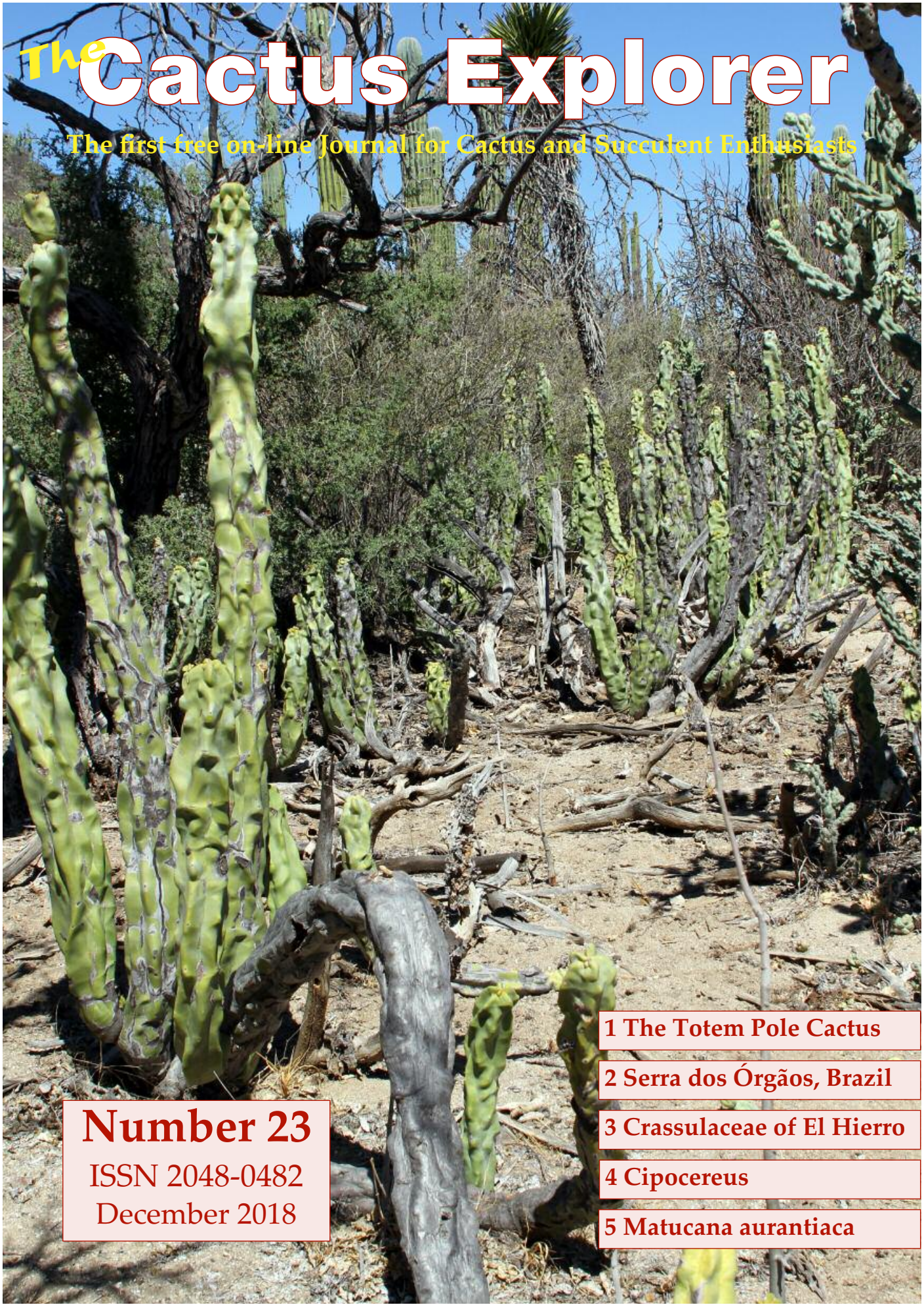
The Cactus Explorer

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



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In this Edition

Cover Picture: Chris Sherrah describes his successful search for the Totem Pole cactus *Lophocereus schottii* f. *monstrosus* in habitat. See his article on page 26.

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

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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14 December 2018

Opinions expressed in the articles are those of the authors, and not necessarily those of the editorial team.

Introduction

Jim Hardaker's collection, Perth

Ian Hay's collection, Sydney

What an Adventure!

Since the last edition of The Cactus Explorer was published in September, I have enjoyed a wonderful adventure visiting and speaking at *Succulenticon 2018* in Perth, Australia. This well-attended event was expertly organized by Bob Hunter and proved to be highly entertaining. It was a great opportunity to meet many succulent enthusiasts and, in some cases, see their collections (see above). Seeing plants growing outside is so different from my conditions where glasshouse culture is the only option.

I was also invited to visit Sydney and speak to the local club there. They are also an enthusiastic group with excellent collections. Like in Perth, their hospitality was oustanding and I was very well looked after by Ian Hay and Kim Hamilton (see above). It was a new experience for me since I had not been to Sydney before and the view of the Opera House, Harbour Bridge and Botanic Gardens from my hotel window is unforgettable.

On the way home, I stopped in Singapore where my friend Nigel Taylor is the Curator of the Botanic Garden. This historic setting has an amazing collection of tropical plants and a vast orchid garden. I used to regularly work in Singapore around 20 years ago, so it was interesting to see how the city and the garden had developed since that time.

The one development I particularly wanted to see was the Gardens by the Bay (pictures above). This huge futuristic garden occupies 100 hectares and is truly amazing. Its two gigantic climate controlled glasshouses contain an astonishing collection of plants, while the outside areas are landscaped to the highest quality imaginable – a fantastic day out!

There will be a Cactus Explorers Weekend next year, please see the details on the next page.

As the end of yet another year approaches, I send you the Season's Greeting!

Graham Charles

News and Events

Oxford Branch 60th Anniversary Celebration Symposium

held on
Sunday 21st October 2018

Bill Darbon (left) organized a splendid event to celebrate 60 years since the founding of the Oxford Branch of the BCSS. There were four excellent talks given by Paul Hoxey, Martin Lowry, Ian Woolnough and the BCSS President Colin Walker (right).

Colin also cut the anniversary cake which was then enjoyed by the 70+ attendees. There were plenty of plant sales, a plant auction and raffle which all added up to a really enjoyable day.

The whole event was enhanced by being held in a high quality venue, the Lambert Arms at Aston Rowant, conveniently situated near to junction 6 of the M40, that provided ideal accommodation with good quality food and other refreshments.

So, congratulations to the organizers for rounding off the year with such a memorable symposium. GC

Mammillaria Society

Annual Meeting at Wisley

5th May 2019

A great day out including free admission to the garden for members. Plant sales and displays.

The Cactus Explorers Club 14th Meeting in 2019

August 16-18th 2019
The Conference Centre
Stamford Court, Leicester.

I am pleased to tell you that this event is back for 2019, this time in August.

It will be the usual mix of talks from invited speakers and attendees. Zlatko Janeba will be one of the invited speakers.

The price for the weekend is **£230** which includes two nights in en-suite single rooms, all meals, refreshments, and wine with the evening meals.

There will be sales of plants, literature and seeds, free for vendors.

Enjoy a relaxed environment, a good place to meet old friends and make new ones. The bar offers real ale, popular with Cactus Explorers. Send me an email to book. *Graham Charles*

Old and Rare Books for Sale

I am selling a major part of my botanical library.

Download the booklist here

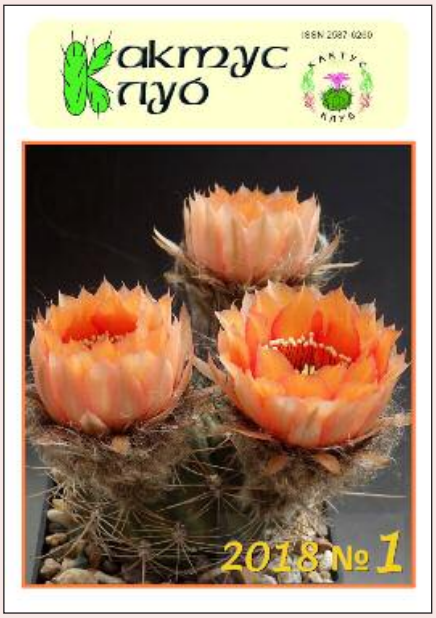
My email: Bockemuehl@gmx.de

Dr. Jochen Bockemühl,
D-97273 Kürnach, Germany.

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

Kaktus Klub

A new online version of the Russian journal *Kaktus Klub* is now available as a free download.



This is a very well produced journal with excellent pictures. The text is mainly in Russian but there are summaries in English

You can download all the issues from
http://www.kaktusklub.com/htmls/e-journal.html

Invitation

37. Annual Meeting of the

Fachgesellschaft andere Sukkulenten

in Parkhotel & Restaurant Borken
34582 Borken (Hessen), Europaplatz 3, Germany

Lectures on hot spots of succulents by internationally renowned experts (Sierra Mixteca, Sokotra, Südafrika, etc.)
Additional short lectures on cultural and other topics
Big sale market for other succulents (no cacti!)
Admission free!

Program and further information: President of FGaS Dr. Jörg Ettelt, Mozartstraße 44, D-59423 Unna, phone +49 2303 968196, E-Mail: praesident@fgas-sukkulenten.de

The life and work of a botanical explorer: John Jacob Lavranos (1926–2018)

The passing of the legendary botanist and botanical explorer John Jacob Lavranos in February 2018 at the age of 91 ended the life of a very talented polymath, the like of which we might never see again.

This biography of his life and work has been compiled mainly from his archives of correspondence, photos and ephemera that were passed to Roy Mottram over a number of years, literature sources, and email contact between 2011 and 2018. The majority of this material has not previously been published anywhere else.

John went though life adopting a modest, low profile, so whilst his contributions to botany are everywhere, his personal life and achievements are a mystery to most.

Roy Mottram

You can download **Cactician 12**, Roy's impressive research, at http://www.crassulaceae.ch/de/publications-the-cactician where you can also find *The plant gatherings and other vouchers of John J Lavranos. An interpreted checklist from 1954 to 2016*. (**Cactician 10 & 11**).

The 13th Spalding Cactus Mart

Saturday 27th April 2019
10.00am–3.00pm

Holbeach Community Centre,
Fishpond Lane,
Holbeach, Lincs P12 7DE

15 nurseries and growers in attendance

Ample free parking
Free admission to the Mart

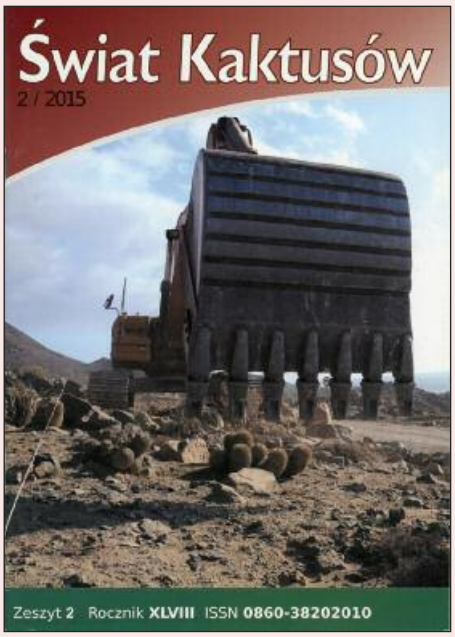
Refreshments available all day

For further details please see the BCSS Spalding Branch website:
www.spalding.bcss.org.uk

The Naturalist's Travel Page

https://thetravelingnaturalist.org

Our website has free-to-use online talks for your succulent society's meetings - from many locations around the world. We also have illustrated trip reports and summaries of South African succulent-rich guest farms. Also, a short course on field photography. We are available to help in natural history travel and tour planning.



Polish Society of Cactus Lovers

The journal Świat Kaktusów is published 4 times every year. Each issue has about 60 pages of articles with good quality pictures in the Polish language with English and German summaries.

Full details can be found at
http://www.ptmk.pl

Opuntia Web.

This website about the opuntias of the USA has been redone and is better than ever. There are 1,500 photographs of the various species in habitat.

Opuntia and related species (= opuntiads) are unique cacti with unusual shapes and beautiful flowers. Common in parts of the United States and Mexico; they also occur throughout most of the Americas. There are over 50 species of opuntiads in the United States and many more in Mexico. Opuntia Web describes opuntias of the United States.

www.opuntiads.com

In The Glasshouse

Kamiel Neirinck tells us about the Brazilian cereoid genus *Cipocereus* which is rarely seen in our collections. All the species are suitable for cultivation given a warm enough environment.

Translation by Ronald Fonteyne.

The genus *Cipocereus* was erected by Friedrich Ritter in 1979 to include the species *Cipocereus minensis* and *C. pleurocarpus*. The genus is controversial. It is recognized by Taylor and Zappi while Braun and Esteves are of the opinion that it should be integrated into the genus *Pilosocereus*. Hence the classification according to the two opinions will be given here. The difference between the two genera is mainly the shape and colour of the fruits and seeds There is molecular support for their separation. *Cipocereus* has been shown to be nested inside *Cereus* sensu lato, not near to *Pilosocereus*. The "*minensis* species" occur only in the Serra do Cipo in the Brazilian state Minas Gerais, hence the name of the genus.

Figure 1. *Cipocereus crassisepalus* GC498.01. Photograph: Graham Charles.

These plants do not grow taller than 1 meter. Also the species *C. crassisepalus* is a small cereus that branches sparsely and apparently only grows on quartz grit in the Serra Negra, accompanied by *Uebelmannia buiningii* and *U. gummifera* (Figure 1). *C. crassisepalus* has a blue-green coloured epidermis and 5 ribs covered with closely set brown woolly areoles. *C. bradei*, the best known species, also has a blue epidermis and can reach 3 meters tall in nature. *C. laniflorus* is olive green, up to 2m high, and has 5–7 ribs with narrowly spaced light brown areoles. The dark blue flower buds are in sharp contrast with the green stem. *C. minensis ssp. leiocarpus* is a geographical form of *C. minensis*.

Taylor and Zappi classified *Cipocereus* as follows:

Cipocereus bradei (Backeberg & Voll) Zappi & Taylor
Cipocereus crassisepalus (Buining & Brederoo) Zappi & Taylor
Cipocereus laniflorus Zappi & Taylor
Cipocereus minensis (Werdermann) F. Ritter, ssp. *minensis*
Cipocereus minensis ssp. *leiocarpus* Zappi & Taylor
Cipocereus pleurocarpus F. Ritter
Cipocereus pusilliflorus (F. Ritter) Zappi & Taylor

Classification according to P.J. Braun & Esteves:

Pilosocereus:

Pilosocereus bradei (Backeberg & Voll) Byles & Rowley
Pilosocereus laniflorus (Taylor & Zappi) P.J. Braun & Esteves
Pilosocereus minensis (Werdermann) Byles & Rowley
Pilosocereus pleurocarpus (F. Ritter) P.J. Braun

Figure 2. *Cipocereus pusilliflorus* HU400 in habitat.
Photograph: Werner Uebelmann

Figure 4. *Cipocereus pusilliflorus* fruits.
Photograph: Eddie Esteves Pereira.

Figure 5. *Cipocereus pusilliflorus* in culture.
Collection and photograph: K. Neirinck.

Figure 3. *Cipocereus pusilliflorus* in culture.
Collection and photograph: Hans Frohning.

Figure 6. *Cipocereus pusilliflorus* in culture.
Collection and photograph: K. Neirinck.

Cereus:
Cereus crassisepalus Buining & Brederoo

Floribunda:
Floribunda pusilliflora F. Ritter

Cipocereus pusilliflorus* and *Cipocereus pleurocarpus

Both these columnar cacti grow only in Brazil in the state Minas Gerais. They are slender cereoids that in habitat rarely grow larger than 1 meter with a diameter of a few cm. They have a green epidermis and a fine spination. They don't have a striking appearance, on the contrary they are rather ordinary looking cereoids. Nobody travels to Brazil to visit these plants. They can't be found in large quantities and on many localities. Also because of this they are mentioned on the red list of threatened cacti. Photographing and touching are allowed, uprooting and importing are not. As concerns the nomenclature, both plants have been subject to a number of name changes.

Figure 7. *Arrojadoa* (*Pierrebraunia*) *bahiensis* fruits. Photograph: P.J. Braun.

Cipocereus pusilliflorus
Synonyms:
Floribunda pusilliflora
Pilosocereus pusilliflorus

Ritter discovered this small cereus back in 1964, whereas he erected the genus *Cipocereus* only in 1979. For sometime this species was classified under *Pilosocereus* and only later under *Cipocereus*. However, recent molecular studies suggest that it is not actually a *Cipocereus*.

Cipocereus pusilliflorus branches at the basis and reaches a height of 50cm, the green to light blue-green stems are 4 to 5cm thick. The lower parts of the plant rest on the rocky substrate. There are 8 to 14 ribs. The spines are brownish, needle-like and have a length of 2–20mm. There are 2–4 central spines and 10–12 radial spines. The mostly numerous flowers arise at the top of the stems, stand upright, have a length of 16mm and are actninomorphic (both halves are always each others mirror image, as in most flowers). The whitish petals are very small. The white stamens have round yellow anthers that are directed towards the pistil. It is a so-called hummingbird flower as the flowers are visited by these birds. The purplish ovary is short and thick , the oblong pericarpel is whitish at the inside and purplish at the outside. The unripe fruits, 6–13mm large, appear like naked red-purplish berries that are much wider than high. When ripe the bottom becomes white and the top purplish. The seeds are black, about 1.3mm long and 1mm wide.

The inflorescence of *Pierrebraunia bahiensis* (synonyms *Floribunda bahiensis* and *Arrojadoa bahiensis*) resemble wonderfully well that of *Cipocereus pusilliflorus*. Does this mean that these cerei have yet something in common? It may be regarded as convergence to a common pollinator — most likely hummingbirds by day and Glossophagine bats at night although this has not been proved. The fruits too look like each other. At first *Floribunda bahiensis* was classified under *Cipocereus* until Taylor and Eggli considered it as being an *Arrojadoa* species. Finally *F. bahiensis* was classified under *Pierrebraunia*, a genus created by Esteves in 1997.

Cipocereus pusilliflorus can only be found in

Figure 8. *Cipocereus pleurocarpus* with some open flowers and a number of flower buds, growing in a rock crevice with quartz grit, at about 1200m, Jaboticatubas municipality, Minas Gerais.

Figure 10. *Cipocereus pleurocarpus.*
Collection and photograph: K. Neirinck.

Figure 11. *Cipocereus pleurocarpus.* Minas Gerais State, Brazil in habitat in Santana do Riacho.
Photograph: Celso Lago-Paiva.

Figure 9. *Cipocereus pleurocarpus.*
Collection and photograph: K. Neirinck.

Figure 12. *Cipocereus pleurocarpus.* Minas Gerais State, Brazil in habitat in Santana do Riacho.
Photograph: Celso Lago-Paiva.

Figure 13. Fruit of *Cipocereus minensis* ssp. *pleurocarpus* Photograph: Celso Lago-Paiva.

Figure 14. Fruit of *Cipocereus minensis* ssp. *pleurocarpus* Photograph: Celso Lago-Paiva.

the state Minas Gerais. The species is endemic in the western part of the Serra Geral (north of the Serra do Espinhaço), east of Monte Azul, at a height between 800 and 1000m. The distribution is very fragmentary on one location. The plants grow there between shrubs on small rock formations together with other cacti.

C. pusilliflorus can easily be grown from seed and when grafted on a strong stock (preferably) can already flower after a few years. A place in the full sun should be avoided in order to prevent sunburn. The minimum winter temperature should be 10°C.

Floribunda pusilliflora Ritter spec. nov. was available for some time in the 1970s from the firm Su-ka-flor of the late Werner Uebelmann in Sarmentorf, Switzerland, under the field number HU 400. At that time Uebelmann was of the opinion that the plant belonged to the genus *Coleocephalocereus*.

Cipocereus pusilliflorus is a rarity not only in European collections but also in Brazil where it has become a seldom occurring cactus as there is only the one very limited habitat on a mountain ridge on Monte Azul. Hence *C. pusilliflorus* is listed on the red list of endangered species. This probably explains its attractiveness.

Cipocereus pleurocarpus
Synonyms:
Cipocereus pleurocarpus
Pilosocereus pleurocarpus
Coleocephalocereus pleurocarpus
Floribunda pleurocarpus
Pseudopilosocereus cleistocactoides nom. prov. (HU list 1972)

Cipocereus pleurocarpus was discovered by Ritter in 1964 and is endemic to the Serra do Cipó in Minas Gerais, Brazil. It is the type species of the genus *Cipocereus* established by Ritter. The plant grows at elevations between 700 and 1500m in quartz grit in rock crevices. There is hardly any organic material. There are no quantitative data on the size of the population(s). On the same mountain ridge, somewhat more to the south where the mountain area has a different name, grows *C. minensis ssp. minensis*. Both species resemble each other and can easily be confused.

C. pleurocarpus is a greenish cactus up to 50cm tall. The stems have a diameter of 2.5cm and 10–16 ribs. The needle-like spination is yellow to yellow-brown and is composed of 4–6 central spines and 8–11 radial spines. The plant can sprout, the lower branches spread over the ground. The flowers are open from sunset till the next morning. They are tilted upwards and arise up to close to the apex. They are 5cm long and 2.5cm wide. The ovary is gleaming red, the pericarpel pale yellow and reddish towards the bottom. The petals are yellowish with a light red point. Unripe fruits are yellowish-green, the ripe fruits are green to

red-brown, sometimes with a bluish shine. The seeds are brownish to black and 1.5mm long. The fruits are rarely found in nature, and if so, most of the time do not contain seeds as these are eaten by birds or insects. The fruits of *Cipocereus* are as wide as long and fall off when ripe. (The fruits of *Pilosocereus* are wider than long, stay on the stem then burst open when ripe.)

At the time Werner Uebelmann imported *Cipocereus pleurocarpus* into Europe under the field number HU111. As already described the stems are small, thick, very sappy and mostly lying down. The plant can take the light shade of trees and rocks or full sun. Sometimes it grows well on places lacking full sunshine. The flowers are pollinated by hummingbirds. Mammals and birds consume the pulp of the berries and spread the seeds. *C. pleurocarpus* is very susceptible in culture. The habitat is threatened by frequent (annual) fires of anthropic origin (caused by men) that are very harmful for the species. As a consequence the plants cannot flower or produce fruits in between the fires. For that reason not enough seed is produced to assure the preservation of the species. Due to climate change the present habitat of *C. pleurocarpus* (and many other elements of the vegetation) can become inhospitable. Migration to higher places is not possible since the plants already occur on the highest mountain ridges. Hence measures must be taken to guarantee the conservation of the species. *C. pleurocarpus* can be found on several places, amongst others not far from Santana do Riacho and Jaboticatubas, close to a lake, together with *Pilosocereus aurisetus* var. *densilanatus*.

Acknowledgements

Thanks to Pierre Braun, Celso Lago-Paiva, Eddie Esteves Pereira, Hans Frohning, †Werner Uebelmann and Graham Charles for permission to use their pictures.

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Gymnocalycium pflanzii

Peach is an unusual colour for a cactus flower, but it can sometimes be found on plants of *Gymnocalycium pflanzii*. Graham Charles grew seeds he had collected west of Palos Blancos, Bolivia, and the seedlings produced pretty peach flowers.

Figure 1. *Gymnocalycium pflanzii* at habitat GC864, west of Palos Blancos, Bolivia at 1070m (31st October 2006). The plants were plentiful on steep earthy slopes with quartzite rocks and there were ripe fruits on some.

Figure 2. A seedling of GC864.03 from seed collected at the habitat in Figure 1.

Figure 3. The ripe fruit of *G. pflanzii* (*millaresii*) with its unique horizonatal split revealing the red pulp within.

Gymnocalycium pflanzii can be found over a large distribution area in Bolivia and northern Argentina, extending just into Paraguay. The first description of the plant by Vaupel in 1923 stated that the flowers are a salmon colour but they are actually more usually white.

The type form has fruits that, when ripe, split horizontally, a character unique in the genus. They usually split vertically as they do in *G. pflanzii* ssp. *zegarrae* which also differs by its white pulp. The seeds are small and the very young seedlings need to be kept moist to avoid losses. GC

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

Issue 23 of *Xerophilia* appeared in February 2018. It is published in English as well as the language of the original article. The quality contents are impressive and varied. There is lots to read in its 102 pages.

Contents include: · Editorial;· Xerophilia 23's Favourite Quote ; Peyote: Worship and Constraint; Enemy Plants; New records of interesting non-native succulents from Alicante; *Mammillaria orcuttii* Bödecker, not rare but beautiful; Notes on some species of the genus *Ariocarpus*; Succulents from the southwestern deciduous forests of Romania; First record of *Aeonium simsii* in New Zealand; Over-fertilization, a determining factor of aberrant growth.

The magazine may be downloaded free as a pdf from

http://xerophilia.ro

Contact: xerophilia@xerophilia.ro

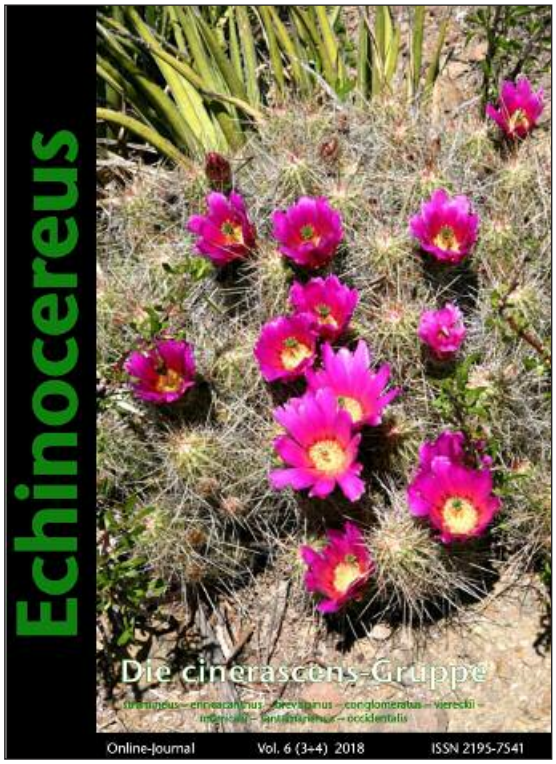
ECHINOCEREUS Online-Journal

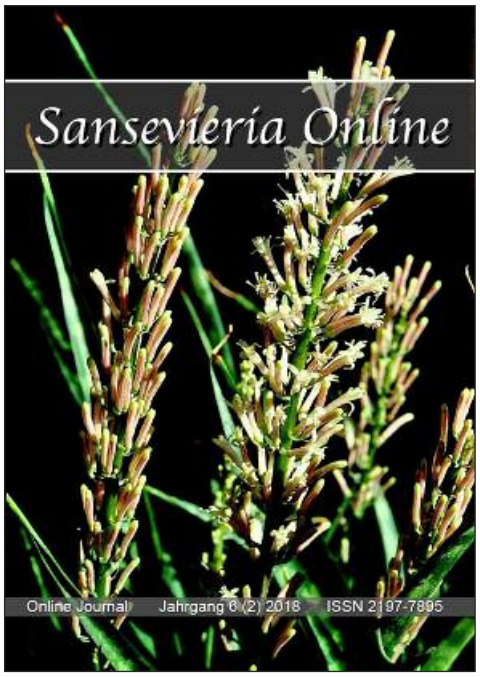
The German language on-line journal for Echinocereus lovers. The goals of this journal are to study the genus *Echinocereus*, to publish articles about the continuous research on these plants (classification, morphology, evolution) as well as to protect the genus *Echinocereus* by reproduction from seeds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

This issue, published in October 2018, concerns the Echicereus cinerascens group: *E. stramineus*; *E. annaecanthus*; *E. conglomeratus*; *E. viereckii* and *E. occidentalis*.

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: *Sansevieria dooneri* and *Sansevieria parva* -two species in the valley of Lebens; Observations on Sansevieria flowers; Sansevieria in the botanical garden of Bochum; A botanical rarity and its culture -*Sansevieria pinguicula*; From historical descriptions (2); Cherished Sansevierias presented.

There is a cumulative index published for 2013–18.

Download the PDF from www.sansevieria-online.de where you can also find a special issue containing field

Schütziana

The latest issue of Schütziana, the specialist on-line journal for *Gymnocalycium* enthusiasts, was published in December 2018 and features 2 articles:

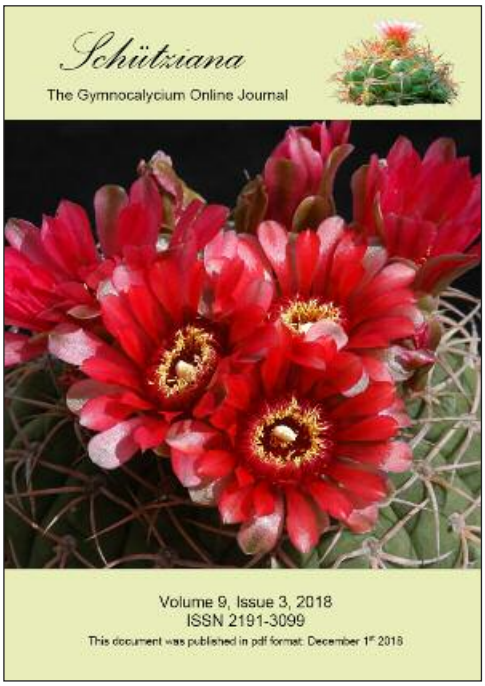
1. About the nomenclatural status of *Gymnocalycium carminanthum.*

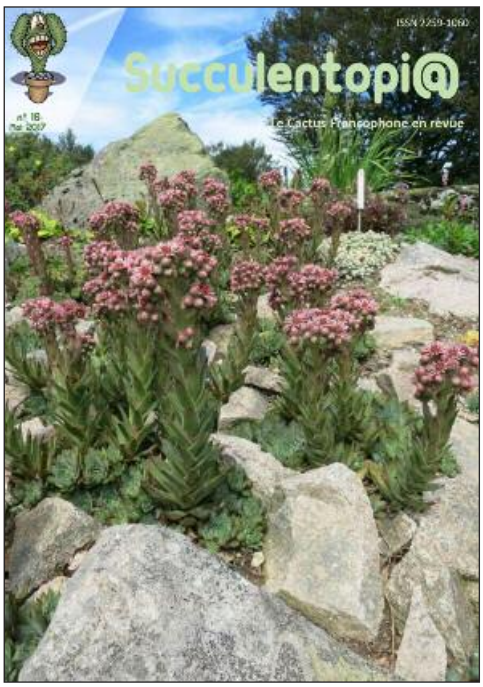
2. The seeds of the genus *Gymnocalycium.*

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

You can download free all the issues from:

www.schuetziana.org





Succulentopi@

More than a year has passed since the last Succulentopi@ was published, No.16 appeared in May 2017.

This was the first online journal published in French. The quality is excellent as you would expect from Yann Cochard and his enthusiastic team.

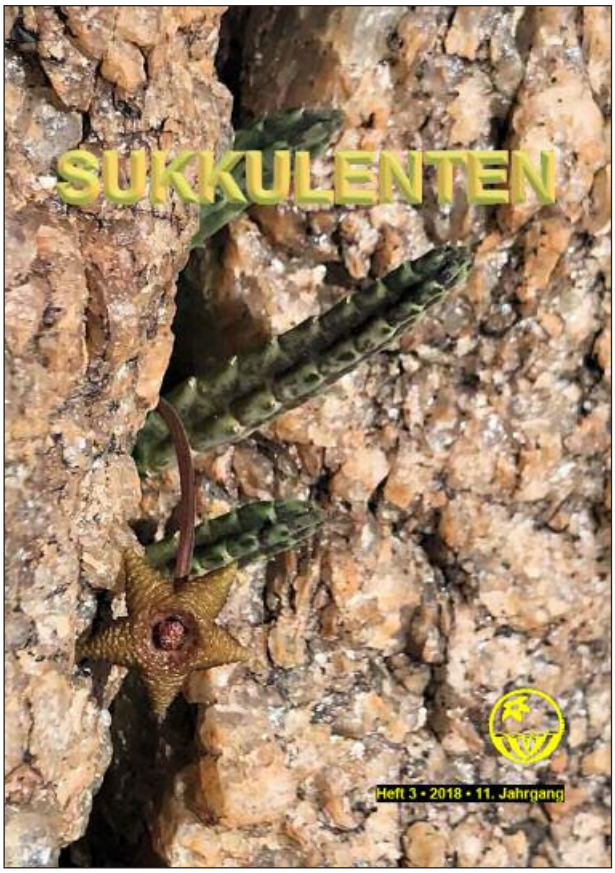
It is available as a free PDF download from:

http://www.cactuspro.com/succulentopia

This issue includes experience with *Toumeya papyracantha*; The genus *Acanthocalycium*; Photo Gallery; 4 pachypodiums from Madagascar; Substrates and their composition; Philately and the CactusPro Library.

I hope we see more issues soon!

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 monthly on-line newsletter has been called "Sukkulenten"

This issue, No. 3 of 2018, discusses The genus *Huernia* and other succulents in Angola, part 4; *Crassula muscosa* – The Wolf claw Crassula and *Sempervivum ciliosum*.

It is very well produced with excellent pictures.

See website: www.fgas-sukkulenten.de

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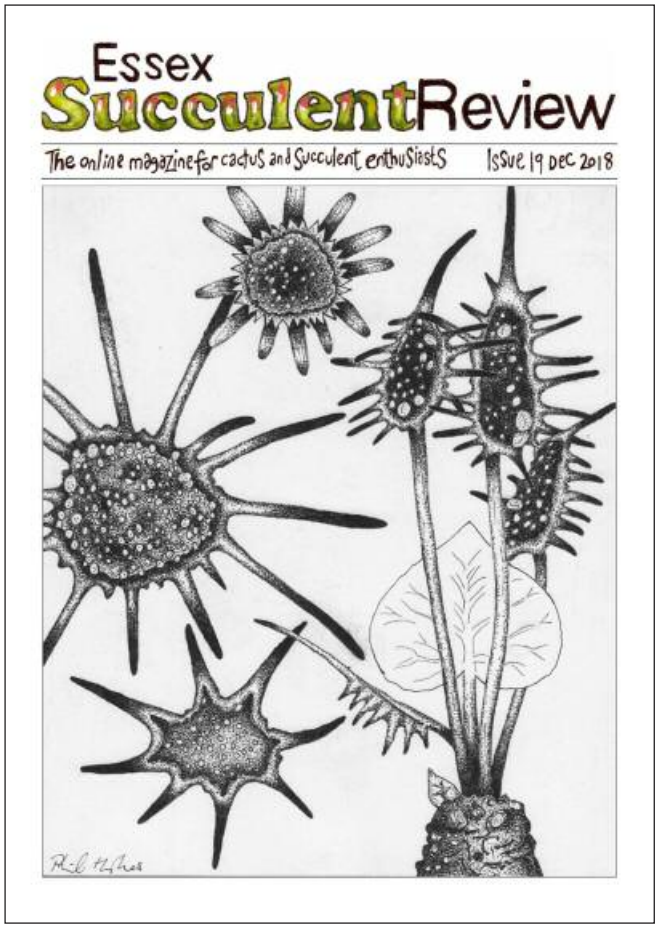
For membership and further information contact:

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

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



Essex SucculentReview

Written by growers for other growers

The Essex Succulent Review is a high quality quarterly on-line UK newsletter featuring non-technical articles on all aspects of cacti and succulents.

Issue 19, published December 2018, features 40 pages of: (Other) Favourite plants; Who knew conophytums grew on walls; Some true Turbinicarpus; The first Agave to flower in England?; Building a greenhouse; Training at Kew; Seed dispersal and Dorstenia (with many artistic drawings).

You can subscribe to the mailing list to be notified by email when each issue is ready to download. Subscription is completely free and you can unsubscribe at any time.

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You don't have to live in Essex to read it!

The Love of Books

Sulcorebutias are very popular, free flowering, small cacti. Graham Charles discusses the genus and reviews the books that have been published about them.

It has been more than 65 years since Backeberg erected the genus *Sulcorebutia* in the GB Journal. Ever since then, there has been discussion as to whether *Sulcorebutia* really belongs to *Rebutia* or not. Some authors, such as Cardenas and Hunt, believed that they are are all rebutias which is where they were placed in the *New Cactus Lexicon*. Recent molecular studies show that sulcorebutias are not rebutias but belong in the older genus *Weingartia*.

At the time of its creation, the only species in *Sulcorebutia* was *S. steinbachii*, first described by Werdermann as *Rebutia steinbachii* in 1931. Nobody then had an idea that the genus would expand in the way it has. A reasonable estimate of the number of species today would stand at around 20 with innumerable subspecies, varieties and forms.

During the 1960s, Martin Cardenas, a Bolivian botanist, described many new species (as *Rebutia*). The genus grew further with descriptions from Ritter, Rausch, and others. The publication of new names continues to this day, fuelled by the explorations of enthusiasts for the genus.

The diverse appearance of individuals in a population, as well as the variation one can find from one hill to another, has presented a challenge to their nomenclature. This has resulted in a miriad of names for populations at botanical ranks that are not justified. It plays to the human desire to 'collect' and to 'get the set'. Even within these population names there is astonishing variation in appearance with different flower colours as well as spination density and colour (Gertel & Latin, 2010). This diversity may be due to the plants being in the process of rapid evolution, their short life cycle allowing there to be many generations in a short time.

The appeal of these plants also lies in their ease of cultivation and free flowering when grown in a glasshouse. Their neat appearance, small size, and ability to withstand low temperatures makes them ideal plants to collect and grow. Many clones produce offsets, allowing easy propagation and facilitating the exchange of material with like-minded people. Serious collectors like having plants with field numbers. These are numbers that are given to plants when they are found in habitat and a particular number usually refers to a single population. For example (Figure 1):

Figure 1. *Sulcorebutia naunacaensis* VZ205/6 from the type locality, 27km northwest of Mojocoya, Co Naunaca, Bolivia at 2850m (6cm pot).

Sulcorebutia naunacaensis VZ205/6. This number tells us that the plant is from VZ, the acronym for Johan de Vries and is clone 6 from his habitat number 205; 27km northwest of Mojocoya, Co. Naunaca, Bolivia at 2850m, the type locality of S. *naunacaensis*

One of the benefits of field numbers is that the associated location is a certain fact, even if the identification of the plant is incorrect, so the name can be corrected later. Willi Gertel has put together an extensive list of field numbers and localities for *Sulcorebutia*. You can order his *Kompendium der Feldnummern der Gattung Sulcorebutia* - 7th edition from Willi. Contact him at willi.gertel@t-online.de in

English or German to order a copy.

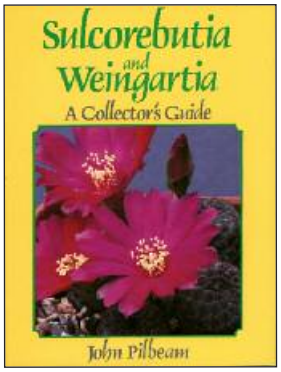
The idea to write this article started with the review in Cactus Explorer 22 of John Pilbeam's latest book which included pictures of some of the recently described *Sulcorebutia* species contributed by Johan de Vries. I was inspired to look for more information and was surprised to discover how many books have been published about these plants, not to mention the many articles in journals.

Here is what I found, in date order of publication. There may be more!

Brinkman, K-H. (1976). Die Gattung *Sulcorebutia*. Deutschen Kakteen-Gesselschaft.

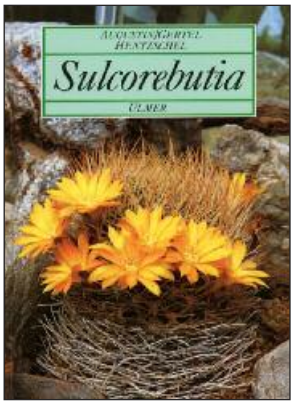
The first book about the genus, it is a useful review of the species known at the time. Soft covers, 79 pages with a few B&W pictures, line drawings and maps. German language. Available as a second hand book for about £25.

Pilbeam, J. (1985). *Sulcorebutia* and *Weingartia.* B. T. Batsford Ltd. London.



Illustrated with both colour and B&W pictures, this is the first comprehensive account in English. 144 pages, hardback. Available as a second hand book for about £20.

Augustin, K., Gertel, W. & Hentzschel, G (2000). *Sulcorebutia*. Kakteenzwerge der bolivianischen Anden. Eugen Ulmer.

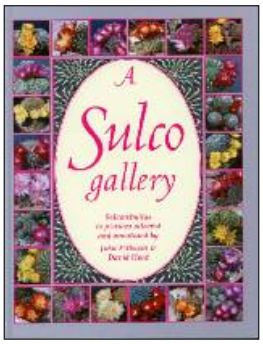


The first account illustrated with high quality colour pictures (159) integrated into the text. 180 pages, hardback. German language. Available as a second hand book for about £60 or a free download from https://www.cactuspro.com/biblio/en:augustin_gertel_hentzschel

Odehnal, J. & Slaba, R. (2001) Rod *Sulcorebutia* – poznámky pod čarou (footnotes). *Kaktusy* 2001 - speciál 2.

32 pages, soft cover. Czech language. Many good quality colour photographs.

Pilbeam, J. & Hunt, D. (2004) A Sulco gallery. DH books.

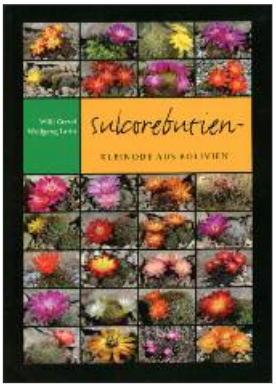


This a picture book of documented plants with brief notes. 64 pages, hardback. Still available new for £15.

Horáček, L. (2008). *Sulcorebutia* 2008.

Another comprehensive account with colour pictures and distribution maps. 288 pages, hardback. Czech language with English summaries. Buy new for £25.

Gertel, W. & Latin, W. (2010). Sulcorebutien - Kleinode aus Bolivien. Deutsche Kakteen-Gesellschaft e.V.



Surely the best book to date with an amazing 1358 colour pictures, all of excellent quality. A comprehensive account which illustrates many clones of each taxon, showing the remarkable diversity. This is one of the books published by the DKG for sale exclusively to its members. It is now out of print. Second hand copies are available but are expensive.

Slaba, R. (2012) Žlutokvěté sulkorebucie. (Yellowish sulcorebutias) *Kaktusy* 2012 - speciál 1.

36 pages, soft cover. Available in Czech or German. Good quality colour pictures of localities and species which can have yellow flowers, including some newer names. New £6.

Gentili, A., Jucker, H., Calestani, . & Lechner, P. (2016). Le sulcorebutie della Cordillera Mandinga. *Piante grasse Speciale* 2016, No.1.

76 pages, soft cover. Text in Italian and English. This is a really interesting description of searching for plants, illustrated with good quality colour pictures and maps.

Price new is 20€.

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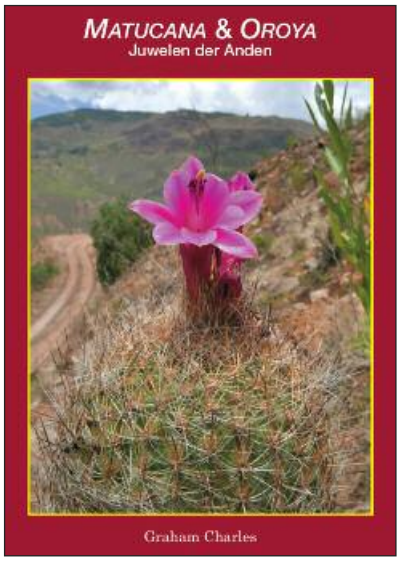
Backeberg, C. (1951). *Sulcorebutia* novem genus Backbg. *The Cactus and Succulent Journal of Great Britain* **13**(4): 96.

Hunt, D., Taylor, N. & Charles, G. (2006). *The New Cactus Lexicon*. DH Books.

Werdermann, E. (1931). Neue Kakteen im Botanischen Garten Berlin-Dahlem. *Rebutia steinbachii* nov. spec. Notizblätter des Botanischen Gartens und Museums Berlin **XI** (104): 268–270.

A new book from the German Cactus Society, the DKG.



Matucana & Oroya
Jewels of the Andes
Number 20 in the DKG's Sonderpublikation series.
144 pages, 170 × 240mm,
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Matucana & Oroya. Jewels of the Andes.

When the DKG asked me if I would write a book for their Sonderpublikation (Special publication) series, I was flattered to be asked to contribute to this impressive set of books. Since 2008, they have been publishing two titles a year exclusively for their members. It is seen as a member benefit, and it certainly is when you see the low price of the books.

My book deals with all the species of *Matucana* and *Oroya* in habitat and in cultivation. There are also chapters about history, distribution and cultivation. I am grateful to Andreas Hofacker, the President of the DKG, for translating my English text into German and for checking the proofs.

For those of you who would like a book in English about *Matucana* and *Oroya*, I am writing a more botanically oriented book, in the style of my *Gymnocalycium in Habitat and Culture,* which I plan to publish early in 2019. These beautiful plants deserve to be much better known, especially after recent discoveries have added to the choice available for cultivation.

Graham Charles

Succulents on a Plate

Graham Charles introduces us to the works of Abraham Munting with their curious botanical plates that feature landscapes and some succulents in ornamental pots.

Figure 95 from *Phytographia Curiosa* depicting *Aloe ferox*.

Abraham Munting (1626–1683)

Abraham Munting was a Dutch botanist and artist who studied medicine and botany as a young man and travelled extensively. Upon returning to Holland, he joined the University of Groningen and stayed for 24 years, becoming professor of botany and chemistry.

He was the son of Henricus Munting (1583–1658) and studied at the Rijkshogeschool Groningen. Because his father insisted that he would take over the famous Hortus garden, he continued to study and research, visiting the universities of Franeker, Utrecht and Leiden. He went to France in 1649. In 1651 he returned to Groningen and after his father's death took over the botanical garden. In 1672 his work *Waare Oeffening der Planten* was published followed by a second edition in 1682. In 1696 Pieter van der Aa in Leiden and Francois

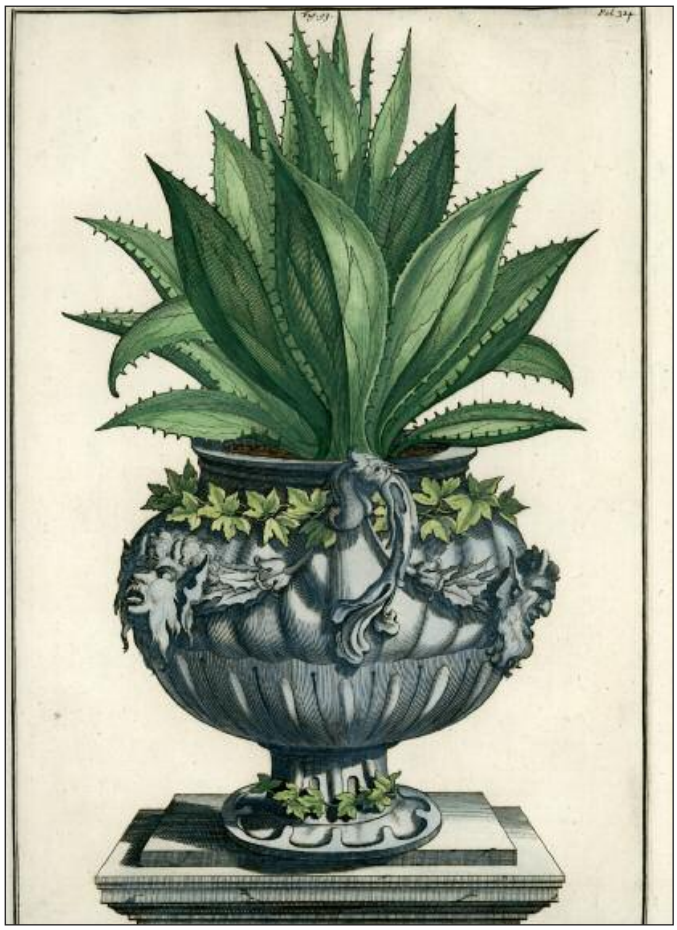

Figure 93 from *Phytographia Curiosa* depicting *Aloë americana minor.*

Figure 157 from *Phytographia Curiosa* depicting *Opuntia maior angustifolia.*

Halma in Utrecht published a very extensive version of this work which included 245 plates under the title *Naauwkeurige Beschryving Der Aardgewassen*. In 1702 his work was translated into Latin by Franz Kiggelaer. Munting was a rector of the Rijkshogeschool Groningen (1675–1675) where, after his death in 1683, his son Albert Munting took over the botanical garden. The 1696 publication *Naauwkeurige Beschryving Der Aardgewassen* [Accurate Description of Terrestrial Plants] was published posthumously by Pieter van der Aa & Francois Halma, Leyden & Utrecht, Netherlands.

It is an unusual early florilegium which adopted an curious style of botanical illustration that now seems rather bizarre; monumental plants fill the foreground or float in mid air above idyllic and sometimes classical landscapes in the distance. Some are shown in decorative urns. The Latin names of the species are presented on ribbon-like scrolls or tablets. It is not known whether this innovative inclusion of landscapes as a backdrop to botanical studies was Munting's idea or that of the artists who completed this work after his death. Among the images are trees, shrubs, flowers, and grasses of temperate zones, along with a number of tropical and subtropical plants imported for cultivation into the Netherlands. It appears that this unusual presentation of the subjects made this book very popular.

Phytographia Curiosa was later published in Amsterdam (1713). It comprised two parts (text and plates) in one volume, folio, containing 245 engraved plates of plants, some or all possibly by Joseph Mulder. This is the second issue of the Latin edition of the author's *Naauwkeurige beschryving der Aardgewassen* (1696) based, in part, on his *Waare Oeffning der Planten* (1672). The illustrations are remarkable for their elegance and originality, following the style of the earlier work.

GC

Matucana aurantiaca at the Laguna Sausacocha

Holger Wittner, a specialist in Peruvian cacti, tells us about his visit to Laguna Sausacocha, a lake high in the Andes near to the pleasant city of Huamachuco. Photographs by the author.

Peru is currently experiencing a rapid economic upswing. In the mountain regions, new mines are constantly being opened from which ores are extracted using open-cast methods. This involves the expansion of roads leading to Lima so that the ores can be quickly transported to the port of Callao and shipped all over the world. Modern filling stations are springing up like mushrooms. Of course, all this has its price in the form of removing complete mountains. One of these regions is that around Huamachuco, capital of the province Sanchez Carrion in the region La Libertad. The journey from Lima led us on our trip in July 2018 to North Peru in the regions of Cajamarca and Amazonas, also via Huamachuco.

When we wanted to continue to Cajamarca after an early stopover on the rather arduous route via Cajabamba, a stop at the Laguna Sausacocha (3164m) was definitely planned. Very early after sunrise we were there. The evening before it had rained lightly and the sky was cloudy. Nothing of that was to be seen any more early in the morning. On the contrary: A bright blue sky but at temperatures just above zero degrees Celsius seemed perfect.

The locals rode on motorcycles with several ponchos on top of each other and apparently using everything they normally had available to wear. We were looking for *Matucana aurantica*, which has been known from the Huamachuco area for a long time. It was clear that one would not find it at the roadside and therefore we went higher up as with other finds. It was noticeable that here, the rocks consisted mainly of granite with a high quartz content that were already strongly weathered. This leads to the fact that there are whole areas that are covered with snow-white quartz sand.

Figure 1. Laguna Suasacocha near Huamachuco; note the mined mountain in background.

Figure 2. *Matucana aurantiaca* with many offsets.

Figure 3. Very healthy and strong flowering *M. aurantiaca*.

Figure 4. Old *M. aurantiaca* covered with lichens on the lower part.

Figure 5. Old *M. aurantiaca* covered with lichens on the lower part.

Figure 6. Small seedling.

Figure 7. Snow-white quartz sand and searching the picture: How many plants here are shown? (8)

Figure 8. The biggest plant found here of *Matucana aurantiaca*.

Figure 9. A little group of plants, one with a bud (5 heads).

Figure 10. A big *M. aurantiaca* with longer denser more yellow spination.

Figure 11. The second flowering plant, only 4cm in diameter.

Now in the dry season, in the Peruvian winter, almost all the grasses were dead and looked brown, yellow or grey. This is exactly the colour of the spines that *Matucana aurantiaca* seems to camouflage itself with here. Fortunately, there were two flowering plants, which quickly led to the discovery of further specimens. The plants seem to fight for survival all year round, are relatively small, often sprout and prolifically. Only very few really strong old specimens were to be found. As already seen with *Matucana aurantiaca* in the region of Cumbe Mayo near Cajamarca at over 3400m (Wittner, 2017), similarly here at well over 3000m altitude, the relatively thick spination prevails. Also in culture, specimens grown from seeds do not cause any problems, then they have their best growth and flowering time especially in spring and autumn in humid, cool but sunny weather. They feel most comfortable at a maximum temperature of 15–20°C by day.

After this highlight in the mountains, we should now continue into the rainforest, which also surprised us with cacti.

WITTNER, H. (2017). *Matucana aurantiaca* at Cumbe Mayo, above Cajamarca (Peru). The *Cactus Explorer* **19**: 17–20.

Holger Wittner

The Totem Pole Cactus – Lophocereus schottii f. monstrosus

Chris Sherrah tells us about his search for the Totem Pole cactus in Baja California. This curiosity has aroused interest since its discovery and it is interesting to know how it is surviving in the wild today. Photographs by the author.

In April 2016, in the company of Brian Bates, I spent the month travelling in Baja California. One of our goals was finding *Lophocereus schottii* f. *monstrosus*, H.E. Gates. *Lophocereus schottii* is widespread in Baja California, however, we only knew two locations for the monstrose form: the original location "1 mile north east of El Arco" reported by Lindsay in 1963 and "9 miles north west of Rancho Santa Ines" reported by Clark and Blom (1982).

The monstrose form first appeared in the literature in 1931 and the population was later described by Lindsay in 1963 as a mile long by several hundred yards containing over a thousand plants. By 1981 the population at El Arco had declined to over 200 plants according to Clark and Blom (1982). In 1989 only the normal form of this iconic plant was reported at the El Arco locality. The monstrose form disappeared through collecting due to its popularity as a landscape plant.

Fasciation is the term used to describe abnormal growth in plants. In cacti this usually manifests either as a crest / cristate or as monstrose growth. The causes of fasciation include environmental stress, genetic

Figure 1. *Lophocereus schottii*, Santa Ines

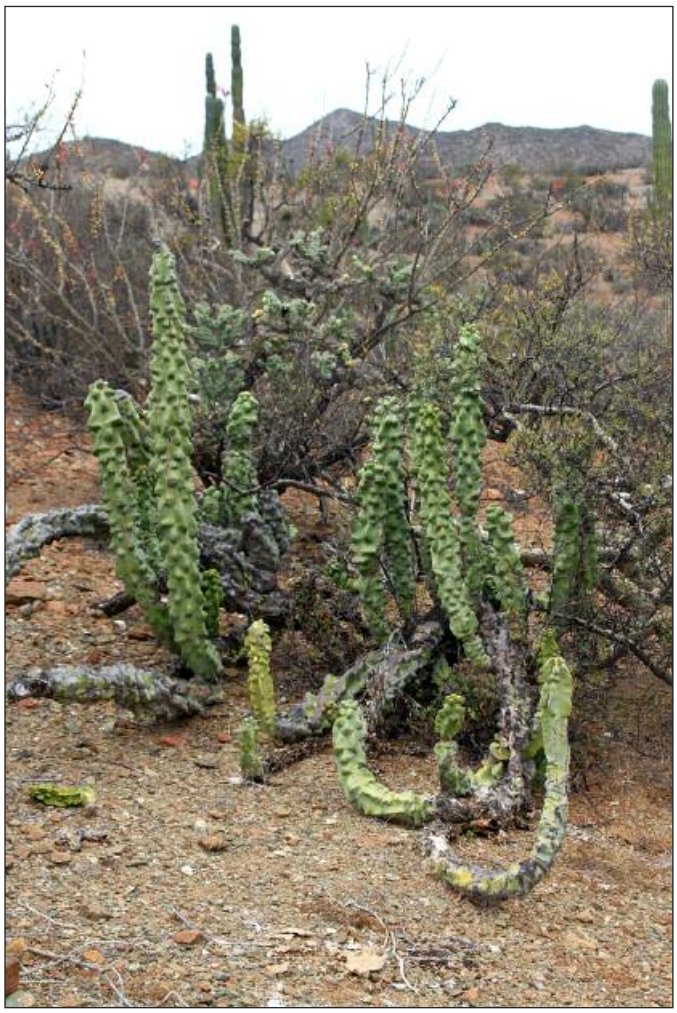

Figure 2. *Lophocereus schottii* f. *monstrosus*, El Arco

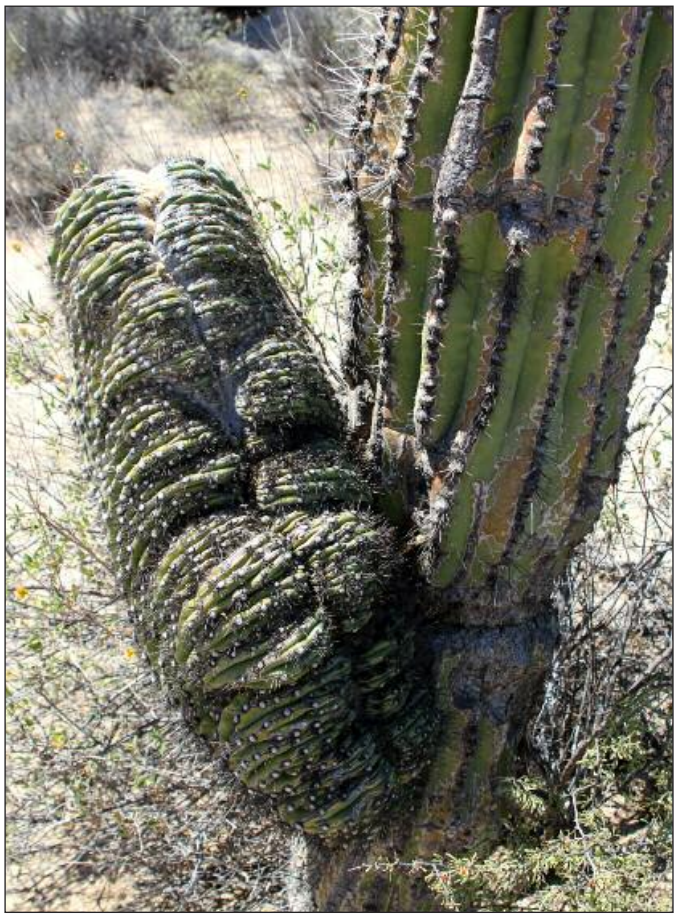

Figure 3a & b. *Pachycereus pringlei* cristate branch growing from a normal trunk above.

Figure 4. *L. schottii* f. *monstosus* clump with regular growth and flower buds.

Figure 5. *L. schottii* flowering from its cephalium.

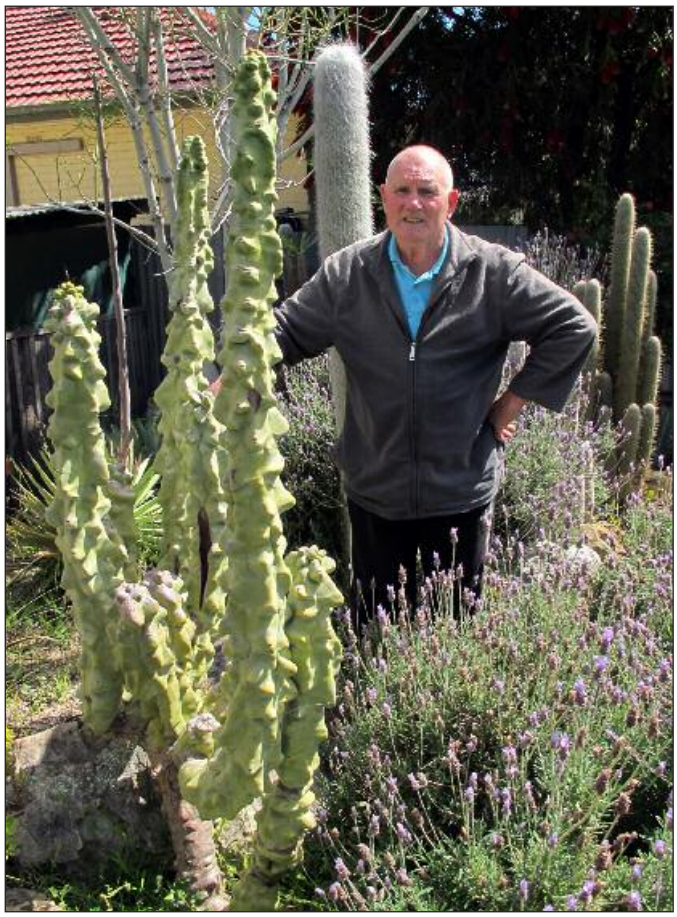

Figure 6. A popular landscape plant - in the garden of Alan Nowell.

mutation, hormonal imbalance, viral, fungal or bacterial attack. In a cristate the abnormal growth occurs in the meristem resulting in fan-shaped growth such as displayed in the *Pachycereus pringlei* (Figure 3). A monstrose cactus has abnormal growth activated in multiple areoles. The example of *L. schottii* f. *monstrosus* shown in Figure 4 has sections of monstrose growth which revert to regular growth. I say regular, rather than normal, as there are flower buds present, but they are not emerging from a cephalium.

Our plan in relation to *L. schottii* f. *monstrosus* was to stop at Santa Ines as we headed south from Los Angeles for a day, followed by a day at El Arco, and then repeat the process in reverse if we were unsuccessful on our return north from La Paz. We stopped 9 miles north of Santa Ines and each took a side of the highway and started walking. No monstrosus, but after 4 hours we had seen many beautiful cacti and succulents in stunning scenery. We decided to continue south into Santa Ines and ask the local

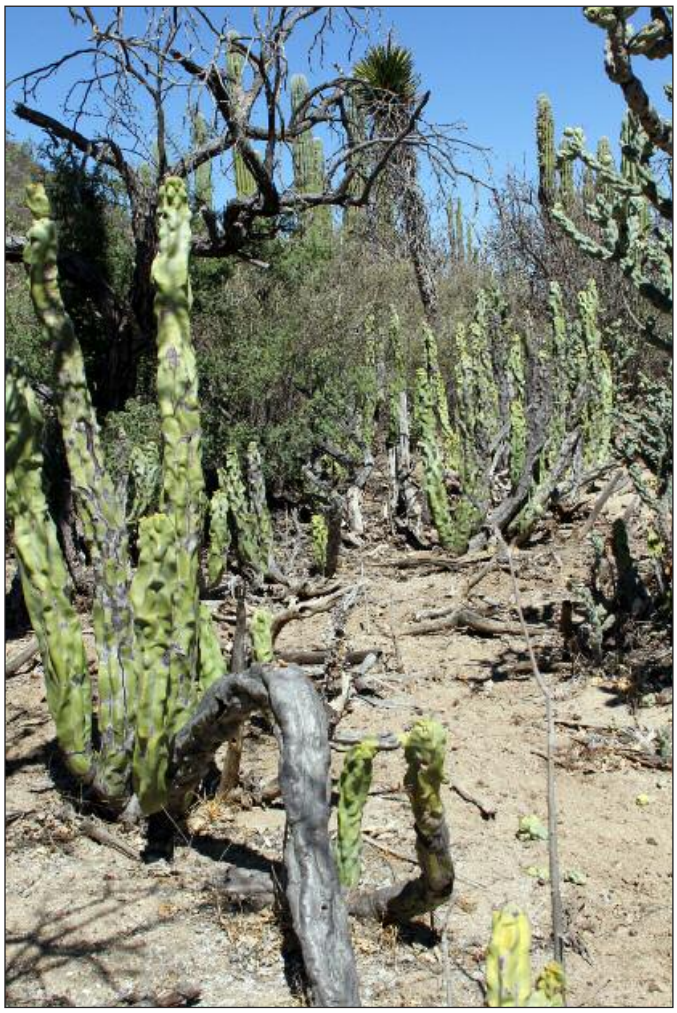

Figure 7. The original population of *L. schottii* f. *monstrosus* north of El Arco.

inhabitants. After drawing a few blanks, we were given directions to a plant by an elderly gentleman. A short drive later and just as the sun was setting we came across, not our objective, but the most bizarre *P. pringlei* I have ever seen

The next day we continued south to El Arco, and as the scrub was thicker there, we decided to go straight to the mine and ask first. The supervisor, Javier Arce, looking at our photographs said "follow me" and took us over to a miner's cottage where a stem of *L. shottii* f. *monstrosus* was planted in the garden. "Where did it come from?" we immediately asked together. Another "follow me" and 2 kilometers later we were standing next to a lovely clump of monstrosus. There were 3 clumps in the vicinity, but this was not north of El Arco, so it couldn't have been the original location.

Two weeks later we returned to El Arco from the south and spent another day

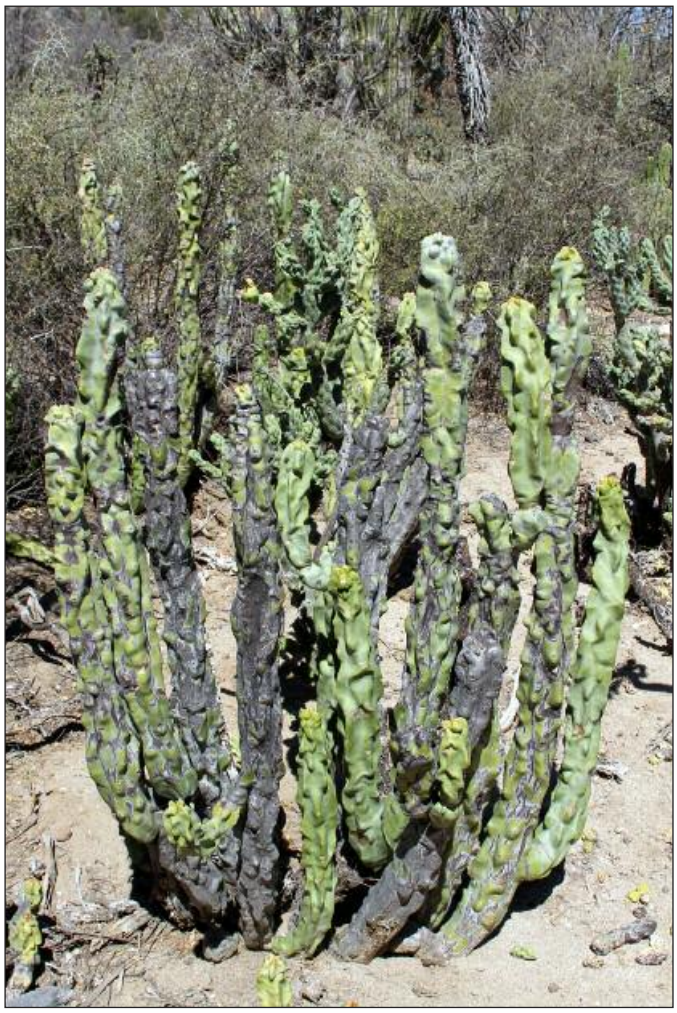

Figure 8. The original population of *L. schottii* f. *monstrosus* north of El Arco.

searching dirt tracks, this time to the north. Around midday we noticed a pickup parked 15 metres off the track in thick scrub and decided to stop and ask the occupants if they knew of *L. schottii monstrosus*. There was no-one around, but we didn't have to ask, all around were clumps of *L. schottii. monstrosus*, not visible from the track, we had found the original location!

I spent the afternoon recording the coordinates of each thicket of stems on my GPS to prepare a plot later. There were 18 clusters, each with up to 40 stems. Unfortunately, the GPS was stolen later, so a plot cannot be presented here. However, my diary notes that many of the thickets grew from horizontal stems on the ground and the area followed the overflow area of a wide dry river course. Following two small dry creek beds that flowed into the river bed upstream revealed no *L. schottii monstrosus* only *L. schottii*. I therefore think that the population is likely to consist of one clone, spread when the river flows, breaking stems, and depositing them downstream. Clark and Blom postulated that the Santa Ines population may have been spread by missionaries in the area due to the presence of an aloe in that population. Or could the flowers pictured in Figure 5 produce viable seed? Whatever the answer, Baja California is a beautiful region to explore and the 'Totem Pole' remains an iconic and desirable cactus.

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Chris Sherrah

The Crassulaceae of El Hierro (Canary Islands)

Marco Cristini takes us on a fascinating walk around the island of El Hierro where he tells us about the many succulents he saw there. Photographs by the author.

El Hierro is the smallest and western-most of the Canary Islands. Often called Isla del Meridiano (the Meridian Island), it was used as a key reference for maps in early modern Europe, since its meridian was considered the prime meridian (Greenwich was adopted at the 1884 International Meridian Conference). With an area of 269km^2 and a population of more or less 10,000, El Hierro has not suffered from the impact of human activities as much as the other islands, being able to preserve its biodiversity and its main ecosystems.

Succulent plants grow in every habitat and can be easily observed while walking on one of the many paths and roads which cross the island. In August 2018, I spent five days in El Hierro looking for *Crassulaceae* species, which are an important part of the island's flora and can be easily spotted when driving from the airport to Valverde, although the better way to find them is walking. Paths are almost always well-marked and there are many signs at crossroads, so exploring El Hierro on foot is not difficult, but one has to keep in mind that the island is a former volcano and that quite a few species live on sheer cliffs.

The path called Camino de Jinama offers a good overview of the local flora. Starting from the church of Nuestra Señora de Candelaria (Frontera, 350m), it reaches the Eremita de la

Figure 1. Map of El Hierro (Source www.elhierro.travel)

Figure 2. Camino de Jinama, a stone wall is covered by *Aeonium canariense* var. *palmense*

Figure 3. *Aeonium canariense* var. *palmense* (close-up), Camino de Jinama

Figure 4. Camino de Jinama, the laurisilva.

Figure 5. *Aichryson laxum* (Camino de Jinama)

Figure 6. *Aichryson punctatum* (Camino de Jinama)

Figure 7. A flower of *Aichryson punctatum* (Camino de Jinama)

Figure 8. Flowers of *Aichryson punctatum* (Camino de Jinama)

Figure 10. A possible cross between *A. aureum* and *A. arboreum* var. *holochrysum*

Caridad (1200m) after a three/four hour climb which takes you from the dry coastal zone rich in euphorbias, opuntias and agaves to the laurisilva and the alpine zone, with meadows and pines. *Aeonium hierrense*, *A. canariense* var. *palmense* (*A. canariense* ssp. *christii*, according to Bañares Baudet *et al.*, 2008) and *A. arboreum* var. *holochrysum* thrive in Frontera, on stone walls, old houses or rocky outcrops. At the beginning of the path, there is a long stone wall which is literally covered by *A. canariense* var. *palmense*. The succulent takes advantage of the water which is used to irrigate gardens and cultivated fields and can become quite big (20–30cm in diameter). I noticed that *A. hierrense*, although widespread in Frontera, is very rare along Camino de Jinama, whereas *A. arboreum* var. *holochrysum* can be found along the whole path. There are bushes up to 2–3m tall and the stems of the biggest *A. arboreum* var. *holochrysum* can be up to 10cm in diameter. On stone walls, there are also a few specimens whose leaves are quite a bit wider than those of the average *A. arboreum* var. *holochrysum*. The reason of this feature could be proximity to a water source or better soil, but I would not rule out the possibility that these plants are the outcome of a natural cross between *A. arboreum* var. *holochrysum* and *A. hierrense* (i.e. *Aeonium* x *isorense*, which grows near Isora and San Andrés according to Bañares Baudet, 2015: 175), whereas I would exclude a cross with *A. canariense* var. *palmense*, since the leaves of the possible hybrid are by no means pubescent.

Figure 9. An open *Aeonium aureum* (Camino de Jinama)

After entering the laurisilva, *A. canariense* var. *palmense* can be seen mostly on rocky outcrops and vertical cliffs, but it grows also under the trees, like *A. canariense* var. *canariense* in Tenerife, although it does not seem to appreciate the shade as much as Tenerife's subspecies. I observed only twice *Aeonium valverdense*, a beautiful plant with yellowish-brownish pubescent leaves, abundant in the southern part of the island.

The moist laurisilva is the habitat of *Aichryson laxum*, which grows in shady places on mossy rocks or near the roots of trees. Small and stressed plants are densely covered by short white hairs, whereas the pubescence is less evident in bigger plants. The leaves are often covered by dark dots or speckles. When I arrived in El Hierro, the majority of plants had already flowered (I spotted many spent inflorescences), but I was able to take a photo of a late inflorescence. The specimens of *A.*

Figure 11. El Golfo seen from Eremita de la Peña

Figure 12. A very stressed *Aeonium spathulatum* (La Cuesta)

Figure 13. *Aeonium hierrense* (La Cuesta)

Figure 14. A spent inflorescence of *Aeonium hierrense* (left) and a mature specimen (right) in La Cuesta

laxum I saw in the laurisilva of La Gomera were often bigger, but I think that it depends on the presence of running water or very damp soil near the plants.

At around 850m, Camino de Jinama borders a vertical cliff where *A. canariense* var. *palmense* grows together with *Monanthes muralis*, a tiny succulent which looks quite dried up in August. The first plants of *Aeonium aureum* are found close by, then one can rest for a moment and enjoy a wonderful view of El Golfo from a nice miradero.

I began to spot *Aichryson punctatum* above 1000m. It is much less common than *A. laxum* and it is easily identifiable by observing its glabrous leaves, with crenulated margins tinged with red dots. In August, there were a few inflorescences in blossom, with fewer and wider petals than *A. laxum*. I spotted a possible hybrid between these two species (*Aichryson* x *intermedium*) at around 1000m. Unfortunately, I was not able to see *A. parlatorei*, which is an annual succulent flowering from January to May/June (Lodé, 2010: 144; Bañares Baudet, 2015: 207). However, there were many dried little inflorescences on shady outcrops and I think that they could be what remains of *A. parlatorei* after the blossom.

Above 1000m, *Aeonium aureum* becomes the prevailing succulent species, occupying the same ecological niche as *A. canariense* var. *palmense* (rocky outcrops and vertical cliffs). The rosette of *A. aureum* usually folds inwards on itself during its summer dormant phase and I saw specimens resembling a little ball on La Gomera. In El Hierro, however, rosettes were more open and quite a few showed no sign of folding inwards, maybe because the upper part of Camino de Jinama is covered by fog for a few hours almost every day and the humidity thus provided allows these plants to be less sensitive about losing water due to evaporation than those living in more arid environments. Specimens growing on vertical lava cliffs have many offsets and are very attractive due to the contrast between the light green leaves and the brown-black lava.

I observed an unusual succulent near a cliff

covered by *A. aureum* (not far from Eremita de la Caridad, at around 1200m): it resembles *A. arboreum* var. *holochrysum*, but is much shorter and has fewer, wider, more rounded and pallid leaves, which are bigger than the usual summer-leaves of the parent and not as closely imbricate and depressed as in its inner rosette (Figure 10). If I had found the plant lower, I would have thought of *A. hierrense* as a parent, but I did not see any *A. hierrense* close by, whereas *A. aureum* is abundant there and *A. arboreum* var. *holochrysum* is not uncommon. I was unable to find any mention of such a cross in literature (see for instance Mottram, 2015), apart from Schulz, who writes that "*A. aureum* freely hybridizes with *A. canariense* and *A. arboreum*" (Schulz, 2007: 55) and Lodé, who published a photo of an unnamed *Aeonium* x *Greenovia* of El Hierro (Lodé, 2010: 247). However, such a cross is in my opinion possible, since *A. aureum* hybridizes with a few aeoniums *sensu stricto* (e.g. *A. spathulatum* or *A. undulatum*) and its flowering [in March–July according to Lodé (2010: 238); in March-May according to Bañares Baudet (2015: 101)] and that of *A. arboreum* var. *holochrysum* [in November–June according to Lodé (2010: 70); in December–April according to Bañares Baudet (2015: 62); Praeger (1928: 476) saw a flowering specimen in Jinama in the middle of May] partially overlap.

At the end of Camino de Jinama (next to Eremita de La Caridad), there is a miradero from which all people brave enough to reach it can admire a wonderful landscape, encompassing the whole of El Golfo; besides, one can spot a few *Aeonium aureum* growing on vertical cliffs. Eremita de La Caridad is on the plateau which covers the central part of El Hierro, where there are many paths bordered by stone walls, but I did not spot any succulent living on those located west of San Andrés, perhaps because they are used to fence pastures for horses, cows and sheep. I do not know for sure whether aeoniums are a delicacy for equine, bovine and ovine gourmets, but I suspect that the answer is positive, since *Aeonium arboreum* var. *holochrysum* and *A. aureum* grow in the near town of San Andrés and along the path leading from San Andrés to La Cuesta, where grazing animals are absent. Apart from cattle, the local fauna I met was represented by lots of grasshoppers leaping away upon the arrival of a human intruder and quite big spiders weaving their webs across the path. Walking in El Hierro, I ran into dozens of spiderwebs, which made me think that either the local spiders are exceedingly quick and industrious or there are not many tourists crossing the island on foot in August. Since one day I had met none after walking for nine hours, I am inclined towards the second conjecture.

Proceeding towards Los Llanos, I found many *Aeonium spathulatum* bushes on stone walls, especially at the crossroad with another path going west. This succulent is said to live in the pine forest zone, but I was unable to spot it in any area covered by pines which I visited, maybe due to the fact that *A. spathulatum* is reduced to tiny balls of clasping leaves on the tips of the branches in August and thus cannot be easily located in the half-light of a wood.

Near La Cuesta, at the crossroad with the path coming from San Andrés (27.76407°N, 17.94532°W, at around 900m), I saw a single stemmed succulent similar to *Aeonium hierrense*, but smaller and whose leaves were fewer, wider, more rounded and turned inwards like those of *A. aureum* (Figures 15 & 16). Since both species grow there, I believe that the plant could be *Aeonium aureum* x *A. hierrense*, although also this nothotaxon seems not to have been reported until now. *A. hierrense* flowers between March and April/May (Lodé, 2010: 68; Bañares Baudet, 2015: 133), so a cross is theoretically possible.

Another likely hybrid to be found there is *A. arboreum* var. *holochrysum* x *A. hierrense* (*Aeonium* x *isorense*): a plant almost as tall as *A. hierrense* and consisting of a stout large stem, but with a few short minor branches near the top.

Pista del Canal, a road along an aqueduct leading from Frontera to Sabinosa, in the western part of the island, is recommended to all people who desire to see the most important species of the local succulent flora without having to climb up for at least 400–500 metres. The path is almost flat and it is bordered by cliffs and rocks hosting thousands

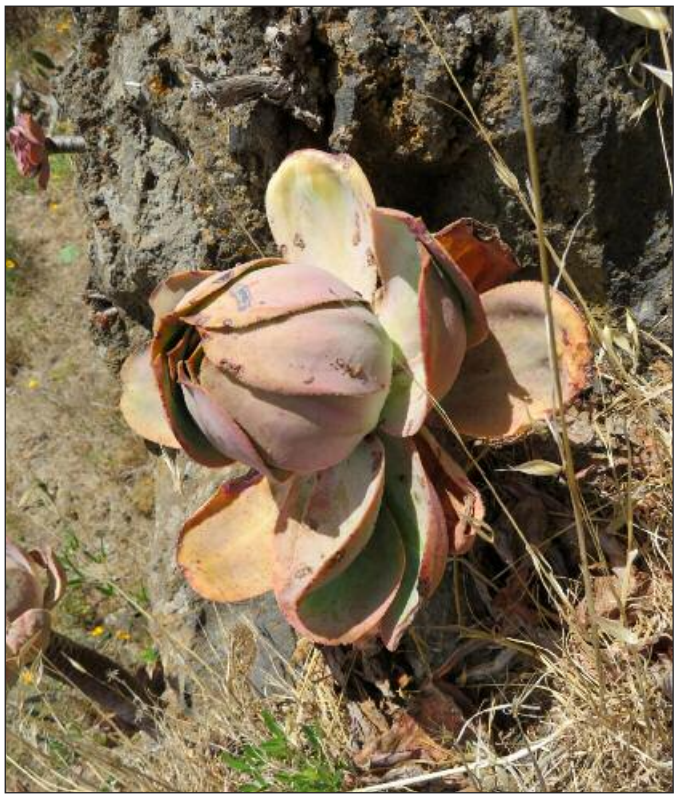

Figure 15. A possible hybrid: *A. aureum* x *A. hierrense*

Figure 17. *Aeonium canariense* var. *palmense* (Pista del Canal)

of *A. canariense* var. *palmense*. *A. hierrense* is also present, but it is far less common than its relative. As far as *A. valverdense* is concerned, I spotted a few specimens under Los Llanillos and two–three kilometres before Sabinosa. When stressed, it is quite difficult to tell this succulent apart from *A. hierrense*. The usual distinguishing features (branched stems vs. unbranched, yellowish leaves vs. green) are not helpful, because *A. hierrense* is not always single-stemmed and the leaves of both species can turn reddish in dry and sunny spots. The only way to distinguish the two species is to

Figure 16. A possible hybrid: *A. aureum* x *A. hierrense* (close-up)

Figure 18. A possible hybrid of *A. aureum* and *A. canariense* var. *palmense*

touch their leaves: if they are pubescent, the plant is *A. valverdense*; if glabrous, it is *A. hierrense*. A low, small and unbranched specimen of *A. valverdense* can also be confused with a young and stressed *A. canariense* var. *palmense*. Pubescence is not helpful to tell the two species apart, so one has to observe the stem. If it is entirely covered by dried leaves, the succulent should be *A. canariense* var. *palmense*, whereas it is *A. valverdense* if it is possible to see a portion of bare and woody stem. The situation is further confused by the presence of hybrids such as *A. canariense* var. *palmense* x *A. hierrense* (*Aeonium* x *jacobsenii*), *A. canariense* var. *palmense* x *A. valverdense* (*Aeonium* x *lambii*, Mottram, 2015: 18; Bañares Baudet, 2015: 166 prefers the name *Aeonium* x *edgari*) and *A. hierrense* x *A. valverdense* [*Aeonium* x *ombriosum*, which is reported by Bañares Baudet (2015: 146) between Frontera and Sabinosa], which I was unable to identify.

Figure 19. Pista del Canal (in the background, centre, there is Sabinosa)

Walking along Pista del Canal and observing small groups of *A. valverdense* growing side by side with *A. canariense* var. *palmense* and *A. hierrense*, I wondered whether *A. valverdense* could be a successful hybrid between the latter two aeoniums which, with the passing of time and evolution, turned into a species and occupied an empty ecological niche in the southern, drier part of the island, where its parents cannot thrive. This could explain why *A. valverdense* is common south of El Pinar and much rarer where also *A. canariense* var. *palmense* and *A. hierrense* grow.

I went to Sabinosa hoping to find *Monanthes pallens*, which was reported there by Bramwell (1974: 141). Although I looked for the plant below the town, inside it and above it, I was not able to locate any specimen. *Monanthes muralis* is only to be found 200–300m above Sabinosa and the outcrops I saw near the town seemed to me to be too sunny and dry to be able to host a population of monanthes. The species is reported also by Praeger (1928: 495; 1932: 231), albeit without a precise location, but I did not find it anywhere on the island and Lodé (2010: 278) was also unable to locate it, so I wonder whether small and stressed specimens of *M. muralis* could have been mistaken for *M. pallens*, although I am reluctant to accept that such an experienced botanist as Praeger had not been able to tell them apart.

Sabinosa is the starting point of a path which climbs up to over 1400m. It is not a leisurely walk, especially on a hot, sunny day, but it enables the visitor to experience the transition from the dry coastal zone to the laurisilva and from it to the pine forest zone. The humid woods over Sabinosa are rich in *Aichryson laxum* and host a good number of *A. punctatum* (especially after Piedra del Rey). *Monanthes muralis* is present from 500m upwards, on rocky outcrops.

Near the border between the coastal zone

and the laurisilva (around 500–600m), I spotted a plant which looked similar to *Aeonium canariense* var. *palmense*, but whose rosettes were flatter, slightly smaller and with more leaves, which were shorter, more pallid and more imbricate (Figure 18). I did not spot any *A. aureum* near by, but *A. canariense* var. *palmense* is abundant (near the laurisilva there are quite a few big specimens) and I saw some inaccessible vertical cliffs not far from there which could host a population of *A. aureum*, so I believe that the hypothesis of a cross between these two species should be taken into consideration, although such an hybrid, as far as I know, has never been described.

The mountains above El Golfo are connected by Camino de la Virgen de los Reyes, a route used once every four years for a religious procession starting from Valverde and crossing the whole island until the Santuario de Nuestra Señora de los Reyes. This panoramic path is not rich in succulents, but it takes the visitor across the higher part of El Hierro, a pine forest which sometimes looks similar to the forests of the Alps. As far as *Crassulaceae* species are concerned, *Aeonium aureum* and *Aichryson laxum* grow near Cruz de los Reyes. Along the road to Tenerista, it is possible to observe again *A. aureum*, growing freely on stone walls, and a population of *Aichryson punctatum*, on north facing mossy rocks.

In order to return to Frontera, one can go on along Camino de la Virgen de los Reyes up to the crossroad with the path coming from the Eremita de la Caridad or take Camino de San Salvador, a quite steep descent which crosses lava fields and the laurisilva, where I found another colony of *Aichryson punctatum* thriving on mossy rocks (this time in a very shady position), together with many *A. laxum*.

Moving from the West to the East of El Hierro, Valverde is a very good starting point, since many paths depart from it, thus enabling a careful exploration of its neighbourhood. Inside the town, I spotted *Aeonium canariense* var. *palmense*, *A. hierrense*, *A. valverdense* (not very widespread, on old stone walls or bordering paths, e.g. along that leading to La Caleta or at the Mirador de Las Pernadas) and *Crassula muscosa* (naturalized), but I was unable to find any *Monanthes muralis*. Bolle (1859: 245) saw it growing on walls near the main church and Burchard (1929: 145) writes that it is common in Valverde; the church and most of the old buildings of the town, however, have been entirely renovated at least once since the beginning of the twentieth century, so I think that *M. muralis* has been mostly removed. Walking towards Tiñor, I saw many very pruinose *A. hierrense*, a few of them branched. Burchard (1929: 133) reports of having found *A. percarneum* along this road, but Praeger (1932: 189) rightly doubts the sighting and conjectures that his predecessor might have mistaken *A. valverdense* for *A. percarneum*. I think that the error could also have occurred seeing a young, branched and stressed *A. hierrense* (see Figure 21). The best representatives of the local *Crassulaceae* flora can be observed along the roadbed of TF-912 north of La Caldereta, where I photographed nice specimens of *Aeonium arboreum* var. *holochrysum*, *A. canariense* var. *palmense*, *A. hierrense*, *Aichryson laxum* and *Monanthes muralis*.

I went to Valverde also in the hope of locating *Aeonium diplocyclum*, which Praeger collected "in 1927 in Bco. de Valverde near the head of the town" (Praeger, 1928, 485). I did not find any members of former genus *Greenovia* neither in Valverde, nor under or east of it, but I managed to spot four or five specimens at 780–790m, on the path south of Embalse de Tefirabe, west of Valverde. The plants were quite stressed, since they are growing in a sunny and dry spot. I found them indistinguishable from *A. aureum*. I had the same impression in La Gomera, where both species are said to be growing. There are no clear boundaries between these plants, which often share the same habitats and the same features; for this reason Schulz (2007: 54) believes that they are the same taxon, whereas Nyffeler (2003: 19) argues that the taxon is "hardly different from *A. aureum*".

There is a good degree of confusion in literature as far as the differences between *A. aureum* and *A. diplocyclum* and their habitat are concerned. Bañares Baudet, for instance, writes

Figure 20. A quite pruinose *Aeonium hierrense* (Valverde, path towards Tiñor)

Figure 21. *Aeonium hierrense* (left, El Hierro, Valverde, path towards Tiñor) and *A. percarneum* (right, Gran Canaria, Jardín Canario 'Viera y Clavijo')

Figure 22. *Aeonium arboreum* var. *holochrysum* (Valverde, path towards Tiñor)

Figure 23. A solitary *Aeonium aureum* (*A. diplocyclum* according to Praeger) near Embalse de Tefirabe

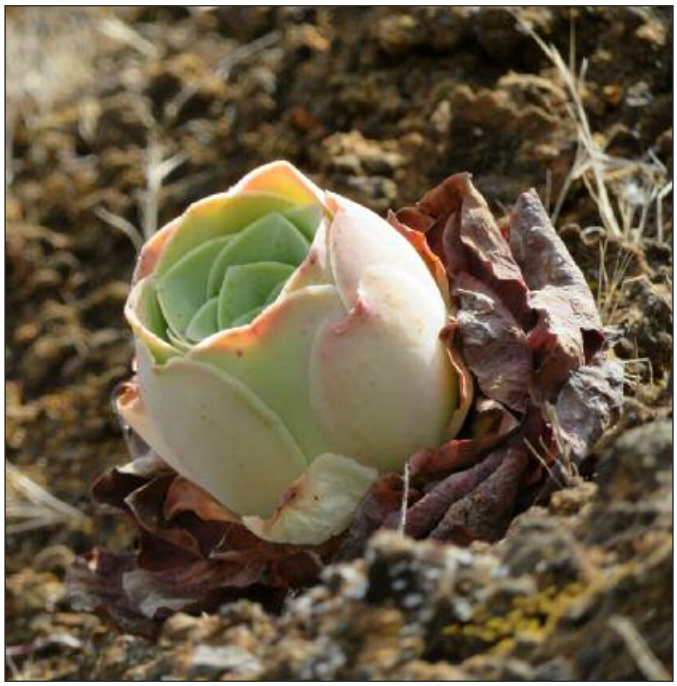

Figure 24. *Aeonium aureum* (*A. diplocyclum* according to Praeger) near Embalse de Tefirabe

Figure 25. *Aeonium aureum* (upper Camino de Jinama)

Figure 26. A cylinder-shaped *Aeonium aureum* (Camino de Jinama)

Figure 27. Flowers of *Aichryson laxum* (over Erese)

Figure 28. *Monanthes muralis* behind Roque de las Gatas

Figure 29. *Monanthes muralis* behind Roque de las Gatas (close-up)

that the presence of *A. aureum* in El Hierro requires confirmation, whereas that of *A. diplocyclum* seems certain (Bañares Baudet, 2015: 101–104), but Praeger found *A. diplocyclum* only near Valverde, as I have already mentioned, and he "searched widely over El Golfo (where R. de Jinama is situated), seeing only one species, which occurs in abundance and seemed typical *aurea*" (Praeger, 1928: 488). I can confirm this report based on my own observations, thus I believe that it is the presence in El Hierro of *A. diplocyclum*, not that of *A. aureum*, which requires confirmation.

The best explanation of the distinguishing features of both species is still that of Praeger (1928: 485), who wrote that *Greenovia diplocycla* (now *Aeonium diplocyclum*) "is distinguished from *aurea* by its unbranched habit, usually ciliate leaves, stem-leaves usually forming a cylinder (not a cone), and about 20-parted

Figure 30. Aeonium valverdense (south of El Pinar)

Figure 31. Aeonium valverdense in El Pinar (close-up)

Figure 32. *Aeonium valverdense* (left) and *A.* x *ombriosum* (right), south of El Pinar

Figure 33. Sunset in Frontera

flowers 15mm across". I was unable to see the flowers, but I observed many unbranched (former) greenovias on Camino de Jinama, growing side by side with branched specimens (Figures 25 & 26). The same is true for the leaves forming a cylinder: I saw both cylinder-like and cone-like plants. Moreover, the alleged specimens of *A. diplocyclum* which I photographed near Valverde had not got leaves more ciliate than the average *A. aureum*. This situation is not surprising, since Praeger himself admits that "both species vary more or less as regards all these characters, and no one of them can be absolutely relied on" (Praeger, 1928: 485). I think that the famous Occam's razor can be helpful to settle this question. We should ask ourselves whether it is more plausible that a very small and lone population of *A. diplocyclum* specimens which are almost indistinguishable from *A. aureum* survives in El Hierro or that only *A. aureum* – more or less branched, ciliate and cylinder-shaped depending on soil, exposition and humidity – grows there.

From Embalse de Tefirabe, one can take the path to Montaña de Los Cepones, crossing a beautiful forest of laurisilva, where I experienced the so-called horizontal rain: the fog coming from the Ocean condenses upon touching the leaves of certain trees (e.g. *Ocotea foetens*) and tiny droplets of water fall to earth. North of this path, there is a road running over Hoyo del Barrio, Betenama and Erese which is bordered by stone walls hosting *Aeonium arboreum* var. *holochrysum*, *Aeonium canariense* var. *palmense* (west of Erese), *Aichryson laxum* (common on north-facing stone walls, also in sunny, not shady places) and *Monanthes muralis*. I found a healthy population of this succulent on a north-facing stone wall behind

El Roque de las Gatas, an unattractive block of lava which has been associated with female cats for reasons not immediately intelligible.

The southern part of El Hierro is very arid and, exactly as it happens in Tenerife and La Gomera, does not host many *Crassulaceae* species. In spite of this, a visit to El Pinar is recommended, because the area between this town and La Restinga is the habitat of *Aeonium valverdense*. I found plenty of *A. valverdense* bushes south-east of El Pinar, on the path towards Playa de Icota (especially below 700m), where also *Aeonium hierrense* grows. I noticed a few plants whose features were intermediate between the two species, possibly *A. hierrense* x *A. valverdense* (*Aeonium* x *ombriosum*). *A. valverdense* grows under near-desert conditions, but it is not immune to damage caused by excessive heat. In August 2018, many plants had shed the majority of their leaves and in some cases also the core of the rosette looked compromised. I witnessed the same "heat shock" in my collection during the hottest months of the year, when aeoniums sometimes shed leaves that are still green and succulent. *A. valverdense* grows also around Las Casas and north of the village, towards Isora, where I spotted it on sunny outcrops inside the pine forest zone.

El Hierro is the smallest of the Canary Islands, but it has a significant endemic flora, which shows how succulent species evolved in different parts of the island. The challenge is always the same, how to thrive in a harsh, dry and windy environment, and every plant growing in this remote corner of the world has found its own peculiar way to avoid extinction. Evolution is going on even now, but at a pace which is too rapid for many species, since the Canary Islands are changing quickly due to human activities. This is the reason why El Hierro and its flora are more important now than they were a century ago: they are one of the last witnesses of the world of yesterday, a world with less buildings, cultivated fields or pollution and more wild plants.

Acknowledgments

Before a journey, every traveller has to ask two questions: where to go and what to see. This is true also for a botanical journey to El Hierro: literature can help, but the advice of people who have already visited the island is invaluable. For this reason, I would like to thank Joël Lodé, Massimo Afferni and Roberto Ariu. Thanks are also due to Ray Stephenson, Les Pearcy and Giuseppe Tavormina, who kindly shared with me their knowledge of the succulents of the Canary Islands. Anna Trevisan and Mauro Miglioli sparked my interest in El Hierro with their excellent paper published in *Piante Grasse*: sadly, Mauro passed away suddenly in May, 2018, but I am sure that his articles will continue for many years to inspire succulentophiles. Special thanks are due to Margrit Bischofberger, whose comments proved most helpful. Needless to say, any remaining errors are my own.

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Appendix 1: Selected locations of *Crassulaceae* species growing in El Hierro

Frontera: *Aeonium canariense* var. *palmense* (common on stone walls), *A. hierrense*.

TF-912 west of La Frontera, above the town: *Aeonium canariense* var. *palmense* (very common along the road), *A. hierrense* (common).

Camino de Jinama: *Aeonium arboreum* var. *holochrysum* (common up to 1000m), *A. aureum* (common on vertical cliffs over 850m), *A. canariense* var. *palmense* (very common up to 900–1000m), *A. hierrense* (rare, to be found especially in the lower part of the path), *A. valverdense* (few specimens), *Aichryson laxum* (laurisilva, common in damp and shady spots, often on mossy rocks), *A. punctatum* (laurisilva, much less common than *A. laxum*, over 700–800m, shady and damp spots, often on mossy rocks), *Monanthes muralis* (vertical cliffs, over 800m), *Aeonium aureum* x *A. arboreum* var. *holochrysum* (over 1000m), *Aichryson laxum* x *A. punctatum* (around 1000m, very shady and damp spot).

Camino de San Salvador: *Aeonium canariense* var. *palmense* (only outside the laurisilva), *A. hierrense* (less common than *A. canariense* var. *palmense*, outside the laurisilva), *Aichryson laxum* (common in the laurisilva), *A. punctatum* (thriving population around 1000m).

Pista del Canal: *Aeonium canariense* var. *palmense* (very common from Frontera to

Sabinosa), *A. hierrense* (less common than *A. canariense* var. *palmense*), *A. valverdense* (a few specimens, under Los Llanillos and a few kilometres before Sabinosa).

Sabinosa: *Aeonium canariense* var. *palmense*.

Sabinosa – Piedra del Rey – Las Tabladas: *Aeonium canariense* var. *palmense* (common up to the laurisilva), *Aeonium aureum* x *A. canariense* var. *palmense* (near Sabinosa, on the path towards Piedra del Rey) *Aichryson laxum* (laurisilva), *A. punctatum* (much less common than *A. laxum*, after Piedra del Rey), *Monanthes muralis* (from 500m upwards).

Cruz de los Reyes: *Aeonium aureum* (common on cliffs along the road), *Aichryson laxum*.

Road after Tenerista, before the crossroad leading to Camino de San Salvador: *Aichryson punctatum* (quite common).

San Andrés: *Aeonium arboreum* var. *holochrysum*, *A. aureum*, *A. arboreum* var. *holochrysum* x *A. hierrense*.

La Cuesta: *Aeonium aureum*, *A. hierrense*, *A. spathulatum* (common on the path towards Los Llanos, especially at the crossroad with another path going west), *A. valverdense* (only one specimen), *A. hierrense* x *A. aureum* (crossroad with the path coming from San Andrés).

Las Lapas: *Aeonium arboreum* var. *holochrysum*, *A. canariense* var. *palmense*, *A. hierrense*.

Valverde: *Aeonium canariense* var. *palmense*, *A. hierrense*, *A. valverdense* (not very widespread, on old stone walls or bordering paths, e.g. along that towards La Caleta or at the Mirador de Las Pernadas), *Crassula muscosa* (naturalized).

Valverde, path towards Tiñor: *Aeonium arboreum* var. *holochrysum*, *A. canariense* var. *palmense*, *A, hierrense* (pruinose specimens, quite common on stone walls), *Aichryson laxum*, *Monanthes muralis*.

West of Valverde, near Embalse de Tefirabe: *Aeonium aureum* (*A. diplocyclum* according to Praeger, four-five specimens at 780–790m, on a path south of Embalse de Tefirabe), *A. hierrense*, *A. valverdense*, *Aichryson laxum*.

Over Hoyo del Barrio: *Aeonium arboreum* var. *holochrysum*, *Aichryson laxum* (common on north-facing stone walls), *Monanthes muralis* (common at El Roque de las Gatas).

Over Erese, west of Casas del Monte: *Aeonium canariense* var. *palmense*, *Aichryson laxum* (common on north-facing stone walls).

Guarazoca: *Aeonium arboreum* var. *holochrysum*, *A. canariense* var. *palmense.*

Eremita de la Peña: *Aeonium aureum*, *A. canariense* var. *palmense*.

South-east of El Pinar, path towards Playa de Icota: *Aeonium hierrense*, *A. valverdense* (common below 700m), *A. hierrense* x *A. valverdense*.

Las Casas: *Aeonium hierrense*, *A. valverdense*.

North of Las Casas, towards Isora: *Aeonium aureum*, *A. valverdense* (also in the pine forest).

North-west of Isora, towards Las Rosas: *Aeonium arboreum* var. *holochrysum*, *A. hierrense*.

Appendix 2: *Crassulaceae* species growing on El Hierro

Aeonium arboreum var. *holochrysum*: Frontera, Camino de Jinama (common up to 1000m), San Andrés, Las Lapas, Valverde (path towards Tiñor), over Hoyo del Barrio, Guarazoca, north-west of Isora (towards Las Rosas).

Aeonium aureum: Camino de Jinama (common on vertical cliffs above 850m), San Andrés,

La Cuesta, Cruz de los Reyes (common on cliffs along the road), Eremita de la Peña, west of Valverde (*A. diplocyclum* according to Praeger, four to five specimens at 780–790m, on the path south of Embalse de Tefirabe), north of Las Casas (towards Isora).

Aeonium canariense var. *palmense*: Frontera (common on stone walls), Camino de Jinama (very common up to 900–1000m), Las Lapas, Pista del Canal (very common from Frontera to Sabinosa), Sabinosa, Sabinosa – Piedra del Rey (common up to the laurisilva), Camino de San Salvador (only outside the laurisilva), TF-912 west of La Frontera (above the town, very common along the road), Valverde (path towards Tiñor), above Erese (west of Casas del Monte), Guarazoca, Eremita de la Peña, Valverde.

Aeonium hierrense: Frontera, Camino de Jinama (rare, to be found especially in the lower part of the path), La Cuesta, Las Lapas, Pista del Canal (less common than *A. canariense* var. *palmense*), Camino de San Salvador (less common than *A. canariense* var. *palmense*, outside the laurisilva), TF-912 west of La Frontera (above the town, common), Valverde (path towards Tiñor, pruinose specimens, quite common on stone walls), Valverde, west of Valverde (near Embalse de Tefirabe), south-east of El Pinar (path towards Playa de Icota), Las Casas, north-west of Isora (towards Las Rosas).

Aeonium spathulatum: La Cuesta (common on the path towards Los Llanos, especialy at the crossroad with another path going west).

Aeonium valverdense: Camino de Jinama (few specimens), La Cuesta (only one specimen), Pista del Canal (a few specimens, below Los Llanillos and a few kilometres before Sabinosa), Valverde (not very widespread, on old stone walls or bordering paths, e.g. along that towards La Caleta or at the Mirador de Las Pernadas), west of Valverde (near Embalse de Tefirabe), south-east of El Pinar (path towards Playa de Icota, common below 700m), Las Casas, north of Las Casas (towards Isora, also in the pine forest).

Aichryson laxum: Camino de Jinama (laurisilva, common in damp and shady spots, often on mossy rocks), Sabinosa – Piedra del Rey – Las Tabladas (laurisilva), Cruz de los Reyes, Camino de San Salvador (common in the laurisilva), Valverde (path towards Tiñor), over Hoyo del Barrio (common on north-facing stone walls), above Erese (west of Casas del Monte, common on north-facing stone walls), west of Valverde (near Embalse de Tefirabe).

Aichryson punctatum: Camino de Jinama (laurisilva, over 700–800m, in shady and damp spots, often on mossy rocks, much less common than *A. laxum*), Piedra del Rey – Las Tabladas (less common than *A. laxum*), road after Tenerista (before the crossroad leading to Camino de San Salvador, quite common), Camino de San Salvador (thriving population around 1000m).

Monanthes muralis: Camino de Jinama (vertical cliffs, over 800m), Sabinosa – Piedra del Rey – Las Tabladas (from 500m onwards), Valverde (path towards Tiñor), over Hoyo del Barrio (common at El Roque de las Gatas).

Possible hybrids: *Aeonium arboreum* var. *holochrysum* x *A. hierrense* (*A.* x *isorense*, San Andrés), *Aeonium aureum* x *A. arboreum* var. *holochrysum* (Camino de Jinama, over 1000m), *Aeonium aureum* x *A. canariense* var. *palmense* (near Sabinosa, on the path towards Piedra del Rey) *Aeonium aureum* x *A. hierrense* (La Cuesta, crossroad with the path coming from San Andrés), *Aeonium hierrense* x *A. valverdense* (*A.* x *ombriosum* south-east of El Pinar, path towards Playa de Icota), *Aichryson laxum* x *A. punctatum* (*A.* x *intermedium* Camino de Jinama, around 1000m, very shady and damp spot).

Appendix 3: Distribution maps of all *Crassulaceae* species growing on El Hierro

I pinpointed the exact location of most *Crassulaceae* specimens I observed in El Hierro by using the Google app *My Maps* and then

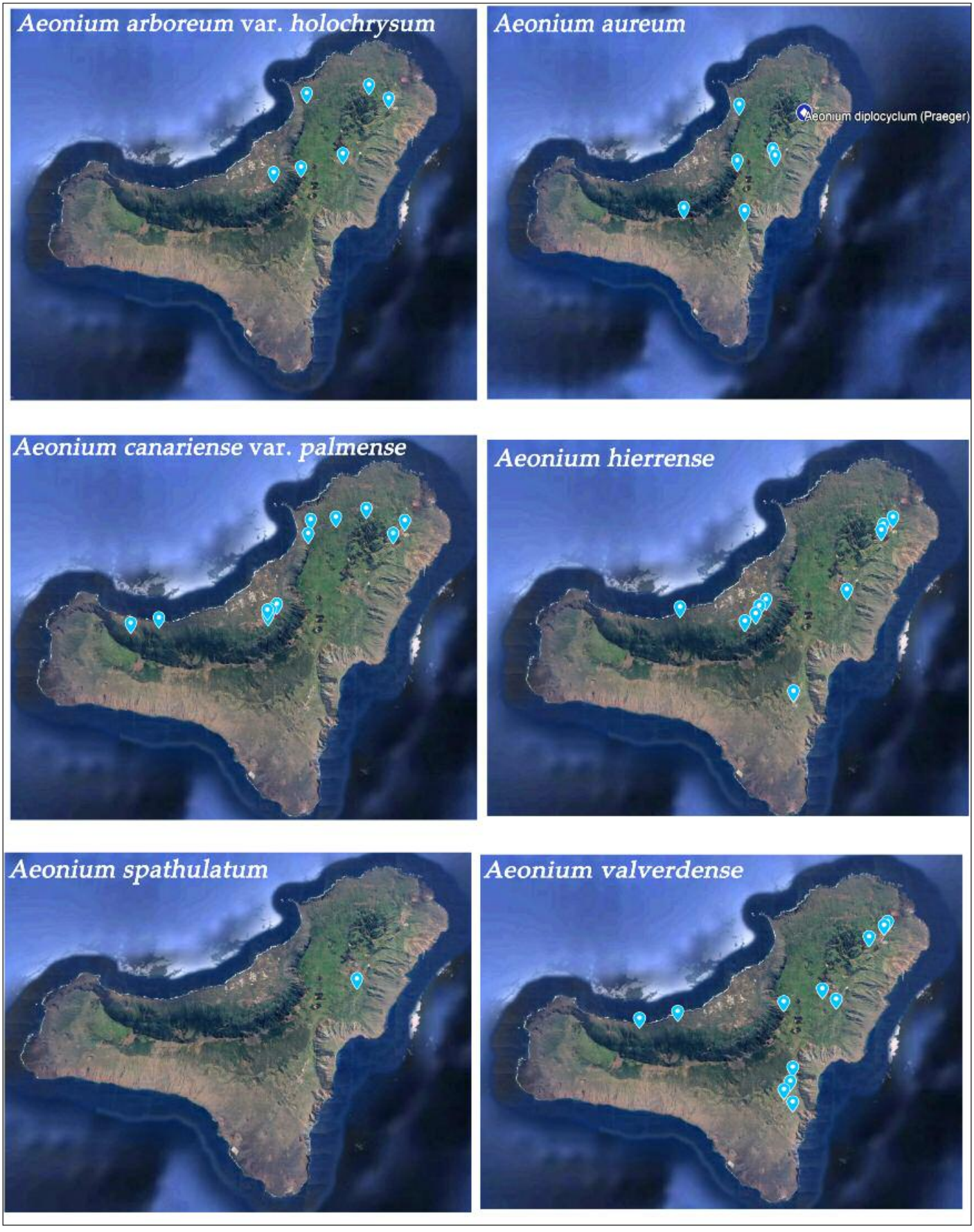

Figure 34. The distribution of *Aeonium* species

uploading the data thus obtained on a Google Earth map of the island. If someone is interested in a particular species or location, I am prepared to tell him/her the exact coordinates.

Marco Cristini

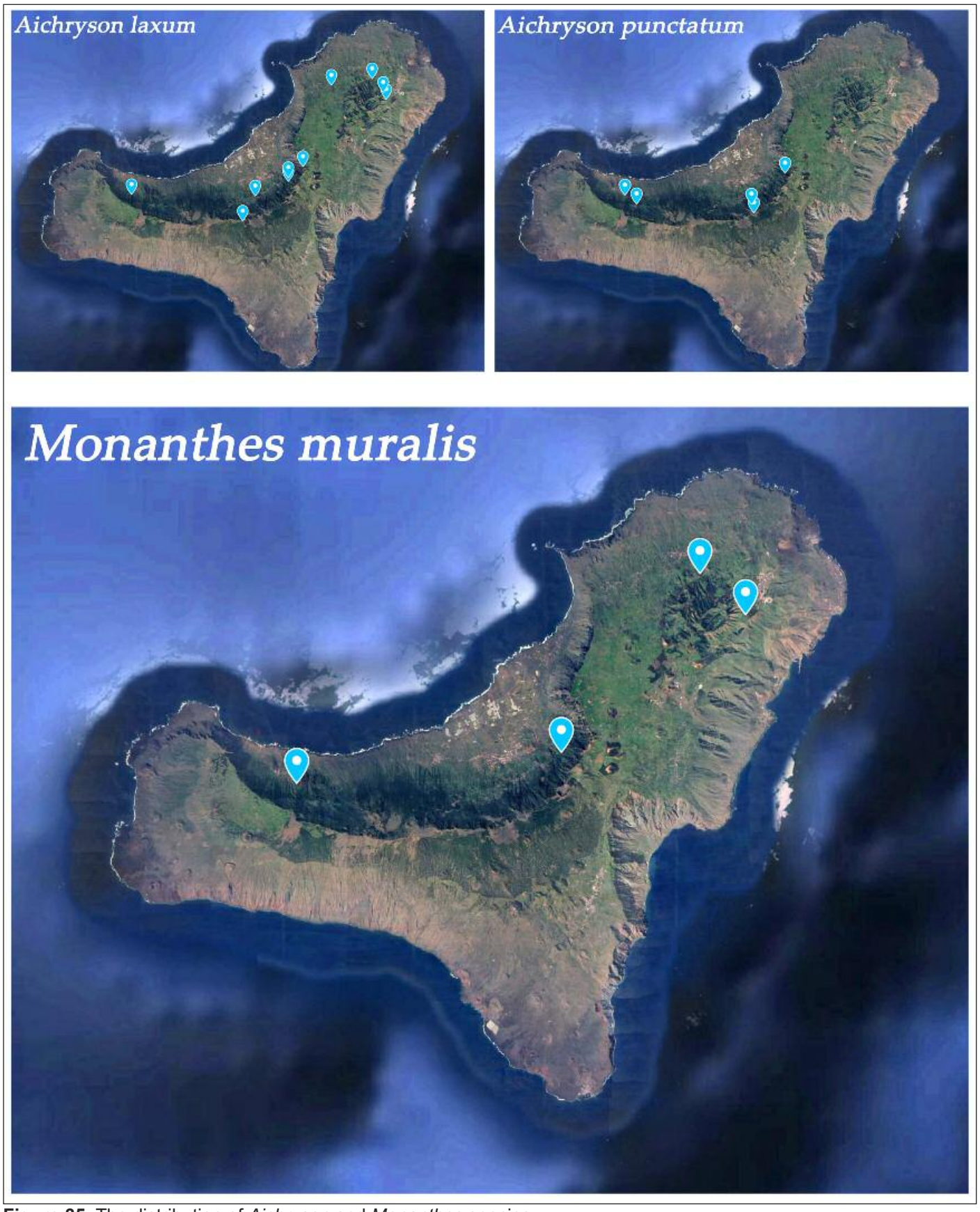

Figure 35. The distribution of *Aichryson* and *Monanthes* species

A journey over the Organ Mountains in Brazil

Andreas Hofacker tells us about an amazing adventure walking in the mountains with his wife Ute. They enjoyed dramatic scenery and were able to find many epiphytic cacti, including Schlumbergeras that are so popular as houseplants. **Photographs by the author.**

The Serra dos Órgãos (Organ Mountains) is one of the most famous, if not the best known, mountains in Brazil. It is located in the state of Rio de Janeiro, approx. 60km north of the city of the same name and is part of the approx. 1500km long coastal mountain range Sera do Mar. The highest peak is the Pedra do Sino (2275m), the nineteenth highest mountain in Brazil. Parts of the Organ Mountains were already declared a National Park in 1939, the Parque Nacional da Serra dos Órgãos.

At the western edge of the National Park lies the old imperial city of Petrópolis at an altitude of approx. 840m. Founded in 1825, it was the summer residence of the Brazilian emperors. In the north of the National Park lies the city of Teresópolis, founded around 1825 and named after Teresa Maria Cristina of Naples-Sicily, the last Brazilian empress.

Although alpinism and hiking have no great tradition in Brazil, there are some wonderful hiking routes. The classic tour is the so-called 'travessia', the route over the Organ Mountains from Petrópolis to Teresópolis.

In May 2016, the author and his wife fulfilled a long-cherished dream and made this 3-day tour. We chose the classic route from Petrópolis to Teresópolis, although of course the opposite is also possible.

Since the infrastructure on this tour is only very rudimentary, a corresponding preparation was necessary. We had to pack all the things necessary for these three days, starting with a large backpack, sleeping bag, sleeping mat, cooking utensils, food and clothing, something that is otherwise not really necessary for Brazil. In addition, it is necessary to stay at higher altitudes, for which we also had to take warm clothing with us.

The travel season in May was deliberately chosen as the dry season of the Brazilian winter begins this month. In the warmer, but also rainy months of October to April, the crossing of the Organ Mountains is even more difficult, because due to the constant rain and the associated cloud formation on the one hand the visibility is not very good, on the other hand your clothing is constantly damp.

We started early in the morning at the entrance of the National Park, about 10km northeast of Petrópolis, equipped with a touring backpack weighing almost 15kg. Here you have to register and explain exactly which tour you are making and when and where you are expected to be back. In addition, the fee for the crossing must be paid.

The registration is not without reason, because only in July 2018 a hiker got lost and could only be found (luckily still alive) again after 7 days of intensive search with helicopters and search dogs. The first part of the trail stretches relatively flat in the valley of the Rio Bonfim and leads through the Atlantic rainforest (Mata Atlântica). This rainforest is a very species-rich biome. Numerous plants, especially ferns, begonias, peppers, bromeliads and orchids have their habitat here. Also some epiphytic cacti can be found. These include *Lepismium houlletianum* and a yet undetermined broad-ribbed *Rhipsalis*. After about one hour the ascent began. Over serpentines it goes more or less steeply upwards. The vegetation is also beginning to change. It becomes flatter, more open and less green. After about two hours you reach the first resting place, the Pedra do Quejo (cheese rock, named after the cheesy shape of the rock). After another two hours at a rest area called Ajax there was the first opportunity to supplement our water supplies, something that was also urgently needed. Here we met

Figure 1. The author and his wife Ute at the beginning of the tour at Petrópolis.

Figure 3. Starting in the flat parts of Mata Atlântica.

Figure 5. The broad *Rhipsalis* on the way to the Pedra do Quejo.

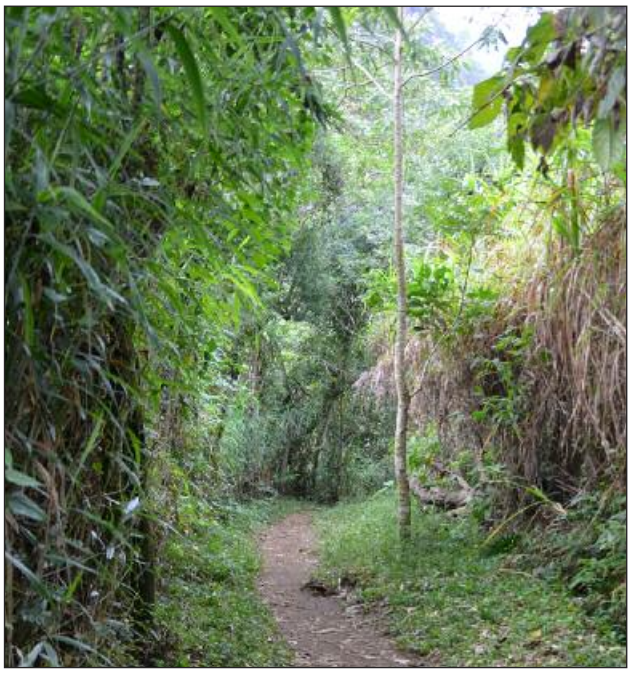

Figure 2. The beginning of the path close to the entrance of the National Park.

Figure 4. *Vriesea carinata*, a common bromeliad in Brazil.

Figure 6. *Lepismium houlletianum* growing in the forest.

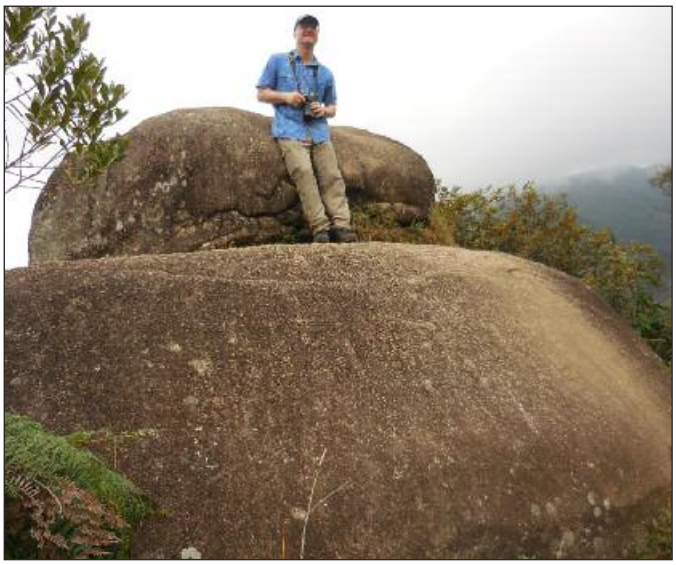

Figure 7. The author at the first rest, the Pedra do Quejo.

Figure 9. One of the many orchids between the Ajax and Castelos de Açu, *Oncidium* sp.

Figure 11. At the campos de altitude grows this orchid, *Zygopetalum* sp.

Figure 8. *Tillandsia gardneri* close to the Pedra do Quejo.

Figure 10. Growing at the beginning of the campos de altitude, the orchid *Zygopetalum* sp.

Figure 12 Reaching the destination of the first day, the Castelos de Açu.

Figure 13. A view back to the valley of the Rio Bonfim.

Figure 14. The cold and wet morning of the second day.

Figure 15. The author at the beginning of the path to the valley called Paráiso.

Figure 16. *Worsleya procera*, the blue Brazilian amaryllis.

Figure 17. The author's wife Ute searching for the path.

Figure 18. The tiny yellow arrows, indicating that you are on the right path

Figure 19. The Castelos de Açu in the background the valley 'Paraíso' in the foreground.

Figure 20. *Schlumbergera russelliana* growing on a mossy tree in the 'Paraíso'.

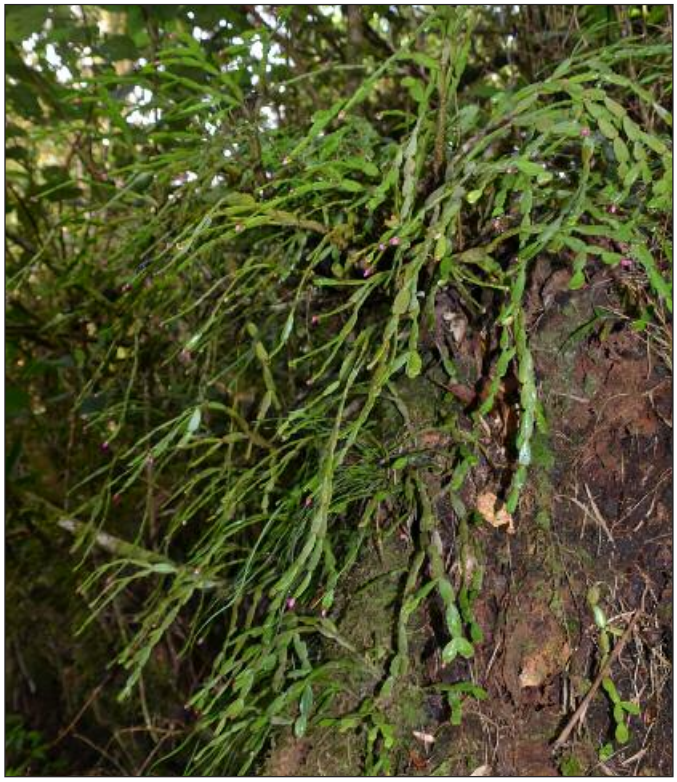

Figure 21. Always in the shade, *Schlumbergera russelliana* in the 'Paraíso'.

Figure 22. Climbing up the 'elevador'.

Figure 23. Fruit of *Schlumbergera russelliana* in the 'Paraíso'.

Figure 24. On the way from the 'Paraíso' to the Vale das Antas.

for the first time a group, consisting of six people and guide, which we met several times during the whole tour. From here the landscape changed again. The Mata Atlântica has been transformed into the campos de altitude, an open landscape of grass and bamboo interspersed with rocks.

After about 8 hours we reached the plateau and after another half hour we had the first view of our days destination, the Castelos do Açu. This is a characteristic rock formation at 2200m altitude.

At the foot of this formation lies an Abrigo, a simple mountain hut. In these cabins you will find simple sleeping possibilities. This Abrigo, however, was closed at the time of our visit due to renovation. Fortunately, the National Park administration had offered an overnight stay in a tent as an alternative.

Around 16:30h we were able to move into our tent. A two person tent with a small awning. Here we had the possibility to make tea or coffee on a brought Esbit-cooker and to prepare a simple meal. At about 17:00h it started to rain heavily. The thermometer showed a temperature of 7°C. As we had expected, a long pair of underpants, gloves and wooly cap were used for the first time in Brazil.

The rain lasted most of the night and soaked the entire ground around the tent. At sunrise at approx. 6:00h we prepared our simple breakfast, packed our backpacks and started in thick fog or clouds. Visibility was under 50 meters.

While the way from the entrance of the National Park at Petrópolis to the Castelos do Açu was completely easy to find, now the first problems begun. Even the entry into the path was difficult to find. The view was zero, the terrain unknown and everything looked the same. Signposts do not exist. Only small yellowish arrows are attached directly to the rocks and show that you are on the right way. Unfortunately, these arrows are sometimes very far apart and can only be seen when you are almost standing on them. A GPS device on which the route was already stored was very

Figure 25. *Fuchsia regia*, quite common in the higher parts of Brazil.

Figure 27. *Canistrum* sp., a bromeliad growing in high altitudes in the Serra dos Órgãos.

Figure 29. An epiphytic growing species of *Vriesea* (Bromeliaceae).

Figure 26. Often found on humid places in the altitude, carnivorous plants, here probably a *Drosera* sp.

Figure 28. The spectacular bluish flowers of *Quesnelia lateritia* (Bromeliadaceae).

Figure 30. The most difficult part of the journey, the 'cavalinho'.

Figure 31. The first view to the destination of the second day, the Pedra do Sino.

Figure 32. The famous rock of the Dede do Deus from the 'back'.

Figure 33. The comfortable Abrigo 4, at the end of day 2.

Figure 35. Where the trees are starting, bromeliads and also cacti are growing.

Figure 37. Way down to Teresópolis, *Schlumbergera russelliana* at about 1900m.

Figure 34. The cold but beautiful kitchen of Abrigo 4.

Figure 36. *Schlumbergera russelliana* close to the Abrigo 4.

Figure 38. Probably *Rhipsalis pulchra* between Abrigo 4 and Abrigo 3.

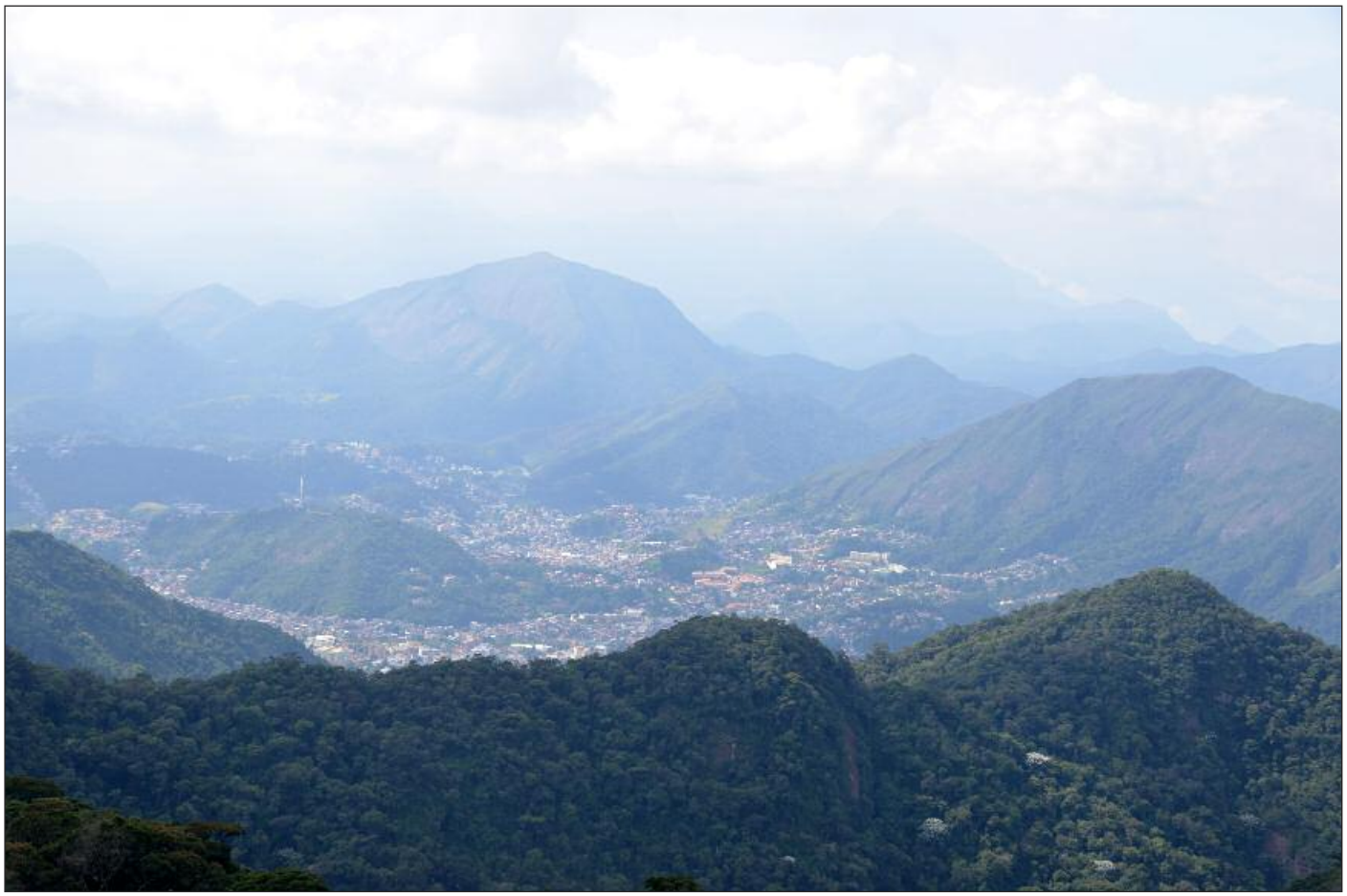

Figure 39. A first view towards the final destination, Teresópolis.

helpful on this day. At the area around the Castelos do Açu grows in larger quantities the blue Brazilian Amaryllis, *Worsleya procera*. Unfortunately, all faded.

At first it went downhill more or less steeply for about one hour, always in dense fog. Then we reached a valley called Paraíso. This valley was a true paradise for the lover of Brazilian epiphytic cacti, as thousands of *Schlumbergera russelliana* grew here in the dense rainforest at about 2000m above sea level. At every turn you came across this species that is so rare in culture. The plants grew epiphytically and lithophytically. The largest were approx. 1.30m long. Unfortunately, the plants were no longer or not yet in bloom. For this it was a little early in the year, first buds have been shown. *Schlumbergera russelliana* grows in the shade and hardly ever gets sun. The entire forest here is very wet to damp and covered with mosses and lichens.

This is also an indication of how *Schlumbergera russelliana* should be cultivated. Namely shady, damp and not very warm. Temperatures above 25–30°C are hardly tolerated and inevitably lead to the dropping of the segments. Orchids and bromeliads are often found together with *Schlumbergera russelliana*. Especially the blue-flowered bromeliad *Quesnelia laeteritia* was frequently observed. At an altitude of about 2050m we found a terete *Rhipsalis*, which we could not identify yet.

After the descent to Paradíso a longer ascent into the again open campos de altitude began. Another descent led us to the Vale da Luva, a valley where you could also find huge amounts of *Schlumbergera russelliana*. After another ascent and descent we had reached the 'escalador'. This is a steep rock face. Since it cannot be climbed without climbing equipment (ropes), iron clips were installed in the rocks, which then formed a kind of staircase. Hence the name 'escalador' (= climber). Some of these clamps are already heavily rusted and not evenly spaced. The ascent is therefore very difficult.

After a break at the end of the ascent we

Figure 40. An almost open flower of *Schlumbergera russelliana* at 1885m.

Figure 42. Flowering plant of *Schlumbergera truncata*.

went down again, this time to Vale das Antas. *Schlumbergera russelliana* can also be found in this valley at altitudes of about 2000m in large quantities. It was remarkable that this species was found exclusively in the valleys of the plateau at the higher parts of the Mata Atlântica, the Floresta Ombrófila Densa. Then follows the last ascent to a key point of the entire tour. The so-called 'cavalinho'. You walk along a narrow, max. 150cm wide path along an approx. 400m steeply sloping rock face.

Figure 41. Probably *Rhipsalis barthlottii* in flowers.

Figure 43. Growing on mossy trees, *Schlumbergera truncata* at about 1200m.

This path is then blocked by a transverse, approx. 3m high rock, the cavalinho. This obstacle must be overcome. Usually ropes are used here. But it is also possible to use a certain technique to swing onto the back of a horse and thus climb up the rock. Hence the name cavalinho (= small horse). Since we hadn't brought any ropes and no other group was present, we had no choice but to climb over the rocks without safety, which we managed with great effort. Over an iron ladder

Figure 44. The Mata Atlântica, where *Schlumbergera truncata* grows.

Figure 45. Growing close to the barrage, probably *Rhipsalis olivifera*.

Figure 46. *Rhipsalis clavata*, close to the entrance of the park.

Figure 47. *Rhipsalis teres*, very widespread in Brazil and also growing on the lower parts of the Serra dos Órgãos.

Figure 48. The broad segments of *Rhipsalis pachyptera*.

Figure 49. *Lepismium cruciforme* growing on mossy trees.

Figure 50. *Rhipsalis neves-armondii* with its red berries.

with a height of about 6m we reached the foot of Pedra do Sino, the highest mountain of the tour. Then you have to walk around this mountain on the flank, which is relatively easy.

After almost 9 hours and a little more than 10km we had reached our destination, the Abrigo 4. This is located at an altitude of approx. 2130m and offered us real luxury. On the one hand, the possibility of staying overnight in a dry mattress camp with plenty of space all around, but on the other hand, the possibility of cooking in a kitchen equipped with a gas cooker. We did not climb the summit of Pedra do Sino, which would have meant another half an hour's ascent. After a cosy breakfast immediately after sunrise, the third and last day of our tour began. This was at the same time the simplest and shortest, but at the same time also the most interesting for a cactus lover. On a well visible path it went first over the open campos de altitude constantly downhill. At an altitude of 2100m the Mata Atlântica began. There the first *Schlumbergera russelliana* grew again, but in large numbers not as many as in the valleys between Castelos do Açu and Abrigo 4; the plants were full of buds, one plant even had an almost open flower. At about 2060m a thin *Rhipsalis* with dark fruits appeared, probably *Rhipsalis pulchra*. Further downhill, a broad *Rhipsalis* grew from an altitude of about 1750m, whose assignment is not yet quite clear, then *Hatiora salicornioides* and *Rhipsalis teres* from 1700m. We saw the last *Schlumbergera russelliana* at 1738m. The valley from Abrigo 4 to Teresópolis may also be the valley in which this species was first collected in 1837 (Hofacker, 2017). Here the forest becomes more open, the tree species have changed. Only the broad *Rhipsalis* could still be found. From an altitude of about 1300m the vegetation began to change again. The forest became denser again and was more overgrown with epiphytes. At 1435m we had already seen a broad-shoot *Rhipsalis* in 2014, which we provisionally assign to *R. barthlottii*. Whether it is the same taxon as the higher

Figure 51. *Hatiora salicornioides* with its yellow flowers and clavate segments.

growing *Rhipsalis* mentioned above, we cannot say, because these plants did not flower. At 1270m the first *Schlumbergera truncata* has been seen. The Brazilians call this species 'flor de maio' (flower of May) and we were lucky enough to find this species blooming at the site for the first time. *Schlumbergera truncata* grows here according to our findings up to altitudes of approx. 1150m. Although the flowering periods of *Schlumbergera russelliana* and *S. truncata* overlap (we have seen open flowers of both taxa on the same day), hybrids have not

Figure 52. Rarely seen around Teresópolis, *Rhipsalis floccosa*.

Figure 53. A famous view seen from Teresópolis with the Dede do Deus (finger of God).

Figure 54. Reaching the final destination at day 3

Figure 55. The park-like area of the Parque Nacional da Serra dos Órgãos at Teresópolis.

Figure 56. The end of a beautiful journey.

yet been found in nature. In culture, both taxa hybridize without problems. The resulting plants are known as *Schlumbergera* x*buckleyi*.

At 14.00h we reached the end of our tour, the barragem (a small reservoir). Up to here you can drive by car and here we were also picked up by a Brazilian friend. A narrow *Rhipsalis* grows around the barragem, which clearly differs in habit from *R. bartlottii* and the deeper growing *R. pachyptera*. Possibly *R. olivifera*. Approx. 3km downhill there is a park-like area with corresponding tourist infrastructure, a lake and the National Park administration. In recent years, various circular hiking trails have been laid out here, on which one can observe fauna and flora. The variety of cacti is increasing strongly here. *Rhipsalis floccosa* (rare), *R. neves-armondii*, *R. pachyptera*, *R. teres*, *R. lindbergiana*, *R. clavata*, *Lepismium cruciforme* and *Hatiora salicornioides* make this part of the National Park a paradise for lovers of epiphytic cacti.

Figure 57. *Schlumbergera* x*buckleyi*, the hybrid between *Schlumbergera truncata* and *S. russelliana*.

What remains of this tour? Certainly unforgettable is the second day. Physical efforts to and beyond the performance limit, numerous sightings of *Schlumbergera russelliana*, but above all the breath-taking landscape.

Literature:

HOFACKER, A. (2017). *Schlumbergera russelliana* (Hooker) Britton & Rose an ihren natürlichen Fundorten. *EPIG* **78**: 5–17.

Andreas Hofacker
Neuweilerstr. 8/1, D-71032 Böblingen, Germany.

Travel with the cactus expert (22)

Zlatko Janeba continues his popular series of articles about travelling in the South West of the USA. This time he saw *Sclerocactus polyancistrus* in flower **Photographs by Zlatko Janeba.**

Tonopah in the morning (18th May 2006) was empty and quiet (Figure 1). It was a strange feeling to walk along the deserted main street and to try to find something for breakfast. It almost felt like we were in a ghost town.

Later we headed from Tonopah back to the east along US 6, but only for a few miles. Josef Busek had been searching in the area east of Tonopah many years before and did not find anything there. Later, in 1991 Josef had been told by Fritz Hochstätter, that between Tonopah city and Tonopah Airport there indeed used to be a small population of *Sclerocactus polyancistrus* (Hochstätter was supposed to have found there one old plant and three younger specimens only). So we were especially tempted to try to search for the scleros there. And since Josef recalled some more descriptive details given to him by Hochstätter, it did not really take long and we soon found our first cactus. It was north of US 6 in a slightly hilly landscape covered with low bushes at an elevation of some 1720m (Figure 2). But even though we tried quite hard we were able to find only three younger specimens of *S. polyancistrus*, two of them bearing flower buds (Figures 2 & 3). It seemed that scleros in that area were really very sparse. I guess one would need much more time to succeed in discovering more cacti in that location. So anyway, we were quite happy to see at least couple of scleros there.

Figure 1. A morning view of the main street in Tonopah, Nevada.

Figure 2. The habitat of *Sclerocactus polyancistrus* east of Tonopah, Nye County, Nevada.

Figure 3. A specimen of *Sclerocactus polyancistrus* east of Tonopah, Nevada.

Then we headed back to Tonopah and first we visited the same spot with *Sclerocactus nyensis* as the day before (Figure 4), at an elevation of 1840–1850m. We took some more pictures of large *S. nyensis* specimens (Figure 5), some of them only about 5m away from the road. But it was still quite early and most of the flowers were not yet fully open.

Figure 4. A flowering specimen of *Sclerocactus nyensis* south of Tonopah (about 1850m), Nevada. For a comparison, the U.S. quarter has a diameter of 24mm.

Figure 5. One of the largest and oldest specimens of *Sclerocactus nyensis* we encountered, south of Tonopah (about 1850m), Nye County, Nevada.

We drove further south along US 95 (towards Goldfield) and some 8 miles south of Tonopah we made another stop. There, east of US 95 at an elevation of about 1680m, we discovered quite a rich population of *Sclerocactus polyancistrus* (Figure 6). The scleros were relatively common there, but sparcely distributed all over the place. Never really abundant. But to our photographic satisfaction, the whole population was in full flower (Figures 7 & 8). Thanks to its large flowers, actually the largest flowers of the genus *Sclerocactus*, *S. polyancistrus* can easily be spotted from a distance. We saw probably something like 15 specimens of *S. polyancistrus* and also several mummies. (When I visited the exactly same spot about 2 months later,

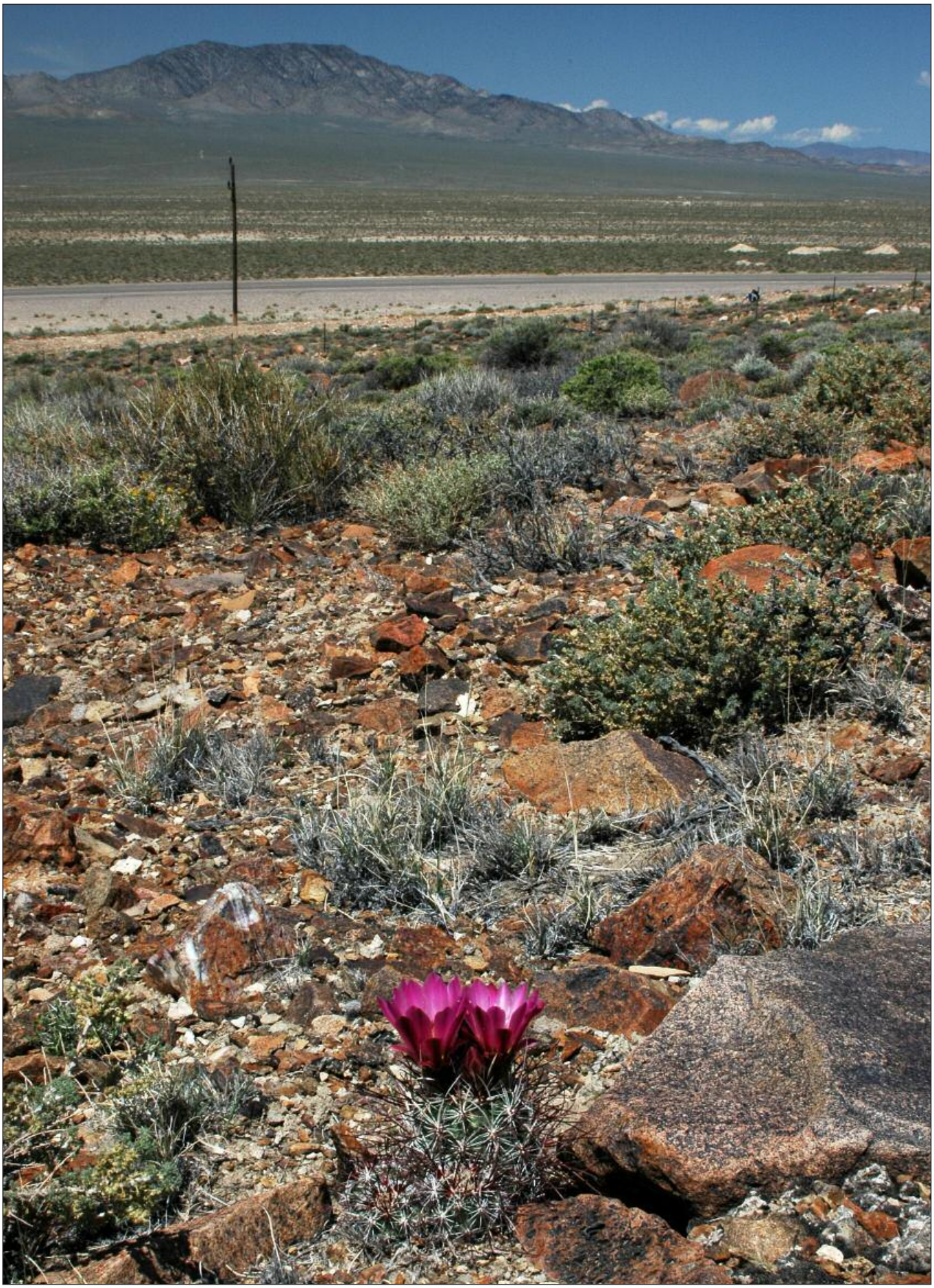

Figure 6. The habitat of *Sclerocactus polyancistrus* south of Tonopah (1680m), Nevada. The US 95 towards Goldfield can be seen in the background.

Figure 7. The population of *Sclerocactus polyancistrus* was in full bloom. South of Tonopah (1680m), Nevada.

Figure 9. Collared Lizard (*Crotaphytus collaris*), south of Tonopah (1680m), Nye County, Nevada.

Figure 11. An old flowering specimen of *Sclerocactus nyensis* is hiding in low bushes, south of Tonopah (1720m), Nevada.

Figure 8. Flowers of *Sclerocactus polyancistrus*, south of Tonopah (1680m), Nevada. The flowers of *S. polyancistrus* are the largest and the most attractive in the genus *Sclerocactus*.

Figure 10. A specimen of *Sclerocactus nyensis* south of Tonopah (1720m), along the US 95, Nevada.

without flowers, I had a hard time finding the scleros again). As a bonus, I had a great opportunity to shoot more pictures of the attractive collared lizard (*Crotaphytus collaris*) which seemed to be trying to protect his territory against unwelcome intruders (Figure 9). This lizard species is quite common in the deserts of the SW of the USA.

I had realized that we were not actually very far away from the nearest population of *Sclerocactus nyensis* which we had seen just the day before. Driven by curiosity, I decided to walk from the *Sclerocactus polyancistrus* habitat towards the nearest *S. nyensis* place, monitoring both species to see if their habitats actually overlap or not. So actually, it was about 0.4 miles between the spot I saw the last *S. polyancistrus* and the first *S. nyensis* plants

Figure 12. The habitat of *Sclerocactus polyancistrus*, east of Silver Peak (1570m), Nevada. In the background, notice the rain shower that is pouring down in the Tonopah area, the habitat of *Sclerocactus nyensis*.

(Figures 10 & 11). In the "zone of nobody" I encountered only *Echinocereus engelmannii* and a form of *Opuntia polyacantha*. So in that area (south of Tonopah), the two sclerocactus species did not seem to be really growing next to each other. But my observation clearly does not mean that their habitats cannot overlap in other places nearby. Furthermore, the flowers of both species are bee pollinated and bees can easily fly over 1 mile and more (but the pollination biology of the two scleros is poorly understood). So the distribution ranges of both these sclero species cannot be considered as separate. (Actually, some year later at the Silver Peak area, I observed both species growing only few meters away from each other, and they were also flowering at the same time). Contrary to what Fritz Hochstätter had reported before ("... these taxa nearby Tonopah flower at different times." in The Genus *Sclerocactus*, 2005), we observed both species having flowers at the exactly same time just south of Tonopah and at the same elevation.

Tempted to see more flowering cacti at other locations, we entered the old highway from the south and then we took another dirt road which headed eastwards. We stopped after 2 miles of driving and after a short time we discovered two specimens of *Sclerocactus polyancistrus* (one of them in flower) and also *Escobaria vivipara*. It was among low hills of whitish colour at an elevation of 1690m. Since we could hear a storm in the distance, and it looked like another rain shower was coming, we decided to go back to US 95.

About 22 miles south of Tonopah we took a paved road leading westwards to Silver Peak (or also Silverpeak). Silver Peak lies next to a dry lake bed which is rich in lithium and other minerals. It is actually one of the oldest mining communities in the state of Nevada and Albemarle Corporation currently represents the only operating source of lithium in the USA.

We stopped about 8 miles from US 95 and

Figure 13. Flowering *Opuntia basilaris*, east of Silver Peak (1570m), Nevada.

we noticed there was another rain shower in the distance, just around Tonopah (Figure 12). South of the road, in the hilly landscape at an elevation of some 1570m, I found four flowering plants of *S. polyancistrus* (Figure 12). Furthermore, I had also noticed small plants (seedlings or bonsais?) of Joshua tree (*Yucca brevifolia*). *Y. brevifolia* is already very rare around Tonopah (we had also seen several of them just east of Tonopah) and it seems that there might be its northernmost limit of the geographic distribution. Simply said, it is too cold for it here. But when one goes a little bit more to the south along US 95 (and also to a lower elevation), there is a nice Joshua tree forest just south of Goldfied.

Figure 14. Flowering *Echinocereus engelmannii*, east of Silver Peak (1570m), Nevada.

We then continued west towards Silver Peak and after a while the road started to descend into the dry lake bed in front of us. We had noticed several taller *Yucca brevifolia* specimens next to the road and some pink flowers in the distance. We stopped there and found flowering *Opuntia basilaris* (Figure 13) and flowering *Echinocereus engelmannii* (Figure 14). Also *Cylindropuntia echinocarpa* grew there. It was some 14 miles from US 95 at an elevation of 1570m.

We made another stop just a little bit further on at an elevation of 1560m. According to Gerhard Häslinger, there was supposed to be *Sclerocactus polyancistrus* there as well, but we only discovered flowering *Opuntia basilaris* again and, to our surprise, also very attractive plants of what we called *Opuntia ursina* (a nice form of *Opuntia polyacantha* var. *erinacea*). We

Figure 15. Very popular among collectors but still quite rare, *Opuntia ursina*. East of Silver Peak (1560m), Nevada.

saw only two specimens there. They formed quite low bushes and their pads were almost completely obscured with very long hair-like spines (Figure 15). Unfortunately, there were no signs of flowers nor fruits.

After that we finally reached Silver Peak (Figure 16). But it started to rain again so we decided to return back to US 95 and head to the south. When passing Goldfield, I drove through a really heavy shower. Just before dusk we made a quick stop north of Beatty (Nevada), but we did not see anything of a special interest. So we decided to call it a day.

But it was not so easy to find accommodation that evening. Beatty was crowded with bikers, mostly Harleys Davidson fans, and all the hotels and motels were full. We were lucky we got one of the last rooms in the Amargosa River Inn. It was probably the worst place in Beatty, but we paid only U$D38 for the night.

Zlatko Janeba

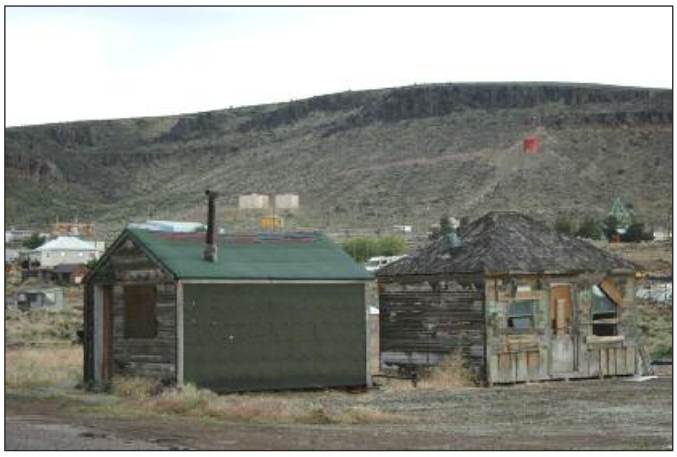

Figure 16. A view of Silver Peak, Nevada. Silver Peak is one of the oldest mining communities in the state of Nevada.

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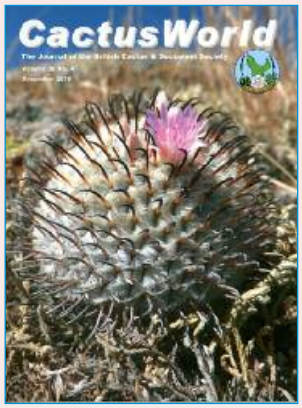

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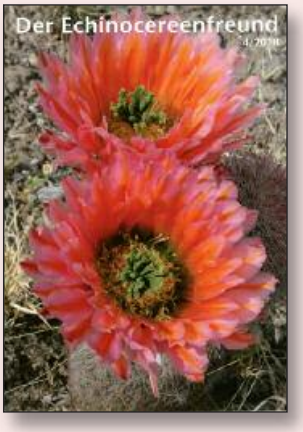

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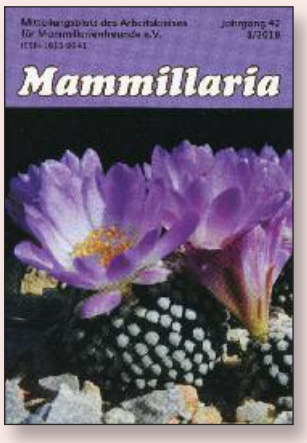

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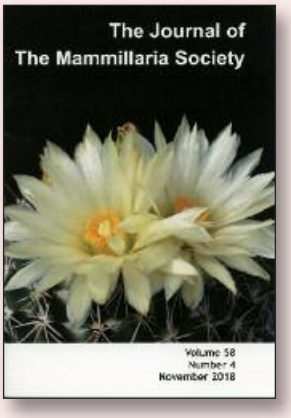

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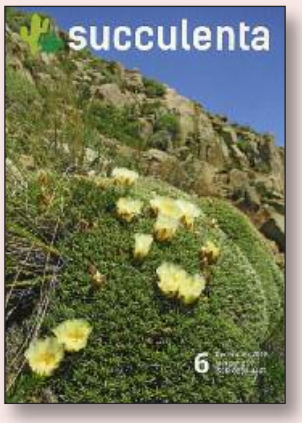

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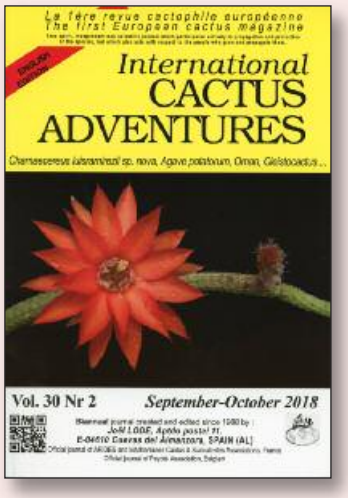

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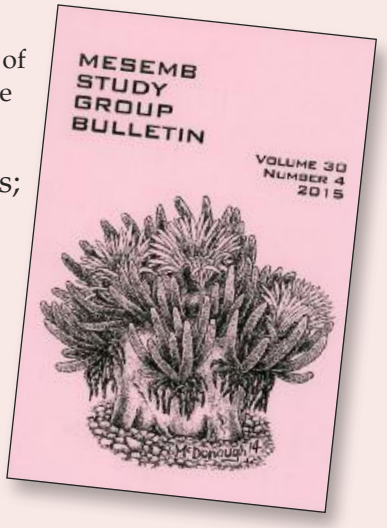

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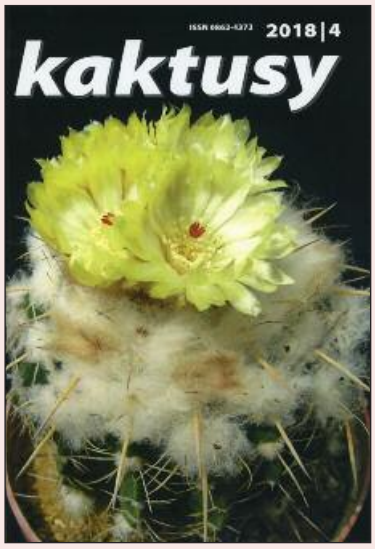

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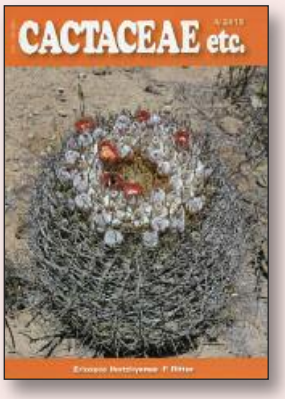

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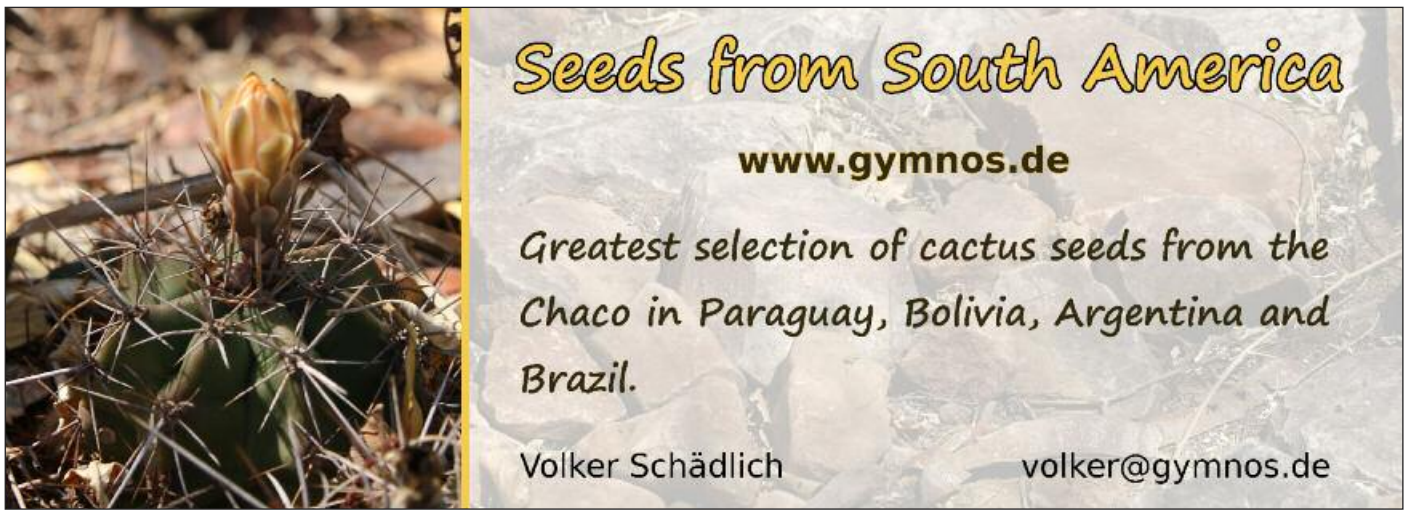

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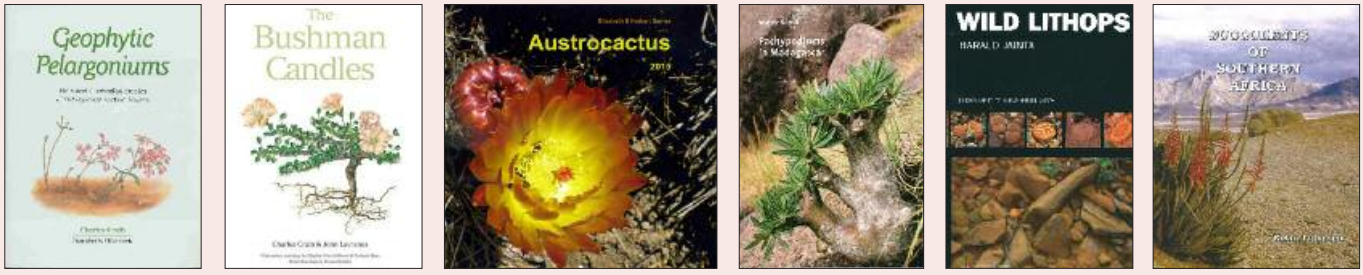

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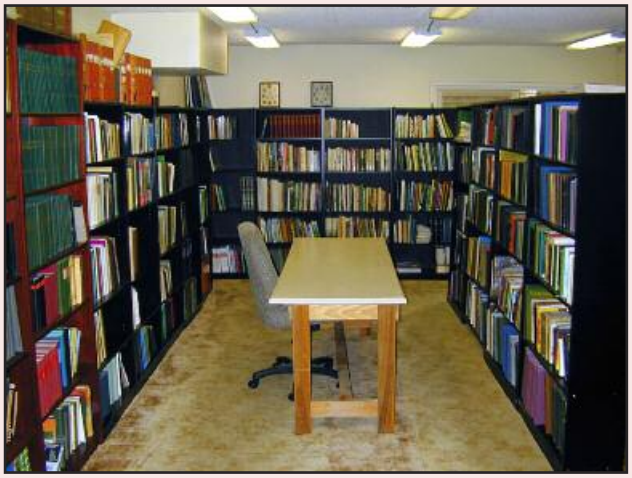

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