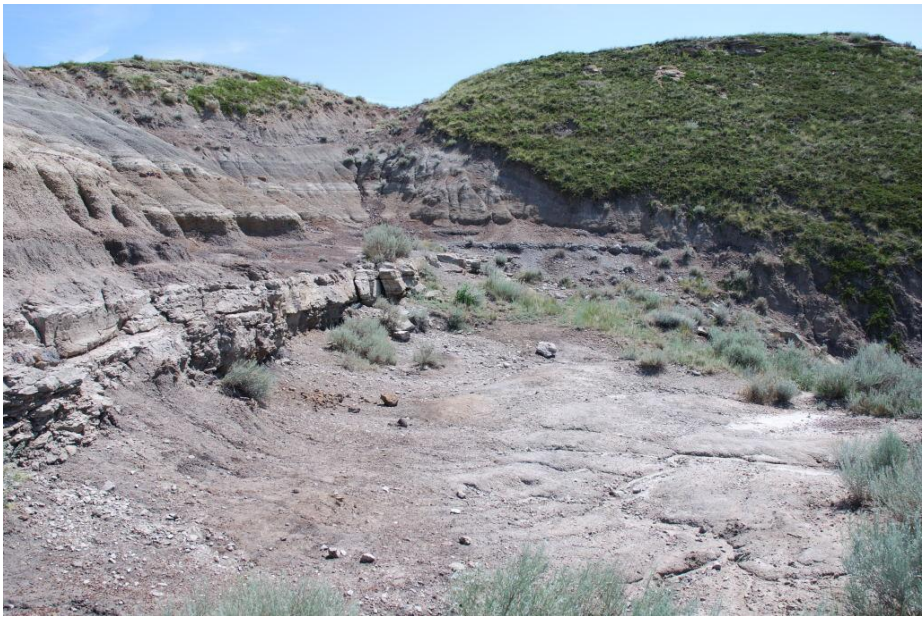


Fig. 8. Cordoba to Fiambala. Days 1 to 3.

Fig. 9. Horseshoe Canyon. Red Deer River badlands.

Figs 9 to 13 by D. Speirs.



Fig, 10. In Midland Provincial Park on East bank of Red Deer river.
Fig. 11. *Opuntia polyacantha* growing in a vein of lignite rock.

Fig. 12. *Opuntia polyacantha* growing in pure bentonite clay.
Fig. 13. *Opuntia polyacantha* growing in dark brown chernozemic grassland soil.

on old wood such as fencepost. There are two species in Alberta, *O. polyacantha* and *O. fragilis*, the former being common and the latter rare. They are widespread in range across the shortgrass prairie and the badlands. The only native trees are those along stream banks, and the land is what is known as bald-headed prairie. On the flat lands, nothing grows taller than knee high, usually just sagebrush.

I am illustrating this article with photos I took in July 2009 on a trip to the Red Deer River badlands, about two hours drive east-northeast of my hometown of Calgary. Figure 9 shows a photo of Horseshoe Canyon, a typical portion of the badlands on the west side of the river. To get an idea of the depth of the badlands, notice the farmhouse and grain silos at the top centre-left of the photo. The badlands are made of various strata of lignite coal, white bentonite clay, yellowish sandstone, brick-coloured ironstone, and grey shale. Figure 10 shows a different portion of the badlands in Midland Provincial Park, on the east bank of the Red Deer River. The next several close-ups of pricklypears, all of *O. polyacantha*, were taken at this spot. This was about three weeks after the flowering season was over, so the plants were setting fruit. The green fruits eventually dry off to a paper shell and break off, then roll about in the wind and thus distribute the seeds.

Figure 11 shows a clump of *Opuntias* growing in a vein of lignite coal. The coal is crumbly and well drained, and the roots are entirely within the seam. Figure 12 shows pricklypears a metre away growing in pure bentonite clay. The clay is dense and solid when dry, and requires a pickaxe to shift. The *Opuntia* roots stay close to the surface. When wet, bentonite swells up and forms a slick layer of mud on the surface, but quickly dries from the wind and sun. It is impossible to climb a badlands slope after a rainfall. The water only touches the surface of the clay and does not penetrate deep, so the *Opuntia* roots are never waterlogged. Figure 13 shows *Opuntias* growing in dark brown chernozemic grassland soil, well drained and but a few metres from the other *Opuntias* illustrated. The shortgrass habitat is usually on top of the badlands hills or on ridges of erosion-resistant strata along the slopes where soil ingredients are dammed up. The chernozem also supports sagebrush, wild rose, various annual flowers, and bulbous plants such as anemones.

In Alberta, humidity is always low, and is never mentioned in weather forecasts on the radio and television. If we ever had a hot summer's week with 90% humidity in Calgary, the city's commerce would collapse. In southern and eastern Alberta, which is the shortgrass prairie and badlands terrain, relative humidity occasionally goes to near zero trace amounts. Alberta gets half its annual precipitation between May and July, and August and September are the driest months. The amount of rainfall is actually mesophytic, but because of the drying chinook winds out of the adjacent Rocky Mountains, this area is an evaporation basin. Patches of saline and solonezic (hardpan) soils are common.

In autumn, the *Opuntias* dehydrate and shrivel back into the soil. There is little snow cover in southern Alberta; we consider 15 cm to be a heavy snow, and most of it is soon removed by winter chinook winds, which briefly raise temperatures above freezing and melt off the snow. Temperatures are about -10C to -20C, with occasional week-long spells of -30C to -40C. The cacti can survive this because they are desiccated. The lengthening photoperiod in spring triggers them to come out of dormancy and accept moisture, and they quickly plump up again. Summer temperatures are about 25C, and hot spells up to 35C. No matter how warm it is by day, nights are cool and about 10C to 15C.

Dale Speirs, Alberta, Canada.

GROWING *PUNA CLAVARIOIDES* GRAFTED.

April 4th and 5th 2009 was the San Jose, California show and sale. For a different show plant I decided to transplant my *Puna clavarioides* into a ceramic pot just to make it look more like a show plant and not an after thought entry. The plant got a lot of comments not to mention best *Opuntia* in the show. Some where along the line a head got knocked off the plant which is an irritation any time a plant gets damaged. On this plant it was not all that easy to see where the head was detached from. I found it laying on the back of the plant like some one had put it so it would not show as having fallen off. I do not remember now if it was the day after the show or two days after the sale I decided to graft the head and see if I could get some more heads growing in time so as to have plants to sell. Some years ago a cactus nursery I worked at had a grafted plant and it flowed down to the table top and spread out on the table top. It did not look natural and so I never grafted one. Photo. 14 is of my plant as a show plant. Photo 15 is of the head after it was grafted for two months. I did not take photos of the grafting and the head afterward as I did not know it would grow as quickly as it has. The head was no larger than about the diameter of a pencil when I grafted it. At two months you can see that it is a lot larger than that. In that time the head went from 7 mm in diameter to two cm across and threw three off sets. The off sets are held on by almost a thread. Where the heads are connected to the head below is about may be only 2 mm in diameter. In habitat the plants next to never have heads growing on heads and never three or four high. You will never see a clump of much more than several heads if you are lucky. Before my largest plant lost its root it was over 30 cm across and was more impressive than the plant in photo 14.

Photo 16 shows two more heads that I took off a plant once I saw that they grow quite easy on a graft. I have always been told that you have to graft *Opuntia* on *Opuntia* stock. Well, this just is not so. That graft stock I used is *Trichocereus spachianus*. That is a hardy and even growing plant. It is not super fast like some stock and it is easy to grow. The only down side of using it is the spines. You will say that you see three heads on the graft stock in photo 16. Well you are in a way wrong. You see the one in the middle is the base of one of the other heads. I thought that since I had three heads of graft stock I should try grafting the bottom of one of the heads. As you can see it is throwing four off sets. The root end has no where to grow and so it is throwing off sets. The two tops are just getting

larger although they are showing signs of maybe wanting to off set also. Photo 17 shows the first graft I did after three months of growing. As you can see it is growing those weird finger-like growths on the back head and starting them on the right hand head. People have asked what causes those growths and my answer is that the plant joints have no growing point but as the head is growing so fast they grow these fingers as a way of putting growth some where. If you go back to photo 14 you will see very little of that kind of growth as I grow the plants quite hard. I have seen other people's plants where they get less light and are watered more often than mine and most heads have had the weird finger growths on most of the heads. Since photo 17 shows a plant which is grafted it is growing fast and so throwing those fingers. The same time I grafted the heads in photo 16 I also grafted the head in photo 19. That head is only about 1.5 cm in diameter and is shooting upward. The top of it looks like it might try to crest through it would not be a crest as like on a *Mammillaria* as it has no growing point. Photo 18 shows the three headed graft stock and the two heads and one up side down graft. As you can see they are growing quite well. The head on the left has now thrown three off sets and the main head it self is about 2 cm in diameter and its tallest off set is 4 cm tall and 3 cm wide. The root up graft in the middle is only a bit fatter than when grafted but has the four off sets the tallest being 3.5 cm tall and 2 cm wide at the top. Notice that it is thinking about throwing a fifth off set. The head on the right has two good sized off sets and it also is throwing two more off sets. This array of growth is after one month being grafted.

What I will be doing with the off sets is to graft some more and to try and root others down. That way it will make a quite rare plant in the trade more available to others. In the past I have taken heads that have fallen off and rooted them down. This takes a while and it takes several years for a plant to grow two or three off sets and get to looking like a serious growing 'normal for cultivated' plant.

A word about *Trichocereus spachianus* for graft stock. Unlike some tender graft stock *T. spachianus* is hardy and is not sucked dry like a lot of stock like *Myrtillocactus geometrizans* and the *Hylocereus stock*. It is cold hardy and I grow it out side here year around. I have several large clumps in my yard from which I take stock when I need it. *T. pachanoi* is another good graft stock but I my self have better luck using *spachianus*. I have seen many times where some of these other stock have been sucked dry before the stock wakes up in the spring. Many people graft 'hard to grow' plants on these other kinds of stock, these plants wake in mid to late winter and the graft stock may not wake till mid to late spring. Thus I do not use them nor recommend them as grafting stock. Elton Roberts. California.

CORRECTION PAGE 19 LAST ISSUE; *AUSTROCYLINDROPUNTIA SP.* BAKER 5130.

Brian Bates who lives in Sucre, Bolivia, has reported that he is pretty sure that the river mentioned in William Baker's travel journal is "Rio Arque" with a "q", not "Argue" with a "g". I have checked on Google Earth and see that Capinota and Apillapampa are near a river Arque with no sign of a river Argue. Ed.

FIELD COLLECTION NUMBERS OF THE OPUNTIOIDAEA

Bates, Lowry, Marshall & Tomlinson BLMT numbers.

Many thanks are given to Martin Lowry for providing an updated list. Items underlined indicate those which might be found in cultivation.

258.02	***Cumulopuntia boliviana***	**Challapata**	**3700**
258.04	***Tunilla sp.***	**Challapata**	**3700**
261.02	***Cumulopuntia rossiana***	**Turichipa**	**3750**
262.04	***Opuntia sulphurea***	**Sucre**	**2850**
269.02	***Opuntia sulphurea***	**Icla**	**2450**
286.02	***Austrocylindropuntia shaferi***	**Buena Vista**	**2840**
292.02	***Opuntia sulphurea***	**Maragua**	**3600**
293.04	***Cumulopuntia rossiana***	**Maragua**	**3900**
293.05	***Cumulopuntia boliviana***	**Maragua**	**3900**
294.07	***Austrocylindropuntia shaferi***	**Rio Honda**	**3300**
295.04	***Opuntia sulphurea***	**San Pedro**	**2460**
296.04	***Austrocylindropuntia shaferi***	**Yuquina**	**3100**
296.05	***Cumulopuntia rossiana***	**Yuquina**	**3100**
297.02	***Cumulopuntia chichensis***	**Padcoyo**	**3300**
297.03	***Cumulopuntia rossiana***	**Padcoyo**	**3300**
297.04	***Opuntia sulphurea***	**Padcoyo**	**3300**
297.05	***Opuntia sp.***	**Padcoyo**	**3300**
297.07	***Austrocylindropuntia shaferi***	**Padcoyo**	**3300**
300.04	***Austrocylindropuntia shaferi***	**Los Alamos**	**2900**
311.01	***Opuntia vulgaris***	**Centeno**	**68**
312.06	***Opuntia sp.***	**Colonia Dora**	**162**
313.09	***Opuntia salmiana***	**Choromoro**	**787**
313.10	***Opuntia sulphurea***	**Choromoro**	**787**
313.11	***Opuntia quimilo***	**Choromoro**	**787**
313.12	***Opuntia anacantha***	**Choromoro**	**787**
315.04	***Opuntia sp.***	**El Cebilar**	**1919**
318.05	***Tunilla sp.***	**Volcan**	**2035**
318.07	***Opuntia sulphurea***	**Volcan**	**2035**
319.06	***Tunilla sp.***	**Tumbaya**	**2010**
319.07	***Opuntia sulphurea***	**Tumbaya**	**2010**
320.05	***Cumulopuntia rossiana***	**Purmamarca**	**3010**
320.06	***Cumulopuntia boliviana***	**Purmamarca**	**3010**
320.07	***Tunilla sp.***	**Purmamarca**	**3010**
320.08	***Opuntia sulphurea***	**Purmamarca**	**3010**
321.04	***Cumulopuntia boliviana***	**Purmamarca**	**4000**
321.05	***Tunilla sp.***	**Purmamarca**	**4000**

Fig. 14 *Puna clavarioides* show plant. **Fig. 15. Single head at 2 months**
Fig. 16. 3 from 2 heads at ten days. **Fig. 17. Above head at 3 months.**

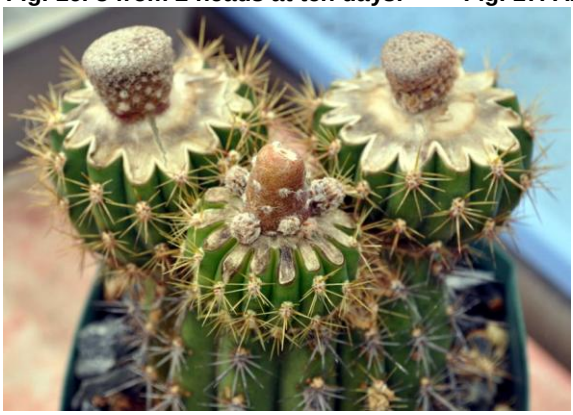


Fig.18 Above grafts about one month. Fig 19. Another graft at one month

All photographs by E. Roberts.

TEPHROCACTUS

Incl. Maihueniopsis, Puna and related genera plus other small Opuntias

Cumulopuntia zehnderi **(Rauh & Backeberg) Ritter. PH590.02 Inland of Chala on road to Malco, Ayacucho, Peru.**
Photograph by Paul Hoxey.

STUDY GROUP

Vol. 15

No. 4 December 2009

SECRETARY'S PAGE.

All articles and comments should be sent to the Editor.

Subscriptions for 2010 are due on the 1st January 2010

Subscriptions and any other correspondence must be sent to the Secretary.

Subs for 2010 remain at £10.00 per annum for the U.K and Europe (European members please note that no Euro-Cheques are accepted by our banks – but you may send £ Notes). The subscriptions for Overseas Members is £14.00 or $25 (in $bills only). Please make all cheques payable to: "The Tephrocactus Study Group" (not individuals).

May I please remind you to let me know of any changes to your address, telephone number or e-Mail address.
If you write to any Officer and expect an answer, please to include a S.A.E.

Members may advertise their "Wants" and "Surplus Plants" free in the Journal, in no more than 30 words.

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THE 2009 TSG MEETING.

This will be held on Sunday 9h May 2010 at the Great Barr Ex Service Men and Women's Club, Birmingham, which is very near Junction 7 of the M6. The room will be available from 10.15 and a buffet lunch costing £5 will be provided. More details of the meeting and location of the venue will be in the TSG March 2010 issue. To help the Caterer notification of the number of people having lunch is needed by April 23rd. I would be grateful if people intending to attend will let me know by that date which might be only about three weeks after the posting of the TSG March issue.

The location is the same as last year and the date is chosen to avoid the meeting being held on the day before the May Bank Holiday Monday. Andrew Gdaniec, based at Kew, will discuss the genera of the North American *Opuntias*. Paul Klaassen will be giving a talk on the *Opuntias* he has seen during his travels in habitat.

Attendance is free and not restricted to members and their guests. Please will TSG members promote the meeting at local BCSS branches etc. ? Ed.

A BRIEF REVIEW OF *CUMULOPUNTIA SPHAERICA* Part 3

Paul Hoxey, 34 Stonehill Road, Great Shelford, Cambridge, CB22 5JL paul@hoxey.com

In the third and final part of this review I will conclude the discussion of the names presently associated with *Cumulopuntia sphaerica* and suggest a tentative new classification with five recognised species. One new combination in *Cumulopuntia* is required and published here.

Opuntia ignota Britton & Rose

Britton and Rose described this taxon in *The Cactaceae* Vol 1 (1919: 99) and on the same page as *Opuntia campestris*. There were both collected by Dr Rose on August 23, 1914 at the railroad station at Pampa de Arrieros, on the Arequipa/Puno railway. The description is brief but concise and included here in full:

"Low, much branched, spreading; joints small, narrow, 2 to 3cm long, more or less purplish; leaves minute, often purplish; spines 2 to 7 from an areole, brownish, acicular, the longest ones 4 to 5cm long; glochids, when present, yellow; areoles large, full of grayish wool; flowers and fruit not seen."

Britton and Rose continue "Plants grown in greenhouses are dark green and develop few spines or none. This plant grows in the same region as *O. campestris*, but is quite different from it."

Since its discovery and description over 90 years ago there is no evidence anyone other than Rose had found the true *Opuntia ignota* in the field, possibly due to the only access being by train until the recent construction of the new Arequipa/Puno highway. Therefore the name *ignota* is very appropriate as it derives from the Latin to overlook or not recognise.

On the hills above Pampa de Arrieros I found a large number of *Cumulopuntia corotilla* and mixed into the population were a handful of plants which looked significantly different and which I couldn't identify. On my return home I checked the literature and it became clear I had encountered *Opuntia ignota*. The photographs included here are possibly the first published of this species. (Figs 1 – 4).

The plant forms low clumps, branching differently from *Cumulopuntia sphaerica*, with new heads forming at ground level and not forming chains of stems upwards. The small ovoid heads, 30mm by 15mm are purple coloured with straight radiating spines up to 8 in number and 50mm long. The spination is reminiscent of *Cumulopuntia leucophaea* (Fig. 9*)*. New heads are a dark green with weak or absent spination. (Fig. 1.) Interestingly neither flowers nor fruits where seen in February 2008, just as Rose failed to encounter them in August 1914.

During a return visit to Pampa de Arrieros in 2009 I paid more careful attention to this plant. A healthy population with tens of specimens was found in a small rocky gully. Reinforcing its reputation for shy flowering only a couple of fruits were found which were small, up to 15mm in diameter and reddish in colour. Areoles were only present around the rim and contained up to 6 strong spines to 20mm long. A maximum of 3 seeds was found in any one fruit.

I also found this plant a few kilometres down the road growing in association with *Cumulopuntia leucophaea*. At each of the two localities I examined the roots of a plant and found them both to form a slightly thickened tapering rootstock (Fig. 3). I found this to be identical to the roots on a small seedling of *Cumulopuntia boliviana* ssp. *ignescens* (Fig. 6).

It is clear this species is not related to *Cumulopuntia sphaerica* but has characteristics closer to *Cumulopuntia boliviana* (Fig.5). These include the way the plants branch, forming low mounds, and the tapering root. It grows in close association with *Cumulopuntia boliviana* ssp. *ignescens* although they are distinct with no intermediates or hybrids observed.

***Cumulopuntia zehnderi* (Rauh & Backeberg) Ritter**

Rauh and Backeberg described this plant as *Tephrocactus zehnderi* in 1957 from material collected below Nevada Sara Sara, near the settlement of Incuyo at 3500m. Ritter made the combination into *Cumulopuntia* in 1981. The description calls for a cushion forming plant with globose tuberculate segments of 3-4cm, sometimes more elongate. Areoles 20-25 per segment, large to 1cm or more, with prominent abundant wool. Spines 3-8(-10) on many areoles, unequal to 3cm, spreading or recurved. Flowers 3cm and yellow. Rauh reports it grows in association with his *Tephrocactus fulvicomus* which is a form of *Cumulopuntia boliviana*.

There is nothing in the description which immediately identities this as a distinct taxon within the *Cumulopuntia sphaerica* complex but on encountering the plant at a number of localities (where it is morphologically consistent) it is clearly different from *C. sphaerica*. The plant form clumps (fig. 6), no more then 3 or 4 segments high of slightly elongating heads with large, angled tubercles which are particularly pronounced on dehydrated plants. The shape and form of the segments is very distinct from *C. sphaerica*. The areoles are very large with white wool (fig.7). The spination is also very distinctive with spreading recurved spines. The fruits have similar spines and large white areoles but they are restricted to the uppermost part around the rim. The lower part of the fruit is naked and devoid of areoles. In November 2005, inland from Chala, we found plants in flower which were consistently yellow but fade to light

orange on wilting. A section of a ripening fruit is shown in figure 8. The thick wall of the fruit and dry cavity, both characteristics of the genus *Cumulopuntia*, are clearly shown. The seeds have a thin central band around the centre, known as a funicular girdle. Subsequently, I failed to germinate any of the seeds although they may not have been ripe when collected.

***Cumulopuntia alboareolata* (Ritter) Ritter**

Ritter described *Tephrocactus alboareolatus* in 1963 and subsequently moved it into *Cumulopuntia* in 1981. The type locality is given as east of Quichaca at 3000m, in the department of Arequipa, which is approximately midway between Chala on the coast and Incuyo (the type locality of *C. zehnderi,* further inland). Ritter's description calls for a loose low clump with segments 5-10cm long and 3-5cm thick, greyish green. The large areoles, 5-7mm in diameter sit at the top of a tubercle. The spines, 3-8 in number are 2.5 to 8cm long. Flowers are yellow fading to red. Ritter illustrates 2 plants (1981, Abb 1099/1100) and although the one in habitat is a rather poor photo, the large white areoles are clearly visible. The other photo is of a weakly spined cultivated plant. However it is clear *Cumulopuntia alboareolata* is a redescription of *Cumulopuntia zehnderi* and it should be sunk into synonymy beneath it. The name *Cumulopuntia zehnderi* takes priority due to the earlier publication date.

On the road from Caravelí and Cahuacho, to the east of Quicacha, I found Cumulopuntia *zehnderi* and Cumulopuntia *sphaerica* (small segmented form) growing together, further confirming they are two distinct species. The distribution of *Cumulopuntia zehnderi* is restricted to the triangle between Chala, Incuyo and Cahuacho, where I have observed plants at altitudes between 2580m and 3700m.

Summary:

We are still lacking important information on a number of taxa and further study is required particularly on flowering and fruiting material. Also in the light of significant differences in root structure this under-appreciated characteristic in this group is worthy of further investigation. However we can make progress in a number of areas. It is clear that there is more than one species involved in *Cumulopuntia sphaerica* as defined in the latest publication Hunt (2006). If we only consider a species level classification and ignore lower ranks, *Cumulopuntia sphaerica* can be circumscribed by non-tuberculate plants with large segments and yellow flowers from the western sides of the Andes. The distribution is fragmented into a number of populations predominantly at lower altitudes (below 3000m). The type form occupies a relatively small area around the city of Arequipa and there are a number of small isolated populations (*C. tumida, C. crassicylindrica* and *C. kuehnrichiana*) which perhaps deserve subspecific status. They all retain the large spherical segments but have distinctive spination.

I consider the small growing form a good species (although clearly related to *C. sphaerica*) due to its consistent spination and dwarf segment size over a wide geographical range which distinguishes it from *Cumulopuntia sphaerica*. It possibly evolved as a fixed juvenile form with a number of characters suited to rapid dispersal; small sized, easily detached and

Fig 1. *Cumulopuntia ignota* PH710.05 Pampa de Arrieros, Arequipa, 3820m (Type locality). Plant in active growth in rainy season.

Fig.2 *Cumulopuntia ignota* PH783.01 3790m. In same location as Fig 1 but in the dry season. Photographs Figs 1 to 9 by Paul Hoxey.

Fig. 3. *Cumulopuntia ignota* PH783.01 segment (25mm long excluding spines) and fruit.

Fig. 4. *Cumulopuntia ignota* PH783.01 showing tapering root.

Fig.5. ***Cumulopuntia boliviana ssp ignescens*** **PH783.04 growing sympatrically with** ***Cumulopuntia ignota PH783.01.***
Fig. 6. ***Cumulopuntia boliviana ssp ignescens*** **PH783.04 showing the same root structure as** ***Cumulopuntia ignota*** **PH 783.01 (Fig. 4).**

Fig. 7. *Cumulopuntia zehnderi* PH751.01. Ayacucho. Type locality

Fig. 8. *Cumulopuntia zehnderi* PH590.02. Sectioned fruit.

Fig.9*. Cumulopuntia sphaerica PH781.01* (left) & *Cumulopuntia leucophaea* PH781.02 (RIGHT) Near Mina Cerro Verde, Arequipa, 2640m.

Fig.10*. Maihueniopsis conoidea* showing normal growth on last year's elongated abnormal segments. Photograph by Roger Moreton.

Fig. 11. *Pterocactus tuberosus* (Pf) B & R. Photograph by Patricia Parkin. Patricia stated that the plant has been grown in this manner for four years and has flowered each year. The hanging basket approach makes the best use of space and reduces the chance of accidently knocking off the stems.

Puna clavarioides

Fig.12. Finger- like growth gone.

Fig. 13. No finger growth but offsetting.

Fig.14. Former grafted heads rooted and growing.

Photographs by E. Roberts.

rapidly rooting stems. At Arequipa it grows with *Cumulopuntia sphaerica* without any observed hybrids. Figure 9 shows a single segment of *C. sphaerica* with a small plant of *O. leucophaea* from that locality. Note the fibrous roots on the later. I also believe *C. sphaerica* is fibrous rooted but I have not examined a plant in habitat. I also include here the coastal plants (*Cumulopuntia unguispina*) and the higher altitude plants (*Opuntia leucophaea*). Backeberg used the name *Tephrocactus dimorphus* for this form but it is uncertain if this name is correctly applied. The description does not match the plant completely and no type specimen exists. Unfortunately no precise locality is recorded either. Therefore I would prefer to use the name *Opuntia leucophaea* because the description, although brief, matches well. There is a type plant (SGO 052672) and a precise locality recorded. *Cumulopuntia unguispina* is a later synonym.

Both *Cumulopuntia sphaerica* (in all its forms) and *Opuntia leucophaea* share a characteristic blue waxy coating on the epidermis which evolves as the segments mature after the initial rapid growth phase. This character is not shared by any other of the taxa discussed here.

Where *Cumulopuntia sphaerica* meets plants from the *Cumulopuntia boliviana* complex from the west, in a band encompassing an area inland from Nazca in the north to Laguna Titicaca in the south, generally between 3000-4000m, a number of taxa have been described with varying degrees of tuberculate bodies and glochids. At this time I am happy to retain *Cumulopuntia zehnderi* and *Cumulopuntia corotilla* as good species. Further work is required in the Nazca valley to determine the relationships of *Cumulopuntia galerasensis*, *Tephrocactus bicolor* and *Cumulopuntia* sp. (Puquio).

Finally I am retaining *Cumulopuntia ignota* as defined by Britton and Rose as a good species. It is a distinct little plant, with affinities to *Cumulopuntia boliviana*, which deserves to be studied in more detail, especially flowering material. It is interesting to note we now have two further examples of sympatric sister species, one a dwarf form of the other; *Cumulopuntia sphaerica/leucophaea* (at Arequipa) and *Cumulopuntia ignescens/ignota* (at Pampa de Arrieros). This twin species concept also occurs in other opuntioid genera. I know of two further examples: *Tephrocactus geometricus/bonnieae* and *Maihueniopsis glomerata/conoidea*.

This study has been primarily undertaken with habitat observations of vegetative characteristics as unfortunately flowering material was not seen for a number of taxa. Ideally further work is required to look at fertile material, particular flowers and seeds. DNA analysis of correctly identified material of the overlooked taxa would also be beneficial.

Tentative species level classification with synonyms

Old names of uncertain application have been left in synonymy under *Cumulopuntia sphaerica.*

***1) Cumulopuntia sphaerica* (Förster) E.F.Anderson, *Cact. Succ. J.* (US) 71(6): 324. (1999).**

Synonyms:

***Cumulopuntia crassicylindrica* (Rauh & Backeberg.) Ritter, *Kakteen in Südamerika* 4: 1254. (1981)**

***Cumulopuntia kuehnrichiana* (Werdermann & Backeberg) Ritter, *Kakteen Südamerika* 4: 1253 (1981)**
***Cumulopuntia multiareolata* (Ritter) Ritter, *Kakteen in Südamerika* 4: 1252 (1981)**
***Cumulopuntia rauppiana* (K.Schumann) Ritter, *Kakteen in Südamerika* 4: 1252. (1981)**
***Cumulopuntia tumida* Ritter, *Kakteen in Südamerika* 4: 1254 (1981)**
***Opuntia dimorpha* Förster, in Hamb. Gartens. 17: 167. (1861)**
***2) Cumulopuntia leucophaea* (Philippi) Hoxey, comb. nov.**
Basionym: *Opuntia leucophaea* Philippi, Anales Mus. Nac. de Chile, Sect. 2 Botany 8: 27 (1891)
Type: Chile, Province Tarapacá, near Usmagama, March 1885 Rahmer s.n. SGO 052672
Synonyms:
***Cumulopuntia unguispina* (Backeberg) Ritter, *Kakteen in Südamerika* 4: 1251 (1981)**
***Cumulopuntia tubercularis* Ritter, *Kakteen in Südamerika* 3: 888 (1980)**
***Tephrocactus mirus* Rauh & Backeberg in Backeberg, *Descr. Cact. Nov*: 8. (1956)**
***Tephrocactus muellerianus* Backeberg, *Descr. Cact. Nov*: 8. (1956) *Tephrocactus pseudorauppianus* Backeberg, in Backeberg & Knuth, *Kaktus-ABC*: 112, 410. (1936)**
***3) Cumulopuntia zehnderi* (Rauh & Backeberg) Ritter, *Kakteen in Südamerika* 4: 1249 (1981).**
Synonym:
***Cumulopuntia alboareolata* (Ritter) Ritter, *Kakteen in Südamerika* 4: 1249 (1981)**
***4) Cumulopuntia corotilla* (K.Schumann ex Vaupel) E.F.Anderson, *Cact. Succ. J.* (US) 71(6): 324. 1999**
Synonyms:
***Opuntia campestris* Britton & Rose, *Cactaceae* 1: 99. (1919)**
***Tephrocactus mistiensis* Backeberg, in Backeberg & Knuth, *Kaktus-ABC*: 110, 410. (1936)**
***5) Cumulopuntia ignota* (Britton & Rose) Ritter, *Kakteen in Südamerika* 4: 1250 (1981)**
Taxa from the Nazca valley of uncertain classification and requiring further study:
***Tephrocactus bicolor* (Rauh & Backeberg) Rauh, in *Sitz. Heidelb. Akad. Wiss.* 1958, 223 (1958)**
***Cumulopuntia galerasensis* Ritter, *Kakteen in Südamerika* 4: 1249 (1981)**
***Cumulopuntia* sp. (Puquio)**

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I thank Roy Mottram for his help in editing this article. Ed.

UNUSUAL GROWTH.

In Vol. 14 No. 4 Dec. 2008 p.54 Roger Moreton reported that many of his plants had been transferred to Winterbourne Gardens, University of Birmingham and two of the plants had then shown abnormal growth. Illustrations were provided. Comments were invited as to the possible cause but none were forthcoming. This year one plant, *Maihueniopsis conoidea*, (Fig 10) has resumed normal growth which can be seen at the end of last year's abnormal elongated growth. The other plant (Cumulopuntia sp. RKH 129) is still in difficulty. Comments are still invited.
A photograph of a normal growing plant *of Maihueniopsis conoidea* can be seen on p.21 of Vol. 13. No. 2 June 2007. Ed.

MAIHUENIOPSIS DARWINII. (Henslow) Ritter.

This year celebrates the bicentenary of the birth of Charles Darwin. In the world of cacti, the only species named after such a distinguished scientist is a plant of the *Opuntia* family. It is a species forming low colonies, probably little more than in height. The roots are lengthy and woody. The joints are subspherical to 3cm in diameter and are dull to olive green. The areoles are quite large and felty, and the spines, which appear in the upper segment, are straight and coloured yellow to yellowish brown being up to 3.5 cm in length. The habitat is southern Argentina, fairly close to the Magellan Straits. *Maihueniopsis darwinii* presents no difficulty in cultivation apart from the odd invasion of black mould around the areoles. I have found it to be quite shy-flowering in cultivation: maybe it's the clones I grow as other people regularly flower the plant. The flower is yellow and about the same size as the segment from which it arises.
Backeberg considered the species to be a *Tephrocactus* along with many other *Opuntia* species which later authors have subsequently placed elsewhere. It is recognised as a valid species by James Iliff and Roberto Kiesling. However, it is interesting to read that the new Cactus Lexicon notes that its status is uncertain pending consideration of the whole "glomerata" complex.
Fig 15 shows a typical plant of unknown origin, whilst Fig 16 shows material obtained from Michael Kiesling as MK100. J. Betteley. Newark.

When Darwin returned on HMS Beagle to England in October 1836 he brought back preserved cactus material that he had collected in January 1834 at Port Desire, Santa Cruz, Latitude 47° S. It was based upon this material that Henslow described the new species that he named in honour of Darwin. Although Darwin collected the material at Latitude 47° S he

recalled seeing similar plants even further south at Latitude 49° S in Patagonia. Thus the taxon is very cold hardy and is an obvious suitable candidate for cold frame culture. Ed.

PUNA CLAVARIOIDES FOLLOW UP.

On the back page of the September 2009 TSG I showed some *Puna clavarioides* that I had grafted. You will notice that on some heads there are finger like growths. I believe that this is caused by the fast growth of the heads of that stem. As the heads have no growing point the plant can do only several things; one is to offset and the other is to grow those finger like growths. I maintain that the finger like growths is due to the plant growing faster than it can make offsets and the excess growth is exhibited in this kind of growth. As the plant settles down or grows more offsets then in time the finger growth will go away as it also tends to do in the time the plant is dormant. I grafted some *Puna clavarioides* so I could take heads to root down. I did take the heads off the grafted heads and potted them. If you look at Figs 12 and 14 these are heads that did have finger growths. In the time they have been rooting and starting to grow they have lost most of the finger like growth. I think that the finger growth is used in this case to help make roots and if you look at Fig 14 you can see that that head is also throwing two off sets. I have seen where grafted or over fed plants will throw finger growth and it will sometimes remain on the heads for years. The reason that these fingers were reabsorbed so fast is that the heads were removed and planted. In order to make roots a normal head will shrink quite a bit before it shows any signs of growth. The heads with the finger growths did not have to shrivel all that much and all seemed to root quite fast and start growing. New owners of two of the sold plants have told me that their plants were also growing new heads.

Notice in photo 15 that the two heads in the foreground that are out of focus are now concave although when planted they were convex or more rounded on top. They did not have the finger growth and so are having to use water and sugars stored in the heads to make roots As these heads are well anchored in the soil I expect to see them start to grow and fatten up again soon.

I was asked if it is special fertilizing or if it is the climate here that makes the plants grow so fast. I have to say that it is a combination of climate and the graft stock. The stock is *Trichocereus spachianus*, which is a fast growing plant. It seems to grow quite well here being an all weather stock. It can take cold down to 9 degrees F as it lived through our big freeze and it can also take quite hot temperatures as it gets to 135 F in my hot houses and they keep right on growing. A lot of unsuitable stock can not take a wide range of temperatures and some graft stock that has to be kept above freezing will be sucked dry in the spring by the scion. For a while after grafting I will water the plant about once a week and that helps it not dry out so fast. Once a graft is growing then it goes back to the normal water times. I treat all my plants about the same; when they get fed all get fed. I my self was quite surprised that the *Puna clavarioides* grafts did so well.

Elton Roberts. California.

Any comments? No finger-like growths are reported in habitat. Ed.

Maihueniopsis darwinii **(Henslow) Ritter. Both photos by J. Betteley.**
Fig. 15. No origin data
Fig. 16. MK 100. "Type form". Therefore collected at Port Desire, Lat. S, Patagonia, Argentina. Ed.