The Cactus Explorer

The first free on-line Journal for Cactus and Succulent Enthusiasts

Number 16
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In this Edition

Regular Features

Articles

Cover Picture: *Pilosocereus gounellei* photographed by Bruno Daniel in flower. See page 17

The No.1 source for on-line information about cacti and succulents is http://www.cactus-mall.com
The best on-line library of succulent literature can be found at http://www.cactuspro.com/biblio/

Invitation to Contributors

Please consider the Cactus Explorer as the place to publish your articles. We welcome contributions for any of the regular features or a longer article with pictures on any aspect of cacti and succulents. The editorial team is happy to help you with preparing your work. Please send your submissions as plain text in a 'Word' document together with jpeg or tiff images with the maximum resolution available.

A major advantage of this on-line format is the possibility of publishing contributions quickly and any issue is never full! We aim to publish your article quickly and the copy deadline is just a few days before the publication date. There will usually be three issues per year, published when sufficient material is available. Please note that **advertising and links are free** and provided for the benefit of readers. Adverts are placed at the discretion of the editorial team, based on their relevance to the readership.

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This issue published on
18th June 2016

New taxa published on pages 38, 42 & 48.

Introduction

Enjoy the Growing Season!

The question of what criteria to use to decide if a first description is really a good new species is a matter of personal view. As the editor of the **Cactus Explorer**, my approach is to give authors the chance to put their case, even if I doubt the strength of their argument.

In this issue you can read the description of a new species of *Rebutia* and two new *Copiapoas*. None of these is clearly distinct from existing species but you can decide for yourself. Whatever you think is the correct name for these plants, I am pleased to record their existence with such good quality pictures and descriptions.

I have mentioned before that the health of Harry Middleditch has recently been failing. Since 1966, he has been the organiser of *The Chileans*, a group dedicated to the study of South American cacti. It means that he is no longer able to produce the journal, so Number 73 (2014) will be the last and *The Chileans* will cease to exist.

I am pleased that the **Cactus Explorer** has been able to produce PDF files of all the issues and make them available as free downloads. I am grateful to Paul Hoxey and Chris Leather for their help with this project and to Peter Bint for agreeing to their distribution in this way. You can read about *The Chileans* and download the files from:

http://www.cactusexplorers.org.uk/Chileans_home.htm

In Britain, there has been a steady decline in attendance at local cactus meetings. It is easy to think that interest in our plants is also in decline but I don't believe that to be the case. In fact, sales of cacti and succulents to the general public are thriving. I know from my own experience from working part-time at a local garden centre that cacti and succulents remain very popular, particularly with the young. I think that while people enjoy having some plants to enjoy, they are not motivated to regularly attend meetings.

If you want to see that our hobby is still alive and flourishing, I suggest you go to the National Show in August. This is the best-attended event organised by the British Cactus and Succulent Society. It is only held every four years and it is the best chance in the UK to see wonderful plants in the competitive classes and to buy additions for your collection from the many plant vendors.

It has been quite a few years now since the use of projected transparencies to illustrate lectures has been replaced by digital. Although presenters now have to spend hours preparing their digital progammes in Powerpoint or similar, the resulting combination of text, photographs and graphics such as maps is so much more informative. Seeing plant names and other captions as text is so much easier to follow. So now, instead of worrying about dropping the slides on the floor, we have to hope that all the technology works!

Enjoy the northern hemisphere summer!

Graham Charles

If you have not already told me and would like to be advised when the next issue of the **Cactus Explorer** is available for down-load, please send me your E-mail address to be added to the distribution list.

News and Events

BCSS National Show

Only every 4 years do you get the chance to see the best display of exhibition quality plants and the largest succulent plant sale held in the UK.

This year, 2016, the event will take place on August 20th at the same venue as last time, Wood Green Animal Shelter, London Road, Godmanchester PE29 2NH England. There are longer opening hours: Sales from 9:00am to 6:00pm Show opens from: 11:30am – 6:00pm. This should give everyone more chance to get around the show and spend time searching the sales stands.

Staging of exhibits will be possible on Friday 19th 12:30pm – 6:00pm as well as on Saturday morning 7:00am –10:00am. As an added incentive to exhibit, there will be a special opening of the sales area on Friday 4:00pm – 6:00pm for exhibitors only. There is also the prize money to help offset your expenses.

The illustrated Show Schedule can be downloaded here.

Calendar of Events in the UK

The list of event published by the British Cactus and Succulent Society can be downloaded here.

Cactus Art for Sale

Available for 2016

Cactus Flowers and Monochrome Cactus Calendars by American Horticulturist and Photographer Nate Abbott

Individual prints and much more at

Cactus - Art for Sale

Invitation

National Turbinicarpus Collection

Open by appointment, please email or tel: 01472 859572 to book and for directions. Some plant sales. Located in Caistor, Lincolnshire, U.K.

Rob and Alison Stevenson

Cactáceas y Suculentas Mexicanas

The Mexican journal has been published since 1955 with the aim of sharing knowledge about succulent plant families, especially the Cactaceae, and to promote interest and research on different aspects of these amazing plants.

The journal is available on line and free at: web.ecologia.unam.mx/cactsucmex/

Any comments please contact: Dra. Mariana Rojas-Aréchiga (mrojas@ecologia.unam.mx)

Geoffrey Swales †

It is with regret that I have to report the death of Geoff Swales on March 9th 2016 after fighting off various bouts of pneumonia since being admitted to hospital in November last year.

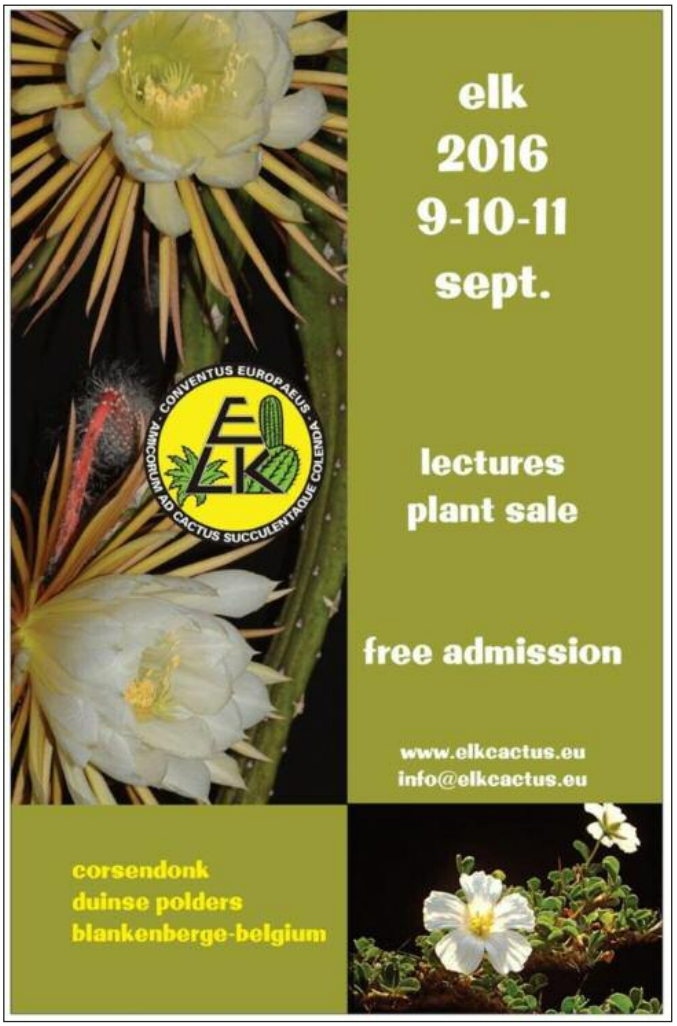
Geoff will be especially remembered by members of *The Chileans* for his serious study of the genus *Gymnocalycium*. His name will also be familiar to cactus enthusiasts for his description of *Gymnocalycium buenekeri* as a new species.

He acted as an adviser to Bill Putnam concerning his book *Gymnocalyciums* and to David Hunt during the compilation of the *CITES Cactaceae Checklist*.

GC

Correction

On page 22 of the **Cactus Explorer** 15, in the article about *Sulcorebutia cantargalloensis*, the field numbers VZ632 and VZ633 should be VZ732 and VZ733.
Willi Gertel



BCSS Oxford Branch Show
with the Mammillaria Society
(Bill Maddams Memorial)

Saturday 23rd July 2016

Old Mill Hall, Grove nr. Wantage OX12 7LB
Plant sales and light refreshments.
Followed by Wolter ten Hoeve lecture:
"Recent Explorations in Mexico"
Download the schedule here.
Organiser: Bill Darbon

FREE download of The Chileans

Journal of South American cacti.

The Chileans started in Autumn 1965 as a study group for Neoporterianae. It was founded by John Donald, David Whiteley and Harry Middleditch in consultation with Dodonaeus, a Belgian study group, and Dr. Priessnitz of Austria.

The aim was to exchange information about cultivation and propagation, sharing photographs, and exchanging spare plants.

The first 'Bulletin' was published as a stapled set of A4 sheets in March 1966. It did not take long before the scope was extended to include cacti from other South American countries.

Due to the failing health of Harry Middleditch, The Chileans Number 73 will be the last issue to be published so membership of the organisation is closed. All editions are now available for free download as PDF files.

I am grateful to Paul Hoxey for PDF files of the issues up to Number 51. These have now been processed with OCR to make the text searchable but please note that this process is not completely accurate. Issues from 52 to 73 were produced from the original print files so the active text should be accurate.

I am also grateful to Chris Leather (who originally produced the print files for Nos. 72 & 73) for the originals of the illustrations from No. 52 onwards.

Two indices were published and image PDFs of these are available for download:

Index of Numbers 1 to 30

Index of Numbers 31 to 51

If you have not previously read any of The Chileans, I hope you will download some issues and enjoy the contents. The translated articles are particularly interesting.

Graham Charles

Chileans download home page

Copiapoa decorticans

Copiapoa ahremephiana

Copiapoa atacamensis

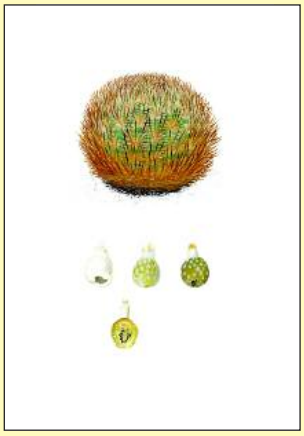
Copiapoa laui

Your chance to buy cards illustrated with reproductions of pictures from
CACTACEAS En la flora silvestre de Chile
by *Adriana Hoffmann* and *Helmut Walter*.
Each card is 124 x 174mm and is blank inside for your own message.
Set of any four designs of your choice: £10 plus postage (UK: £0.64; EU: £1.52; World: £2.25)
Orders and PayPal payments to Roger Ferryman email: rmf@f2s.com

Eriosyce aspillagae maechleri

Eriosyce napina challensis

Copiapoa krainziana



Eriosyce spinibarbis

Plant Auction

The auction of the entire collection of the late Peter Burton will be on Sunday July 17th 2016.

The Auction of the 200–250 lots will be held at 64 Green Lane, Selby N.Yorks. UK YO8 9AW Viewing from 10am. Auction to commence at 11am. Refreshments will be available and a 45 minute break taken at 1pm.

A full list of the lots will be available on request from June 19th by emailing: johncarr4@talktalk.net
Purchases will be on a cash only basis unless agreed in advance.

As a guide there will be approx
- 35 lots of Agave including many small and variegated forms.
- 20 lots of Lophophora
- 20 lots of Astrophytum including some of the named hybrids
- 30 lots of Haworthia
- 40 lots of larger cacti and succulents

In addition there will be books etc. for sale and a large propagator in excellent condition.

Pre-registration would be appreciated to help planning.
Contact: John Carr tel: 01757 702772

Gloucester BCSS Branch
50th Anniversary Special Meeting
Saturday July 9th

Longford Village Hall, Longford Lane, Longford, Gloucester, GL2 9EL.
Speakers: Colin Walker *Agaves through the ages* and Graham Charles *Searching the back roads of Peru*.
www.gloucester.bcss.org.uk/anniv.htm

West of England
Cactus & Succulent Society
Connie Hobbs Memorial Lecture
Sunday 23rd October

Cleeve Village Hall, Cleeve Hill Road, Cleeve, Bristol, BS49 4PH. 14:00-17:00.
Speaker: Trevor Wray *Andean Adventures - a guided tour through Argentina and Chile*
Details from Robin Owen-Smith: 01934 732304/732776

Exeter Branch Convention
Sunday 9th October

Woodbury Village Hall, Flower Street, Woodbury, Exeter, EX5 1LX. 9:45-15:30.
Speakers: Roger Ferryman and Bob Potter.
Details from Ian Woolnough: 01392 422147.

South West Cactus Mart
Saturday 25th June

Portishead Youth Centre, 1 Harbour Road, Portishead, Bristol, BS20 7DD. 09:30-13:30

Small Opuntias
A new book from John Pilbeam and Mike Partridge

150 pages, 250 photos of species in habitat and cultivation in flower, with cultivation notes, maps, and description references.

Publication is planned for August/ September 2016 but you can order it now.

£38 UK, **£43** EU, **£48** everywhere else including postage.

Payment by UK cheque to John Pilbeam, 51, Chelsfield Lane, Orpington, Kent, BR5 4HG, England or pay by PayPal to jpilbeam@tiscali.co.uk.

Jahreshauptversammlung der FGaS 2016

Am 08. Oktober 2016 (Anreise ab 07.10.) findet die JHV im Hotel „Alte Spinnerei", Chemnitzer Str. 89–91, 09217 Burgstädt statt.
Vom 07. bis 09. Oktober 2016 läuft das Rahmenprogramm.

Jahrestreffen der IG Euphorbia 2016

Am 30. Juli 2016 findet das Treffen der IG Euphorbia bei Fam. Thimjahn, Treuenbrietzener Str. 19a, 14823 Niemegk statt.
Beginn ist 10 Uhr. Das Mittagessen findet in einer Gaststätte statt. Es wird um Voranmeldung gebeten. thinie@t-online.de

Mesemb Study Group Event
Saturday 24th September

Banstead Community Centre, Park Road, Banstead, Surrey, SM7 3AJ.
Details from Suzanne Mace: suzanne@paperweight-mall.com

On-Line Free Book
The Cacti of Rio Grande do Sul

My thanks go to David Whiteley for finding this link to a beautiful book about the cacti of Rio Grande do Sul, the most southern state of Brazil. Portuguese language.

The 227 pages are illustrated with very good pictures of plants in habitat and culture. There are chapters on Collections of cacti in botanical gardens at Porto Alegre; Geographic distribution; Classification and features; Morphology of cacti; Key to the genera; Characterization of species; Conservation and recommendations; Glossary and References.

This is a comprehensive account of a place famous for Notocactus and Frailea. You can download the 57 Mbyte PDF file from the link below.

GC

Download the Book

In The Glasshouse

Graham Charles tells the story of *Parodia* (*Notocactus*) *scopa*, surely one of the most beautiful cacti from South America. Easy to grow and flower, its dense, colourful spines make it a year-round attraction. Photographs by the author

The first field number recorded by Andreas Hofacker is *Parodia scopa* AH1 from Cordilheira, Cachoeira do Sul, Rio Grande do Sul, Brazil.

The field number from Andreas Hofacker AH187 is also *Parodia scopa* from Minas, Lavalleja, Uruguay.

Notocactus comprises a recognisable group of species within the genus *Parodia*. Back in the 1970s the species were very popular and were my first speciality. It was a time when many new species were being found in southern Brazil and Uruguay which stimulated interest. I have already discussed the popularity of various cactus genera and those which are fashionable. At the moment, *Notocactus* is out of favour with growers but I still have a great liking for them and present here one of the best.

Parodia (*Notocactus*) *scopa* is not a new species, having first been described long ago in *Systema Vegetabilium* (1925) as *Cactus scopa* by Sprengel. No location was given but later when DeCandolle transferred the species to *Cereus*, he stated Brazil as the origin. Its early discovery is probably because it has a wide distribution in rocky places including near the coast, for instance, to the east of Montevideo, near Maldonado.

The familiar spination of this plant is white, usually with darker centrals, but some forms have golden spines such as *N. succineus* which is now regarded as a subspecies.

The plants are usually solitary and can eventually get tall, but the subspecies *marchesii* and the familiar ssp. *neobuenekeri* make clusters of stems.

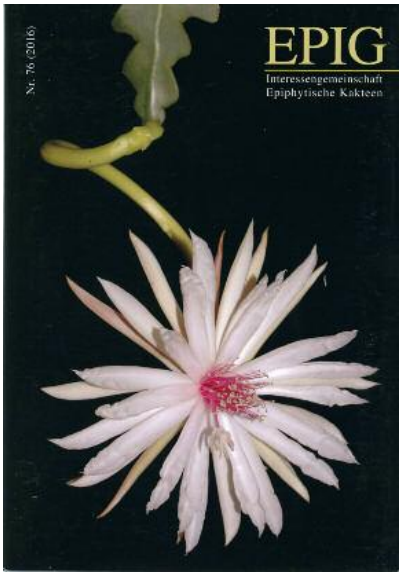
P. scopa ssp. *succinea* GC775.04 in habitat East of São Gabriel, Rio Grande do Sul, Brazil

Graham Charles

GERLOFF, N. & NEDUCHAL, J. (2003) Die pflanzen um *Notocactus scopa* (Spreng) A. Berger ex Backeb. *Internoto* **24** 3/4:49–64

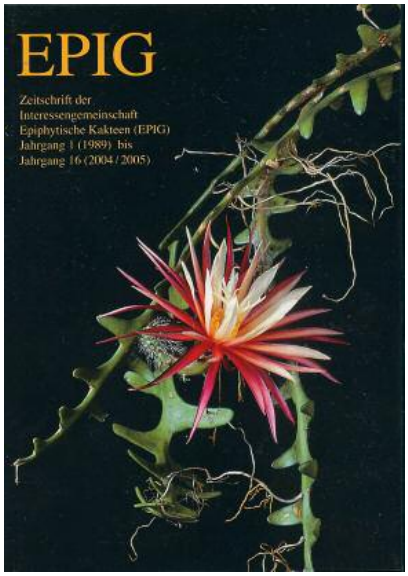
HOFACKER, A. (2013) *Notokakteen von* Acanthocephala *bis* Wigginsia. Deutsche Kakteen-Gesellschaft e.V.

Journal Roundup



Epiphytic Plant Literature

My recent interest in epiphytic cacti has encouraged me to find out what has been published about these fascinating plants. I was fortunate to be able to buy a set of the journal *Epiphytes* which started as a study group of the National Cactus & Succulent Society in 1968. The A5 Newsletter started with just text and line drawings then No.37, in 1986, changed its description 'journal' and was illustrated with stuck-in colour pictures. This format continued but I have been unable to discover when the last issue was published.



A German study group started a journal in 1989 called EPIG. At first it was A4, but from Vol.3 No.2 it was changed to A5. It was illustrated with stick-in colour pictures until 2005, then starting with No.56 of 2006, the colour pictures were printed on the pages. The journal is still published, No.76 having just been published.

A very convenient way to have EPIG for reference is to buy the DVD with PDF files of the 55 issues from 1989 to 2005 (€20 = postage). Membership costs 15€ for Europe and you can get an application form from Kirsten Pfeiffer, pfeiffer.epig@gmx.de

Looking to expand your library? - Journals for sale

I have the following cactus and succulent journals for sale. All are loose issues and in generally good to excellent condition unless stated otherwise. I would like to sell them as complete runs if possible but please contact me if you are looking for partial runs. Delivery can be arranged but may be expensive due to the weight. I will be at the BCSS National Show in August and at the Cactus Explorers Weekend in September where I can deliver them. I can also arrange for them to be taken to ELK in September

Kakteen und andere Sukkulenten Vols.8 – 66 (1957 – 2015) complete + Vol.6 (1955) with 3 issues – 12 issues per year. **£250**

The National Cactus and Succulent Journal (NCSJ) Vols.1 – 37 (1946 – 1982) complete except issue Vol.14 No. 4. First 3 issues with hole punches: 4 issues per year. **£50**

The Cactus and Succulent Journal of Great Britain (CSJGB) Vols. 13 – 44 (1951 – 1982) complete, loose issues- 4 issues per year. **£75**

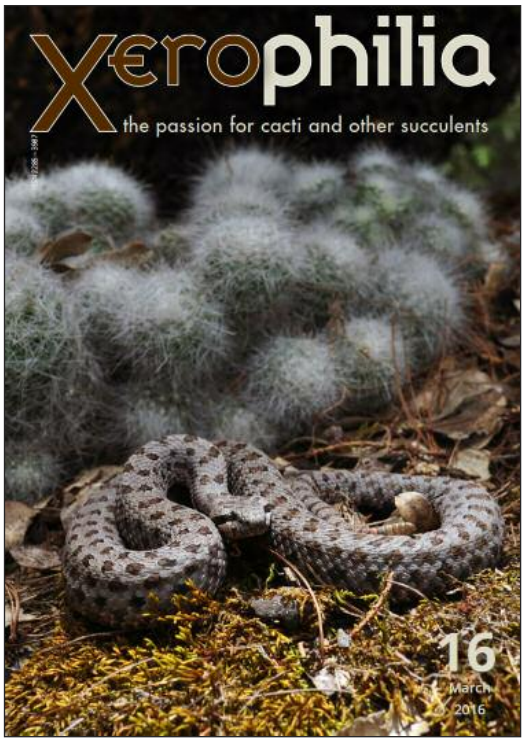
UK Mammillaria Journal Vols.1 – 45 (1960 – 2005) 45 volumes complete (Vol.8 No.1 & 2 + Vol.9 No.3 in photocopy), a few early issues with hole punches: 236 issues in total **£50**

Paul Hoxey (paul@hoxey.com)

On-line Journals

On-line Journals for you to download free

Publishing journals on the web is now very popular. Creating them is a lot of work so perhaps that is why some have ceased publication.Here are some links for you to download and enjoy.



Xerophilia

The sixteenth issue of Xerophilia appeared in March 2016. It is published in English as well as the language of the original article. The quality of the contents is varied and impressive.

Contents include: Xeric flora in "La Hoya" craters region; *Myrmecodia beccarii* - a pictorial appraisal including epiphytic companion species – from Yarrabah, South of Cairns, to the "southern form" habitat in the Hinchinbrook Channel swamps to north of Townsville - part 3; Notes on *Mammillaria pectinifera* F.A.C. Weber; *Echinocereus* aff. *chalettii* in Baborigame; *Sedum burrito* Moran, the succulent from nowhere; *Disphyma australe* (Sol. ex G.Forst.) N.E.Br., in Rangitoto; *Mammillaria heidiae* Krainz., the hidden beauty.

The magazine may be downloaded free as a pdf from

http://xerophilia.ro

Contact: xerophilia@xerophilia.ro

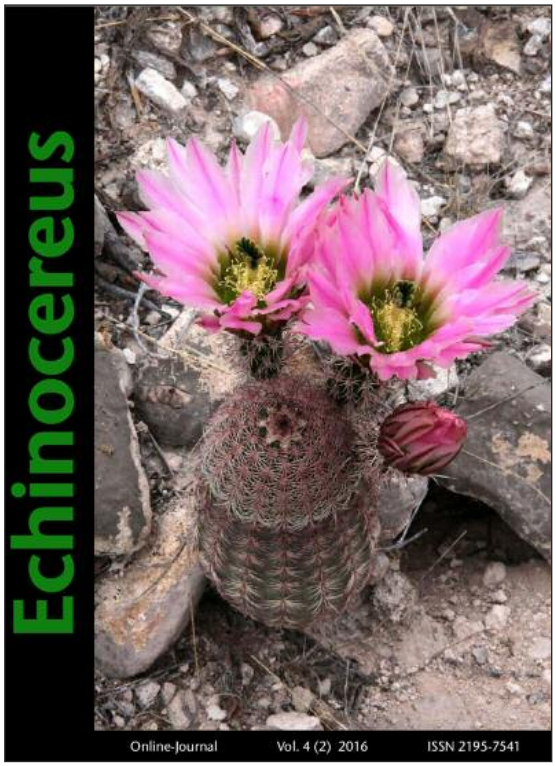
ECHINOCEREUS Online-Journal

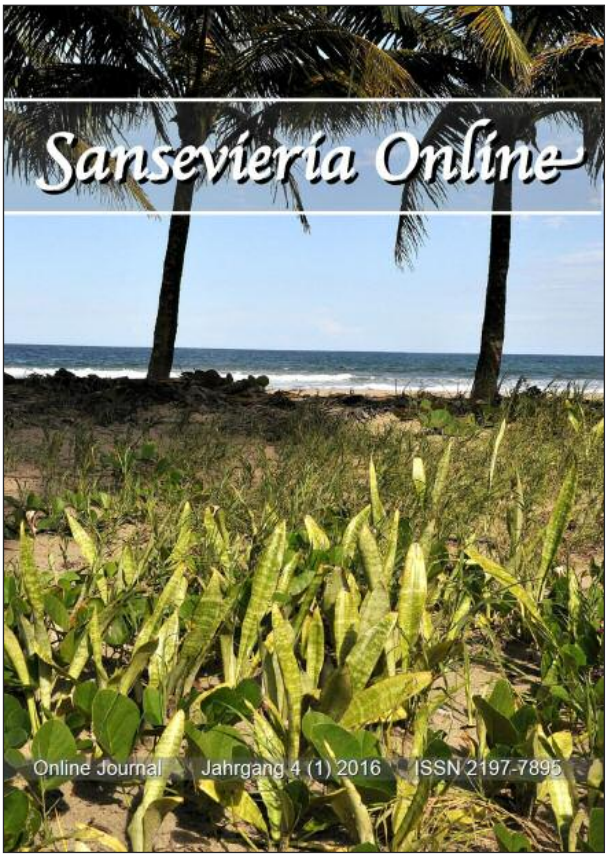
The German language on-line journal for Echinocereus lovers. The goals of this journal are to study the genus *Echinocereus*, to publish articles about the continuous research on these plants (classification, morphology, evolution) as well as to protect the genus *Echinocereus* by reproduction from seeds and distribution of the seedlings.

In this issue, 2016 02, there are well-illustrated articles: Notes on the *Echinocereus adustus* group; The kingdom of flowers Mexico 2015 - From Torreon, Coahuila to Ojinaga, Chihuahua; Biodiversity - and dealing with it.

The downloaded pdf file allows printing, but does not permit copying of the content. For those of us who do not understand German very well, the publishers also provide a downloadable MS Word document of the text making it possible to copy and paste it into a translation program. This is a major benefit of online journals and I thank them for this useful feature.

See website: www.echinocereus.eu





Sansevieria Online

The online journal for the growing number of enthusiasts for this genus. A small group of *Sansevieria* enthusiasts publish the first *Sansevieria* online journal in German. They welcome contributions on systematics, morphology, physiology, evolution etc.

This issue includes: The Dominican Republic also for Sansevieria enthusiasts; Sansevieria - From collection to presentation; The etymology of Sansevierias or what the names mean; Winter-spring flowers in south Florida; Pagoda like and floriferous: *Sansevieria francisii*.

The publisher of this online journal have set themselves the goal of contributing more to clarify this wonderful genus.

Download the PDF from www.sansevieria-online.de where you can also find a special issue containing field number lists and an index to the journal.

Schütziana

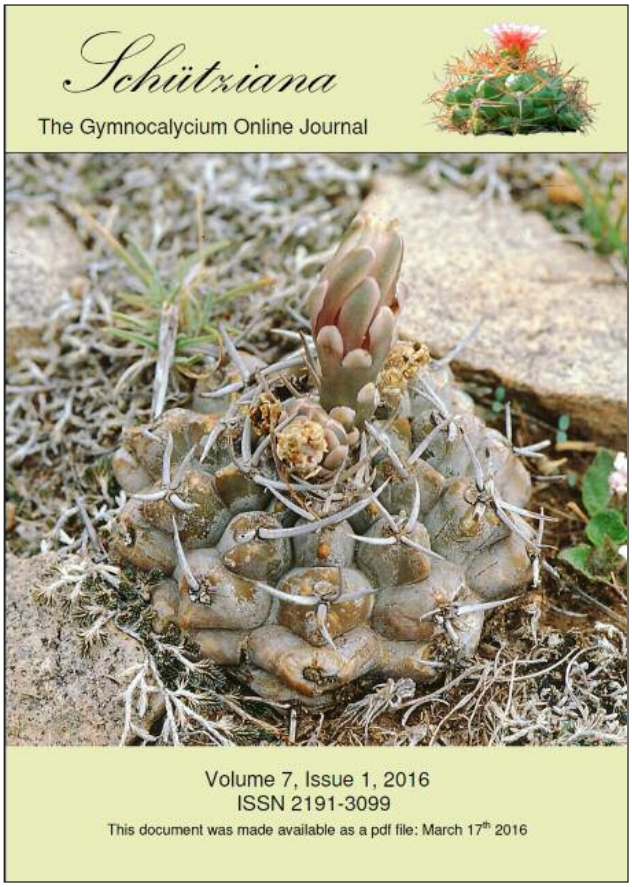
The latest issue of Schütziana, the specialist online journal for *Gymnocalycium* enthusiasts, features *Gymnocalycium pinali*, a new species from the Province of Córdoba by Massimo Meregalli and Tomáš Kulhánek and new finds on the distribution area of *Gymnocalycium prochazkianum* Šorma.

The text of this valuable publication is available in English, German, Russian and Japanese.

The pictures and distribution maps give a clear insight into the plants found in habitat and culture.

You can download free all the issues from:

www.schuetziana.org



Sukkulenten (formerly Avonia News)

Free German language on-line newsletter of "Avonia", the quarterly journal of the German Society for other Succulents.

From 2015, the on-line journal has been called "Sukkulenten"

See website: www.fgas-sukkulenten.de

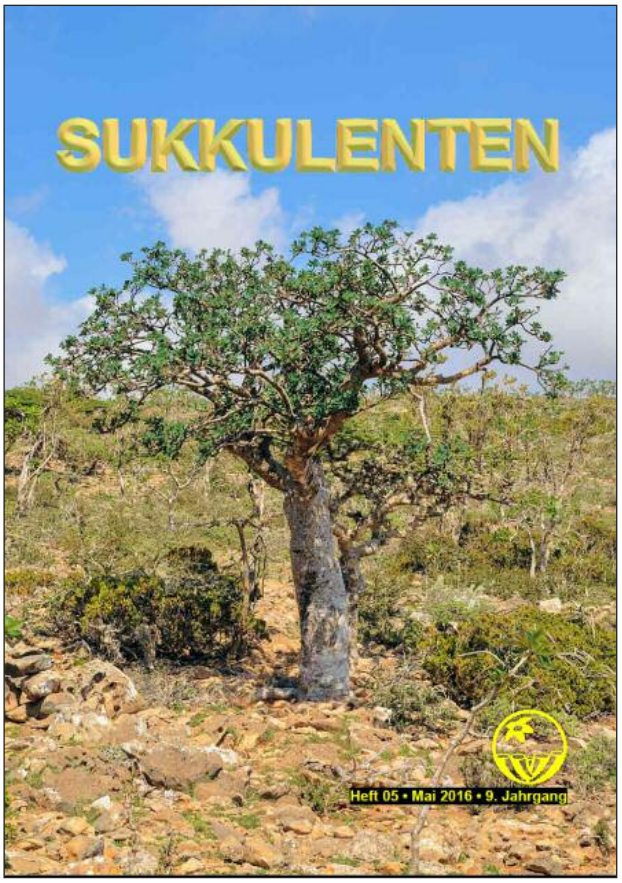
Annual seed list for members and much more.

Special interest groups for *Aloe* (incl. *Haworthia* etc.), Ascleps, *Euphorbia*, *Mesembs* and *Yucca*/winter-hardy Succulents.

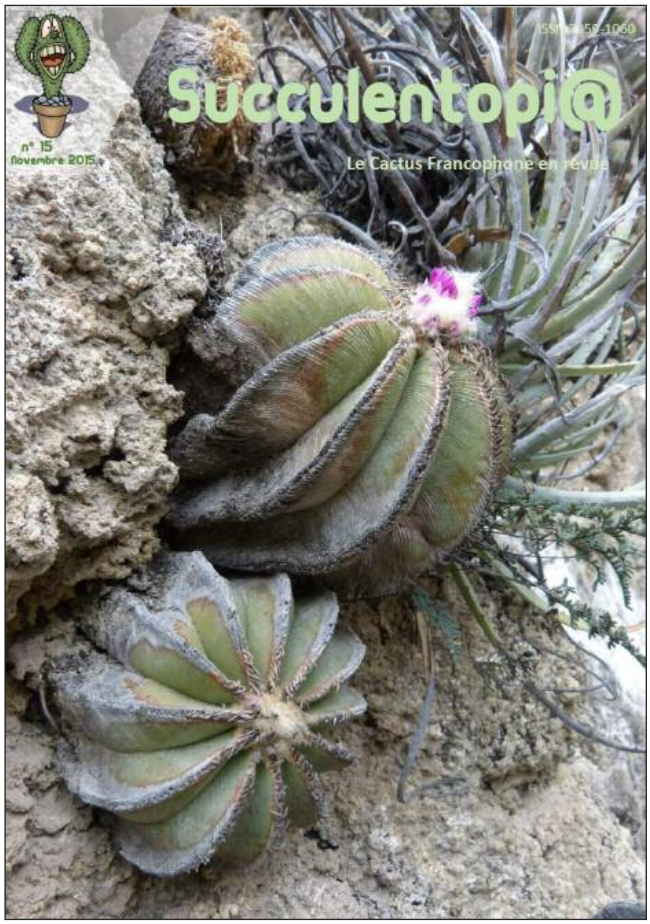
For membership and further information contact:

Dr. Jörg Ettelt: Morgenstr. 72, D-59423 Unna, praesident@fgas.sukkulenten.de or

Wilfried Burwitz: Postfach 100206, D-03002 Cottbus, geschaeftsstelle@fgas.sukkulenten.de



Succulentopi@



The 15th issue of this free online journal has recently appeared. This was the first online journal published in French. The quality is excellent in every respect.

It is available as a free PDF download from: http://www.cactuspro.com/succulentopia

This issue includes Editorial; Philately; The cultivation of Lithops N. E. Brown; The genus Aztekium; What water for our cactus? Picture gallery; Digital Library CactusPro; Preview discussions on the forum; Agenda.

The Love of Books

The Joys of being a Book Dealer!

Keith Larkin runs a business which sells books about plants, especially cacti and succulents. He relates his recent experience of trying to prepare journals for sale. Pictures by Graham Charles

If you haven't been involved in a particular type of business then you are unlikely to be aware of the challenges and idiosyncrasies of it. Surely book selling is simple and straight-forward, isn't it? You just buy stock, and they say it is easier to buy than sell – but I'm not going to explode that myth as it relates to bookselling in this article. But rather I'm going to relate just one aspect which has been a major challenge recently.

Those of you on my newsletter email list will know that I have offered a large number of journals recently – and there will be just a few more soon.

The most obvious problem is one of space. I live in a small house and don't have much space. Long runs of journals are voluminous so there have been boxes all over the place getting in the way of my "normal" life.

But before I offer the journals I need to check that runs are complete. When they are bound, then hopefully one can assume they are – and so not have to go through them. There can be issues, though. I have come across journals which have been 2 or 4 hole punched before binding. And sometimes for old journals the owner didn't manage to get a full set of originals so bound in photocopies which aren't always obvious.

Then loose modern journals have glossy covers and slide all over the place.

What about numbering? Some are given volume numbers – useful so you know when you're coming up to say the 10th or 50th anniversary. And often there is also the year of publication. And occasionally one or the other is wrong! Or both are missing. Or printed across a picture so it isn't readable. In these cases it is usually possible to find it inside – but not always! And what about Roman

Early German journals are full of valuable information but the different titles make it difficult to know if the set is complete.

numerals which I find a lot more difficult than Arabic – and also for the publisher judging from the mistakes I've encountered!

Where should this important information be put on the cover? Surely best across the top? But what about along the bottom, or perhaps down the left side, or perhaps up the right. One journal had three of these layouts in just one year's set of issues. And many change from year to year. Give it a try yourself and see how frustrating and time consuming it is!

Then there are varying numbers of issues per year, or in one case an issue was completely missed out. What about the journal which had just three issues in the middle of its run in English, and the rest in its native language?

Ah what about supplements, special issues, newsletters, loose photos ……..

Oh I was forgetting about reprints, some of which were made a long time ago so can look like originals if you're not careful. And then there are changes of the publication size.

And what about all those early German Journals with rather similar names, sometimes in Gothic German which few of us outside Germany are adept at deciphering. And how many issues of each were there?

Fortunately I do have some resources to help try to come to grips with all this. Roy Mottram gave me a copy of his library list when I acquired his book stock after his retirement many years ago. This has been invaluable, but as large as it is, it still has gaps.

Graham Charles has put together a guide to the German Journals based on information from Jörg Köpper which has been essential for sorting them out.

But there is one challenge which I still have to find a practical solution for. Hans Krainz, when he published the loose-leaf *Die Kakteen* in parts over 20 years from 1956, intended it to be filed in systematic order. But far from the parts being published in that order, they were produced in seemingly random order, no doubt as the information became available. And the pages published were numbered to enable them to be filed systematically. It was planned that it would be continuously updated over time but inevitably the work was never finished – and with new discoveries and reclassifications could never be.

Urs Eggli produced a booklet documenting the parts issued and their contents, of which he kindly supplied me a copy. But this doesn't extend to the systematic filing of the parts issued. It might sound a simple task to produce one, but with over 2000 pages published, some as replacements for previously published ones, it is a monumental task which if you haven't tried it you won't comprehend!

Inevitably I have a copy filed in systematic order. My source of the copy says that the reputable supplier it was obtained from stated it was a complete copy – but there is nothing to that effect in the original four volume two hole binders.

Copies I have seen offered on the net seem to ignore the issue no doubt because they are unaware of it! But it is likely that most copies

A complete (?) set of Krainz *Die Kakteen* bound in three volumes in the order the parts were published with the Index produced by Urs Eggli.

around are incomplete – and possibly in some cases the owners will be unaware of it.

So what should I do about what I suspect is a complete copy, but daunted by the effort of satisfying myself about it? A verified complete copy must surely be substantially more valuable than an incomplete one. I just don't know!

Apart from the Krainz, I haven't mentioned specific examples as I don't want to embarrass any organisation or individual. Producing journals is a hard task and we should be grateful to those who willingly work hard for us, and errors are inevitable. But editors please be aware of the impact on poor individuals who at some time in the future will need to do the checking so try to be careful, and please not so many bright ideas for design, supplements, special issues ……..

Keith Larkin Link to Website

Nopalxochia conzattiana (?)

Don Smith tells us of a chance encounter with an interesting plant in Mexico which he thinks he has identified as an uncommon *Disocactus* (*Nopalxochia*) Photographs by the author.

In the morning of 9th April 2015, we had stopped at a roadside cantina in the mountains near Oaxaca, at N17 11.046, W096 36.431 at 2,677m. The owner had a collection of nice plants in a small garden at the rear, where I was excited to see this plant, growing in one end of an upturned log. It was in bud and I realised that it was a species and no hybrid, so I asked where he had obtained it. He waved his hand in the air and said 'up the mountain'. There was no visible road or track here so he would have just struggled straight up through the scrub and trees.

The patron told me that he found his plant at 3,000 metres. At home, I identified it from my copy of Backeberg's Cactus Lexicon pp. 426–7 as *Pseudonopalxochia conzattiana,* an invalid name. Half an hour later, driving non-stop through a small town I noticed some red-flowered windowsill plants which I recognised as *Epiphyllum ackermannii* which I used to grow in my schoolboy collection. I mention this because it seems that there is some question about these both being the same species.

Nopalxochia conzattiana was first described as a new species by MacDougall in 1947, naming it after the botanist Prof. C. Conzatti of Oaxaca. The type locality is a hill near Santiago Lachiguiri, Oaxaca, about 125km south-east of the cantina. Lau collected his number 1266, which he identified as *Nopalxochia conzattiana*, at Quiechapa, another place in Oaxaca, about 100km south of the cantina.

My plant differs from the first description by having a few small spines in the axils of the petaloid bracts and the orange colour of the flowers which are described as 'bright red with orange suffusion' in the original description.

Fig 1. The small collection of plants at the cantina.

Fig 2. The plant that attracted my attention.

N. conzattiana is now considered to belong to the genus *Disocactus* and to be a synonym of *D. ackermannii.* Ralf Bauer made the combination *Disocactus ackermannii* ssp. *conzattianus* in 2003.

Don Smith

BAUER, R. (2003) A synopsis of the tribe Hylocereeae F. Buxb. *Cactaceae Systematic Initiatives* **17**:17

MACDOUGALL, T. (1947) New species of *Nopalxochia*. *Cact. Succ. J. (US)* **19**:22–23

Pilosocereus gounellei flowering on Christmas Day

Bruno Daniel relates his first encounter with the flowers of *Pilosocereus gounellei* which happened early in the morning of Christmas Day

Photographs by the author.

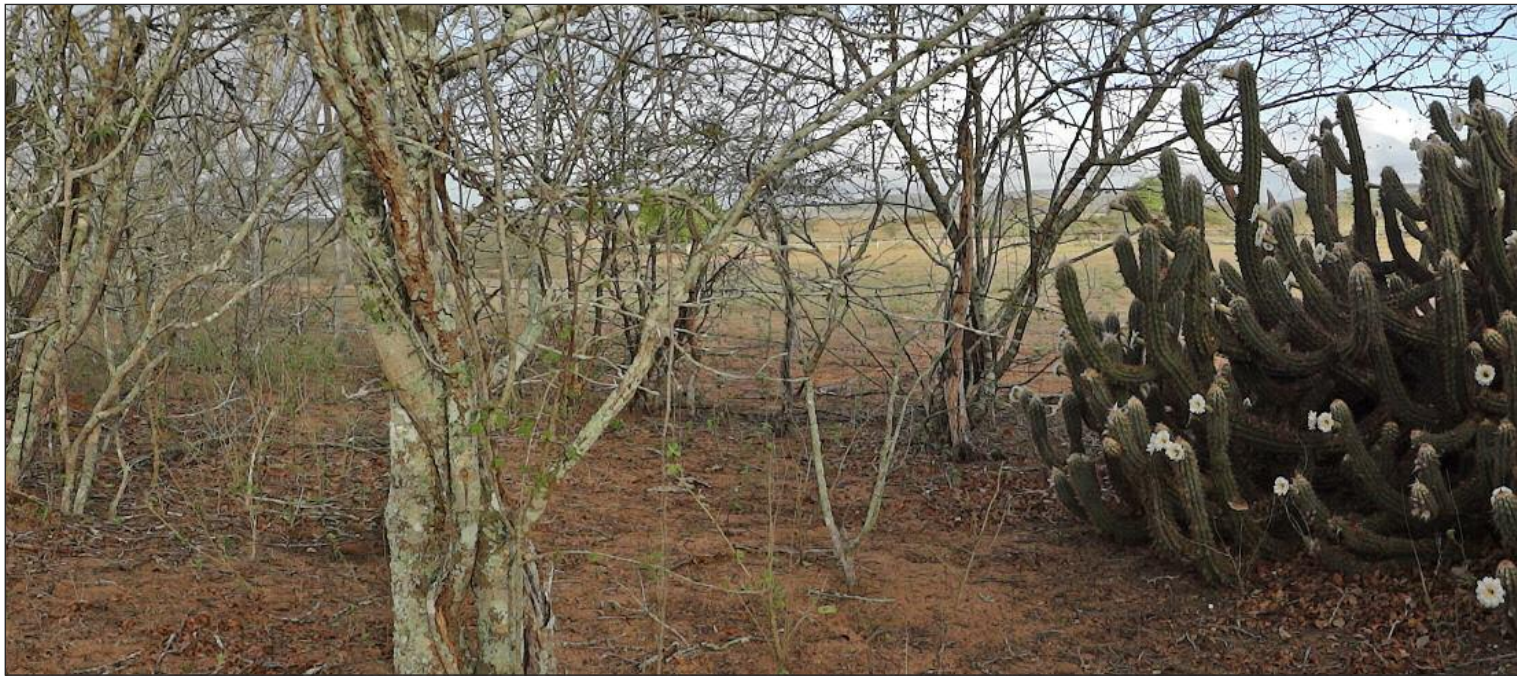
Eastern Brazil is known for having a great cactus diversity, but you would only occasionally hear a Brazilian speak about the "East" of Brazil. This is because Brazilians refer either to the Northeast or to the Southeast, which are two of the five geographical regions in this country.

The Nordeste (Northeast) is the region where most of the Brazilian driest lands are located, and the vegetation of these semi-arid lands was given the name of Caatinga, or Caatingas. This aboriginal word means "white

forest", due to the fact that for most of the year, during the dry season, the majority of plants are leafless, therefore, exposing their pale stems and branches.

Almost anywhere in the Caatingas biome, there is one plant that a cactophile would hardly miss noticing, the candelabra-shaped cactus *Pilosocereus gounellei*, also known by its popular name, "xique-xique". Just like it occurs with *Cereus jamacaru*, being so widely present in the Northeast has made *Pilosocereus gounellei* a very symbolic plant for local people. When Opuntia crops aren't enough to feed the cattle, these cacti serve as a substitute, but one must deal with its spines first.

Occurring noticeably at rocky outcrops, *P. gounellei* is also found on sandy soils, forming huge populations in the driest areas of the



Caatingas and sometimes even found as an epiphyte. It is one of the three species that comprise *Pilosocereus* subgenus *Gounellea*, together with *P. tuberculatus* and *P. frewenii*, the last described only a few years ago. Species of this subgenus differ from other *Pilosocereus* because their floral remnants are not deeply immersed in the apex of the fruits, also, the insertion point between floral remnant and fruit is circular rather than linear.

Being a columnar cactus enthusiast, I have

always found this species a beautiful cactus due to its sinuate ribs and striking spination, but it wasn't until recently that I had the opportunity to contemplate its flowers. On a Christmas Eve, while driving on a dirt road on the way to my grandparents' house, I noticed little white flecks among the vegetation, which were illuminated by the car's headlights. A closer look made me notice that many specimens of *Pilosocereus gounellei* were going to bloom that night, so I decided to wake up early on Christmas Day in order to catch some still open flowers.

It was still dark when I left the house with a camera and a flashlight, but the bright white flowers were easy to spot. Different kinds of bees and ants were feeding on the flowers' nectar and the static morning air allowed the flowers' scent to be appreciated. This wouldn't last long, so it was time to take a few pictures. I was glad that I had time to photograph those flowers with some natural light. A few minutes later and the sun was coming up fast and the flowers were starting to close. During the Caatingas' dry season not many plants offer convenient protection from the intense sunlight, and since it was breakfast time, I decided to go back to the house. Starting that Christmas Day earlier than usual was really worth it and I hope I can soon witness other night blooming cactus species in habitat.

Bruno Daniel

Reference

TAYLOR, N. AND ZAPPI, D. (2004) *Cacti of Eastern Brazil*. Royal Botanic Gardens, Kew, UK, 499 pp.

ZAPPI, D. (1994) Pilosocereus (Cactaceae) *The genus in Brazil*. 160pp.

High altitude cacti
how high can they grow?

Paul Hoxey describes his endeavours to find the cactus growing at the highest altitude in the Andes.

Photographs by the author.

If you ask a member of the general public about cacti then their stereotype view is a spiny plant that grows in a hot desert environment where it thrives with minimal rainfall and exposure to a strong sun. There are many species that fit into that category but cacti are far more diverse and have adapted to successfully live in a range of different habitats.

Some species live in moist tropic environments as epiphytes (eg *Rhipsalis* species) and others in habitats far away from the tropics where they endure very cold and prolonged winters (e.g. *Opuntia fragilis* in Canada). Other species have managed to colonize another unlikely habitat for desert plants; that of extreme altitude, high in the Andes of South America. There they ensure a harsh set of alpine growing conditions where temperatures drop markedly at night, especially in the winter when sub-zero temperatures are common place. During the daytime the sun can be intense

Fig 1. An unidentified plant PH1219.01 with slightly succulent leaves growing at 5100m on the pass at Picavilque in northern Chile.

Fig 2. *Austrocylindropuntia floccosa* PH727.01, *Punotia lagopus* PH727.02 and *Lobivia maximiliana* PH727.03 all growing together at Macusani, Puno, Peru at 4610m.

Fig 3. *Austrocylindropuntia floccosa* PH727.01 Macusani, Puno, Peru at 4610m.

Fig 4. *Punotia lagopus* PH727.02 with a little overnight snow yet to melt. Macusani, Puno, Peru at 4610m.

Fig 5. *Lobivia maximiliana* PH727.03 a large clumping specimen. Macusani, Puno, Peru at 4610m.

Fig 6. *Cumulopuntia ignescens* PH933.01 above Palca, near the Chilean border, Tacna, Peru at 4580m

Fig 7. A road sign incorrectly stating an altitude of 5250m on the road passing by Volcan Taapacá near Putre in northern Chile. My own measurement at this locality is 4790m.

and the UV levels high due to the thin atmosphere but temperature generally remain low. Often strong winds are present. Some habitats may have low annual rainfall but other may have significant rainfall that can fall as snow when temperatures drop below freezing.

During my travels in Peru and Chile I have observed cacti high in the Andes on many occasions and I admired the plants that could survive in such alpine habitats. I also started to ask myself: What is the maximum elevation that cacti grow? Generally speaking the flora of the high Andes tends to thin out to a relatively small number of plant species above 4500m but a few plants can grow and thrive to about 5000m. Beyond 5000m, slopes become barren and only a few scattered plants, usually protected in rock

Table 1. Observational records from Chile and Peru

Number	Species	Locality	Altitude	Date
PH932.01	*Cumulopuntia ignescens*	Peru; Tacna; above Palca, approaching the Chilean border	4540m	21 Mar 2011
PH976.01	*Cumulopuntia ignescens*	Peru; Tacna; above Palca, near the Chilean border	4540m	9 Mar 2012
PH933.01	*Cumulopuntia ignescens*	Peru; Tacna; above Palca, near the Chilean border	4580m	21 Mar 2011
PH727.01	*Austrocylindropuntia floccosa*	Peru; Puno; Macusani	4610m	24 Feb 2008
PH727.02	*Punotia lagopus*	Peru; Puno; Macusani	4610m	24 Feb 2008
PH727.03	*Lobivia maximiliana*	Peru; Puno; Macusani	4610m	24 Feb 2008

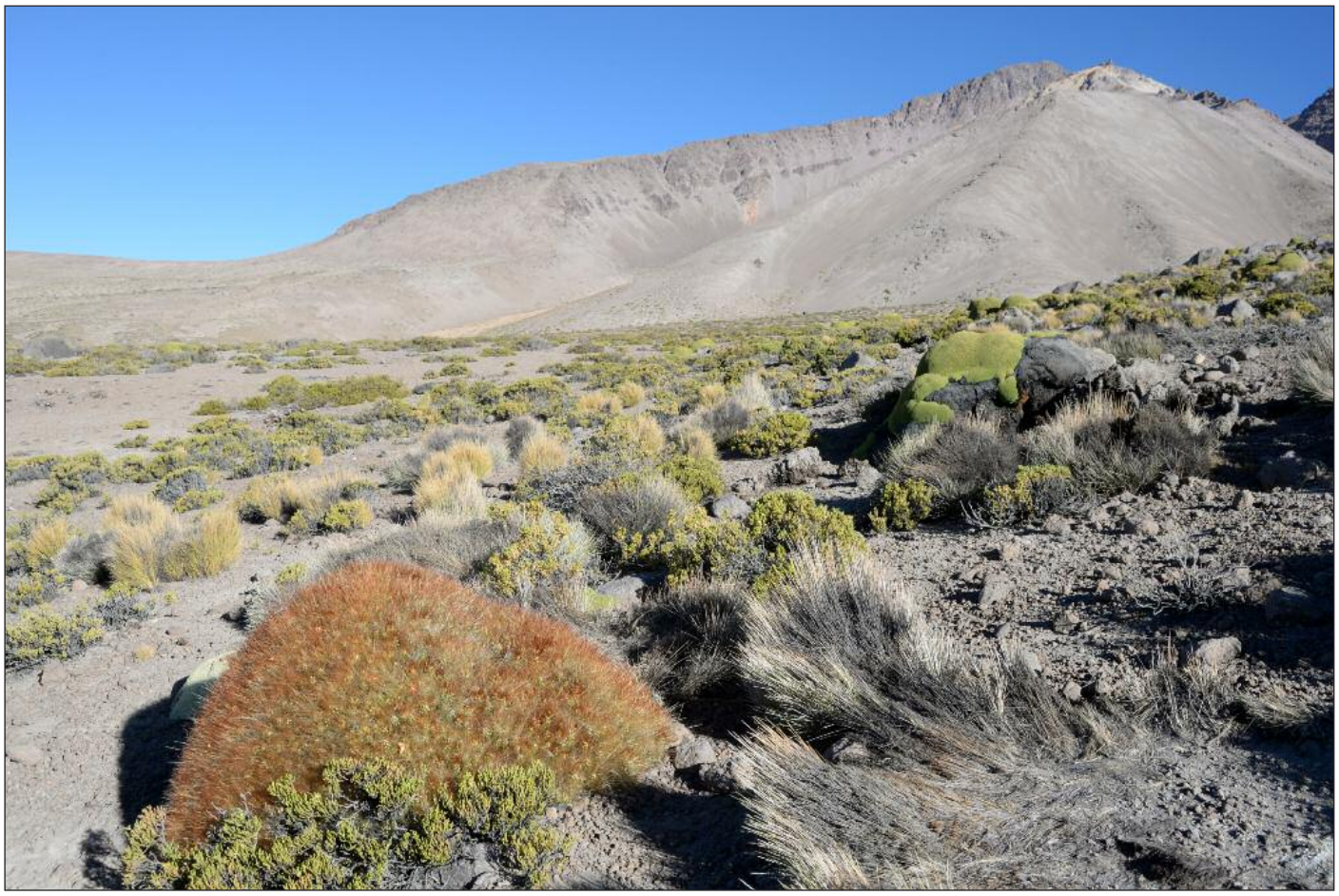


Fig 8. *Cumulopuntia ignescens* PH1207A.01 Volcán Taapacá, Arica and Parinacota, Chile at 4770m.

cracks, can be found. My elevation record is at 5100m for a plant, presently unidentified, found growing in rock cracks on the high pass at Picavilque in the north of Chile (Fig.1).

So what about the cacti? What is their altitude limit? Using an altitude of 4500m as a starting point I have the observational records in Table 1 from Chile and Peru based on field trips up to the end of 2015.

Remarkably, three of the four species grow together in the Peruvian department of Puno near the town of Macusani, one of the highest towns in the world at 4350m. Climate data for Macusani indicates day time temperatures reach the mid teens centigrade throughout the year but drop below freezing most of the year at night and fall to at least -10°C during the winter months of June to August. Rainfall averages about 700mm a year with a noticeable drier period between May and August which corresponds to the colder time of year. During my visit to Macusani in February 2008, overnight snow had fallen yet this is the warmest time of year and equivalent to snow falling during mid summer in the northern hemisphere! All three species are found growing on gentle grass covered hills with rocky patches above the town (Fig.2).

Punotia lagopus (perhaps better known as *Austrocylindropuntia lagopus*) has obvious adaptations to an alpine habitat (Fig.4) and forms large clumps of densely-packed heads, a shape typical of high elevation plants which helps the plant to retain heat most effectively within the body. It is also densely covered in white wool and bristles. *Punotia lagopus* has a restricted distribution in Puno, Peru extending just into western Bolivia and is only found in a narrow altitude band from 4300m to 4600m

Austrocylindropuntia floccosa (Fig.3) is a wide ranging species from northern Peru and into Bolivia found in high mountain areas with an altitude range of 3500–4600m based on my personal observations. Near to Macusani the plants from loose clumps of rather large heads densely covered in white hairs but in other habitats it can have much smaller heads and less hair.

Lobivia maximiliana (Fig.5) is a globular species, sometimes clustering, and perhaps the most surprising species to find at such high altitudes with its small size and lack of obvious adaptation to alpine conditions. Unique in the genus *Lobivia*, it has a hummingbird adapted flower. I have found it growing from 3200–4600m.

My observations of *Cumulopuntia ignescens* above 4500m are all in the same general area in southern Peru near to the Chilean border overlooking Volcán Tacora. The climate here is

Fig 9. High altitudes slope (4850–5000m) on Volcán Taapacá dominated by *Azorella compacta* PH1267.05.

rather different to Macusani; the rainfall is lower and so the habitat is much drier. Sparse clumps of ichu grass dominate the flora with the specimens of *Cumulopuntia ignescens* (Fig.6) interspersed between them. The hemispherical clumps are densely covered in spination but lack hair. *Cumulopuntia ignescens* is found at altitudes from 3300m and above.

In January 2016, I undertook a field trip to northern Chile, accompanied by Andrew Gdaniec, curator of Gibraltar Botanic Gardens. One of our goals for the trip was to investigate high Andean cacti and to try and improve on my altitude record of 4610m. I had heard of rumors and seen unsubstantiated records of cacti growing as high as 5000m so the ultimate aim was to find plants at or close to that altitude.

From my previous observations in southern Peru, *Cumulopuntia ignescens* was the likely target for our search as it is frequently found in northern Chile. In an earlier trip to Chile in 2006 I had seen large clumps near to the geysers at El Tatio at 4300m. The guide there stated temperatures drop to -25°C at night during winter so clearly this species has the capability to survive a harsh frost. Rainfall is low and at nearby San Pedro de Atacama it is less than 50mm a year, although likely to be a little higher at El Tatio.

On just the third day of the 2016 Chile trip, we left the village of Putre in the far north of the country to explore towards the Peruvian border. Overlooking Putre, a dormant volcano, Volcán Taapacá, rises high above the surrounding land with a snow covered summit reaching an altitude of 5860m. We took a very conveniently constructed road that climbs the lower slopes and passes to the west of the mountain before heading off further north. A road sign indicating the highest point of the road reaches 5200m (Fig.7) is clearly a little optimistic based on my own GPS reading of 4790m which is in line with Google Earth. The vegetation

Figs 10 & 11. *Nototriche* sp. PH1267.

Fig 12. Asteraceae species PH1267.03.

Fig 13. Asteraceae species PH1267.03.

Fig 14. *Pycnophyllum bryoides* PH1267.06 tiny heads, flat cushion forming.

Fig 15. *Pycnophyllum bryoides* PH1267.06 tiny heads, flat cushion forming.

Figs 16 & 17. PH1267.07 a small plant with a woody stem and small slightly succulent leaves.

Fig. 18 & 19. PH1267.08 tiny white flowers on inflorescence.

Figs. 20 & 21. PH1267.09 small branching plant with reduced succulent leaves, flowers terminal on branches.

here is dominated by clumps of *Azorella compacta* (Family Apiaceae) commonly called llareta and a widespread Andean plant found growing at altitudes from 4000–5000m.

The key to finding cacti at the extreme end of the elevation range is to find favourable habitats that are exposed to the sun for as much of the day as possible but are sheltered from the worst of the strong winds. In northern Chile these tend to be north or northwest facing slopes and it is noticeable how much more vegetation is found on these sheltered slopes compared to others facing in different directions. We succeeded in finding *Cumulopuntia ignescens* at 4770m on Volcán Taapacá (Fig.8). The plants found at this elevation were healthy and not stunted or struggling as one would expect of plants at the extreme end of distributions so that gave us encouragement to continue looking for even higher altitude plants during the remainder of the trip.

We failed to increase our new altitude record of 4770m until on our final day in Chile when we returned to Putre. Once again we took the road to Volcán Taapacá and on this occasion we found a faint track into another gully close to our previous location. The track gently climbed from the road and reached about 4850m where we parked the car. From there we explored a northwest facing slope covered with llareta (Fig.9) and various smaller alpine plants. A selection of plants found between 4850m and 5000m are illustrated here (Figs.10–21) and I would welcome help with their identification. A pretty alpine *Notoriche* sp. in flower was very common in the area with the densest population growing in loose gravel in the gully below the slope. The largest plants, to 10cm tall and forming clusters of heads, were found on the edge of vicuña dug sites, where they must benefit from some natural fertilizer! As luck would have it, a group of vicuña passed by indicating that these hardy animals are quite happy to live at 5000m.

After climbing to 5000m on the northwest facing slope we had failed to find any cacti, although *Azorella compacta* continued a little higher, so we decided to walk down the ridge looking for the 'first' and hence highest elevation cactus which we encountered at 4830m (Fig.22). Again the plant was very healthy and growing well so it was not clear why we failed to find any examples a little higher. A second specimen a few metres lower was in flower and with immature fruits (Fig.23). *Cumulopuntia ignescens* usually has a bright red flower so this example is rather lighter-coloured than usual.

Table 2 contains details of all my observations of cacti above 4500m during the January 2016 trip in Chile/Peru.

Table 2. Observational records of cacti above 4500m during the January 2016 trip in Chile/Peru.

Number	Species	Locality	Altitude	Date
PH1220.01	*Cumulopuntia ignescens*	Chile; Tarapacá; between Lirima and Paso Picavilque	4640m	8 Jan 2016
PH1207A.01	*Cumulopuntia ignescens*	Chile; Arica and Parinacota; north west slopes of Volcán Taapacá	4770m	4 Jan 2016
PH1268.01	*Cumulopuntia ignescens*	Peru; Tacna; near Chilean border overlooking Volcán Tacora	4700m	24 Jan 2016
PH1218.01	*Cumulopuntia ignescens*	Chile; Tarapacá; about 8km north of Paso Picavilque	4740m	8 Jan 2016
PH1267.01	*Cumulopuntia ignescens*	Chile; Arica and Parinacota; north west slopes of Volcan Taapacá	4830m	23 Jan 2016

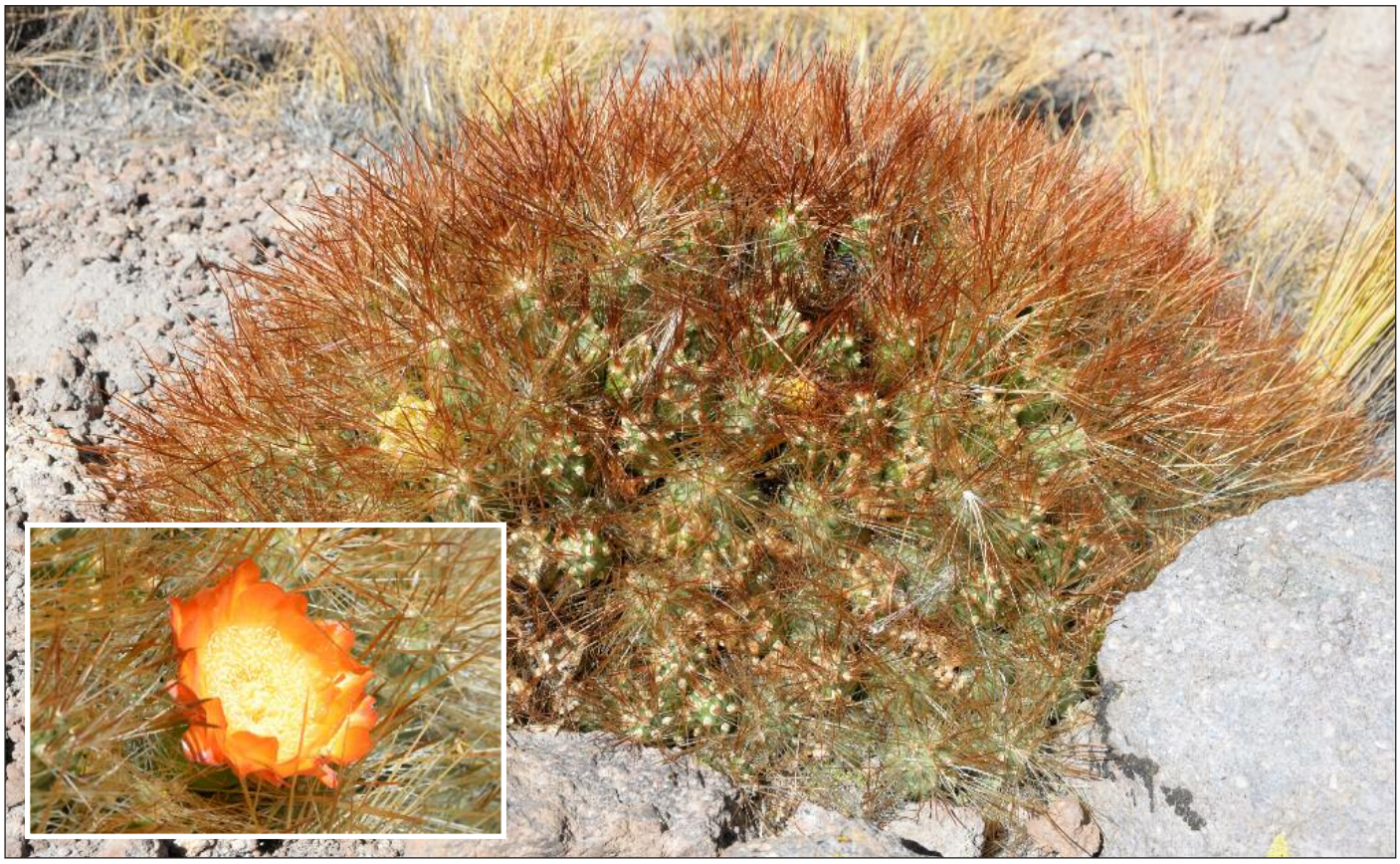


Fig. 22 *Cumulopuntia ignescens* PH1267.01 at 4830m, the highest altitude I have found a cactus to date.
Fig. 23 (inset) *Cumulopuntia ignescens* PH1267.01 a flowering example at 4790m.

My new altitude record is just 170m shy of the magic 5000m level so can cacti reach that elevation? I know of two reports of cacti at 5000m.

Firstly Frič reports that *Neowerdermannia vorwerkii* grows at 5000m. This has generally been dismissed as improbable. Based on more recent field observations an altitude range of 3500-4300m is more typical for this species and Frič is likely to be mistaken. Perhaps his altimeter was poorly calibrated or a transcription error occurred with 4000m switched to 5000m.

Secondly, there is a specimen in the Kew herbarium of *Cumulopuntia ignescens* that has a reported elevation of 5200m. Full details from the online database are:

Name:	*Opuntia ignescens* Vaupel
Collector No.:	*Wickens* 1589
Collection Date:	10/12/1989
Location:	Chile; El Loa Cosca
Lat. and Long.:	S21°7′, W68°22′
Altitude:	5200m

(http://specimens.kew.org/herbarium/K000100910)

The altitude from Google Earth at the given co-ordinates is 4070m, so the recorded altitude of 5200m altitude is likely to be a transcription error with a 4 switched for a 5, giving a reading 1000m higher than the reality.

So a well documented case of a cactus growing at 5000m is still elusive yet I believe it may exist so that is why I am asking all cactus explorers to see if they can add to the four species found growing about 4500m or improve of my altitude record of 4830m. Good luck with the search and I hope you will share with us your successes in this quest within the pages of the **Cactus Explorer**.

Paul Hoxey

(Steno) Cereus pseudosonorensis Gürke

Michael Lange tells us about the 'Octopus Cacti': Stenocereus sect. Rathbunia.

Photographs by the author except where shown.

Why do we deal with succulents? Reasons are as many as the shape and colours of the flowers. The fascination is continual both arising from the cacti themselves as well as from the habitat wilderness. Although enthusiasts get access to more and more areas and today travelling through the habitats is more or less a common activity, there are obviously undescribed entities and some taxa which have been known for about a century have not been rediscovered or not recognized until now.

The opportunity to read about the group of the 'Octopus Cacti' is rare in international literature. Thus is probably caused by the temperature demanding ecology and space demanding habit in cultivation. So we have only a very few reports for this species group and logically even enthusiasts are often not able to recognize the species correctly nor do

Figs.1–3. The "Octopus" *Stenocereus alamosensis* in situ west of Hermosillo, Sonora/ Mexico.

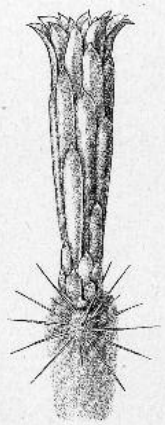
Cereus Sonorensis Rg.

Von K. Schumann.

(Mit einer Abbildung.)

Columnaris validus costis 8 rectis obtusis crenatis saturate viridis; aculeis radialibus 11 radiantibus vel patentibus rectis albis; centrali solitario simili at paulo validiore; floribus scarlatinis ovario tuberculato breviter squamoso.

Der kräftige säulenförmige Körper wird bis 50 cm hoch und hat bis 6 cm im Durchmesser; er ist oben gerundet, von spärlichem weissem Wollfilz geschlossen und wird von weißen, aufrechtstehenden Stacheln überragt. Im Neutrieb ist er frisch laubgrün, später wird er gesättigt dunkelgrün. Rippen sind 8 vorhanden; sie sind kaum 1 cm hoch, stumpf, deutlich gekerbt und über der Kerbe ist eine seichte Furche. Die Areolen stehen 2 cm von einander ab, sind kreisrund und haben bis 4 cm im Durchmesser; sie sind mit rein weißem, kurzem Wollfilz versehen, der später ergraut. Randstacheln finden sich bis 11; sie strahlen horizontal auseinander oder sind mehr oder weniger aufwärts gerichtet; die mittelsten sind die längsten und werden bis 1,5 cm lang. Ihre Farbe ist schneeweiß, die Spitzen sind brandigbraun. Der einzelne Mittelstachel ist ähnlich, aber etwas länger und kräftiger; er ist am Grunde braun; später ergrauen die Stacheln und werden bestoßen.



Cereus Sonorensis Runge. Blüte mit Stachelbündel gezeichnet von T. Gürke.

Die Blüten erscheinen seitlich am Körper. Die ganze Länge derselben beträgt 6,5 cm. Der 8 mm lange Fruchtknoten ist gehöckert: auf den breiten Höckern sitzen 1 mm lange und breite, eiförmige, fleischige Schuppen, aus deren Achseln ein winziges weißes Wollflöckchen tritt. Er ist wie die eng cylindrische, 4,5 cm lange, gestreifte, spärlich beschuppte Röhre zinnoberbis scharlachrot. Die Blütenhüllblätter sind sehr kurz, nur bis 13 mm lang, linealisch-lanzettlich spitz; sie stehen aufrecht und sind etwas nach außen gekrümmt. Die Staubgefäße sind kürzer als die Hülle; die Fäden sind weiß, die Beutel violett und carminrot. Der Griffel ist unten weiß, dann wird er rosenrot, endlich wieder weiß, und läuft in 8 gelbe, kegelförmig zusammengeneigte Narben, welche kürzer als die Staubgefäße sind.

Geographische Verbreitung.

Nach RUNGE, welcher die Pflanze einführte, Mexiko, Staat Sonora.

Diese Art ist wegen ihrer eigentümlichen kurzen und engen zinnoberroten Blüten höchst bemerkenswert. Mir ist keine Art bekannt, welche nach dieser Richtung mit ihr zu vergleichen wäre. Die weißen Stacheln sind für den Körper ein auffallendes Merkmal.

Ich verdanke die Pflanze der Sammlung des Herrn Geheimrat HEMPEL in Ohorn. Ihm, sowie Herrn FOBE, der mich auf die Blüten aufmerksam machte, spreche ich den verbindlichsten Dank dafür aus.

Fig.4. *Cereus Sonorensis* from K. Schumann, in *Monatsshrift für Kakteenkunde* **11**(9):135–6 (1901). Diagram is a potential Lectotype for *Cereus pseudosonorensis* Gürke.

Fig.5. *Stenocereus stellatus* (ex situ)

Cereus pseudosonorensis Gürke

bezeichnen. Sie wurde nach meiner Kenntnis zuerst aus den Kulturen des Geheimrats HEMPEL in Ohorn bekannt gemacht, indem Herr FOBE im Jahre 1901 eine blühende Pflanze an den Botanischen Garten zu Berlin sandte. K. SCHUMANN veröffentlichte die Beschreibung*) als *Cereus sonorensis* nebst einer Abbildung der Blüte. Im Jahre 1903 wiederholte er die Beschreibung und Abbildung**) aber unter dem Namen *C. stellatus* Pfeiff., in der Meinung, dass die von FOBE kultivierte Pflanze mit dem von PFEIFFER aufgestellten *C. stellatus* identisch wäre. Herrn WEINGART fiel die Vereinigung der beiden Arten sofort als nicht zutreffend auf, und bei der nächsten Gelegenheit erfuhr er mündlich auf sein Befragen, dass SCHUMANN seine Ansicht auf die von WEBER in Bois, Diction. d'hortic. unter *C. Dyckii* Mart. (syn. *C. stellatus* Pfeiff.) angegebene Diagnose gegründet hatte; bei einer erneuten, in Gemeinschaft mit Herrn WEINGART vorgenommenen Prüfung der WEBERschen Beschreibung musste SCHUMANN sich aber überzeugen, dass von einer Übereinstimmung der beiden Arten *C. Dyckii* Mart. (*C. stellatus* Pfeiff.) und *C. sonorensis* Runge nicht die Rede sein könnte.

Diese von Herrn FOBE kultivierte und an den Botanischen Garten zu Berlin gesandte Pflanze war nach Herrn WEINGARTS Mitteilung von schlankerem Wuchse als der ursprüngliche *Cereus sonorensis*, auch die Kanten mehr gekerbt, im Neutrieb sogar ziemlich stark gekerbt, dabei die Bestachelung im Neutrieb kräftiger gefärbt, die Oberhaut am alten Triebe dunkler als an den Neutrieben.

Herr FOBE war so freundlich, eine Beschreibung des Körpers seiner Exemplare anzufertigen, und mit Berücksichtigung dieser und der von SCHUMANN veröffentlichten Beschreibung seien die folgenden Merkmale von *Cereus pseudosonorensis* angeführt.

Stamm in der Jugend einfach, erst im höheren Alter oder bei Beschädigung der Spitze am Grunde und an den Seiten reichlich sprossend; in der Heimat erreicht er jedenfalls eine Höhe von mehreren Metern, da bei uns in den Kulturen innerhalb von 8 bis 10 Jahren Pflanzen bis zu 1,5 m herangezogen wurden; seine Färbung ist dunkelgrün, im Neutrieb hellgrün mit bräunlichem Schimmer; bei sonnigem, trockenem Standort, oftmals auch bei der Wurzelerkrankung violett überhaucht und dadurch der Pflanze im Verein mit der schneeweissen Bestachelung ein eigenartiges, schönes Aussehen verleihend. Kräftige Exemplare erreichen einen Durchmesser von 5 bis 6 cm, meist mit 8 gewölbten und gekerbten Rippen von 1 cm Höhe und 1,5 cm Breite. Die Areolen sitzen etwas vertieft, 1 bis 2 cm voneinander entfernt, sind kreisrund, weissfilzig, 3 bis 4 mm im Durchmesser. An Importpflanzen ist die Bestachelung überaus kräftig. Randstacheln 8 bis 14; sie strahlen horizontal auseinander oder sind mehr oder weniger aufwärts gerichtet; die mittelsten sind die längsten und werden bis 1,5 cm lang; ihre Farbe ist schneeweiss; die Spitzen sind brandig-braun. Der einzelne Mittelstachel ist 3 bis 4 cm lang, oftmals flach gedrückt, am Grunde braun. Bei uns in der Kultur bleibt die Bestachelung gegen die des Heimatlandes bedeutend zurück; Rand und Mittelstachel überschreiten hier selten die Länge von 2 cm, sie bleiben auch viel dünner, im Neutrieb gelblichbraun, später weissgrau mit brauner Spitze; zuletzt werden sie grau, brüchig und bestossen. Die Blüten erscheinen seitlich am Körper, ihre ganze Länge beträgt 6,5 cm. Der 8 mm lange Fruchtknoten ist gehöckert; auf den breiten Höckern sitzen 1 mm lange und breite, eiförmige, fleischige Schuppen, aus deren Achseln ein winziges, weisses Wollflöckchen tritt. Er ist wie die eng zylindrische, 4,5 cm lange, gestreifte, spärlich beschuppte Röhre zinnober- bis scharlachrot. Die Blütenhüllblätter sind sehr kurz, nur bis 13 mm lang, linealisch-lanzettlich, spitz, aufrecht stehend und nur wenig nach aussen gekrümmt. Die Staubgefässe sind kürzer als die Hülle; Fäden weiss, Beutel violett und karminrot. Der Griffel ist unten weiss, in der Mitte rosenrot, an der Spitze wieder weiss und läuft in 8 gelbe, kegelförmig zusammengeneigte Narben aus, welche kürzer als die Staubgefässe sind.

Die wichtigeren Unterschiede der beiden Arten ergeben sich aus folgender Übersicht:

	C. sonorensis Runge.	*C. pseudosonorensis* Gürke.
Wuchs	kräftiger	schwächer
Kanten	weniger gekerbt	stärker gekerbt
Mittelstacheln	1 bis 3	1
Randstacheln	13	8 bis 14
Gesamtlänge der Blüte	75 mm	65 mm
Länge der Blütenröhre	35—40 mm	45 mm
Blütenhüllblätter	die inneren 18 bis 22 mm lang und dabei stark nach aussen gerollt	die inneren 13 mm lang, aufrecht und nur wenig nach aussen gekrümmt
Staubfäden und Griffel	2 cm über die zurückgerollten Blütenblätter herausragend	kürzer als die Blütenhüllblätter
Anzahl der Narben	5 bis 6	8

Fig.6. *Cereus pseudosonorensis* Gürke, in *Monatsshrift für Kakteenkunde* **20**(10):147–8 (1910)

Figs.7 & 8. *Stenocereus alamosensis* in situ near Mazatan/ Sonora (Photo: T. VanDevender). Fig.9. *S. alamosensis*, flower section 1997 in Bot. Garden Dresden (squares = 5mm); specimen raised from G. Köhres seed ca. 1974.

they spent much attention to these subjects in the field (Niestradt, 2000).

One of those entities is *Cereus pseudo-sonorensis* Gürke (1910) [syn. *C. sonorensis* Runge sensu Schumann (1901)]. It originated as a *nomen nudum* in a catalogue of Runge, some authors consider writing the name as *C. sonorensis* Runge ex Schumann; I prefer to write *C. sonorensis* Runge sensu Schumann, because I have reasons to believe, both authors probably had different taxa in mind when producing their notes.

The usage of the name *Cereus sonorensis* is problematic anyway; it caused a muddle of names and misidentifications. Very probably, different nurseries and importers sold different plant material under this name around the year 1900. Therefore it is important to differentiate exactly between the catalogue name *Cereus sonorensis* Runge and the descriptions

Fig.10 &11. *Stenocereus kerberi* in Botanical Garden Mexico, UNAM (C-23-6-50), 2011.

Fig.12 &13. *Stenocereus kerberi* (GM 1261.1) in situ at Los Lumbres, NAY. (Photos: G. Matuszewski)

presented later on (*Cereus sonorensis* Runge sensu Schumann (1901) and *Cereus sonorensis* Runge sensu Gürke (in Gürke 1910 and in Schumann *et al*. 1910: Tafel 122).

[As an additional mistake, Schumann (1903: 25–26) himself placed his interpretation of the name *Cereus sonorensis* as a synonym of the whitish-flowering *Cereus stellatus* Pfeiffer = *Stenocereus stellatus* (Pfeiffer) Riccobono.]

While *C. sonorensis* Runge and *C. sonorensis* Runge sensu Gürke are synonyms of *Stenocereus alamosensis* (Coulter) Gibson & Horak, *C. sonorensis* Runge sensu Schumann seems to be another taxon. Gürke (1910) recognized the conflict and solved the problem creating *C. pseudosonorensis*.

Backeberg (1960: 2124 ff.) made the muddle perfect; he misunderstood *C. sonorensis* Runge sensu Gürke (1910) as another species to be recognized beside *Rathbunia alamosensis* and

Figs.14 &15. *Stenocereus standleyi* in the Berlin Botanical Garden (BGBM), raised from seed collected by Dr. Leuenberger.

Fig. 16. *Stenocereus standleyi* at Jalisco, Mexico Photograph by Jeff Hamann

Fig.17. *C. pseudosonorensis*, 1997 from a cultivated specimen in Botanical Garden Dresden (squares = 5mm).

named it *R. neosonorensis* Backeberg. So we have today 4 nearly identical names in use for only 2 close related taxa. In modern cactology, only one of practical use is left: *Stenocereus alamosensis*. However, the writer is seeing the possibility we might have lost a recognizable entity in *Cereus pseudosonorensis* Gürke within time and by nomenclatural stress.

To prove this nearly unknown plant it is necessary to have a deeper look into the "Rathbunias", a group of cacti included in the genus *Stenocereus*, rarely under cultivation in European greenhouses. While the taxonomic relationship is well supported by studies of Gibson & Horak (1978) and Arroyo-Cosultchi (2006) the nomenclatural concept was stabilized by the conservation of *Stenocereus*; *Rathbunia* is older but of problematic typification and sadly we do not know much about the species of that group. Very probably, the following taxa belong in this postulated section: *S. alamosensis* (Sonora) (synonym *Rathbunia sonorensis*, *R. neosonorensis*), *S. kerberi* (Sinaloa, Nayarit and Colima), *S. standleyi* (Colima, Guerrero, Jalisco, Michoacán, Nayarit and Sinaloa) and *C. pseudosonorensis* (Sonora?, obviously not yet rediscovered). In a little wider relationship we have to consider some

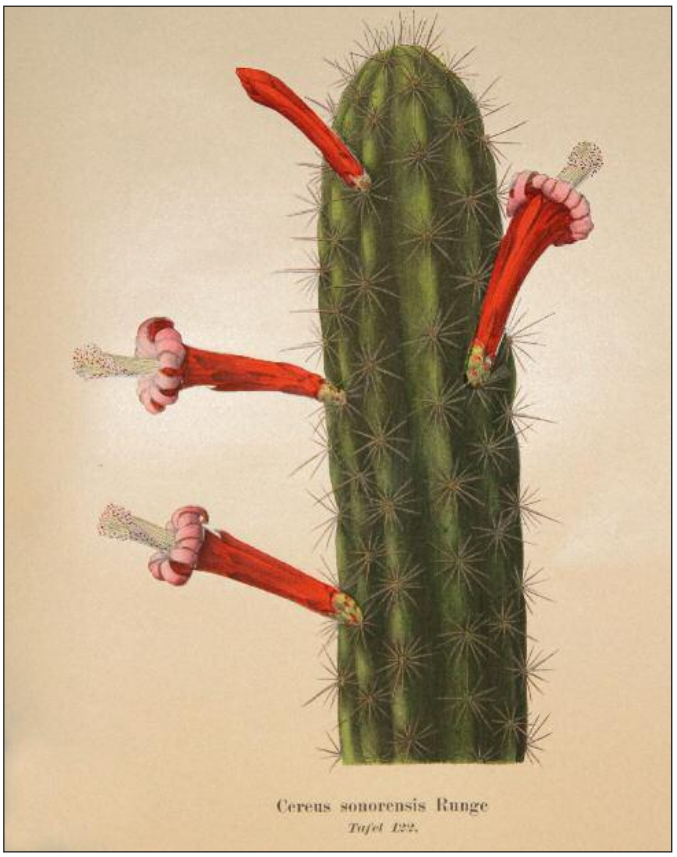
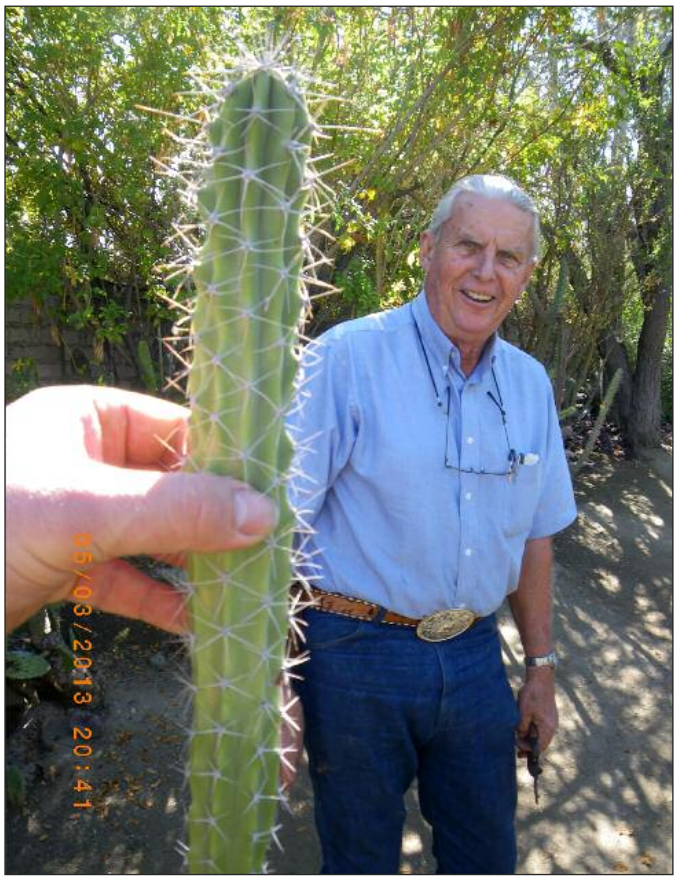


Fig.18. *Cereus sonorensis* Runge sensu Gürke in Schumann *et al*. Blühende Kakteen (1910): Band 9, Tafel 122 = *Stenocereus alamosensis* (painting by T. Gürke, July 1905)

(partly) endemic species from Baja California: *S. eruca* and S. *gummosus* [also *Morangaya pensilis* is worth being discussed herein].

In 1997, I was lucky to see a plant I later identified as *Cereus pseudosonorensis* Gürke that originated in an untold Spanish (Botanical) Garden and *S. alamosensis* (that time under the wrong name *Machaerocereus gummosus*). Because it was a spontaneous visit when I saw it, I returned the very next day to make photographs. Even if the results were not that pretty as one will expected today; unfortunately I had only very view slides left and decided to use them for the flower sections. The "Spanish plant" had a few more

	Number of ribs	Flower colour	Flower symmetry	Nectar chamber	Flowering time
S. alamosensis	>5	red	axial symmetry	(always?) with axial protrusion	diurnal
S. kerberi	4 (–5)	red	axial symmetry	?	diurnal
S. standleyi	4	white	radial symmetry	?	nocturnal
C. pseudo-sonorensis	>/=5…8	red	radial symmetry	no axial protrusion	diurnal



Figs.19 & 20. *Stenocereus sp.* in the Mortens Botanical Garden, Palm Springs, California, USA.

buds and I had in mind to return soon but failed and about a year later the specimen had disappeared… But I remember very well the unspectacular habit of a boring cereus-like plant with 5 or a few more ribs and size of about 40 cm. But not only is a slide remaining but I still have the dried flower in my herbarium and I donated a positive to the Herbarium in Berlin (B) when I was discussing the subject with the late Dr. Leuenberger about 15 years ago.

Well, there is some work to do for the experts travelling Sonora and further south because as one can see in the picture taken at Mortens Botanical Garden there might be some more unknown cacti waiting exploration!

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A new taxon of Rebutia K.Schum. from the Chicligasta District of Tucumán

Roy Mottram & Victor Gapon describe a new species of Rebutia, the most southerly species ever found.

All photographs by Victor Gapon, except where stated.

Summary

First description of a new species, *Rebutia australis* Mottram & Gapon, the most southern species of *Rebutia* known. Comparisons with the closely related *Rebutia minuscula* (F.A.C. Weber ex Rebut) K.Schum., and with the more distant *Rebutia senilis* Backeb. are made.

During the 140 years since the first *Rebutia* was discovered, it has been believed that their geographical range was no further south than the mountains bordering Salta and Tucumán. However, since the start of the millennium it has become clear that they also occur more than 100km further south in the Province of Tucumán in the eastern foothills of the mountains that share a border with Catamarca.

The first to discover this southern rebutia was Gert Neuhuber in 1999, on slopes of the mountain pass known as the Cuesta del Clavillo along the RN 65 road that runs from Concepción in Tucumán to Andalgalá in Catamarca. Gert told Victor Gapon about the plant and Victor asked Gert to show him the plant in nature. They visited the location at the end of 2004, but could not find the plant again. Victor made a further attempt to find it in 2007

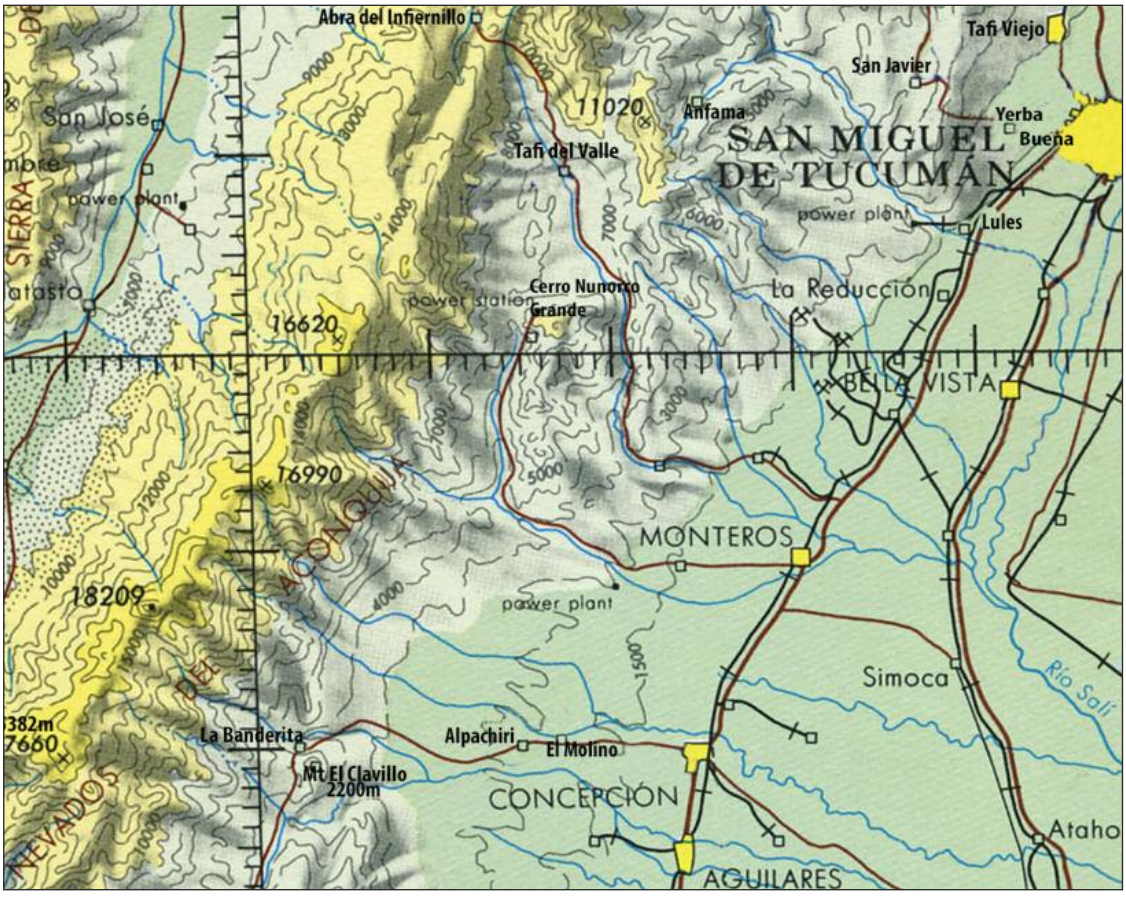

Fig.1. Map of Tucuman showing locations cited in this paper. Artwork by Roy Mottram, adapted from a 1973 1: 1,000,000 Operational Navigation chart.

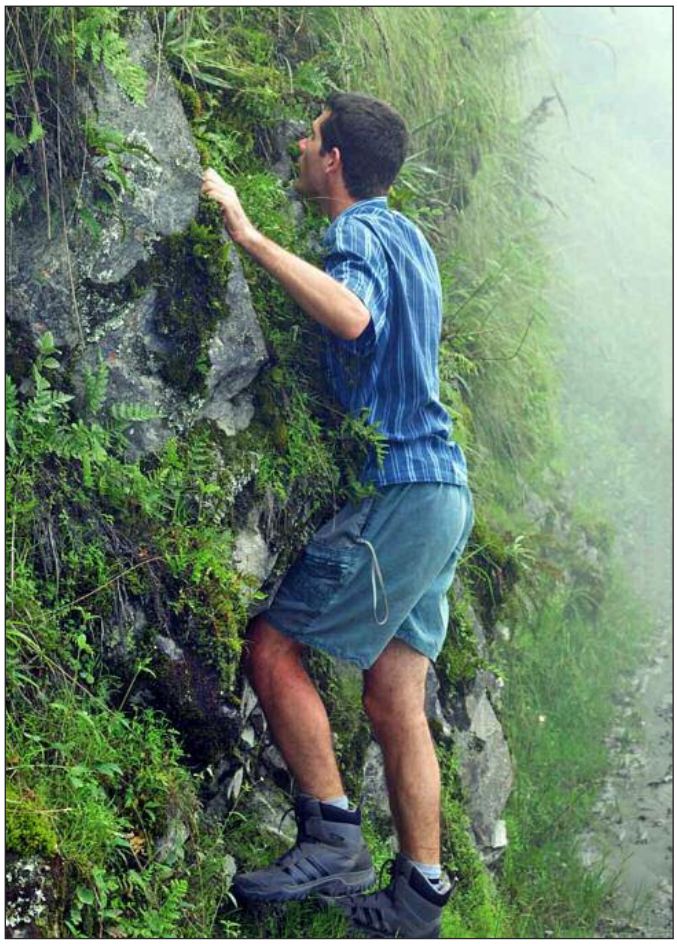

Fig. 2 Nick Gapon in the mist searching for plants at the *Rebutia australis* location in February 2010.

Fig.3 Flowering plant of *Rebutia australis* VG641.

and discovered it on the same road slightly to the north and gave the location his number 641. This time the weather was poor and the light too bad for good photography. His visit in 2010 was more successful, enabling some photography and a sample gathering for propagation and the depositing of a herbarium specimen. The last visit was in 2013.

Fig.4 Flowering plant of *Rebutia australis* VG641.

Fig. 5 left to right: Flowering plants of *Rebutia senilis* VG364 (San Fernando de Escoipe, 1830m) with *Rebutia australis* VG641 compared.

Not only is the orographic precipitation here extremely high, but the moist air during the summer rainy season produces a bank of cloud of considerable depth, extending from about 1000m to over 2000m altitude, and even during the winter months variable patches of low cloud remain.

Because the rebutias of the Salta/Tucumán border were believed to be the only ones present in Tucumán, it has been assumed in the past that must be the location of the earliest species known, *Rebutia minuscula*. However, despite superficial resemblance, nothing that matched the plants of the type collection of *Rebutia minuscula* has ever been found in that area.

Rebutia minuscula was found by Schickendantz, probably on one of his journeys over the

Fig.6 left to right: *Rebutia australis* VG641, *Rebutia minuscula* (cult.) & *Rebutia senilis* (cult.) compared.
Composite photograph: Victor Gapon & Roy Mottram

Nevados del Aconquija on his way to Catamarca. That route was roughly in a straight line directly due west of Tucumán city, over the San Xavier hills, meeting the river Lules near its source at Anfama and thence to Tafí del Valle. This route was well described by Burmeister (1868), and could only be undertaken on horseback. Middleditch (1992: 125–127; 2001: 35–39) provided an English translation of his accounts, and of other sources. This route fell out of use with the advent of motor vehicles in the early 19thC. and the building of roads that circumvented the mountain range.

A gathering made 14km south of Tafí del Valle at 2800m on the Cerro Nuñorco Grande in the year 2000 might possibly be the original *R. minuscula*, because it is quite close to Schickendantz's route, but no material has been made available for study. Apart from that, no attempts to follow the route of Schickendantz in modern times has ever been undertaken.

The El Clavillo plant does not coincide with *R. minuscula* nor any other known species, so is described here as a new taxon. It is like *Rebutia minuscula* in that it shares a similar floral syndrome, but it differs significantly in habit of growth and spination. In the latter it may sometimes superficially resemble *Rebutia senilis* but there are significant structural differences in the flowers, the latter mostly having exserted stigmas, a different syndrome requiring long-tongued pollinators that have a long reach and hover above the flowers.

The distribution of *Rebutia senilis* is in a drier vegetation zone than the new species and probably also of *Rebutia minuscula* that was described as originating from Province Tucumán, and its actual type locality has yet to be found.

The rebutias of the mountains bordering with Salta in the north of Tucuman are actually southern representatives of *Rebutia senilis*, mostly with short spines, at altitudes of some 1500–2300m. There they are usually found in the company of ferns and begonias, as the new species also does at El Clavillo. So there are parallels in the type of habitat, but the annual rainfall at Mt. El Clavillo is several times more than that of the mountains of northern Tucumán and at their altitude they are shrouded in the mists of low cloud for long periods (Fig.2).

Tucumán city averages 1000mm of rainfall per annum, and Salta 700mm, but, according to Cabrera (1971), the eastern flanks of the Andes that receive orographic rainfall can have as much as 2500mm or more.

Most species of *Rebutia* are autogamous, that is to say that they are self-compatible and capable of fertilising themselves with their own pollen. Where the stigma lies at the height of the stamens, self-fertility is then obligate and plants always produce fruit and seed whether visited by pollinators or not. *Rebutia minuscula* and *Rebutia australis* are both autogamous in this sense, and are therefore inbreeding. However, in *Rebutia senilis*, the

Fig.7 Fruiting plant of *Rebutia australis* GN1023.

stigma is usually exserted by up to 1cm beyond the level of the anthers, and therefore they do not automatically come into contact. So they need a pollen transferring agent, the pollinator, and they are therefore outbreeding. When its own pollen is transferred accidentally or by a seedsman, then it too will produce fruit and seed. However, that would not normally occur in nature. This outbreeding characteristic makes *Rebutia senilis* exhibit a great deal more diversity in nature than is the case for *Rebutia minuscula* and *R. australis*.

Rebutia australis Mottram & Gapon **sp. nov.**

Diagnosis: Similar and related to *Rebutia minuscula* and *R. senilis*, but differs in being solitary, even in cultivation, having chestnut brown areoles and brownish spines, and with flowers that rarely fully expand, not at all on a dull, cloudy day, but will set fruit autogamously and cleistogamously. Floral solid axis absent or nearly so.

Type: Argentina, Tucumán, Chicligasta Distr., Cuesta del Clavillo, on the RN 65 road on the N side of the RN 65 road from Concepción to Andalgalá [before 2008 called ruta 365], c.1km SW of La Banderita & c.1km NW of the peak of Mt. El Clavillo, 1850m; 5 Feb 2010, *Victor Gapon* VG10-641 (WU3795 (plant in alc. [holo.]);

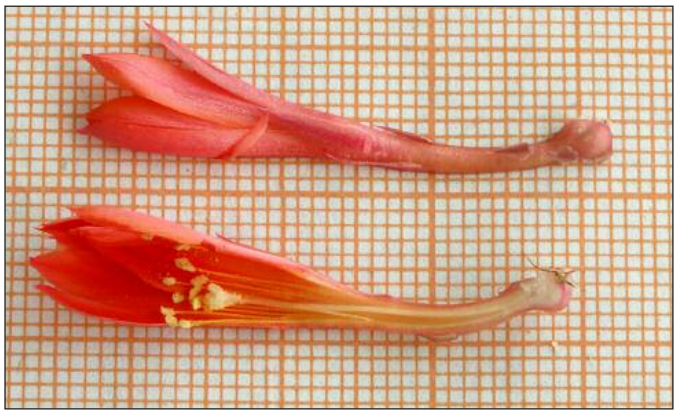

Fig. 8 Flower section of *Rebutia australis* VG641.

WU3796 (flower in alc. [iso.]).

Etymology: Latin adjective, australis, southern, for its position as the most southerly known *Rebutia*.

Description: **Stem** spherical, wholly tuberculate, up to 3cm diameter (3.5cm in cultivation), solitary. Epidermis glossy green. Areoles and base of spines chestnut brown, bearing a tuft of white, kinked trichomes up to 0.5mm long in addition to the spines. **Spines** 15–20 (cf. 20–30 in *R. minuscula*, 25–30+ in *R. senilis*), radiating in all directions, multicoloured, pale chestnut brown to white, darker brown at the base, all of differing length, 3–8mm long, acicular, straight or slightly recurved near their base, where the spines thicken to 0.1–0.25mm diam.

Flower funnelform, 2.5–5.0cm long, mostly only partially opening even in full sun, but also more rarely expanding to 5cm broad, only for a brief period around midday, then slowly closing throughout the afternoon. **Ovary** 3mm diam. **Receptacle tube** c.1.7cm long, curving upwards, bearing 5 fleshy, pink to red scales, up to 0.6mm long, lying against the tube wall. **Perianth parts** 13, to 1.6cm long & 3.5mm broad, rich red, recurving at full expansion. Like *R. minuscula* in having no significant floral solid axis (cf. 1–2mm, rarely to 7mm long in *R. senilis*). **Nectar chamber** c.8mm long. **Filaments** creamy white, 8–13mm long, inserted over c.5mm of the lower tube walls directly above the nectar chamber. **Anthers** cream. **Style** 2.1cm long, up to 1mm thick, white below shading to red at the very top. **Stigma lobes** 5, white, located among the anthers.

Fig.9a *Rebutia australis* VG641 in habitat.

Fig.9c *Rebutia australis* VG641 in habitat.

Fig. 9b *Rebutia australis* VG641 in habitat.

Fig.10 A particularly handsome, strong-spined form of *Rebutia australis* VG641, 3.5cm diameter.

Fruit 4.3mm long, 4.5–5.0mm diam. **Pericarpel** translucent, glossy pale greenish pink to orange, bearing 5 areoles (c.10 in *R. minuscula*). **Uppermost areoles** of fruit pale brown, c.0.6mm long, naked in the axils. **Lowermost** larger, bright rose pink with narrow white tip, acute to equilateral, up to 1.3mm long, and with 1–2 curly white hairs only to 0.2mm long.

Seed up to 1.3mm long, 0.8mm broad, 0.7mm thick, glossy black at magnification, with whitish hilum, 0.6mm. long, 0.5mm broad, with spongy aril extending from 0 to 0.4mm beyond the hilum. Testa cells convex, those at the top end often extended into short papillae. Indistinguishable from the seeds of *Rebutia minuscula*, but a little larger than the seeds of *R. senilis* (c.1.0mm long).

Vouchers: Argentina: Tucumán, Chicligasta Distr., slopes of Mt. El Clavillo, RN 65 road from Concepción to Andalgalá, [before 2008 called ruta 365], 1830m; 1999, *Gert Neuhuber* GN99-1023; Tucumán, Chicligasta Distr., La Banderita, 2000m.; 20 Oct 2001, *Nora B. Muruaga* 357 (LIL) [not seen] (This location was stated to be in Andalgalá Distr., Catamarca (2008: 326), but La Banderita is actually in Tucumán, near Mt. El Clavillo); Tucumán, Chicligasta Distr., Cuesta del Clavillo, on the RN 65 road on the N side of the RN 65 road from Concepción to Andalgalá [before 2008 called ruta 365], c.1km SW of La Banderita & c.1km NW of the peak of Mt. El Clavillo, 1850m; 2007, 2010, 2013, *Victor Gapon* VG07-641, VG10-641 (WU, holo), VG13-641.

Conservation status

Rebutia australis is only known from its type locality and only just over 20 plants have ever

Comparison Table

Character	*R. australis*	*R. minuscula*	*R. senilis*
Habit of growth	solitary	basal branching	basal branching
Epidermis	glossy grass green	glossy grass green	mat dark green
Spination	15–20, strong, bristly to subulate, almost hiding the epidermis	20–30, weak, exposing the epidermis	27–30, strong, bristly to subulate, almost hiding the epidermis
Autogamy	inbreeding	inbreeding	outbreeding
Floral solid axis length	0–1mm	0–1mm	1–2 (–7)mm
Nectar chamber length	c.8mm	4–7mm	2.6–4.5mm
Stigma lobes	5, short, not expanding, not exserted	4–5, short, not expanding, not exserted	4–6, long, thin, fully expanding, exserted c.1cm
Fruit areoles	5	10	?

been found. It is likely to occur elsewhere in the neighbourhood, but it very cryptic and is probably safely hidden in inaccessible places. Under 50 known plants and a distribution of less than 20 sq.km. would give it currently a Critically Endangered (CR) status, but that is probably a worst case scenario. With the prospect of more plants or other populations being discovered, this assessment may be later downgraded.

Rebutia minuscula in the broadest sense as adopted in Hunt (2006: 249, 334) is given the status LC (Least Concern), but that assumed that the widespread taxon *R. senilis* was conspecific, a view that is not shared by the present authors. *R. minuscula* in its original sense has not yet been refound and could even be extinct. *R. minuscula*-like examples in cultivation clearly have genes from the type collection, but they are not reliable given the amount of hybridisation to which this group has been subjected in the horticultural trade.

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Copiapoa fusca and C. corralensis
Descriptions of two new species

Ingrid Schaub and Ricardo Keim name two plants which they consider to be sufficiently different from existing species to be described as new species.

Photographs by Ingrid Schaub.

Copiapoa fusca

Introduction

While studying areas we had not explored before, we found a population of plants that we believe is a new species. By chance, we had found these plants which show all the characteristics of the genus *Copiapoa*, but are not *Copiapoa coquimbana* (Karw. ex Rümpler) Britton & Rose, nor *Copiapoa griseoviolacea* I. Schaub & Keim, nor *Copiapoa ignazii* n.n., nor *Copiapoa sarcoana* I. Schaub & Keim, all of which grow not far from this place.

Description

Copiapoa fusca Ingrid Schaub & Ricardo Keim **sp. nov**. Differs from *Copiapoa coquimbana*, *Copiapoa griseoviolacea*, *Copiapoa ignazii* n.n. and *Copiapoa sarcoana*, which grow in the nearby area, by having a smaller body with a matt surface. Old fruits and dried flowers remain attached to the apex.**Holotype**: Collected by Ingrid Schaub & Ricardo Keim, on November 14th 2015 and deposited in the Herbarium of the Museo de Historia Natural, Santiago, Chile (SGO 166363)

Fig 1. *Copiapoa fusca* with long central spines, flowering at the type locality.

Fig 2. *Copiapoa fusca* with its patchy white coating of wax.

Fig 3. *Copiapoa fusca* showing the large taproot.

Fig 4. The type locality of *Copiapoa fusca*.

Fig 5. Stony ground with a large clump of *Copiapoa fusca*.

Fig 6. Section of the flower of *Copiapoa fusca*.

Habit: body globose or moderately applanate, some heads tending to elongate slightly, up to 60mm in diameter. Epidermis grey-green, matt, with a partial coating of thin white wax, yellowish at the base. Most plants have one or two heads, rarely up to 30 heads. Apex sunken, 20mm in diameter with pale grey- yellowish wool. Neck 10mm in diameter connecting to a 30mm diameter taproot by 120mm long, fleshy, hard to the touch, ending obtusely. At the lower part there are some fibrous roots, 2mm in diameter. Brown surface.

Areoles: 2mm in diameter, oval, slightly elongated vertically, on the upper part of the tubercles.

Ribs: 13 to 15 disposed vertically comprising round tubercles, a bit elongated with a slight depression between the mammillae.

Spines: needle-like, straight, grey. Radial spines 6–7, opaque, thinner and shorter slightly pointing outwards from the body, 15mm long. Central spines stronger and longer, 1–3, pointing away from the body, flat on the upper surface, straight, needle-like. The upper ones reach 40mm long, the lower are slightly shorter. Spines next to the apex are darker, the remainder grey, paler at the lower part.

Flower: born at the stem tip, growing from the wooly apex, 27–31mm long and 20–36mm wide when fully open, funnel-shaped. Opening during the day. Tepals are 25mm long and 6mm wide, yellow with red to brown mid-stripe at the tip. Ovary cup-shaped, rounded and 3-4mm in diameter. Pericarpel

Fig 7. A large clump of *Copiapoa fusca* with flowers and dried flower remains attached.

Fig 8. *Copiapoa fusca* fruit with dried flower remains attached and seeds.

pale green covered with wool. Style 15mm long, yellow. Stigma lobes yellow. Stamens yellow, 8mm long. The flowering period begins in mid- November.

Fig 9. *Copiapoa corralensis* at the type locality.

Fruit: brown, slightly oval 10mm high by 10mm wide. No hairs. Indehiscent. Up to 5 seed pods which take the whole space of the apex. Covered by a little wool.

Seed: 1.6mm long by 1.4mm broad by 0.9mm, kidney-shaped, lengthwise irregular. Round on one end, and sharp at the other end. Black and glossy. Aprox 50 seeds per seed pod.

Old fruits and flowers remain attached to the wool, even if new buds are emerging.

Type locality: South of Freirina (Cuesta), lll region, Chile.

Distribution: *Copiapoa fusca* grows on north facing, not steep hills, between gravely-stony soil, with some outcrops, exposed. They grow from 700m to 320m altitude on the edge of mountains which get to the plains and sand dunes. next to the sea. There are plants of different ages. At 400m altitude a population of 60 plants studied included 20% that were dead.

Other plants growing in the area, excluding annuals, are:
Echinopsis deserticola (Werdermann) H. Friedrich & G.D. Rowley (1974)
Eulychnia acida Philippi (1864)
Miqueliopuntia miquelii (Monville) Ritter (1980)
Oxalis sp.

Copiapoa corralensis

Introduction

A friend brought to our attention a Copiapoa population he considered to be a different species. He suggested this new plant had a napiform root and black spines unlike *Copiapoa griseoviridis*. Our first reaction was that these are only minor differences which did not justify a different species.

Later he sent us pictures of both forms as grafted plants, which showed spination differences but, being seedlings, were inconclusive.

We carried out an extensive study of the

Fig 10. *Copiapoa corralensis* at the type locality.

Fig 11. *Copiapoa corralensis* at the type locality.

population where the seed originated (the "mother plants") and it was clear there were significant differences. It was easy to establish three important differences:

- an enormous napiniform root
- the spines not appressed to the body, making the body clearly visible.
- the colour and size of the body and spines

The very strong opinion of our friend had motivated us to study the plants in detail and we consider it significantly different enough to warrant a new description. We decided to describe and name it as *Copiapoa corralensis*,

The species name refers to the many goat pens surrounding the area.

Other Copiapoa species which grow in the vicinity are *Copiapoa coquimbana* to the north, C*opiapoa sarcoana* to the southwest and next to the ocean, *Copiapoa domeykoensis* and *Copiapoa schulziana* to the south. None of these show any resemblance to the plant that we are describing here.

Description

Copiapoa corralensis Ingrid Schaub & Ricardo Keim **sp. nov**. Differs from *Copiapoa griseoviolacea* by having an extremely large taproot, spines not appressed to the body so the body is always visible, spines changing from black to yellow and the light colour of the stem. **Holotype**: Collected by Ricardo Keim and Ingrid Schaub on September 6th 2015 and deposited in the Herbarium of the Museo Nacional de Historia Natural, Santiago, Chile (SGO number 166364)

Habit: Mostly single or double headed and round shaped with a flattened apex, exceptionally with more heads (up to seven).

Stem: 180mm (up to 300mm) tall by 80mm (up to 200mm) in diameter. Apex slightly sunken 40mm in diameter covered with white yellowish, soft and long fibrous wool. The upper half of the epidermis is grey-green, to the base pale green to ochre-yellow. Some plants have a patchy white coating. It has a big

Fig 12. *Copiapoa corralensis* at the type locality.

Fig 13. *Copiapoa corralensis* in flower at the type locality.

Fig 14. The type locality of *Copiapoa corralensis.*

Fig 15. *Copiapoa corralensis* at the type locality.

taproot which can reach three times the width of the body. The colour of the cortex is ochre-yellow with horizontal wrinkles. The neck is short 10mm (up to 20mm) long by 15mm (up to 20mm) wide.

Ribs: 11–14, 18mm wide by 80mm high. Width varies clearly on the body of the upper part, getting larger towards the lower part of the plant. Areoles sunken, 2–3mm in diameter, dark coloured. Separated by 10 to 12mm vertically. Between the areoles on the rib is a slightly depressed narrowness.

Spines: one central growing upwards 1mm (up to 1.5mm) wide by up to 40mm long, round section, dark brown to black at the upper part. 5–7 lateral spines, open curved to the body, 10mm to 30mm long, round section, yellow 1mm (up to 1.5mm) in diameter. Lateral spines next to the apex are shorter and growing next to the body. The closer they are to the centre of the body, the longer they grow and more separated from the body, having a lighter ochre-yellow colour.

Flower: mostly single, emerging from the woolly apex, funnel-shaped, 40mm long by 30mm in diameter. Open during the day. Petals 22 in a double row 10–12mm wide, pale yellow. The outer row of petals have a reddish brown mid-stripe. 9 shorter reddish brown outer tepals, the bigger ones with a yellow margin 10–12mm long by 5–6mm broad. 6 sepals ending needle-like 2–3mm broad by 8–9mm long. Ovary 3mm in diameter at its

Fig 16. Section of the flower of *Copiapoa corralensis*.

Fig 17. Fruit and seeds of *Copiapoa corralensis*.

upper part and 2mm at his lower part, cup-shaped. Style 12–14mm long, yellow. Stigma yellow, 14–16 lobes, 2mm long. Stamens 5–12mm long, pale yellow. Flowering period beginning in September.

Fruit: indehiscent, ovoid, irregular 15mm in diameter by 20mm high, white-greenish on the base, ending upwards with 7–9 small dark reddish brown scales. Seed: 1.2–1.5mm long by 1mm wide. Testa: black with glossy surface.

Type locality

South of Freirina, III region - Chile, on very steep north facing and northeast facing hills, at 720m and down to 400m altitude, growing on yellowish-white granite rock which is breaking apart. Most of the plants are located next to rocks which gives them support.

The commonest other succulents growing in

Fig 18. Young plants of *Copiapoa corralensis* at the type locality.

the area are: *Eulychnia acida* Philippi 1864, *Echinopsis deserticola* (Werdermann) H. Friedrich & G.D. Rowley 1974, *Cumulopuntia sphaerica* (Foerster) Anderson 1999, *Miqueliopuntia miquelii* (Monville) Ritter 1980, *Oxalis gigantea*. There are also perennial woody shrubs up to 150mm high.

The population is healthy, having plants of different ages. The only problem we observed is that most of the seed pods are eaten by larvae

Acknowledgments

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Travel with the cactus expert (15)

Zlatko Janeba continues his adventures in cactus country and reminds us that places can change. A once wonderful habitat may not be what you remember if you visit it again.

Photographs Zlatko Janeba, desert-flora@seznam.cz.

The first thing I did in the morning of the 11th May 2006 was to climb the hill next to our campground. There were marvellous views of the surrounding landscape (Fig.1) and, moreover, I found my first cacti of the day. There, at elevation of some 1580m, I saw several clusters of *Echinocereus triglochidiatus* and a single specimen of *Sclerocactus glaucus*.

After breakfast we tried to locate the *S. glaucus* locality Josef had visited some 25 years before. It was north of our campground and, according to his notes, we were supposed to find a fenced pasture for cattle with copious large plants of *S. glaucus*. But it was not the case. We could not find a single sclerocactus at the spot Josef identified as the right one. The land there was covered by a thick growth of low bushes, mostly sagebrush (*Artemisia tridentata*), interlaced with tracks created by grazing animals. There seemed to be no suitable conditions for cacti to grow. Josef could not believe how the habitat was changed by pastoral farming. But was it only the direct impact of farming or was there also perceptible impact of more complex weather changes, like global warming?

We returned slightly back towards our camping site where the terrain seemed to be more open and thus more promising for cactus hunting. Although we spent quite some time and effort there, we were able to find only four specimens of *S. glaucus* in total. They were growing among grasses and sagebrush (Fig.2). All of them were large old cacti with numerous flower buds just about to open (Fig.3). The largest specimen was lying down in the grass and was about 25cm in length, also bearing numerous flowers (Fig.4). The sclerocacti could be found growing on both sides of the road and were not easy to find. The dense grass cover, especially, represents quite a danger for

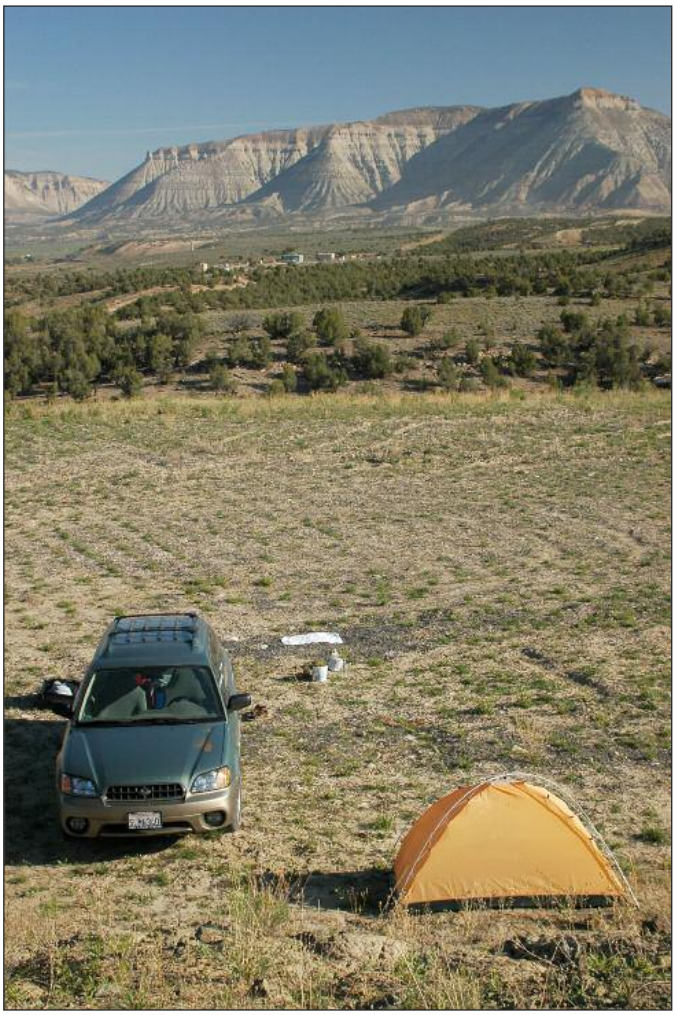

Fig 1. A morning view of our campground near De Beque, Colorado. The picture was taken from the hill just above our campground where we saw a single plant of *Sclerocactus glaucus*. More plants were found in the habitat in the background with sparse juniper trees.

the cactus population near De Beque. And I guess those were invasive grass species.

Although happy we had seen at least several sclerocacti near De Beque, we were disappointed to realize the huge impact of human activities on the cactus population there. So, we gave up and decided to move on further. We continued on I-70 eastwards and then took Colorado Hwy 82 (CO-82) and Hwy

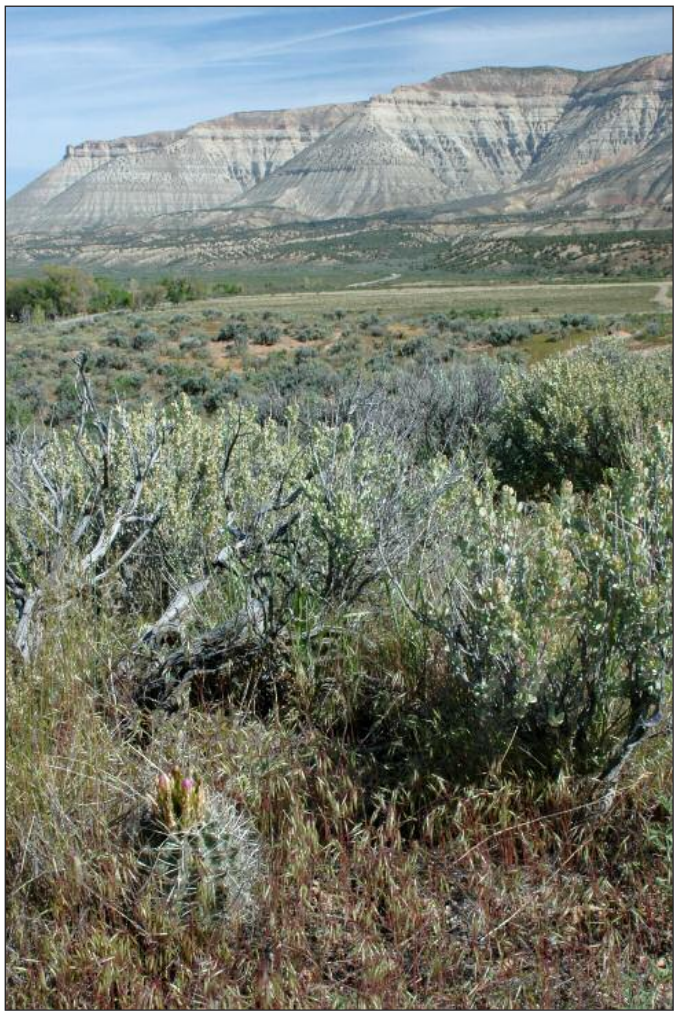

Fig.2. A view of the habitat of *Sclerocactus glaucus* near De Beque, Colorado. The sclerocactus habitat was dominated by Great Basin sagebrush (*Artemisia tridentata*) and sparse juniperus trees. Unfortunately for the cacti, probably invasive grasses were doing very well there, almost covering even adult sclerocactus specimens.

Fig.3. An adult specimen of *Sclerocactus glaucus* near De Beque, Colorado. The numerous flower buds were just about to open.

133 (CO-133) to McClure Pass (a pass in the Rocky Mountains at an elevation of some 2700m, South of Redstone). Our goal was to see *Pediocactus simpsonii* in that area.

Unfortunately, in the limited time we had available, we were unable to identify a habitat suitable for pediocacti. There appeared to be only forests (either coniferous or aspen forest at higher elevation) that were too dense to look for cacti so we decided to turn back. On the way back, some two miles South of Redstone, we admired a beautiful waterfall; Hays Creek Falls (Fig.5).

Later we drove further along I-70 towards Denver and at Gypsum we took an exit and then a dirt road going high up into the mountains. There, at an elevation of some 2300m, among sagebrush and pine trees, we were able to find two shrivelled plants of *Pediocactus simpsonii*, as well as a few *Opuntia polyacantha*. Surprisingly, the area seemed to suffer from serious droughts.

In the late afternoon we reached the house of Mr. F. Grund in Denver, the capital of Colorado state. Josef had some kind of business with him to do the other day. Mr. Grund let us stay at his place overnight but before sunset he took us for a short trip. He showed us an area with well-preserved dinosaur tracks in the rocks. After that we also visited quite famous Red Rocks Amphitheatre, located in Red Rocks Park near Morrison, some 15 miles West of Denver. It is said that there is no better place to see the stars and listen to music at the same time. The open-air

Fig.4 The biggest plant of *Sclerocactus glaucus* I saw that day near De Beque, Colorado. This old sclerocactus is partially lying down but still fully fertile.

amphitheatre itself is surrounded with large colourful rocks that provide excellent acoustics for live music and theatre performance. We wrapped up the evening in a Czech restaurant, of which I unfortunately remember neither the name nor the location. But it was great. We all ordered tasty, though heavy, Czech cuisine (roast pork with dumplings and sauerkraut) and delicious Czech beer (Pilsner Urquell). I guess we all slept really well that night.

Zlatko Janeba

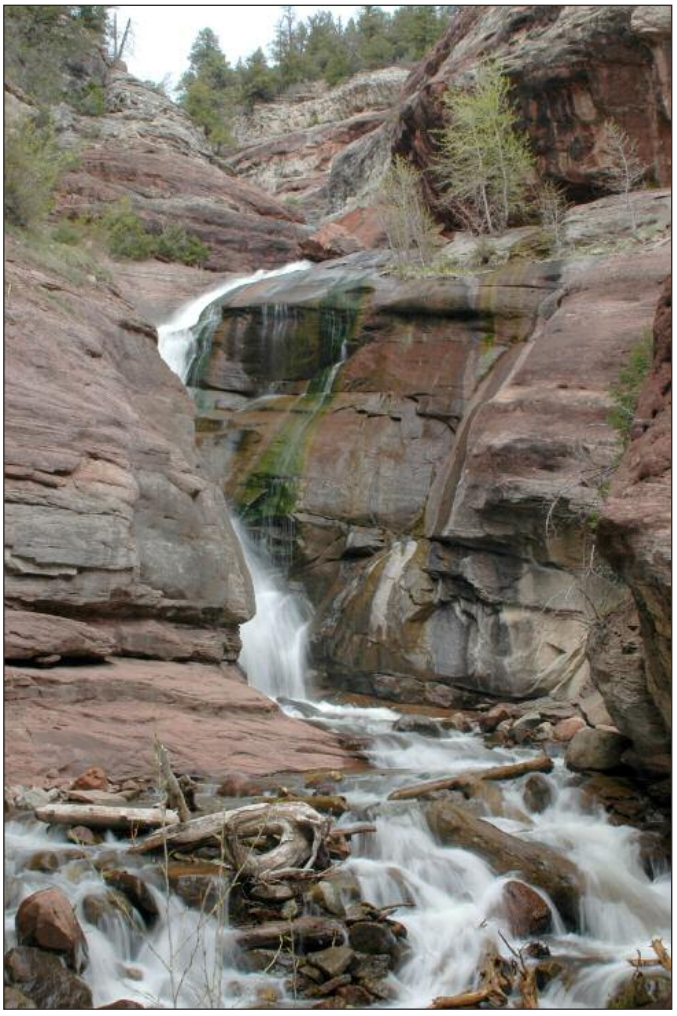

Fig 5 Hays Creek Falls, near Redstone, Colorado.

Duchesne County, Utah, throughout the year 2015

It must be a joy to live near to where cacti grow naturally. One such place is Salt Lake City, Utah. ***Article by Petr Šimon***

Photographs by the author.

As many cactus enthusiasts are not fortunate enough to live close to the natural habitat of the plants of their interest, discoveries and studies can only be done during a relatively short visit during the entire year. These limitations mean strong influence of the understanding of environment and weather conditions through the whole year.

The cactus family is an extreme group of plants adapted to very dry periods during their lifetime. Within this group of notably specialized plants, there are many subgroups, which differ from the other members even more. I have studied and grown cacti for many years and hoped for an opportunity to observe them in their natural habitat. I especially wanted to see any of *Pediocactus*, *Sclerocactus*, *Escobaria* or *Opuntia* in nature.

I really enjoyed the year I lived with my wife in Salt Lake City, Utah. We were able travel to many cactus places and study these plants at various times through the year life cycle. One of the first places we visited was in Duchesne County, Utah. Many cactus specialists know localities bearing the names Fruitland, Hanna or Duchesne. Therefore, we focused our attention on this area, because it is one of the northernmost reported distributions

Fig.1. A shriveled clump of *Echinocereus triglochidiatus* ssp. *mojavensis* near Tabiona, Duchesne County, Utah (March 2015).

Fig.2. *Opuntia* sp. near Tabiona, Duchesne County, Utah (March 2015).

Fig.3. A spiny clump of *Opuntia* sp. with buds near Tabiona, Duchesne County, Utah (May 2015).

Fig.4. *Sclerocactus* aff. *parviflorus* with flowers, road 35, Duchesne County, Utah (May 2015).

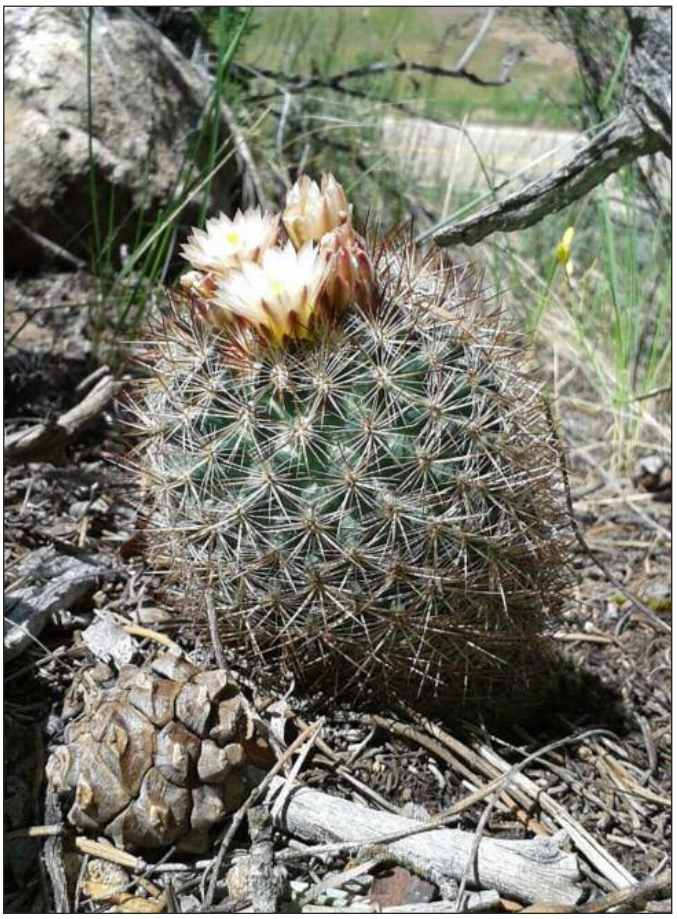

Fig.5. *Pediocactus simpsonii* with flowers, road 35, Duchesne County, Utah (May 2015).

of *Echinocereus triglochidiatus* and may be the most northern of *Sclerocactus parviflorus*.

We first visited Duchesne County during the early spring of 2015 (March 14th). There were still remnants of snow all around, especially in shady places. We went from Fruitland (Highway 40), through Tabiona, and north of Hanna along the route 35. A general description of the whole area could be predominantly characterised as private ranches with cattle, and free land with increasing amount of oil extraction facilities as you approach close to Duchesne City. The open land is covered mainly by sagebrush (*Artemisia* sp.), pines (*Pinus* sp.), and juniper trees (*Juniperus* sp.). However, along the Duchesne River there are many fields for grain production. At higher elevations you can see more compact tree cover with increasing amount of aspens (*Populus* sp.).

I searched internet maps in order to find exact areas with possible cactus vegetation before our trip. To my surprise during the first personal visit, many of them were on private, fenced properties. We first stopped south of Tabiona along route 208. The sandy soil was very wet and a lot of snow was in the shade. The landscape consisted of sparse woods of junipers and pines with some *Opuntia* sp. on the sandstone rocks. We also found a single plant of *Echinocereus triglochidiatus* ssp. *mojavensis* there.

We saw quite a similar situation near Hanna during the second stop. At a rocky place next to the road we saw many opuntias and again one *Echinocereus* specimen in very bad shape. Searching for more cacti that day, we travelled northwest from Hanna along the Duchesne River. With increasing altitude and distance from the ranches, the natural habitat changed from low sagebrush bush to denser forest with more abundant aspen trees. The road was muddy, and the amount of snow was breathtaking. The Duchesne River was frisky and noisy there, and the campgrounds were still closed for the winter season.

Our next visit to this area was during the cactus flowering season (May 23th, 2015). We

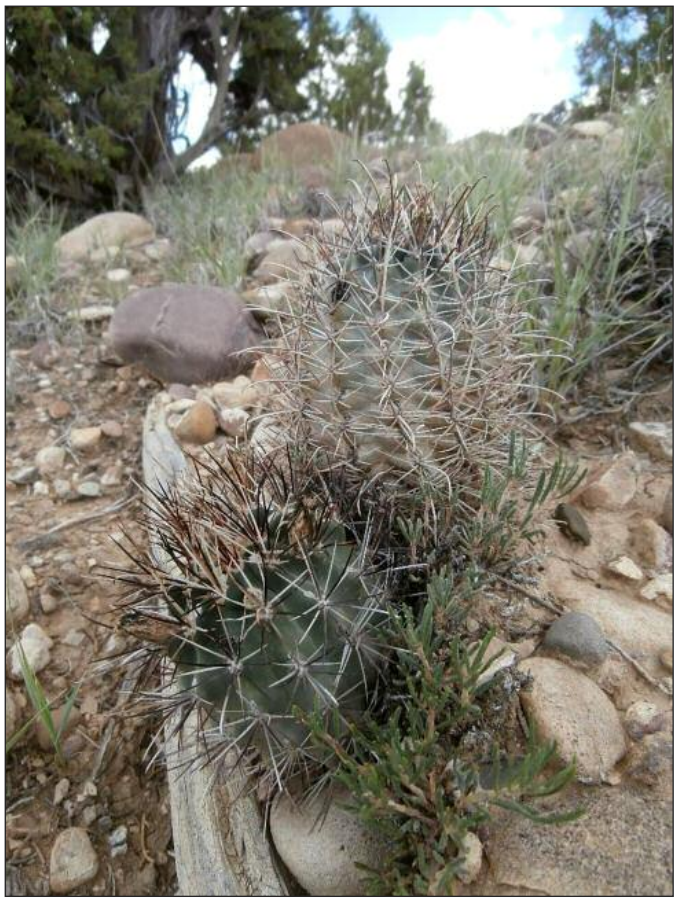

Fig.6. *Sclerocactus* aff. *parviflorus* in pebble habitat, road 35, Duchesne County, Utah (July 2015).

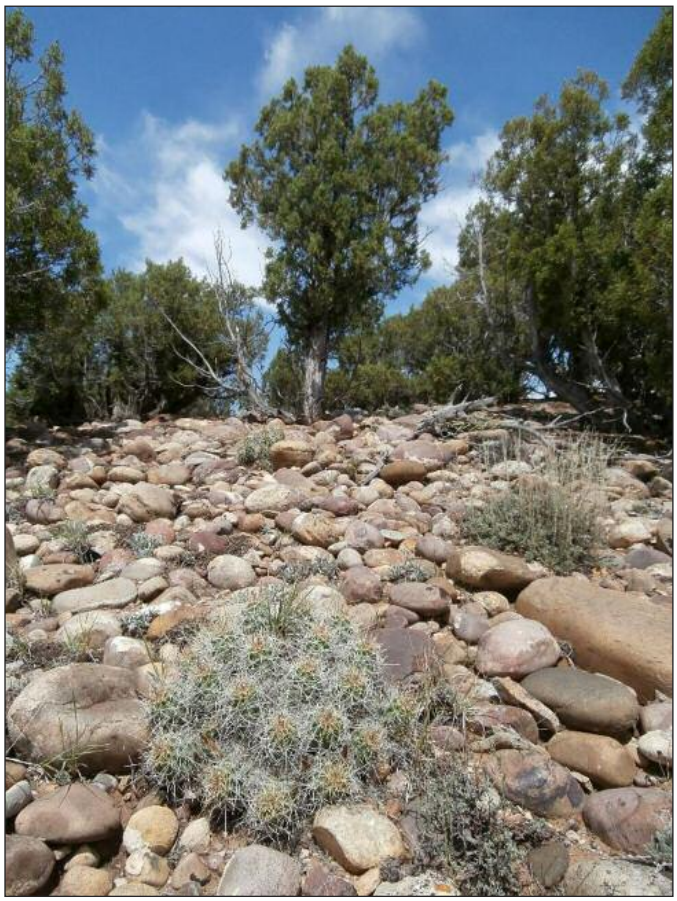

Fig.7. A pebble slope with juniper tree and *Echinocereus triglochidiatus* ssp. *mojavensis*, road 35, Duchesne County, Utah (July 2015).

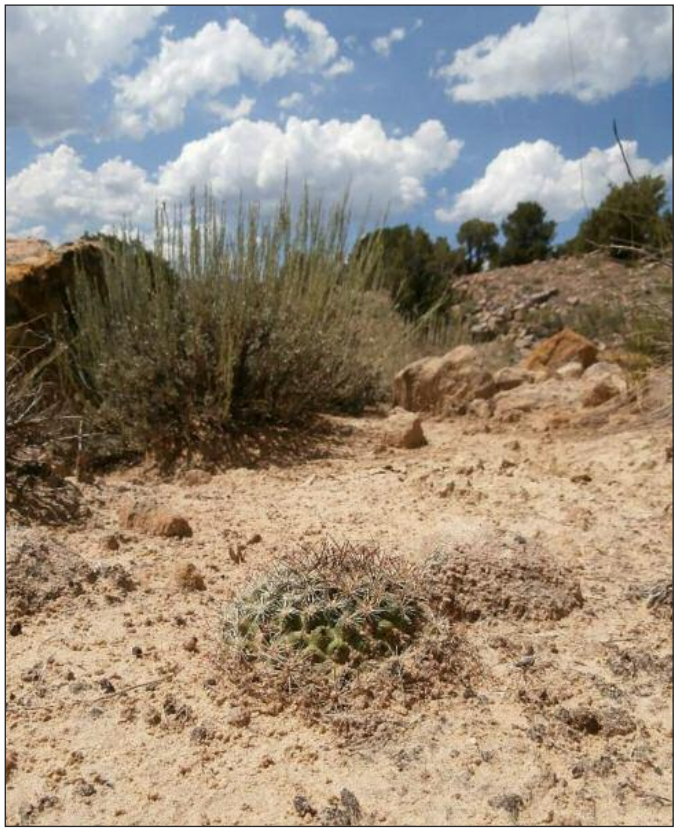

Fig.8. *Pediocactus simpsonii* near the pebble locality, road 35, Duchesne County, Utah (July 2015).

reached route 35 north from Duchesne and went westwards. Our first stop was a huge success. We found many cacti including opuntias, forms of *Echinocereus triglochidiatus* and especially *Sclerocactus* aff. *parviflorus*, which were just flowering. This locality was a north oriented sandstone slope literally next to the route 35. On the other side of the road was the Duchesne River and grain fields with active watering systems (to illustrate dryness of this period). We did next stop a couple more miles west and found a locality with *Opuntia* sp. and abundant *Pediocactus simpsonii*. This place was again a north oriented sandstone slope but had more pine trees, grasses, and bushes than at our first stop. The cacti were growing typically in the shade of these taller plants. We were very happy to find pediocacti, especially in flower.

The last stop during our May trip was at the same place northwest of Hanna that we had visited in March. The hot sunny weather and dryness drastically changed the landscape.

Fig.9. An unusual clump of *Pediocactus simpsonii* from the same locality as Figure 5, road 35, Duchesne County, Utah (July 2015).

Fig.10. *Opuntia* aff. *fragilis* with fragile and almost spineless segments, road 35, Duchesne County, Utah (July 2015).

Fig.11. A spiny *Opuntia* sp. with unripe fruit, the same species as Figure 3, road 35, Duchesne County, Utah (July 2015).

Fig.12. A spiny *Opuntia* sp. at higher elevation still in flower, northwest from Hanna, Duchesne County, Utah (July 2015).

Areas without trees or shade were very dry and the vegetation reflected real desert conditions. Sagebrush (*Artemisia* sp.) and red-flowering Indian Paintbrush (*Castilleja* sp.) prospered well in places previously covered with huge amount of snow. A short walk around the paved road rewarded us with the discovery of two cactus family members. However, both *Pediocactus simpsonii* and *Opuntia* aff. *fragilis* seemed very dry in comparison with the same species not far away from there.

Our last visit to Duchesne County was in a warm, dry period during summer (17th July, 2015). Based on the very high temperatures in Salt Lake City (up to 40°C), we decided to spend the weekend camping high in the Uinta Mountains. This gave us enough time to check all our previously mentioned localities and look for some new ones.

Unfortunately, three areas along Highway 40 that we newly found on the internet were on private property or part of Ute Tribe lands so we turned back towards the Duchesne River and took the route 35 again. As on our previous trip, we travelled from east to west. As we were driving, I saw some plants from the car. We stopped to check the locality in detail. It was approximately 1 mile from the intersection with route 87 (1800m altitude). We found many *Sclerocactus* aff. *parviflorus* and *Opuntia* sp. growing on the slopes covered by pebbles. The crowns of the *Sclerocactus* plants were covered with fruits full of seeds.

It was a sunny day and the temperature was around 25°C. But, as often occurs in the mountains, dark clouds quickly formed, and we were caught in a short rainstorm. We ran to our car and drove to the *Sclerocactus* locality we knew from early summer. After an hour, we went back to the first locality, we spent more time and we studied an area much further from the road. We additionally found another species there. The clusters of *Echinocereus triglochidiatus* were in a very good shape, healthy and again with many fruits. Not far from there were also two plants of *Pediocactus simpsonii*. We were very pleased to discover this place with the sandstone rock and pebble slopes where all these cacti grew very close to each other.

After this success we continued west to check places from our spring trip. First we stopped at the place that was inhabited predominantly by sclerocacti. The plants were in a good shape and were bearing fruits. We found another place not far away with even more plants there. Then we travelled to the locality with *Pediocactus simpsonii* and the two types of opuntias (Figs. 10 & 11) a couple miles from there. The first plant, *Opuntia* aff. *fragilis*, was almost spineless, smaller, and very fragile to the touch. The second opuntia was slightly larger, with spines, and with many fruits on it. Importantly, the latter did not fall apart upon touching it. During our previous visit to this locality, we had not realized this difference, but it was obvious in summer.

Our last stop was again northwest from Hanna (2200m altitude). Close to the campground, *Opuntia* sp. was still in flower at that elevation. It was the form with less fragile fragmentation, longer spines and larger fragments. Not far from there we found also *Pediocactus simpsonii* and the second type of *Opuntia* sp. We found that the amount of fruits and seeds on *Pediocactus* depended on the presence of ants. One part of the locality was so full of ants that we could not find any fruit or seeds there.

These are our discoveries from three visits of Duchesne County within the year 2015, from the frosty and snowy visit in March, to flowering time in May, and finally to the fruit and seed period in July. Each visit and locality was distinct and will be deeply engraved in our hearts.

Petr Šimon

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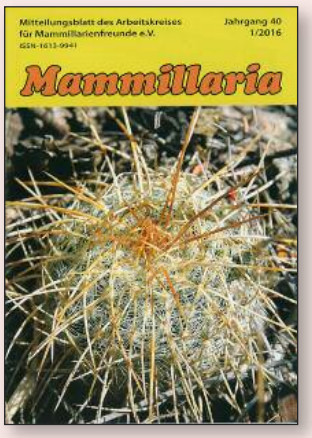

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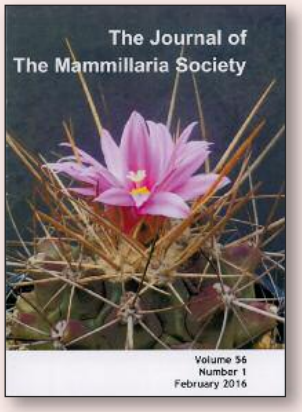

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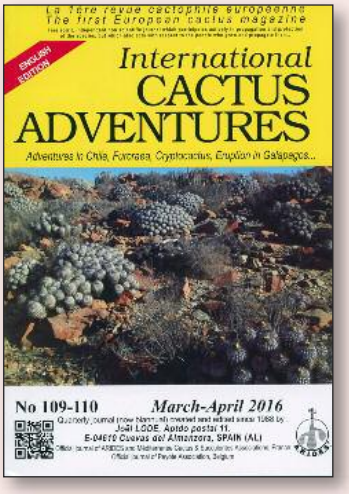

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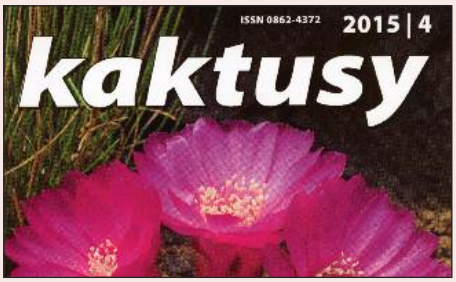

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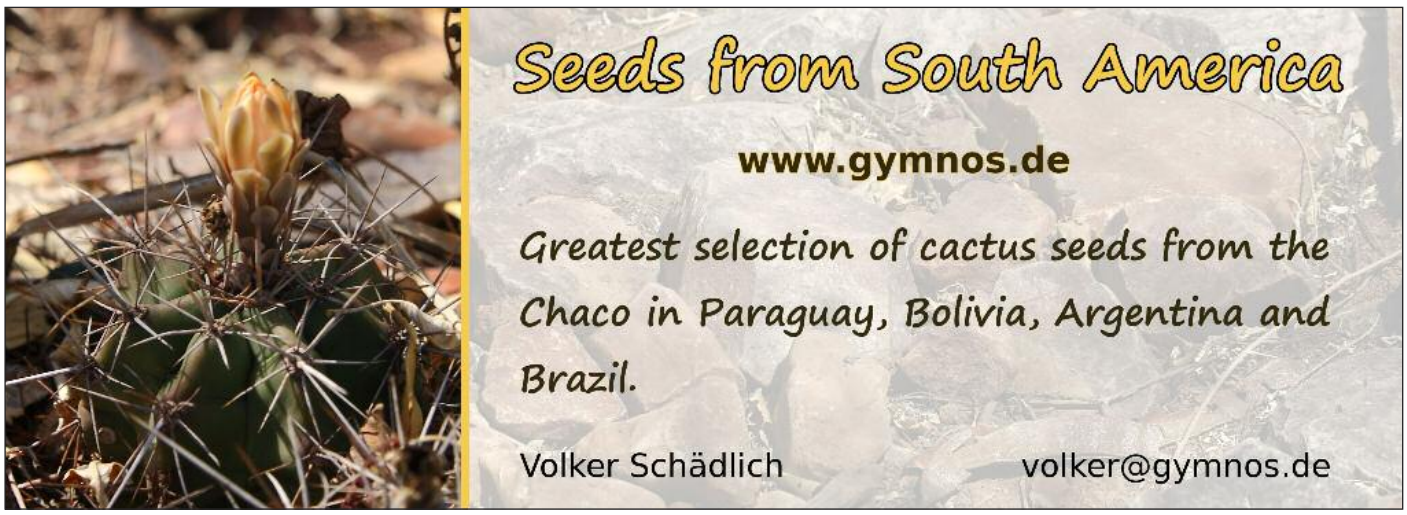

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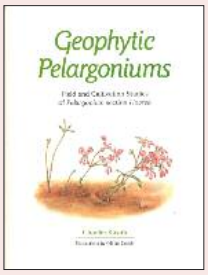

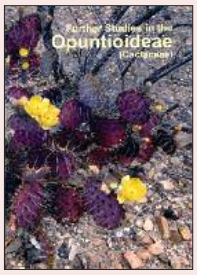

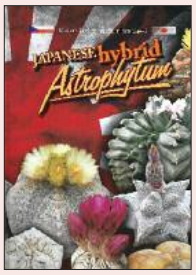

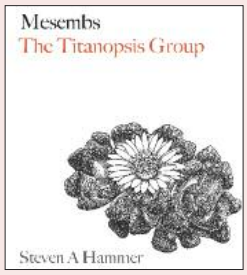

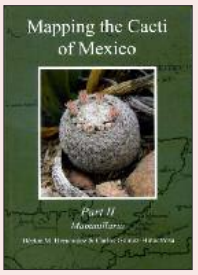

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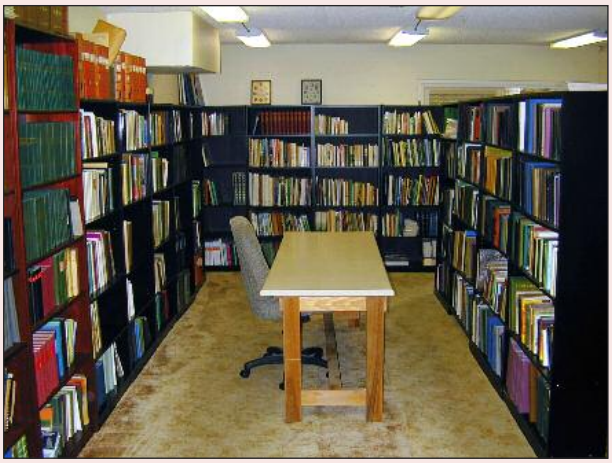

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