

TEPHROCACTUS

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



Cylindropuntia tunicata PH586.02 growing on the Inca ruins at Lomas de Atiquipa, Arequipa, 1280m, Peru. Photograph by Paul Hoxey.

STUDY GROUP

Vol. 18

No. 1 March 2012

SECRETARY'S PAGE.

All articles and comments should be sent to the Editor.

Subscriptions for 2012 were due on the 1st January 2012

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

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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 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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Vols 1 - 10 are at present temporarily out of stock,

TSG web page: [http:// www.cactus-mall.com/tsg/index.html](http://www.cactus-mall.com/tsg/index.html)

THE 2012 TSG ANNUAL MEETING.

The meeting took place as arranged in May at the Great Barr Ex Service Men and Women's Club, Birmingham and favourable comments have been made. There were many plants for sale, seed for sale and an excellent buffet. The first talk was given by Graham Charles on recent genetic studies of South American *Opuntias*. Starting with a quick survey of the results of the Wallace & Dickie Study (Succulent Plant Research Volume 6, 2002) and the Griffiths & Porter study (International Journal of Plant Science 170 (1) 2009) Graham then commented on the genera recognised in The New Cactus Lexicon. The remainder (bulk) of the presentation was on the results of an IOS instigated study in 2009 undertaken by Dr Christiane Ritz and her students using documented plant samples. The study is now complete (as far as it goes) and has been accepted for publication in the prestigious journal "Molecular Phylogenetics and Evolution" but has not yet appeared in print so the contents cannot be divulged here. It is possible to make the personal comment that not only were the findings of interest but the presentation helped me to understand some of the methods used for research and decipher how the results were presented. The second presentation was by Tony Roberts who brought plants, rather than the usual pictures by a speaker, to illustrate his talk on small South American *Opuntias*. The plants were in excellent condition and Tony's comments included not only details of the plants but hints on how to treat them in cultivation.

All the current officials were re-elected but the Editor made clear that he was retiring from that position at the end of this session. As in past few previous years at the AGM the question of the future of the TSG was discussed. Various alternatives were outlined and after discussion a vote was taken which showed the meeting to be in favour of a move to make much more use of the Internet and an expanded webpage. It was agreed that a small group of volunteers would draw up plans to publish the TSG issue free of charge on the Internet in order to widen the readership base and thus generate more material for discussion and for articles than was at present coming in from a narrow membership base. Provision would be made for the printed issue to continue to be available if members preferred to receive material in that format rather than digital. Ivor Crook, who volunteered to lead the group, has written a short article below on the intention.

A. Hill

BCSS NATIONAL SHOW 18TH AUGUST 2012

Unfortunately there will be no TSG stand at the event which will be held at Wood Green Animal Shelter, London Road, Godmanchester, Cambs, PE29 2NH. Regretfully we have had to inform the organizers that we must withdraw due to lack of commitment by enough members to stage and steward the stand. Thank you and apologies to those members who have done some of the work in preparation for the event.

A. Hill. Chairman.

THE FUTURE OF THE TSG PUBLICATION.

At this year's TSG annual day meeting there ensued a lively discussion on the future of the group. The main focus of our activity over the years, outside of the annual day meeting, has been the production of a quarterly journal. Recently we have been unable to produce editions of the journal on time due to lack of articles to publish. My view is that the group is at a crossroads in its evolution; either evolve or die. The members at the annual meeting were all keen to see the group continue as it has to date but this is not possible if we have nothing to print!

My proposal for a way forward is aimed at change whilst at the same time satisfying the needs of our current members. I proposed that from 2013 we publish our quarterly journal free of charge on the internet through an expanded web site. This is aimed at expanding our readership and hopefully, along with this, expanding potential contributors of articles. Current members would be given a choice when renewing their membership for 2013. Option 1 would be to renew their annual membership, currently £10 per annum in the UK, and continuing to receive the printed journal through the post. Option 2 would allow current members to continue to receive the journal, as a free download over the internet, without payment of a membership fee.

Examining the accounts I notice most of the membership fee goes towards printing and postage of the journal but there are some other advantages of membership. These include the seed list and room hire for the annual meeting. I would like to see both these remain available under options 1 and 2. However, it may be necessary to impose a small premium to people wanting these items under option 2. This would allow sufficient funding to remain available for the running of the group and for us to 'break even' over a 12 month period and to ensure fairness.

If anyone would like to be actively involved in this development please contact me by email, ivorcrook@btinternet.co.uk or by post at Crowshaw, 38, Clarendon Rd, Audenshaw, Manchester, M34 5QB. I am also happy to discuss through the above, or the pages of the TSG journal, any queries or problems we may not have anticipated. Ivor Crook. Manchester.

Apologies for the present volume of the TSG running late but whatever changes are made to the next volume present subscribers will receive the four issues for Volume 18 for which they have paid. Ed.

OPUNTIOIDEAE OF PERU – AN OVERVIEW –Part 2.

Paul Hoxey, Cambridge, UK

paul@hoxey.com

I continue the review of Peruvian Opuntioids by covering two genera and just two species, one native and one introduced.

TUNILLA.

The name *Tunilla* was recently erected by David Hunt and James Iliff to cover a distinctive group of small joined *Opuntias* sometimes given the name *Airampo*. The species are quite poorly understood and although quite a few names have been described it is unclear how many good species there are. Fortunately the situation in Peru is less confused and

only one species, *Tunilla soehrensii*, is named from the country which also happens to be the type of the genus.

Tunilla soehrensii

Tunilla soehrensii was originally described by Britton and Rose as *Opuntia soehrensii*, in honour of the German Botanist Prof. Johannes Söhrens. The type was collected by Dr Rose and his wife at Pampa de Arrieros inland from Arequipa in southern Peru. Sometimes the technical details in describing plants with terms such as “type” and “type location” can be confusing to non-botanists but they are of great value in understanding what a plant really is. In this case the accurately recorded type location allows us to return there today and examine the plants. For this species I have done just that and the Fig. 1 shows the species growing in the general area of Pampa de Arrieros. It forms low and spreading clumps, offsetting at ground level with densely spined flattened pads. Plants often have a tatty appearance especially in the dry season when dehydrated. The pads suffer and become shriveled and often die. New pads are then quickly added after the rains.

Tunilla soehrensii is commonly cultivated in the Canon del Colca region in southern Peru. Single pads are placed along the top of walls (Fig. 3) and happily grow on into plants. Within a few years quite large flowering sized clumps can form. The flowers are yellow with a green stigma and style. The stamens are sensitive to touch and curl up if a bee (or finger!) enters the flower.

Perhaps the most interesting characters of the plant concern the fruits and seeds. I found some fruiting specimens in the Colca canyon region and out of curiosity cut one open with the knife. I was surprised to find the seeds are under pressure and they pushed their way out of the fruit through the cut and the released seeds consumed perhaps twice the area they did in the closed fruit. This example showed unripe seeds that had not fully developed. A second surprise awaited when I opened a ripe fruit which contained seeds under pressure as before but now with a bright red pigment on the seeds. The pigment is a very intense red and covers the seeds. On touching them the red pigment stains your fingers and is quite difficult to remove. The fruits are not juicy and the red pigment is restricted to the surface of the seeds. Historically the red pigment was used as a red dye for cloth but I do not know if it is still used for that purpose today.

I have found *Tunilla soehrensii* in many locations in the departments of Arequipa and Tacna in southern Peru. It is also known from Moquegua and its distribution extends into northern Chile. It is a plant of high altitude habitats between 2900 and 3800m.

CYLINDROPUNTIA.

Cylindropuntia is a non-native genus to South American but one species has become quite widely distributed and naturalized through the actions of man. The genus is native to Mexico, the USA and some islands in the Caribbean. There are about 30 species. It is very easy to identify *Cylindropuntia* on account of the spines which are covered with a papery sheath. This can be observed in the species by gently tugging on the spine to release the papery sheath. (Danger! Do not use bare fingers! Ed.)



Fig 1. *Tunilla soehrensii* PH782.03. South of Pampa de Arrieros, Arequipa, Peru. 3310m. Photos 1-7 by P. Hoxey.

Fig 2. *Tunilla soehrensii* PH790.01. Canon del Colca, Arequipa, Peru. 3790m.





Fig. 3. *Tunilla soehrensii* PH787.01 planted on a wall. Canon del Colca, Arequipa, 3440m.

Fig. 4. Flower and Fig. 5 fruit from the above plant.





Fig. 6 *Tunilla soehrensii* PH790.01. Canon del Colca, Arequipa, 3440m.
Fig. 7 *Tunilla soehrensii* PH788.01. Canon del Colca, Arequipa, 3440m.





Fig. 8 *Maihueniopsis darwinii/hickenii* RESA2007-2 CIMG5050 at tip of Peninsula Valdes.

Fig. 9 *Maihueniopsis darwinii/hickenii* RESA2007-3 CIMG028 near Trelew on Ruta Nacional 3.





Fig. 10. *Maihueniopsis darwinii/hickenii* RESA 2007-4 CIMG5073. Halfway between Trelew and Comodoro Rivavia, at Estancia El Conuto on RN3.
Fig. 11. Same site. *Maihueniopsis darwinii/hickenii* RESA 2007-4 CIMG5071





Fig. 12 *Maihueniopsis darwinii/hickenii* RESA2007-5 CIMG5074 at Comodora Rivadavia.

Fig. 13 *Maihueniopsis darwinii/hickenii* RESA207-6 CIMG027 at Caleta Olivia (Santa Cruz). Photos 8 -13 by R. Samek.



Cylindropuntia tunicata.

Cylindropuntia tunicata was probably introduced into South America in pre-Colombian times for reasons not understood today. It is widespread but not particularly common. It tends to be encountered now and again in widely separated habitats. I have found the species in Chile as well as Peru. Some locations have had evidence of pre-Colombian occupation so it is likely the plant was introduced intentionally and cultivated. It is most often found along the coast in lomas habitats. Today these places are not populated but in the past they acted as oasis which allowed people to live in the extremely arid environment along the Atacama desert coast. I have also seen *Cylindropuntia tunicata* in the Río Apurímac, one of the inter-Andean valleys, well inland and some distance from the coast. Altitude is likely to place a factor in the distribution and I have not found *Cylindropuntia tunicata* above 2600m. (See frontispiece and Fig. 14).

Cylindropuntia tunicata grows into a low bush with very spiny stems. I have not seen flowers or fruits in its Peruvian or Chilean habitats. Perhaps the majority of propagation is by vegetative means. The stems are not firmly attached and they can be broken off, perhaps by passing animals, and deposited elsewhere to form a new plant.

To be continued

MAIHUENIOPSIS DARWINII/HICKENII.

Last year I (Ed.) received an email from Rene Samek which contained the following:

“Having read your plea for material to print, I can offer photos of a *Maihueniopsis* which I originally thought was *M. hickenii* but which does not fully fit descriptions in articles by Roberto Kiesling and elsewhere: This *Maihueniopsis* grows between Trelew and Caleta Olivia on the coast of Argentina, in the habitat of *M. Darwinian* and *M. hickenii*. Based on the articles I read before my trip in 2007, I thought that *M. hickenii* is a form of *M. darwinii* with longer spines and I thus happily identified the plant as *M. hickenii*. However, I was recently able to download Kiesling’s 1984 article in *Darwiniana (Estudios de Cactaceae de Argentina: Maihueniopsis, Tephrocactus y Generos Affines)* where there are drawings of both *M. darwinii* and *M. hickenii* and from them and from the accompanying text I got a different view: *M. hickenii* looks just like *M. darwinii* but is just bigger. We travelled all along the coast from Buenos Aires down to Rio Gallegos and along the way I saw a number of forms of *M. darwinii/hickenii*. This form, however, seems to me to be quite different - its segments are small (1-2 cm) while the spines are much longer (5-7 cm) and flat - as opposed to not-at-all or not-much flattened spines of the "normal" *darwinii/hickenii*. Photos of *M. darwinii/hickenii* in the book *Tephrocactus und andere Fiegenkakteen* by Michael Kiessling from Germany are also quite different.”

Rene sent one photograph (Fig 10) and kindly offered to send more photos plus an extended version of the above text. The latter information was sent after he received, with his TSG issue, a copy of volume 25 of *Cactaceae Systematics Initiatives*. In his second communication Rene said that the chapter in CSI perhaps made his contribution unnecessary but the CSI article had stimulated him to send the promised extra photographs and a few notes in the hope that they may perhaps be useful. When David Hunt

kindly offered enough copies of CSI 25 for me to send to each TSG member he commented that perhaps some of our members would be encouraged enough to comment in the TSG issue on what was in the CSI issue. Unfortunately this has not so far happened, except for Rene's contribution. Rene's second batch of information is published below for general interest to members and in the hope that you will respond with comments/opinions on the points raised and especially how you identify the plants in the photographs. Ed.

"In early 2007 I saw *Maihueiopsis darwinii/hickenii* at several locations between Peninsula Valdes and Caleta Olivia on the Patagonian coast;

- at the tip of Peninsula Valdes, RESA 2007-2 Fig. 8.
- near Trelew on Ruta Nacional 3, RESA 2007-3 Fig. 9.
- half-way between Trelew and Comodora Rivadavia, at Estancia El Conuto, RN3, RESA 2007-4 Figs. 10 & 11.
- north of (cca 15 kms) Comodora Rivadavia on RN3, RESA 2007-5 Fig 12.
- At Caleta Olivia (Santa Cruz), RESA 2007-6 Fig. 13.

Unfortunately there was no time to go to Puerte Deseado where Darwin visited.

"The plants showed great differences in segment size and spination but I was unable to determine with certainty at that time which ones were *darwinii* and which were *hickenii*, as the plants with smallest segments had the longest spines while I had understood that from the literature I had (including Kiesling's *Cacti of Patagonia*) that it should be the other way around –

Kiesling, *Cactus de la Patagonia*, English summary on page 111:

A. Stems less than 3 cm diam. Plants less than 10 cm height and diam var. *darwinii* (fig 180)

AA Stems more than 3 cm in diam. Plants bigger than 10 cm height and diam var *hickenii* (fig. 179)

But in the same publication, in the main Spanish text, one can find on pages 228 – 230 the following:

M. darwinii var *darwinii* – fig 180

...espinas ... de 2-4 cm...

M. darwinii var *hickenii* – fig 179

... las espinas hasta 12 cm ...

Also, according to Backeberg, *hickenii* was a version of *darwinii* with longer, flattened, spines (Die Cactaceae, Vol. 1) – photos there tally with my plants.

"I thought that the plants with flat spines could be *M. platyacantha* but that taxon is supposed to come from Western Argentina, so I was really confused.

"The chapter in CSI 25 on *Maihueiopsis* seems to answer my questions: *M. darwinii* has shorter spines, either not flattened or only flattened near the base.

M. hickenii has distinctly flattened spines, twice as long as *darwinii* (or more).

M. platyacantha has also flattened spines, but it grows in Mendoza and Neuquén, not on the Patagonian coast as the above two species.

“One striking difference is the colouring of the spination:

The description of *M. hickenii* on page 21 of CSI 25 says that the spines are “silvery coloured but nearly black with age”. On “my” plants it was the other way around – new spines are black and they become greyish-white to creamy-white with age – please see RESA 2007-3 _Trelew_ 028 Fig.9, RESA 2007-4 _Estancia El Conuto_CIMG 5071 Fig. 11 and RESA 2007-6_Caleta Olivia – 027 Fig 13.

“Fruit of *M. hickenii*.”

In the description of *M. hickenii* in CSI 25 there is only a question mark instead of a description of the fruit. Perhaps RESA 2007-4 Fig. 10 could be considered to be this species. Unfortunately they were not yet fully ripe at the end of January (21st-22nd). I would say that they were fitting the description of the fruit of *M. darwinii* on page 20 of CSI 25, but not yet yellow, only green. Flowering was already over but from the remains of flowers I would guess that they had been yellow, perhaps yellow-orange.”

Rene Samek, Czech Republic.

THE FALL OF OPUNTIA PACHYPUS.

Some years ago, giving a 09:00hrs winter inspection of my small collection of plants, I was horrified to see that my 120cm tall *Opuntia pachypus* was leaning at an approx 45 degree angle. Being Christmas morning I double checked that I was at the correct angle to view - sure enough *pachypus* was leaning at this acute angle. I was most upset that this magnificent plant which was growing so well and which had been given to me years earlier by a very dear friend, when it was about 80 cms tall, was on the verge of collapse. On close inspection I saw that the base was soft and mushy - nothing else for it but to operate and sever the trunk above the soft mush, to look for firm body flesh, hopefully to dry and then re-root. Back in the house I reflected on what to do. So mind made up, I returned back into the greenhouse armed with strong glove and carving knife! I laughed out loud as I realised that only a few hours later, when my wife arrived home from work, I would be carving the festive turkey with the same knife!

I made the first cut about 10cms above the rot and found that the centre of the plant was hollow, so I cut again about 10cms higher and found the same, and then the same again and again and again until I reached almost the top. The inside was like a bamboo shoot, hollow and in sections (See Fig 15). So there it was, hollow and in sections from the base all the way to the top. So what was it that caused this? Has anybody in the TSG experienced this phenomenon perhaps in the fall of their *O. pachypus*?

John Cox. Bradford.

A reminder that members may advertise plants for sale/exchange or for those they are seeking. There is no charge for this service.

RANDOM RAMBLING RUMINATIONS.

Greetings from sunny Sucre.

Here in Sucre, autumn is with us and the rainy season is almost over, so constant sunny days will soon be the norm. There will be no rain until at least August. I have two projects to keep me busy. The first is to build a house on our lot which is visible from the Los Alamos road about 200m past the airport runway. Anyone will be welcome to visit and, when sufficient is complete, to stay at the Bates motel. The second is to build a trailer and buy a bike to return to my two loves, cycling and plants. The trailer is being built and the bike assembled, so in a couple of weeks I'll be road testing the setup, and my state of health and fitness. It's about twenty five years since I last did any serious cycling, but now, there's no time limit and it's not a race, so if I get too tired, I can just stop and camp. In the past, I always had to get back to go to work, but now, this is MY time. I tell anyone that I worked hard for ungrateful bosses for thirty six years, now I don't have a boss. If you see me on the road, honk your horn or stop for a natter. I blame Chris Sherrah for the bike/trailer project. He re-infested me with the travel/cactus virus when we travelled together in 2009-2010. Of the vast amount of travels that I've done over the years, these were the most enjoyable. What is it about people like Australians and Bolivians? I'm *Mediobolivian psychobatesii*.

Comments on the last journal contents.

P 52 Fig. 10. I have doubts about this plant's identification. The glochids don't go all the way down like in all the other photos. It could be an aberrant *Cumulopuntia pentlandii (boliviana)*, but I do trust Elton to know his own plants. These observations are based on only seeing the one photo of two cladodes.

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

Brian noticed the following several typographical errors in the last issue.

Apologies from me.

Ed.

Errors

P 48. 2nd paragraph, 4th line "quiet variable" to "quite variable".

A little lower in the same paragraph, a comma after Arequipa.

P 49. Heading "*BRAZILIOPUNTIA*" should be "*BRASILIO PUNTIA*".

3rd line "various additions names" should be "various additional names".

P 57 Last paragraph of "Random Rambling Ruminations" "I usually bother" should be "I usually DON'T bother".

Advancing age and increasing ill health has made it inevitable that I must give up the position of Editor which I took on, in a temporary capacity, in December 1998. Please will you help me, for the rest of the year, by providing material for publication? Comments on previous TSG articles or on articles published elsewhere are obviously welcome as well as your own articles on any *Opuntias* or habitat experiences. Also your experience of cultivation of the plants. The important thing is to contribute something. If possible will you please submit text and pictures digitally? Thank you in advance.

Ed.



Fig. 14. *Cylindropuntia tunicata* PH738.04, Puente Pasaje, Rio Apurimac, Cusco, Peru. 1150m. Photograph by Paul Hoxey.

Fig. 15. *Austrocylindropuntia pachypus*. Photograph by John Cox. Note the “chambers” in the hollow core. Ed



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plus other small Opuntias



Tephrocactus articulatus flower.
Photograph by Tony Roberts.

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THE TSG QUARTERLY PUBLICATION.

In the last edition it was remarked that there was too little copy available to produce the June edition on time. This coupled with our editor being indisposed has led to an unfortunate delay in the printing of this issue. Thankfully we now appear to be back on track with this year's issues. I now feel a lot more optimistic about the future of the TSG having recently received several articles from members in quick succession. I would like to thank all those who have taken the time to contribute. The bad news though, is that we must not rest on our laurels. We still need more articles to be able to keep our study group viable, so please keep writing.

I would also like to apologize for incorrect information in the last journal. Please note my correct email address should read: ivor.crook@btinternet.com

The postal address printed below the email is correct.

Thanks also to Pete Arthurs who has informed me that he has acquired a new web address for the TSG and is currently in the process of building us a new web site. This will hopefully take us more in line with similar small groups of cactus and succulent enthusiasts. I remain upbeat that this may also bring us to the attention of a greater number of people increasing our readership and encouraging an increasing number of authors within the journal.

May I also give advance notice to readers that the 2013 Annual meeting will be held on Sunday 12th May at the Great Barr Ex Service Men and Women's Club, Birmingham. This central venue has proved popular over the last few years.

I. Crook, Manchester. (Ivor has very kindly compiled this issue. Ed.)

TEPHROCACTUS ARTICULATUS IN MY COLLECTION.

With the advent of the more "in vogue" *Tephrocacti* such as *T. bonnieae* and certain forms of *T. alexanderi* and *T. molinensis*, it is perhaps not surprising that plants of *T. articulatus* are rather neglected in our collections and linger at the back of the staging. In this article I hope to bring this species, in its various forms, to your attention once more, so that you can see these plants as ones well worth growing.

Lots of names have come and gone (or nearly gone!) over the last 175 years for plants which are now all attributable to *Tephrocactus articulatus*, starting with *Cereus articulatus* (1837), *Cereus syringacanthus* (1837), *Opuntia diademata* (1838) and *Opuntia turpinii* (1838), then later on *Opuntia papyracantha* (1898) and *Opuntia strombiliformis* (1929). It is still useful today to use some of these specific or varietal names to describe plants in cultivation, that vary typically in the body shape and colour and particularly in the degree of spination. This is despite the fact (as Mike Partridge tells me) that driving along a road in Argentina you might see many of these variants within a short distance or even in a single population. So to illustrate this point, I'll pick out a few different clones of *T. articulatus* within my collection.

Tephrocactus articulatus (free-flowering form)

This is the plant I have always called *T. articulatus* sensu stricto. It has relatively small segments compared with most other forms, each one being 4 - 5cm long and quite slender, and has a sparse number of flat central spines (just one or two) coming from the top-most areoles (Fig. 1). Once it gets to the size shown, it is quite slow growing, just the one new segment on the far left in the last year. This is

because it seems to put all its energy into flowering for, compared to all the subsequent forms, it is very free-flowering. The floral remains are quite persistent and may stay well attached for several years. This plant has produced numerous flowers over several summers; the flowers are pure white and about 3-4cm across (Fig. 2) although I also have a very similar plant which has whitish flowers with a pale pink hue.

Tephrocactus articulatus (papyracanthus with white spines)

Opuntia papyracantha and *O. diademata* are the names I originally associated with this next clone. It has several distinguishing features, segments 5-8cm long (or even longer) and more rounded than the previous clone, and several white papery spines on each of the upper areoles, making a handsome plant. I have several plants of this clone; some are quite tight clumps whilst another has grown several “branches” of segments (Fig. 3). This plant has stayed intact (is depicted in a 19cm pot) and several of the branches are now 9-10 segments long. As I’m sure many of you know this is the type of plant which will fall apart quite easily, especially if it gets too dry in winter. The plant may look as one plant but after the first watering of the spring or when you move it, you notice that segments are actually detached; see the result (Fig. 4)! The saving grace here is that you now have plenty of segments from which to propagate new plants. Put 28 in a seed tray, half buried in the compost and they will soon root – before you know it you have a forest of new plants (Fig. 5), waiting to be put into separate pots. Being a plant that propagates so readily from detached segments, it must have in its genes that it doesn’t need to flower and set seed to survive, for I am still waiting after many years.

Tephrocactus articulatus (papyracanthus with dark spines)

More rarely in cultivation, you see a clone of *Tephrocactus articulatus (papyracanthus)* which has even larger segments (8-12cm long) bearing more distinctive and wider papery spines which are dark brown or even black in colour. I have seen plants like this called *T. turpinii* but I’m not certain whether this matches the original description. It also has a propensity to detach segments so my plants of this clone don’t normally reach more than four segments tall (Fig. 6). It is also shy to flower but this summer (2012) for my first time it did so producing two flowers, one after the other (Fig. 7); again the typical white flower you would expect for *T. articulatus*.

Tephrocactus articulatus (inermis and strombiliformis)

Finally, there are two forms that have no central spines at all (or perhaps just a very occasional one). These I have separated as *inermis* and *strombiliformis* although these names are sometimes used synonymously. The plant which I grow as *T. articulatus (inermis)* has pale green chunky, cylindrical segments (5-7cm) which are well attached to each other resulting in a quite robust and stocky plant (fig. 8). In contrast, *T articulatus (strombiliformis)* has segments which are more like an ellipsoid in shape and are more blue-grey in colour. Sometimes with this form, the segments are rather indeterminate and a considerably longer column results. It forms a plant of similar size to *T. articulatus (inermis)* but rather than illustrate this, I show you one of my propagation experiments (Fig. 9). Here, I have

taken a single segment of this clone, sliced it in half vertically, and then grafted each half horizontally onto a stock of *O. elata*. Very quickly new segments are produced which can be removed every few months and rooted down as new plants – a somewhat quicker method I find than taking segments from a plant on its own roots.

I hope this article and the photographs have helped you to see what some people may consider a rather ordinary plant, *Tephrocactus articulatus*, in a new light.

Tony Roberts, Kent.
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FLOWERING *TEPHROCACTUS GEOMETRICUS*.

At the end of March this year I noticed the new growth on *T. geometricus* which turned out to be flower buds. The forming of the buds was very slow which I associated with the appalling wet dull weather, indeed over two months passed before the buds looked ready for opening. I hoped some would for Bradford Branch Show on June 9th but not one opened for the day (Fig. 10). It was the end of June before they started to open and continued for the next 2-3 weeks. (Figs 11 & 12). 14 of the 16 buds opened with just 2 aborting. A long wait but well worth it. This was a five pad plant from the Czech Republic bought at ELK in Belgium five years ago which has grown well for me and this was the second year of flowering but there was no new growth this year. The flowers opened five weeks later than last year.

John Cox, Bradford.

BOOK REVIEW: CACTUS DE PATAGONIA BY ELISABETH AND NORBERT SARNES.

Published in 2012, this is a lavishly illustrated eighty page book on the cacti of Chilean and Argentinian Patagonia. The book has both German and English text and details many of the Opuntiads endemic to most of the unique and untouched landscape of this fascinating part of South America. The book deals with *Maihuenia*, *Maihueniopsis* and most of the *Pterocacti* with many habitat illustrations of each species.

In the latter part of the book the authors detail the *Austrocacti* and several of the *Gymnocalycium gibbosum* forms.

The last thirteen pages concern propagation and cultivation of each of the genera appearing earlier in the book.

For those TSG members interested in this unique and fascinating group of plants, I would heartily recommend getting hold of a copy. One of the authors (Norbert Sarnes) is a TSG member. The book costs £10 plus postage and is freely available from Keith Larkin books at www.keithsplantbooks.co.uk

John Betteley.



Fig. 1. *Tephrocactus articulatus* (free flowering form).



Fig. 2. *Tephrocactus articulatus* (in flower).



Fig. 3. *Tephrocactus articulatus* (*papyracanthus*) – with white spines



Fig. 4. *Tephrocactus articulatus* (*papyracanthus*) – segments



Fig. 5. *Tephrocactus articulatus (papyracanthus)* – new plants in seed tray



Fig. 6. *Tephrocactus articulatus (papyracanthus)* – with dark spines



Fig. 7. *T. articulatus* (*papyracanthus*) – with dark spines, in flower.



Fig. 8. *Tephrocactus articulatus* (*inermis*)



Fig. 9. Grafted *Tephrocactus articulatus* (*strombilliformis*)
Photos 1-9 by Tony Roberts



Fig. 10. *Tephrocactus geometricus* in bud



**Figs. 11 (above)
and 12 (below).
*Tephrocactus
geometricus* in
flower.**

**Photos, 10 -12 by
J. Cox**



Profile of the TSG Secretary: John Betteley.

I started growing cacti in the late 1950's (even though I only admit to being 47 years old). My first encounter with *Opuntias* was in 1963. I visited Worfield Gardens in Shropshire, UK. This was the largest cactus and succulent nursery in the UK at the time and was owned by Sir Oliver Leese.

I remember purchasing *Opuntia scheerii* – a Mexican padded *Opuntia* with golden spines, and the blue padded *Opuntia robusta*. Twelve months later I chose to de-pot them and to plant them in the ground of an 8 foot by 6 foot glasshouse. Four years later, they had grown so quickly that they began to push the glass out of the sides and roof of the glasshouse. In the intervening years, I built up a significant collection of all *Opuntia*-related material, acquiring plants from Clive Innes, Edgar Lamb and Ing van Donbelaar (a Dutch nurseryman with an extensive list of sales material).

At its peak, the collection contained more than three hundred and fifty species and subspecies, all of which were cultivated in two glasshouses at the family home in Shropshire.

With changes in employment necessitating a move from home, the collection deteriorated. When I retired and settled at my present address, the interest was re-kindled, but I chose to concentrate on growing the smaller and more manageable South American taxa.

A few years ago, I was fortunate to acquire two collections; one from former TSG assistant editor Bill Jackson and the other from a long standing friend, David Parker.

David was an outstanding grower and developed his own compost formula; until a few years ago he was custodian of a superb *Echinocereus* reference collection. In spite of the quality of the acquisitions, I chose to repot every plant.

Over the years, I have found that the *Opuntias* are amenable to most growing mediums which incorporate at least 50% of grit. At the present time I use a quality Kettering loam (only available in the UK), with added flint grit and hard pumice. I used to add bonemeal, superphosphate and phosphate of potash to this mix, but stopped this when I found that one of the ingredients was a magnet for sciara fly. My present collection extends to over two thousand cacti and succulents, which are accommodated in three greenhouses, a conservatory and four garden frames. Such is the sheer size of the collection that watering can take many hours. During the summer, I estimate that I spend at least thirty hours a week, maintaining the still-expanding range of plants.

For the last part of this article I have selected five of my current favourite *Opuntiads*. Whether these will still be in favour in several years time is pure conjecture.

Maihueniopsis mandragora. Those who subscribe to updated taxonomy will note that this species name has been sunk under *M. minuta*, a much earlier species name. As I grow several forms of both *M. minuta* and *M. mandragora*, I see there are differences in body size and colour.

The plant in the photo (Fig 16) has no habitat province, but came from Michael Kiesling's collection in Germany. Many forms of *mandragora* have a steely-blue epidermis which is lacking on *M. minuta*. The plant is found in the Salta and Jujuy regions of Argentina, between 2500 and 3000m. The flowers, which are freely produced, are campanulate and invariably yellow.

Maihueniopsis subterranea incahuasi (or *pulcherrima*) is supposedly the red flowered form of *M. subterranea* proper, although the plant bodies are distinguishable in the way they grow and divide. Here the bodies are similar and form dense clusters arising from a strong tuberous root. This form is found in Bolivia, growing at 3,200m, near Incahuasi. The striking red flowers and the plant's increasing availability, combined with its compact habit, should endear it to most *Opuntia* enthusiasts. (Fig 13)

Tephrocactus bonniae: this is a particular favourite of the author, since its introduction to cultivation some fifteen years or so ago. There are several forms of this species on the market, and it is well worthwhile seeking out the plants with more colourful bodies and spination. Formerly described as a 'Puna' by Roberto Keisling, seed morphology placed it firmly with the *Tephrocactus*. Growing at 2000m in the Catamarca region of Argentina, the plant in cultivation forms a dense group of globular heads arising from a thickened rootstock. The flowers are generally pale pink. Segments root easily in the spring and summer, provided they are half-buried in the growing medium, and watered weekly.

Maihueniopsis clavarioides was first ascribed to the genus *Puna* until 2001. The plant in Fig 15 is on its own roots, although larger specimens are often grafted. The segments are obconical and laxly arise from a tuberous rootstock. In fact segments root down without difficulty but take several years to form a tuberous root before showing evidence of segmentation. This clone was collected by Franz Kühhas as FK 93-209-665, growing at 2600m at Arrequeintin, in San Juan, Argentina.

Pterocactus hickenii: this is the form with short, cylindrical stems, collected in the Sarmiento area of Chubut, Argentina. (Fig 14). Again this is a variable species, with some forms having globular segments; spination is also considerably variable. I would suggest that this species has affinity with *Pterocactus araucanus*. The flowers are apical (typical of the genus) and pale yellow. Segments arise from a tuberous rootstock (also typical). There exists a particular long-spined form in cultivation, formerly with the specific name '*skottsbergii*'

John Betteley, Newark

COMMENTS ON CUMULOPUNTIA ITURBICOLA, MAIHEUNIOPSIS MINUTA AND MANDRAGORA.

I have grown three plants of GC 180.09 for some years, the plants that Graham Charles calls *Cumulopuntia iturbicola*. The one I had the longest produced yellow flowers but in the big freeze-up they were all lost. I considered them to be *C. rossiana* forms having collected similar plants at Iscayachi. The description of *C. iturbicola* could equally apply to plants I found near Iscayachi. The elongate-obovoid nature of the plants I saw in habitat has become nearer to the spherical-ovoid in cultivation. You will note Graham gives a comparison to *C. boliviana* rather than *C. rossiana*.

The other thing I do not understand is why botanists equate *Maihueniopsis mandragora* to *M. minuta*, two species that are very different. My first *M. minuta* label has "ex Dog Dyke from Alan Hill 1993". It has segments 11 or 12mm diameter by 15 or 16 mm tall. They have a few wispy spines, to 3mm long, on the upper areoles of some segments. My second *M. minuta* label has "KG 1712 ex R Kiesling, Sirre de Palo, San Juan, from Klaus Gilmer 1996". It has segments 10 to 12 mm diameter by 14 mm tall. The segments are of similar size and have similar wispy spines as the Dog Dyke plant. However, in addition it has produced some proper spines to 15mm long on a couple of segments. Both these plants have flowered on a more or less regular basis and when pollinated have produced fruit and seed. I have two plants, 'A' and 'B' from seed sown in 1995 and also two plants 'A' and 'B' from seed sown in 2005. These four plants all look like their parents but so far have not flowered.

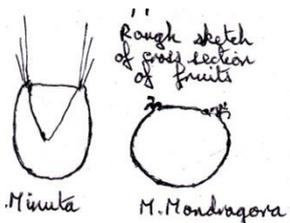
My first *M. mandragora* was KG 1964. Its segments are 20mm diameter by 33mm tall. My second was GEH.036 ex R Kiesling from Graham Hole in 1998. It had segments to 17mm diameter by up to 25mm tall. My third was GEH 103 Serrano 22-78 also from Graham Hole in 1998. Its segments are 16mm diameter by up to 26mm tall. These three plants tend to look spineless although there are a few small spines on some of the upper areoles of some segments. They have also flowered more or less regularly though not all of them in the same year or at the same time of year. When plants have flowered at the same time and they have been pollinated, fruits and seeds have been produced. I have a plant from KG seed in 2004, GEH 036 seed in 2007 and Serrano 22-78m seed in 2008. With this species it seems a slow process for this to change from its seedling stage into producing mature segments. The one that has managed to change is just like its parents. The *mandragora* segments are much larger than those of *minuta*, their diameter and height being nearly double. The other *minutas* have a rather ordinary matt surface from light to dark green. The *mandragoras* have a smooth, shiny surface that tends to be a grey or sometimes bluey-green, often with areas of a maroon colour.

However, it is the fruits that show the greatest differences. Those on the Dog Dyke *minuta* plant (2 in 2012) were cylindrical, 13-16mm diameter and 15-18mm tall. In ripening they turn from green to yellow. The floral scar is 11mm in diameter in a cup shape 11mm deep. Around the floral scar were a number of fine, straight, easily detached, mainly vertical spines up to 15mm long. On the *mandragora*, Serrano 22-78 plant (1 in 2012) it was 19mm diameter by 15mm tall. The floral scar, slightly

domed, was basically a flat disc of 12mm diameter. On the GEH 036 plant (2 large and 1 small fruit in 2012) they were 20mm diameter and 15mm tall. The floral scars were flat discs, 11mm in diameter. There were a few curly spines around the floral scars up to 8mm long that didn't readily detach.

In 2001 I got another *M. minuta* from Graham Hole, Ex R Kiesling from NW of Calingasta. Its segments are up to 16mm diameter by up to 20mm tall, of a dark grey-green colour. It has a number of wispy spines up to 6mm long from each areole and from nearly all areoles on a segment. Also at that time he gave me pieces from the three plants he collected along the Fiambala/Chaschuil road as a single species. However, back home in cultivation, they appeared to be a *minuta*, a *mandragora*, and a *conoidea* plant. The *minuta* of this collection looks similar to the Calingasta plant but perhaps more green than grey in colour. The *mandragora* of this collection looks very much like my other *mandragoras* but with smaller segments which are 14mm in diameter by 20mm tall. Graham reported that these three plants had, in habitat, large tuberous roots below ground. My plants of these three species, like all the other plants are in 2 ¼ inch square pots. This *mandragora* plant in particular is already distorting the sides of its pot so is in need of potting on. The oldest two *M. minutas* also need to be potted on but due to their top growth and not because the roots are distorting the pot. In 2008 I acquired two *M. minutas* with the labels Haff 62-70 and HT 88-150 that look like, given time, they are correct. Another two that came at the same time with labels STD 550 and STD 553 so far would appear to be something else.

Royston Hughes, Liverpool.



LATEST RESEARCH IN ANDEAN OPUNTIAS.

TSG members will remember we recently enclosed a copy of David Hunt's Cactaceae Systematics Initiatives No 25. On page 3 of that publication mention was made of a forthcoming paper by Dr Ritz. The article has now been published. The reference is:

Molecular phylogeny and character evolution in terete-stemmed Andean Opuntias (Cactaceae-Opuntioideae). C.M. Ritz et al. Molecular Phylogenetics and Evolution. 65 (2012) 668-681.

TSG SEED

The editor would like to hear about members' experiences of growing *Opuntia* seeds, either seed issued via the TSG or from other sources. Photos of seedlings at every stage of development would be appreciated. Information on the season of sowing, germination rates, time from sowing to germination, pretreatment given to seeds and mortality rates following germination (plus other information) are all factors you might wish to share. We would like to hear about your failures and successes, even if you wish the information to be published anonymously. Ed.



Fig 13 *Maihueniopsis subterranea*
v. *incahuasi*.



Fig 15. *Maihueniopsis clavarioides*



Fig 14. *Pterocactus hickenii*

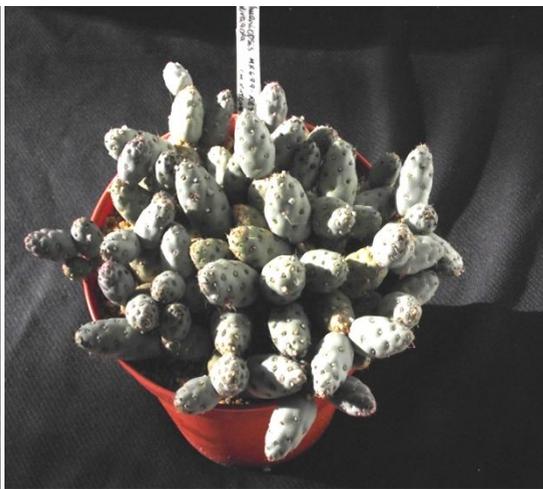


Fig 16. *Maihueniopsis mandragora*

Figs 13 – 16 photographs by John Betteley.

TEPHROCACTUS

Incl. *Maihueniopsis*, *Cumulopuntia* and related genera
plus other small *Opuntias*



Opuntia engelmannii with fruits.
Photograph by Dave Ferguson, courtesy of opuntiads.com website.

STUDY GROUP
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SECRETARY'S PAGE.

All articles and comments should be sent to the Editor

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

Subs for 2012 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 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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NORTH AMERICAN OPUNTIAS-SPECIAL EDITION.

Following our call for articles I have been sent several articles concerning the Opuntiads in North America. These either concern plants native to North America or cultivation of plants in North America. Whilst not strictly within the initial remit of the group I hope readers will forgive me for clumping these articles together. I have done this for three reasons. Firstly, I was sent the articles for publication so readers must have thought them relevant. Secondly, they can serve to give members a broader understanding of the Opuntiads as a whole. Finally, in the hope of increasing readership of our journal and ultimately our web pages to stimulate a wider participation in the TSG.

I. Crook, Manchester. (Ivor has very kindly compiled this issue. Ed.)

CORYNOPUNTIA – AN UNDERRATED GENUS IN CULTURE.

Most growers of small *Opuntiads* tend to favour plants from the genera *Tephrocactus*, *Maihueiniopsis* and *Cumulopuntia*. For some reason, whether space or spikiness, plants of the genus *Corynopuntia* are less favoured. This is a pity and in this article I hope to show you a selection of plants that are well worthy of being in your collections.

Corynopuntia was first used by Knuth in 1936 to encompass *Opuntia* which had distinct club-shaped segments. Earlier (and more recently!) these had been considered as *Grusonia*; however, the latter genus is now monotypic, the sole survivor being *G. bradtiana*, but that is another story. *Corynopuntia* occur in habitat predominantly in the south-western states of the USA and the northern states of Mexico. Perhaps this also explains why they are not more widely seen in collections, for collectors in these regions in the past would have always focused on more worthy plants rather than “just another *Opuntia*”!

There are two other genera (and two plants) that now fit within the scope of *Corynopuntia*, these being *Marenopuntia marenae* and *Micropuntia pulchella*. I will not cover these in this article but they are both distinctive and well worth growing too. So for now, I'll just choose five of my favourite *Corynopuntia sensu stricto*.

Corynopuntia clavata

This plant is the type species of the genus *Corynopuntia*, and *clavata* also means club-shaped (a modern tautology arising from the original name of *Opuntia clavata* being superseded by *Corynopuntia clavata*!). This species remains low to the ground (<15cm) and will become considerably wider than tall. Rather than describe its characteristics in detail, it is easier to observe it (Fig. 1); note the very characteristic coloration and spatial arrangement of the spines. This is not a vigorous grower for me, adding only a few segments each year, and I have never flowered it in our UK climate.

Corynopuntia bulbispina

Corynopuntia bulbispina is one of the tidiest species of the genus, after ten years or so becoming a neat, low growing mound about 20cm across (Fig. 2). It also has the smallest segments (1-2cm long) of all the species. If you are lucky, it will produce bright yellow flowers in summer. The trick with this

plant and other *Corynopuntia* is to start watering it in February/March before any new shoots appear. (This is in stark contrast to say most *Maihueniopsis* from which you should withhold water until May/June (if you dare!) until buds appear – watering these latter plants too early will, in my experience, just result in vegetative growth.) A closely related species is *Corynopuntia moelleri*, which in my hands has larger segments (3-4cm long) and a more lax habit.

Corynopuntia emoryi

This plant is similar in shape and size to *C. clavata* but tends to have weaker spines (brown and white in colour) and its body can develop rather nice hues of green and purple in sunny summers, providing rather a nice contrast to related plants. The plant I illustrate here (Fig. 3) I acquired as *C. stanlyi*, now considered synonymous with *C. emoryi*.

Corynopuntia invicta

Corynopuntia invicta is the “big daddy” of the genus and is quite unmistakable; though from a distance (and when not in flower) it can look like a clump of *Echinocereus*! Today you still often see this for sale as *Opuntia* or *Grusonia invicta*. Its segments can be anything up to 10-12cm long (though more commonly 6-8cm). The spines on old segments are quite dull and grey in colour but new segments are bright and have distinctive red spines (Fig. 4). The flowers of this species are also yellow (Fig. 5), up to 5cm across, and the spiny floral remains will persist and stay attached to the plant for several years. This is a must for your collection, but it is a literal “pain to re-pot”!

Corynopuntia parishii

Closely related to *C. clavata* is *C. parishii*, again with slightly weaker spines especially when young. Like *C. invicta* the new segments are considerably brighter and have more colourful spines than more mature segments. The illustration (Fig. 6) shows a young plant started from rooting down a single segment a couple of years earlier. Hopefully, this brief survey will encourage you to seek out some specimens of this genus to add to your collection.

Tony Roberts. tony@robertscacti.co.uk

THE GENUS MICROPUNTIA.

I have written about *Micropuntia pygmaea* and *wiegandii* several times over the past two or three years. This article covers all of the plants that Backeberg lists in his Lexicon. I now believe that I have each of the plants that he lists. For a long time I thought that he listed some plants that were just a different looking form of plant X. All of the *Micropuntia* have now been shoved or lumped under *Opuntia pulchella*. If you are a fan of the NCL you will find it under *Corynopuntia pulchella*. If you are a follower of Anderson then they are shoved under *Grusonia pulchella*. In the Mesa Garden catalog they are all listed under *Opuntia pulchella*.

1116.91- <i>pulchella</i> RP43 /18/ Warm Springs, NV, caudex, purple fl	2.00+
1116.913- <i>pulchella</i> RP128 Snake Valley, UT/NV, large club joints	2.50*
1116.92- <i>pulchella</i> SB1453 s Callao, UT	2.50*
1116.93- <i>pulchella</i> /18/ Coaldale, NV, long soft spines, huge tuber	2.50*

I have been studying the *Micropuntia* for about fifteen years and as such now more or less know what plant grows where. I know that the seeds #1116.91 from Warm Springs, NV are *Micropuntia pygmaea*. Snake Valley covers a lot of area in eastern Nevada and western Utah. Snake Valley is a large curving valley that is at least 125 miles long and to about 45 or 50 miles wide in places; it is shaped like a crescent moon. Callao is in Snake Valley Utah and the seeds listed as # 1116.913 are *Micropuntia barkleyana*. The Coaldale, NV seed #1116.93 are *M. wiegandii*. Thanks to people going out and collecting seed I have most if not all the listed *Micropuntia*. A friend ordered seed from Mesa Garden and grew *M. barkleyana*, #1116.913 and 1116.92 [not listed above] which is *M. tuberculosirhopalica*. Once they gained a little size he grafted them on a *Pereskiosis* species. They have been on the graft for several years and they look more like a bush than what they are supposed to look like. Grafted plants do not grow like habitat plants. Some really go haywire. Some grafted plants will look like habitat plants for quite a while but in time will become much larger or grow kind of strange. The plant stems on the two grafted plants look somewhat alike in that they are long stringy stems. The plant of *M. barkleyana* has stems that are about the diameter of a pencil and are to 18 cm long. My cultivated plant has stems that are 3 to 5 cm long and a true club shape. *M. tuberculosirhopalica* is about the same stringy looking plant but with stems only to 13 cm long. I am not showing photographs of the grafted plants.

I have taken several photos of the plants from different angles to give an all-around view of the plants. This way the reader can make up their own minds if the plants are different from each other or if they are all the same plant as the books try and tell us. The lumping approach is that all the plants have a tuber type root, stems that are smallish, and flowers that are in shades of pink, pinkish-red, or purplish-pink. So far all the flowers I have seen on different plants are in shades of pink and all about the same color. It is because of the small joints, the flower color and the tuberous roots that all the plants are considered as nothing but a *Corynopuntia pulchella*. With that kind of approach you could also say that they are an *Opuntia basilaris* for they are jointed and have pink flowers. Or you could say that they are an *Opuntia erinacea* [the common but pink flowering grizzly bear] because they are jointed and have pink flowers. Growing all over the deserts from California and all over the western states to the eastern sea board down through Mexico and in South America are jointed and yellow flowering cactus plants that also have spines. Do they list them all as one and the same thing?? No so why just because the *Micropuntia* have stems and a tuberous root and even short spines are they all considered just a *C. pulchella*? I will try and show why I do not think they are a *C. pulchella*.



Fig. 1. *Corynopuntia clavata*

Fig. 2. *Corynopuntia bulbispina*





Fig. 3. *Corynopuntia emoryi* (*C. stanlyi*)
Fig. 4. *Corynopuntia invicta*





Fig. 5. *Corynopuntia invicta*, the same plant closer up



Fig. 6. *Corynopuntia parishii*, a small plant



Fig. 7. *Micropuntia barkleyana* – typical stem



Fig 8 *Micropuntia barkleyana* – typical stem with side stem



Fig 9



Fig 12

Fig 10



Fig 11





Fig 13



Fig 14



Fig 15

**This page – *Micropuntia barkleyana*
Photos 9 - 15 by E. Roberts.**

The description of *M. barkleyana* says that it says 'later clavate' that is because when the seedling first grows it is like a small diameter stick sticking up. As the seedling grows it get the club shaped stems. It does not say very much about the size the plants become in habitat. Fig 7 shows a typical stem with side stems. There the club shape shows up quite well. In Fig 8 the club shape shows up much better and also showing up are rounded tubercles. Fig 9 shows the club shape of the stems, the leaves and the spines. At the areole are leaves that are short and stubby and they and the spines grow out of a pad of felt. Also it can be seen that the spines taper and they are thickened below. In Fig 10 is a close up of a stem. The leaves have mostly dried up and easy to see what looks like long tapering spines. In actually they are only about 1 cm long. In this photo and Fig 11 it is easy to see the rounded tubercles. In Fig 11 it is also easy to see the spine taper and that they are thickened below or at the base. Fig 10 shows the side of the growing point which I was hoping would be a flower bud but it was a stem forming. Fig 11 shows it from above and the very small leaves show up quite well. They are curved and green-red.

Fig 12 is of one of the plants, taken just before the plant started to grow after its spring dormant time. For many cactus plants in Nevada, Utah, northern Arizona and California; from about mid-April till the monsoon rains arrive is a time of no rain and they go dormant. As can be seen the stems are a bit wrinkled and even some of the tubercles are resting on adjacent tubercles. Compare that photo with Figs 13-15, which are of actively growing stems. Here what I was hoping would be a flower bud has grown into healthy green stems. The tubercles are nice and rounded again and the plant still has some spines to grow or lengthen. Also seen is the felt at the areole and it is a bit longer than on older stems. The rains seem to knock some of the longer felt off leaving only a pad of felt. Photo 9 is of one of the plants as it is actively growing. Easy to see is the club shaped stems, even the newest stems have the shape to them. I have not up-rooted my plants to see the tuberous roots but have seen roots on a plant that a friend had and there were no glochids on the roots. Also I saw in a photo a root of a plant someone dug in habitat to show the root and there were no glochids on that root either. Elton Roberts. California

THE ORIGINS OF *OPUNTIA FICUS-INDICA*.

It may come as a surprise to cactus hobbyists but probably more has been written about *Opuntia ficus-indica* than any other cactus species. To illustrate this point, a quick Google scholar search will reveal over 12,400 results for *Opuntia ficus-indica*. You can learn about its medicinal properties for treating ulcers, scurvy and diabetes, lowering cholesterol, accelerating wound healing and even as a hangover cure. It is a source of dietary fibre, high in Vitamin C and essential amino acids. It is eaten by

humans, grown as cattle fodder and as a host for the cochineal insect, the source of a natural red dye. Some people even admit to growing it in their cactus collections. It is thus closely linked with mankind for most of human occupation of the New World. In addition, ever since the first arrival of the Spanish in Mexico, it has been spread around much of the planet by the hand of man. Yet, despite this, its origins remain shrouded in mystery. Modern research suggests it is a native of southern Mexico. But, to better understand the potential origins of *Opuntia ficus-indica* (Fig. 16), we need to examine not just the plant but the landscape of Southern Mexico and the early history of human civilization in the New World.

One of the papers in the scientific literature examines molecular evidence to try and determine the closest relatives of *Opuntia ficus-indica*¹. In this study, Patrick Griffith proposes that there is a close relationship of the tree-like, fleshy-fruited, large padded *Opuntias* of South and Central Mexico. Different clones of *Opuntia ficus-indica* appear at different places within the cladogram suggesting several independent origins of the species. This strongly supports the classical hypothesis that selected clones of *Opuntia ficus-indica* became a domesticated crop plant and became so important to man that it quickly spread across much of Mesoamerica. Another potential inference from the cladogram is that it is of hybrid origin. The inference is that the hybridization to form what is today known as *Opuntia ficus-indica* happened more than once. *Opuntia streptacantha* and *O. tomentosa* seem to be two of the most likely parents. The case for *O. streptacantha* as a potential parent to *O. ficus-indica* is strengthened as it too has significant anti-diabetic and cholesterol lowering properties. But, with the notoriety of *Opuntias* to hybridise, it does not tell us if this is a natural or man-made hybrid. Whichever is true we next need to look at why it became so important to our early ancestors.

The earliest generally accepted evidence of human occupation of the New World is towards the end of the last Ice Age about 14,000 to 15,000 years ago through a corridor in the melting ice cap at the Northern end of the Americas.² On entering what is now modern day Mexico, man was met by a wealth of large mammalian species that were common across the whole of the Americas at that time. These provided for all his needs. About 9,000 to 10,000 years ago the climate began to change and become more arid. Coincident with this, large prey animals became extinct and the vegetation changed to become similar to that found today. With his main food supply gone, man had to look elsewhere for sustenance. Small game and vegetable matter quickly took their place at the dinner table. With the loss of large prey animals man became dependent on vegetable matter to supplement the diet to survive. This therefore led to a more settled lifestyle to enable the cultivation of crops and to other innovations including hybridisation of crop plants for increased yields and the development of corn, beans, squash, chillies and avocado as we know them today. Along with these crops, *Opuntia* pads and fruits were also collected and eaten and probably planted near to crop fields much as they are today. By 4,000 years ago, living in villages, growing crops and making pottery was an established way of life.³

But, where exactly did this happen? The landscape of Southern Mexico is formed as a result of plate tectonic activity. The easterly movement of the Cocos ocean plate causes the formation of the Sierra Madre del Sur mountain chain. The more northerly Sierra Madre Oriental is heavily influenced by hard, immovable rock from volcanic activity. As a result of continued eastern movement of the Cocos Pacific plate, the land between the two chains is forced upwards as an inland plateau at about 1500m above sea level. The average temperature on the high altitude valley floors is about 15-20°C with about 400mm of rain per year.⁴ The vegetation of the valley floor is mainly pastureland or desert scrub vegetation at about 1500-2200m becoming oak forest then pine forest further up the mountains. Pastureland and desert scrub areas are the habitat for most of the wild large-padded *Opuntias* including *O. streptacantha* and *O. tomentosa*, the potential parents of *O. ficus-indica*.^{5,6}

Thus, we can now examine the archaeological evidence of man's early occupation of Southern Mexico and relate this to the physical geography and vegetation zones of modern day Mexico. The modern day city of Oaxaca sits on a plateau about 1500m above sea level. It sits strategically at the head of three highland valleys which contain a lot of Southern Mexico's most important archaeological sites. Some of these are marked on the map (Fig17). Today, we have no direct evidence to show that early farming communities from 9,000 years ago remained in the same localities and eventually developed enough to produce pottery and leave behind relics some 4,000 years later. However, it would be fair to make this assumption as it is unlikely that the optimum places to farm changed much during this time-scale. These sites are mostly within the three valleys that radiate away from Oaxaca and on the valley floor or lower foothills. By 3,000 years ago farming techniques had developed so significantly that crop yields were high enough for people to be freed from working the land to take up alternate occupations such as potters or builders. This led to the first major city-state of Mesoamerica at Monte Alban near the modern day city of Oaxaca.

In conclusion it seems likely that early man reached South and Central Mexico and with climate change at about 9,000 years ago became farmers. Archaeological evidence suggests the highland valleys around Oaxaca proved highly suitable as farming land as the population grew significantly to enable the emergence of Mesoamerica's first city state of Oaxaca at Monte Alban. Ancient farmer's ability to hybridise and improve foods crops such as corn played an equally important role in providing enough food for population growth. Molecular evidence from *Opuntia ficus-indica* suggests its polyphyletic nature means it may also have been subject to human intervention with the tree-like *O. streptacantha* and *O. tomentosa* as potential parents. Whether its origins were as a result of natural or man-made hybridization remains uncertain. The presence of multiple sites of ancient human activity within the type of vegetation favoured by the tree-like *Opuntias* strengthens the case that this happened in the highland valleys around Oaxaca between 4,000 and 9,000 years ago. Its multiple uses for man and ability to thrive in an arid environment accounted for its success. This is seen in its spread across Mesoamerica and later, following the Spanish conquest, across the globe.

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I. Crook, Manchester.

OPUNTIADS WEBSITE.

Joe Shaw edits the American based internet website opuntiaads.com along with Dave Ferguson. He has given us an insight into the website and the reasoning behind its creation. (Ed)

Opuntiaads Web is for people interested in Opuntiaads, especially Opuntiaads of the USA. We enjoy writing about and photographing *Opuntia* and related plants and making the information available to other plant lovers. Our major goal is to describe and document the Opuntia species of the USA. Towards this end we have photographically documented over 100 species of *Opuntia*, *Cylindropuntia*, and *Grusonia*. Additionally, we have consulted and reproduced early descriptions of each species to support our identifications.

Of the many Opuntiaads in the USA, some look superficially alike and some have even been forgotten; even botanists confuse them with each other and don't know there are so many species. But they have different bloom times, consistently identifiable fruits, normally don't interpollinate, and are restricted to specific habitats. Early botanists identified them and understood their uniqueness.

Our editors, writers, and photographers have diverse backgrounds and experience with Opuntiaads and use their strengths to accurately identify and portray the various species. In our effort to help readers discern the differences between species, we provide large photographs (typically over 1000 pixels on an edge) because Opuntiaads can be plastic in their morphology. Where we can, we provide images from different seasons and also seek to provide images of flowers and fruits. For many species we provide geographic information.

Joe Shaw
www.opuntiaads.com/O



Fig. 16. *Opuntia ficus-indica* at Puerto Escondido, Southern Mexico.

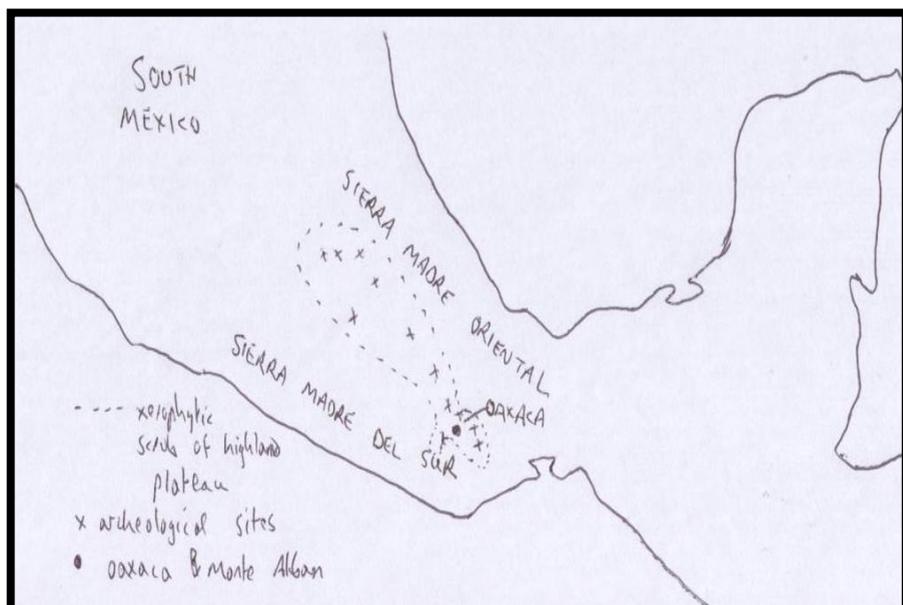


Fig 17. Map of South Mexico

TEPHROCACTUS

Incl. *Maihueniopsis*, *Punotia* and related genera
plus other small *Opuntias*



Punotia lagopus near Macusani, Peru, growing in peat by running water.
Photograph by I. Crook.

STUDY GROUP
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SECRETARY'S PAGE.

All articles and comments should be sent to the Editor.

Subscriptions for 2012 were due on the 1st January 2012

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

Subs for 2012 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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CANCELLATION OF THE MAY 2013 AGM BIRMINGHAM MEETING.

Unfortunately we have been informed, at short notice, that our booking of the Birmingham venue for the meeting has been cancelled. Efforts, without success, were made to make new arrangements. This, plus some problems about speakers, necessitated the cancellation of this year's meeting. However, recently received information has resulted in a plan to hold a meeting next year on May 11th 2014 at Coddington Village Hall, near Newark, Nottinghamshire. The venue is easily accessible just off the A1 and will be no further than Great Barr for the majority of attending members. The meeting will commence at 11.00 am. Tea and coffee will be available.

At the end of the meeting, there will be an opportunity to visit the collection of John Betteley, which is only five hundred yards from the venue. The collection is in three greenhouses, a conservatory and several garden frames. There is a good range of Opuntias and related genera to view.

The Birmingham venue was ideal and we would like to have similar facilities in 2015: easy access for travellers, blackout facilities and ability to access refreshments. Members are requested please to consider if they are aware of any possible venue and inform John Betteley or me.

Alan Hill. Chairman

THE FORMAT FOR THE TSG IN 2013.

At the 2012 TSG Birmingham meeting it was agreed that the TSG would go digital and public. It was hoped that this would create a wider audience and produce more articles and comments. It would also solve the main problem of intending to print a regular quarterly issue but having no contributions to fill it. (In the last three months we have had one article sent in). It is intended therefore to suspend membership fees. Articles, pictures and comments may be posted on our new website, tephro.com, hosted by Pete Arthurs and access will be given to members and the general public. Material for publication should be sent to Ivor Crook at Croshaw, 38, Clarendon Road, Audenshaw, Manchester, M34 5QB or ivor.crook@btinternet.com. Members will be notified by email of the posting of new material on the website. To obtain this notification we request present members to confirm their present email address by going to membership@tephro.com and filling in the details. John Betteley, our Secretary, will continue to keep an up to date list of members. He will be automatically informed of your email address and any changes you make to it. However, if you change your postal address please will you inform John directly? Newcomers can have the notification facility by completing the details on the above website and will be classified as new members.

We are aware that some present members do not have access to the Internet. It is suggested that some might know some one nearby who has access and will make a private arrangement with them to provide a print-out. If there are members who are not able to do this please contact John Betteley. It might be possible then to suggest (with that member's agreement) some member who lives close and could provide the material or some form of posting might be possible.

Future developments will be publicized on the website. Some members have already sent John Betteley a subscription for 2013. If you have done this please will you contact him with details of your pay-pal account or other details so that a refund can be made? A. Hill. Chairman.

PUNA NO MORE!

The genus *Puna* was created by Roberto Kiesling [1] in 1982 to encompass just two plants which in much earlier times had been known as *Opuntia subterranea* (1905) and *Opuntia clavarioides* (1837). At the time Kiesling's intent was quite valid for these plants had similar morphological characteristics such as their habit and tap roots. In 1997 a new plant was discovered and described [2], making a total of three in the genus; this was of course *Puna bonnieae*. However, subsequent studies (both of the seed structures [3, 4] and recent definitive DNA studies [5, 6]) have shown that these three plants now fit better within three different genera of the *Opuntioideae*. Historically, it is quite amazing that these small plants have undergone so many names changes over the years; two of them have resided in five different genera (see table).

<i>C. subterranea</i>	<i>M. clavarioides</i>	<i>T. bonnieae</i>
1905 - <i>Opuntia</i>		
1936 - <i>Tephrocactus</i>	1837 - <i>Opuntia</i>	
1980 - <i>Cumulopuntia</i>	1930 - <i>Cylindropuntia</i>	
1982 - <i>Puna</i>	1941 - <i>Austrocylindropuntia</i>	1997 - <i>Puna</i>
1999 - <i>Maihueniopsis</i>	1982 - <i>Puna</i>	1999 - <i>Maihueniopsis</i>
2011 - <i>Cumulopuntia</i>	1999 - <i>Maihueniopsis</i>	2001 - <i>Tephrocactus</i>

But never mind the names; let's have a closer look at these three species for they are truly gems of the small *Opuntiads*.

Cumulopuntia subterranea

This plant occurs in the Argentinean province of Jujuy and in the Potosi department of Bolivia. Like all the plants discussed in this article it usually consists of a single or just a few heads and has a significant tap root – its species name *subterranea* clearly indicating that most of the action takes place underground! The small bodies have numerous areoles with very short glochids and spines. In cultivation, whether grafted or not, it can make a fine clump given time, and has flowers about 3cm across which can be white to pale-pink or occasionally somewhat darker (fig. 1).

In 2000, a subspecies was discovered near Incahuasi in the department of Chuquisaca in Bolivia, and originally described as *Tephrocactus pulcherrimus* [7], but now classified as *C. subterranea* subsp. *pulcherrima* [5]. This plant tends to proliferate more than the type species both in habitat and culture (albeit slowly) and has a larger (4-6cm) red or sometimes violet flower. My specimen came from a plant found by Martin

Lowry in 1997 originally assigned simply as "*Opuntia subterranea*", but when it flowers you can see the distinction (fig. 2).

Maihueniopsis clavarioides

Maihueniopsis clavarioides is the eldest statesman of these three species although it didn't receive this name until 1999 [8]. It also originates from Argentina, and has been seen in collections for many years. Often plants were grafted, and they proliferated more quickly, resulting in prize winning specimens like the one owned by David and Kathleen Briggs from Bridlington (fig. 3). You can see from this the abundance of strange-shaped segments (club-like and fingers) that can occur. Offsets from such plants will root down quite readily, but they don't seem to do much on top for quite a while as they are busy developing a tap root below ground, to take on more closely the habit of plants found in the wild.

Tephrocactus bonnieae

The third of these choice *Opuntiads* is *Tephrocactus bonnieae*, which held the name *Puna* for the shortest time of all. In their original article [2] Ferguson and Kiesling mention that the plant was first taken for a *Tephrocactus* seedling and, somewhat ironically, just four years later Stuppy confirmed it to be indeed a *Tephrocactus* based on a detailed examination of its seeds [3]. In cultivation *Tephrocactus bonnieae* is often seen as a grafted plant (typically, grafted on *Austrocylindropuntia subulata*) resulting in a multi-headed specimen (fig. 4). New segments start off quite brown in body colour gradually turning green and then becoming even paler after they have matured. Such grafted plants show a greater propensity to flower and for me sometimes have two flushes of flowers, in spring and then in late summer – the flowers are spectacular, pinkish white to pale-pink and about 5cm across (fig. 5). Individual segments will root down, again slowly and, like with some other *Tephrocactus* species e.g. *T. molinensis*, it helps if you almost bury the segment – just be careful it doesn't rot!

In its natural habitat near Loro Huasi in the Argentinean province of Catamarca, these plants occur as tiny specimens that you are unlikely to find unless you know where to look or they are in flower, for they are almost completely underground. There is also a totally spineless form occurring at a nearby locality (fig. 7). Again, I just have a grafted plant of this form; it has not yet flowered for me, but you can clearly see the young and more mature segments (fig.6).

So the ultimate Cactus Trivial Pursuit® question! Is there another genus containing just three species which have subsequently been transferred to different genera? Or is this unique?

In conclusion, these are all plants you should have in your collection, if you haven't already, for they won't take up much space. But perhaps, now is the time to take the plunge, to re-label your existing plants, and say “*Puna* no more!”

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Fig 1. *Cumulopuntia subterranea*

Fig 2. *Cumulopuntia subterranea* subsp. *pulcherrima*





Fig. 3. *Maihueniopsis clavarioides*
Fig. 4 *Tephrocactus bonnieae*





From top:
Fig. 5. *Tephrocactus bonnieae* in flower.
Fig. 6. Grafted *Tephrocactus bonnieae*.
Spineless form showing young and more mature segments.
Fig. 7. Same as Fig. 6 in original habitat near Loro Huasi, Catamarca province, Argentina.



Figs. 8, 9, 10. *Austrocylindropuntia floccosa*.
Flowered in a 6 cm. pot.
Photos 1 – 10 by Tony Roberts.





Fig. 11 *Punotia lagopus* on the altiplano.
Fig.12 *Punotia lagopus* with pollinator on flowers





Fig. 13 *Punotia lagopus* showing dead areas within the plant

Fig. 14 *Punotia lagopus* with a sprinkling of snow.



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Tony Roberts tony@robertscacti.co.uk

There is an article on *C. subterranea subsp. pulcherrima* by Martin Lowry in TSG Vol. 10 No.4 Dec. 2004 p55 with a photograph on p54 of a plant he found. On p54 there is also a photograph of a young grafted "*Puna incahuasi*". The latter name does not appear to have been published and it is the same taxon as *C. subterranea subsp. pulcherrima*. Plants under the "*incahuasi*" name are on sale in Europe. I obtained one sold by a Czech grower at ELK with the label "*Puna subterranea f. incahuasi AJS2152*". The plant found by Martin is, out of flower, very similar to the usual *C. subterranea* while the AJS2152 stands out (amongst my *C. subterraneas*) as a more open bodied, light green softer looking with pale yellow spines form, whether grafted or on its own roots –of course clones of the same taxon can differ in appearance. Ed.

PUNOTIA LAGOPUS, A DECADE ON FROM A FIRST ENCOUNTER.

It is now nearly a decade since I was fortunate enough to see *Punotia lagopus* in habitat. It thus seems an opportune time to review that trip and subsequent publications.

I visited the Southern Peruvian altiplano with my friends Martin Lowry and John Arnold as part of a five week trip to Southern Peru in late October of 2002. This was my first trip to cactus habitat so I was keen to see any cacti but in particular the *Opuntias* of Southern Peru.

I was particularly keen to see these plants as I was aware that a lot of mystery surrounded them at that time. Ten years ago, the species name *lagopus* was confused within the cactus hobby. The name was originally used by Karl Schumann in 1903 for plants sent to him by Weberbauer during a long trip to Peru. Plants of *lagopus* and *Austrocylindropuntia floccosa* were sent back to Schumann with the very vague habitat details 'above Ariquepa'. These specimens were destroyed during World War II. The only contemporaneous record that survives is a named photograph in a book by Harper Goodspeed called 'Plant Hunters in the Andes' first published in 1941. We can have a high degree of confidence in the naming of the plant in the photograph as Goodspeed's trip was guided by Weberbauer.

It seems Walter Rausch was unaware of all this when he visited the area and described the plants as *Tephrocactus malyanus*, later to be invalidly moved into *Austrocylindropuntia* by Ritter.

I was also made aware that there were observations of the plants near Macusani in Peru and near Ulla Ulla in Bolivia but nothing between these points which are almost 200 kilometres apart. Thus, an objective of our trip was to see if we could find plants between these two points.

So it was with all this in mind that we took the north turn towards Rosario and on to Macusani as we drove from Cuzco towards Juliaca. At the time this was a poor quality road and the trip took most of the day. The road

climbs steadily as it heads towards a pass in the Nudo Aricoma mountains before a short descent into Macusani. As we climbed above 4100 metres above sea level (asl) we noted some of the clumps of hairy cacti began to look slightly different. Amongst the small clumps of *Austrocylindropuntia floccosa* and the occasional *Echinopsis maximilliana* we found our first specimens of *Punotia lagopus* on a flat grazed patch of land. (Fig. 8) Further on, at around 4300m altitude we found larger specimens, some up to almost 2 metres in diameter, in very dark and wet peaty ground. At this site some of the plants were almost growing into the river. (see front cover). One plant had been uprooted and turned over. Looking at the underside we could confirm these large clumps of stems are all one plant with branches spreading radially from one central, rooted stem.

The following morning, after spending the night in Macusani, we drove back through the pass stopping at the highest point, just over 4686 metres asl. The plants here were covered with a light sprinkling of snow which had fallen in the night (fig. 10). By mid morning it had melted completely. Cacti here were growing on East facing gentle slopes of short grass. Only *A floccosa* and *P lagopus* grew here making this, I believe, the highest location recorded for cacti. Some plants were in flower and a small orange and black butterfly was busily visiting open flowers that were pushing out through the tightly packed stems (fig 9). Some fruits too were present. These looked very different from typical *Austrocylindropuntia* fruits which normally have a thick, succulent greenish capsule. The fruits on *Punotia lagopus* were thinner walled and pink in colour and not as tightly packed with seed. They looked more like the wind blown fruits of *Islaya* or even *Melocactus* than a typical *Austrocylindropuntia floccosa* fruit.

Having retraced our tracks back to Rosario where we took a left turn to head West towards the Bolivian border. The map showed a good road to the junction with the road for the Sandia valley, our next objective. The first 35 kilometres to Crucero were easy going on a relatively good road. We stopped along the road and found plants of *Punotia lagopus* at 4200 metres asl. These plants were about a metre in diameter. One conspicuous feature of a lot of plants along this road was partial death of large sections of the plants for which no obvious reason could be seen (fig. 10). In many plants between a quarter and a third of the plant had died. We speculated poor weather conditions as the most likely cause of this damage. On arrival at Crucero we found it to be a ghost town and the road beyond merely a series of vague tracks on the open altiplano with few landmarks to guide us. For the next 50 kilometres we navigated by a combination of ephemeral tracks, a compass and GPS co-ordinates every 10 minutes. We did however, achieve our second objective and find clumps of *P lagopus* along this track in a band between 4200 and 4350 metres. The plants may grow higher and lower than these altitude limits which simply reflect the altitude of the route we travelled.

On our return back to England we were able to publish our findings in the BCSS Journal 'Bradleya' enabling us to validate the name *Austrocylindropuntia lagopus* and to confirm its continuity between the previously recorded disjoint sites in Peru and Bolivia.

But this is not the end of our story. With the advent of DNA sequencing technology we are seeing more and more scientific papers being published

that are slowly revealing greater detail on the evolution of cacti and changing cactus taxonomy. One of these is previewed in David Hunt's Cactaceae Systematics Initiatives No 25, October 2011. It shows *lagopus* to be basal to both *Austrocyllindropuntia* and *Cumulopuntia*. In other words it is derived from a common ancestor of the genera *Austrocyllindropuntia* and *Cumulopuntia* but not a member of either genus. He resolves this taxonomic dilemma by referring the plant to the monotypic genus *Punotia*. This goes some way towards explaining the different seed capsule of *Punotia lagopus*. It also may explain why it grows in the same places as *Austrocyllindropuntia floccosa*, often flowering at the same time, with probably the same pollinators but we never saw any hybrids.

Today, this wonderful habitat, though still rarely visited by cactus enthusiasts is gaining popularity. However, it still remains a desolate, unspoilt and beautiful part of the world, enhanced by the fascinating cactus flora it supports.

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Photographs and articles on this taxon in habitat appear in TSG Vol. 7 No. 2 & 3 2001, Vol. 9 No. 4 (by Ivor on the above expedition) and Vol. 17 No. 1. For many years I was intrigued by the queries about the name, synonymy and habitat location of this taxon. I did query the possibility of plants growing between Macusani and the suggested habitat site further south. I was informed then that at the differing altitudes of the terrain meant that a link was not possible.

It should be noted that Ivor and his companions saw no hybrids. Ivor advances a suggestion as to why *Punotio lagopus* and *Austrocyllindropuntia floccosa* can grow together but not hybridize. However, Brian Bates reported in TSG Vol. 17 No.1 p10 (Pic p9) that he found two such hybrids at Macusani. Photographs of one of the plants is on the back cover of this issue of the TSG. Comments please. Ed.

A RARE FLOWERING.

I don't take many photographs of my plants early in the year but, as I was preparing for a new talk on small *Opuntia*s in 2012, I had reason to look at my plants in closer detail. I took a photograph of a plant of *Austrocyllindropuntia floccosa* HS30a on 18th March 2012 (fig.8). This is a form which has strong brown spines and copious white hairs making it attractive most of the time; it was first collected by Heinz Swoboda (of *Sulcorebutia* fame) back in 1983 at Morochata in the Cochabamba department of Bolivia. A month later on 21st April 2012, the day before I gave the talk for the first time, I went back and looked at the plants again

gaped “What’s that – a flower bud?” Indeed it was (fig. 9)! Yet another month later on 22nd May 2012, the flower opened (fig. 10). This is the first time any of my *A. floccosa* has flowered, and this was on a small plant in a 6cm pot. I don’t think it is a species that flowers often in the UK, so I would be very interested to hear the experiences of others. Tony Roberts.

OPUNTIA FICUS-INDICA; CHROMOSOME RACES AND ORIGINS.

G.D. Rowley.

Ivor Crook’s account of the possible domestication of this iconic prickly pear complements the story concerning its cytology. A little juggling with mathematics is all that is needed to piece together the various ideas thrown up to resolve its ancestry.

Reported chromosome counts for *Opuntia ficus-indica* (or under its synonymic name *O. Opuntia*) are mostly $2n = 8x = 88$ for plants from Mexico, California and Arizona, $2n = 4x = 44$ from Arizona and Texas and one count of $2n = 2x = 22$ from Spain (see Pinkava & McLeod 1971). There are also hybrids, as for example *O. ficus-indica* ($8x$) x *O. phaeacantha* ($6x$) giving the expected count of $2n = 77$ (heptaploid).

The octoploid *O. ficus-indica* is probably of hybrid origin, involving as wild ancestors perhaps *O. streptacantha*, reported as a diploid, $2x$, and octoploid, $8x$, with *O. tomentosa* which can be tetraploid, $4x$, or octoploid, $8x$. Thus we are reminded here of a situation resembling that of the bread wheats (Simmonds 1976) where a build-up of genomes by polyploidy created today’s hexaploids from three diploid ancestors. In cytological terms the occurrence of trivalents and tetravalents in the octoploid led Carpio in 1952 to declare *Opuntia ficus-indica* as an allopolyploid derived from two species with 44 chromosomes.

Whatever species, living or extinct, combined forces in the past, further changes took place as man selected and spread the plants throughout the tropics. So our name *Opuntia ficus-indica* in effect covers a species complex (aggregate species) composed of cytotypes (chromosome races) at different polyploid levels. Intercrossing that resulted in odd polyploid levels ($3x$, $5x$, $7x$) would probably have been eliminated through sterility or at least a poorer set of fruits than in even polyploids. For the present it is best to stick to cultivar names for clones most favoured, rather than attempt a botanical breakdown into species, subspecies, varieties and so on. The future lies in DNA sequencing, and a fine start has been made in South Africa in a study of 38 clones of *O. ficus-indica* in cultivation (Mashope et al. 2011). This relates genetic diversity to recognisable differences in habit, and the tabulated results will assuredly be of use to breeders of future improved cultivars.

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Fig. 15. *Punotia lagopus* x *Austrocyllindropuntia floccosa* hybrid. BB 774.04. DSC6262
Fig..16. *Punotia lagopus* x *Austrocyllindropuntia floccosa* hybrid. BB 774.04. DSC6263
Macusani, Peru.

