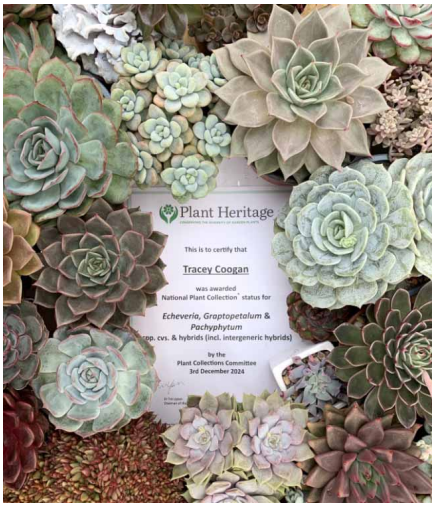
Cactus & succulent REVIEW

The online magazine for cactus and succulent enthusiasts Issue 44 March 2025



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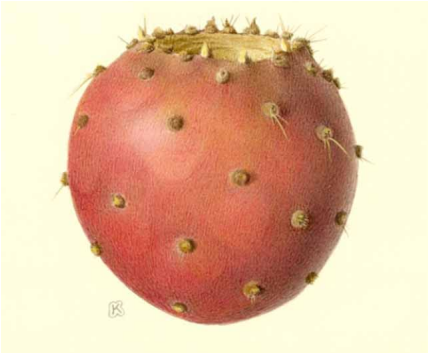
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Editor's notes

Welcome to the March issue of the *Cactus and Succulent Review*

March is officially the beginning of spring, at any rate in the UK and the northern hemisphere, when our cacti and many of our succulents are beginning to wake up and even think about flowering. I realise, of course, that for my readers in the southern half of the world this is not altogether appropriate for which I apologise.

Here in the UK early flowerers include *Turbinicarpus valdezianus* and *Turbinicarpus pseudopectinatus* and so I am very pleased to include an article on these attractive and popular plants by Graham Evans on Page 25.

Agaves are renowned for their large inflorescences which can be up to 12m tall. I am delighted to include Part 1 of a two-part article on the 'Marginate agaves of Section Heteracanthae', by Colin C. Walker on Page 33. Part 2 will appear in the June issue.

Just how do you take a photograph of something which is towering above your head? Go to Colin's 'Agave Diaries' on Page 42 to find out.



Echinocereus viridiflorus is often one of the earliest echinocerei to flower each year (Photo: Roger Ferryman)

Another genus that contains plants with amazing inflorescenes is *Aeonium* and these are featured in Mellie Lewis's article on Page 53 describing her recent visit to El Hierro. This is one of the smallest of the Canary Islands and one which is not so often visited or featured in publications.

Then, for a final flourish of flowers, please see Roger Ferryman's article 'Spring has sprung' on Page 45, featuring photographs of plants in habitat in the Chihuahuan desert.

Truly a great welcome to spring.

Sheila Cude

Cactus&Succulent REVIEW

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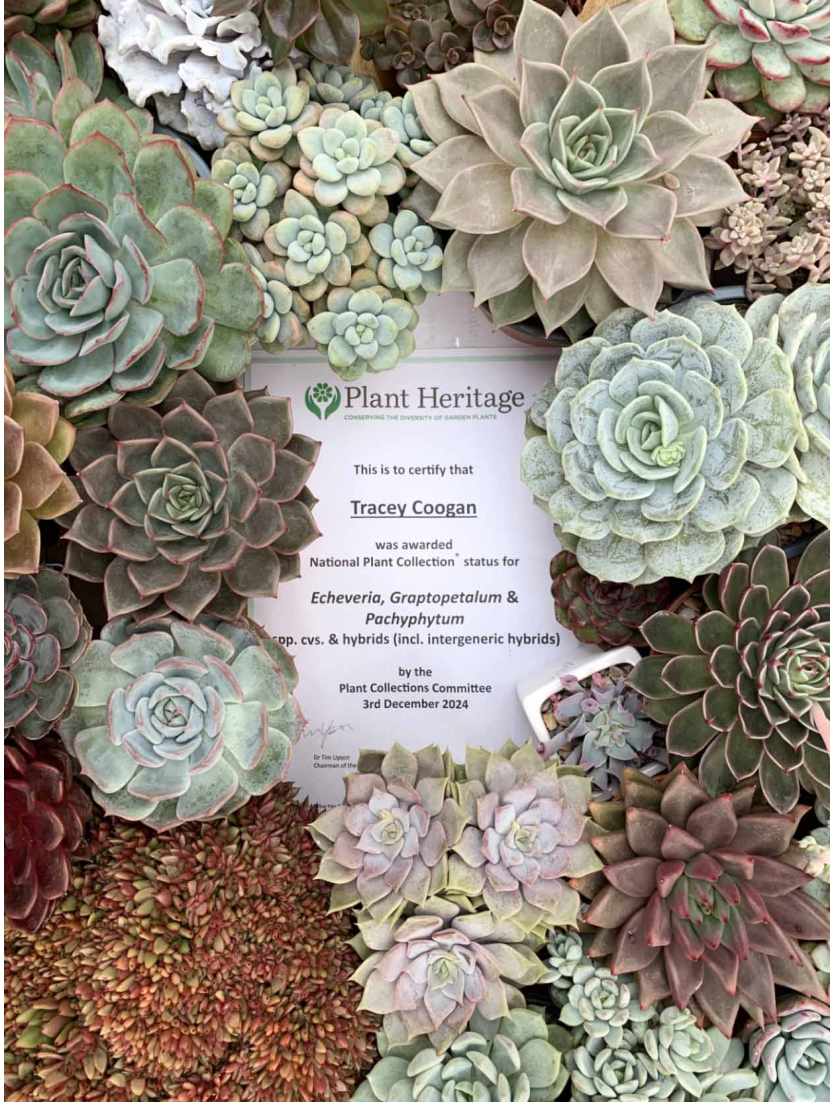
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A new National Plant Collection

by Tracey Coogan

"On 3 December 2024 the Plant Heritage Collection Committee met and I waited with bated breath to see if my plant collection would be awarded National Collection status."

A Brief History

I can't remember when I got my first tender succulents. I was growing quite a lot of hardy sedums, sempervivums and various other alpine-type plants and tender succulents just started to appear in my plant collection.

I recall my first ever plant being from a garden centre reduced section: it was scruffy and soggy and I thought it was an unusual sempervivum. I brought it home, stripped off the dead leaves, potted it back up and pretty much forgot about it for a few weeks.

The next time I looked at it, I realised it was something quite different, so I took to the internet! It took me quite a while to find out what I had. Back then echeverias were not particularly popular plants and the internet was not inundated with them as it is now.

The only places you could find echeverias were specialist nurseries and at British Cactus and Succulent Society events. We would take regular drives out to Abbey Brook Cactus Nursery and fill a box or three with wonderful succulents.

Initially, because tender succulents were not easy to source, my collection was very eclectic with many different types of Crassulaceae, including but not limited to *Aeonium*, *Crassula* and *Echeveria* plus a few *Haworthia*, *Agave* and other random succulents.

My first trip to the British Cactus and Succulent Society National Show, which included plant sales, in 2012 was an eye-opener. I also discovered that some of the sellers had eBay shops. Yet the range of echeverias on offer was quite limited and I was still stuffing my basket with all things Crassulaceae.

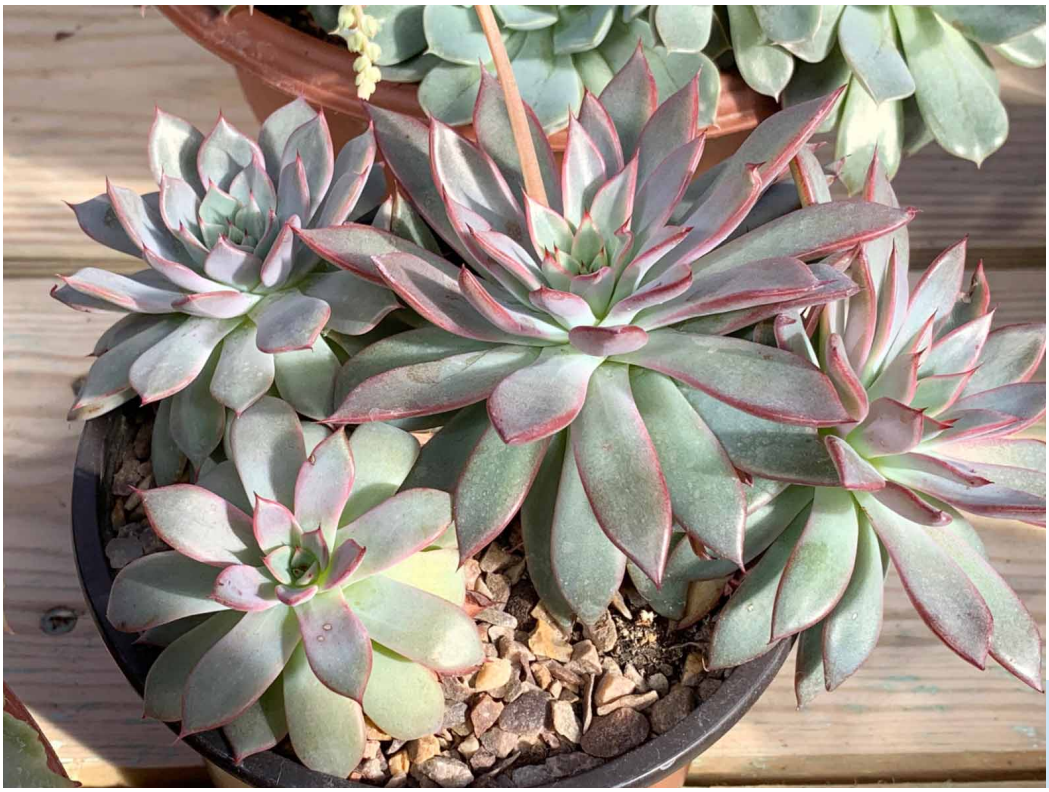
By the time the next BCSS National Show was upon us in 2016 the scope of my collection was slowly reducing to *Echeveria*, *Graptopetalum*, *Pachyphytum* and their hybrids. My love for these plants was taking over to the exclusion of all other genera.

In 2017 someone mentioned that Facebook had groups where people exchanged leaves, cuttings and plants. That was it! I signed up to Facebook and joined a leaf-swapping group. This was an excellent way to increase my collection of plants and meet like-minded people online. Around this time I gave away all my 'other' succulents and concentrated on *Echeveria* and their relatives.

New imports

It was around 2018 when I started to see plants coming to the UK from Korea. For a collector this was super-exciting. The Korean hybrids were still thin on the ground. Oh, how that has changed! In some respects, this is where I feel a number of issues began.

Over the years I have imported over 800 varieties of hybrid plants from Korea to add to my collection.



Echeveria caamanoi nom. prov.



Echeveria cante

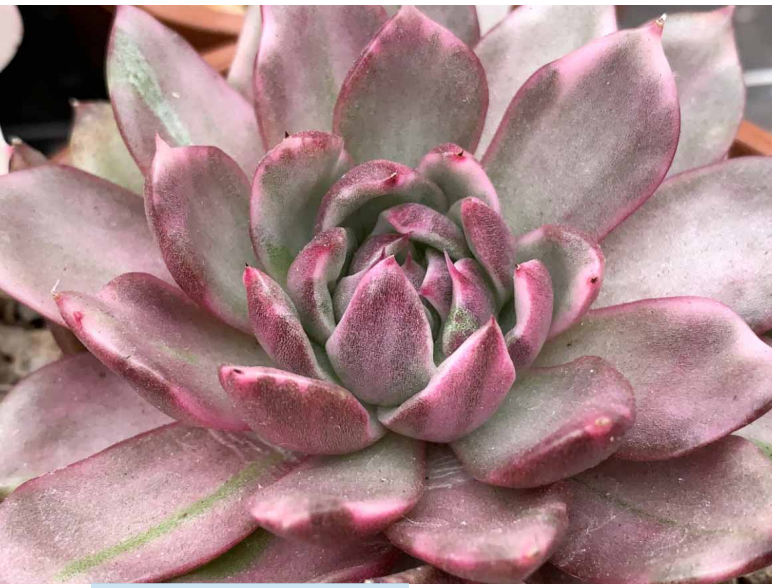
It was a most enjoyable process. With a seemingly unlimited and endless supply of new and exciting hybrids, with care taken to ensure they were imported legally, no longer did I struggle to find a new plant,

A couple of years ago it dawned on me that with the mass influx of plants from Asia the species plants and older established hybrids were getting very thin on the ground. In my last article back in September *(Cactus and Succulent Review, Issue 42, September 2024)* I touched on the difficulty of finding species plants, which means that many of the species plants in my collection have been grown from seed.

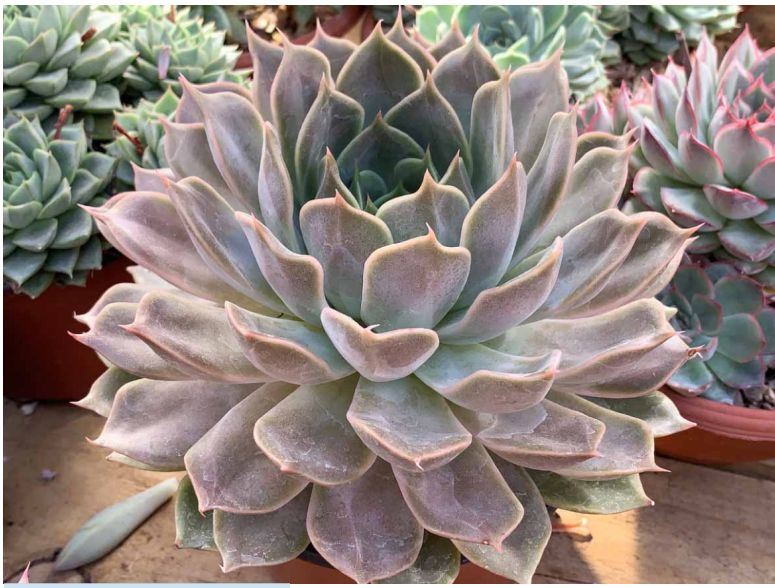
Although the Korean hybrids are pretty and I don't want to take away from the skill of their creators and growers, they are often sold after being grown 'hard', giving them bright colours that are not sustainable when grown naturally. The lack of parentage information is also a problem. Many of the plants purchased as echeverias turn out to be intergeneric hybrids. This is only discovered when they eventually flower. The internet is full of people who buy plants purely for resale. Plant names get confused and can be misspelled several different ways due to the difficulty in translation from pictorial characters to our alphabet.

Another issue is many of the plants sold as seedlings have not been stabilised. In effect you could buy three different plants with the same name from the same seed batch and have three plants that look different.

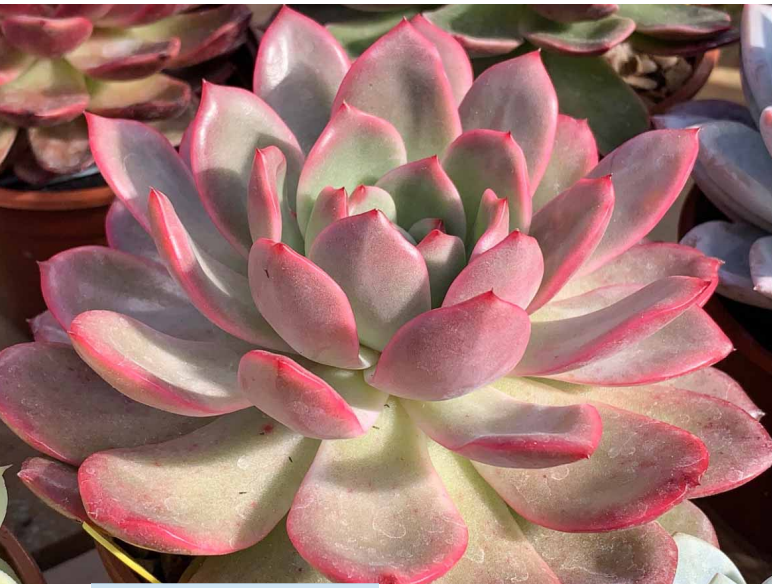
These issues have been compounded by mass imports from China to the UK. Often the plants come into the UK without having the regulatory health checks. The phytosanitary certificates inside the boxes are, quite frankly, not worth the paper they are written on and the boxes are labelled as toys, jewellery or a myriad of other household items to smuggle them through UK customs without plant health checks.



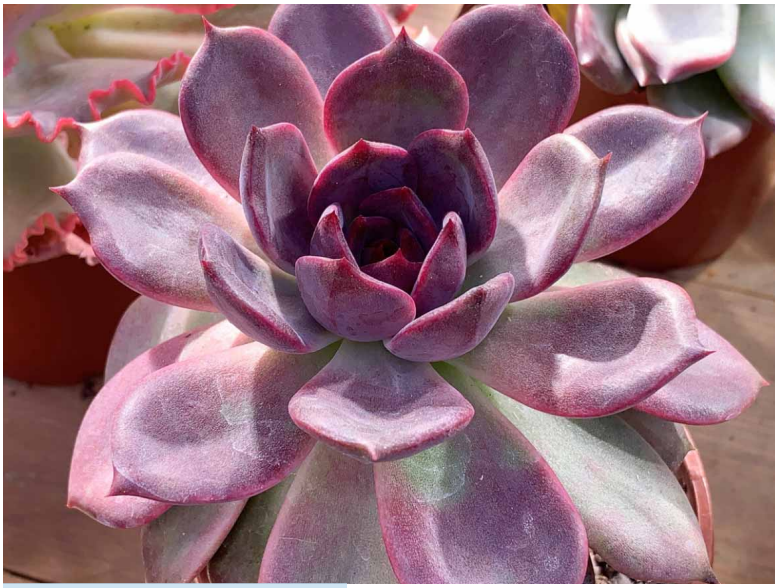
Echeveria 'Dark Pamela'



Echeveria 'Latte Rose'



Echeveria 'Glam Pink'

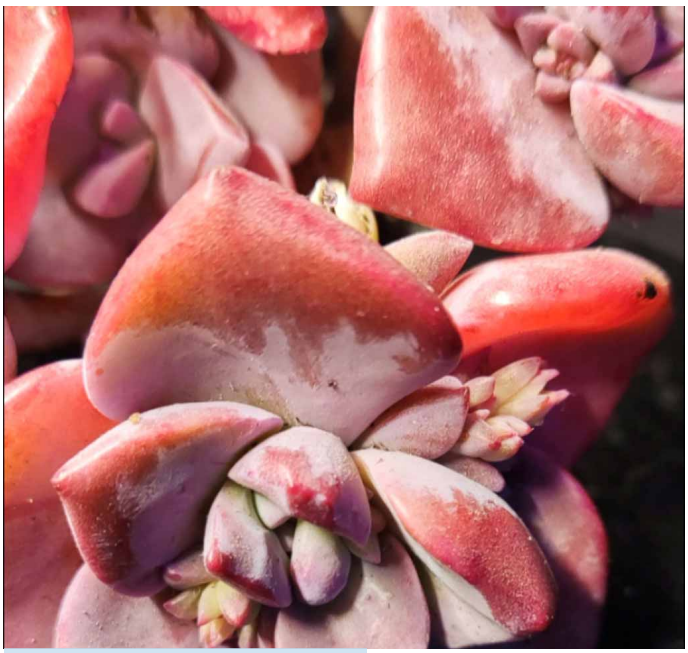


Echeveria 'Dark Chocolate'

The English of the sellers is limited and the translations are so bad it appears we now have many new plants with names picked from a supermarket shopping list. Old established varieties like ×*Graptoveria* 'Mrs Richards' have been renamed; it would be hilarious if it wasn't so sad. I wonder how many people have ×*Graptoveria* 'Gypsy Meatballs' in their collections!

Phytosanitary certificates and plant checks by the Animal and Plant Health Agency (APHA) play a critical role in safeguarding the UK's ecosystems and agriculture when importing plant products. These measures ensure that plants and plant materials entering the country are free from pests, diseases, and invasive species that could devastate crops, woodlands, and biodiversity. By requiring a phytosanitary certificate, issued by the exporting country, to confirm compliance with UK standards, and conducting thorough inspections, APHA helps prevent the introduction of harmful organisms, protecting both the economy and the environment. This process is essential for maintaining biosecurity.

It's easy enough to import legally and no longer prohibitive cost wise. When I was importing the cost of APHA inspections was around £195 plus import duty, making it quite an expensive process, With the introduction of the new IPAFFS system, the costs have been reduced to less than £40.00 plus import duty meaning they are affordable.



Graptoveria 'Mrs Richards'



Echeveria 'Orange Monroe' cristate

'It's only a few plants' is the kind of thinking that keeps this illegal trade humming. People assume it's no big deal, either out of ignorance or just wanting a deal. But it's not harmless; South Africa has seen over a million illegally harvested succulents seized since 2019, often headed for East Asia, and some of those routes pass through places like the UK. The World Customs Organisation noted a 43% spike in small parcel smuggling of flora and fauna in 2022 alone, with toys being a common cover. The plants people smuggle to the UK may not be rare species; but the money sent to overseas smugglers is fuelling this trade

With the above in mind, I have made a conscious decision not to import any further hybrid plants and to concentrate on trying to get hold of every species plant and, if possible, more of the classical, formally described hybrids. This may be an impossible task and could very well take the rest of my life to achieve.

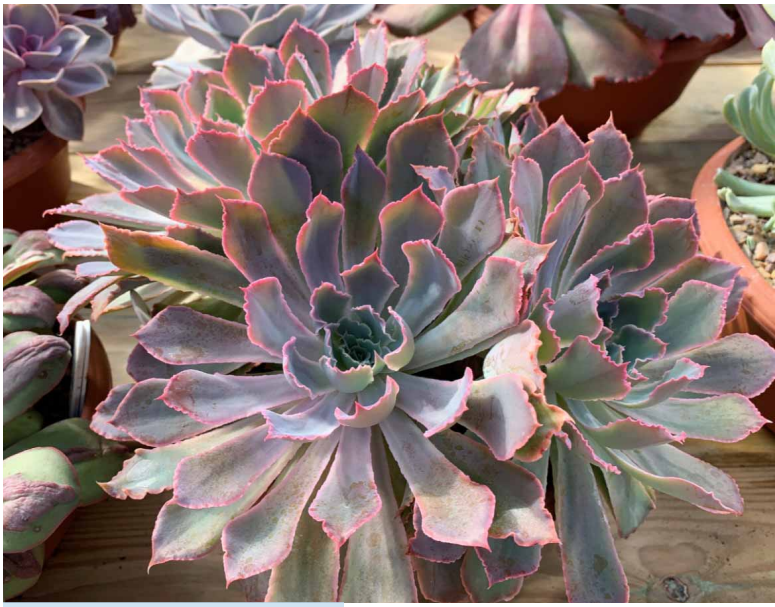
My current plant collection already holds many species plants and those I refer to as 'classical hybrids'; hybrids that have been accepted either due to having been described, named, and published or due to their longevity in plant collections. In recent years these plants are rarely seen for sale; nor do we see photographs of them published on the internet.

I don't believe the lack of them currently being in circulation is down to a lack of popularity, more a lack of availability. These plants have stood the test of time but, as older collectors have passed away or stopped collecting, the plants are being lost to us.

The UK has a rich history of echeveria growers. Carruthers and Ginns published a book, '*Echeverias: A guide to cultivation and identification*' back in the 1970s and of course there is the beautifully written and illustrated book by John Pilbeam '*The Genus Echeveria*'.



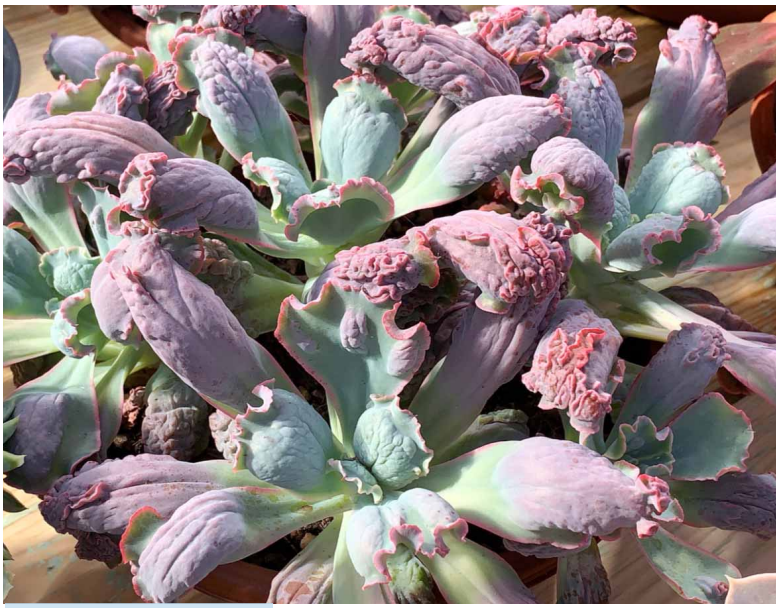
Echeveria 'Cubic Frost'



Echeveria 'Neon Breaker'



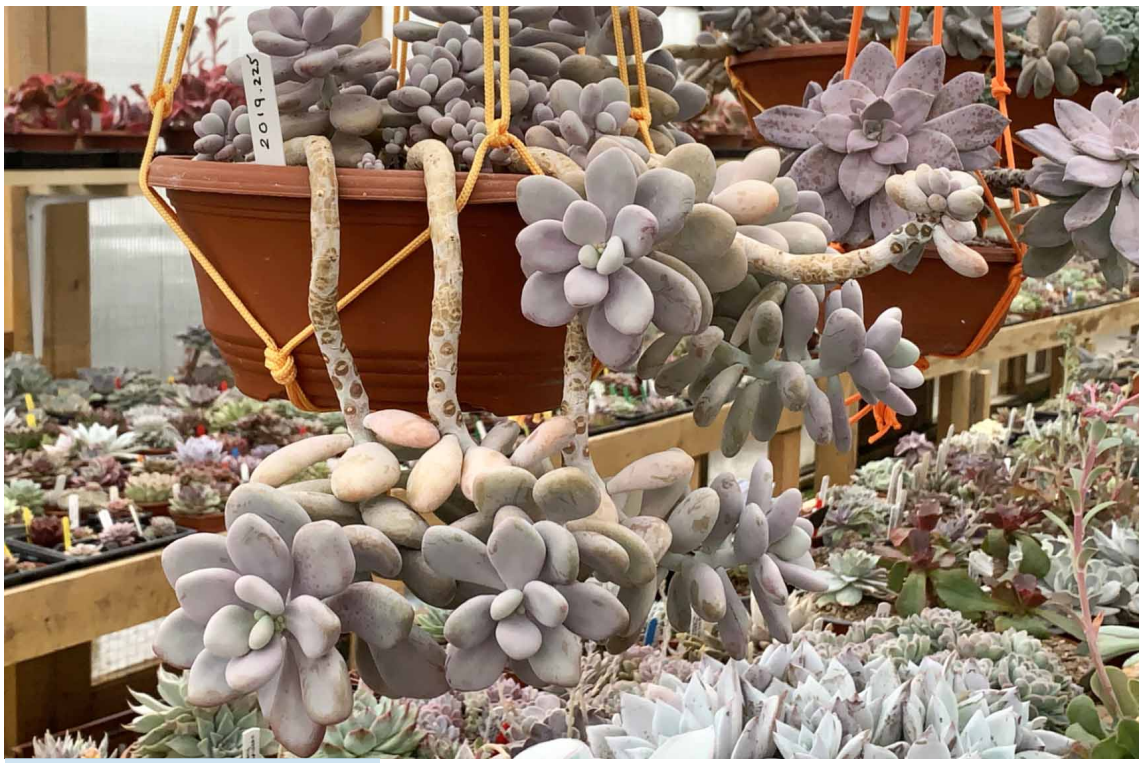
Echeveria 'Rubella'



Echeveria 'Linguas'

There is a plant called *Echeveria* 'Fred Wass' named by Brian Fearn of Abbey Brook Cactus Nursery after a Nottingham miner and collector. I have plants in my collection created by Roy Mottram, Brian Fearn, John Pilbeam, Albert Baynes, Southfield Nurseries and Derek Bowdery.

Many of these collections and the information about them have been lost to us. I would love to know what happened to the Carruthers collection or to the species plants collected and used by John Pilbeam when he wrote his book. If anyone reading this has any information about the people or the plants I would love to hear from you. (*See contact details Page 10.*)



Graptopetalum amethystinum

In place of these beautiful older plants, the internet is flooded with dubiously named, unestablished seedlings and misnomers.

The National Collection

Armed with these thoughts and the fact that we are slowly losing our heritage plants I began to look at Plant Heritage and seriously considered starting a 'National Collection'.

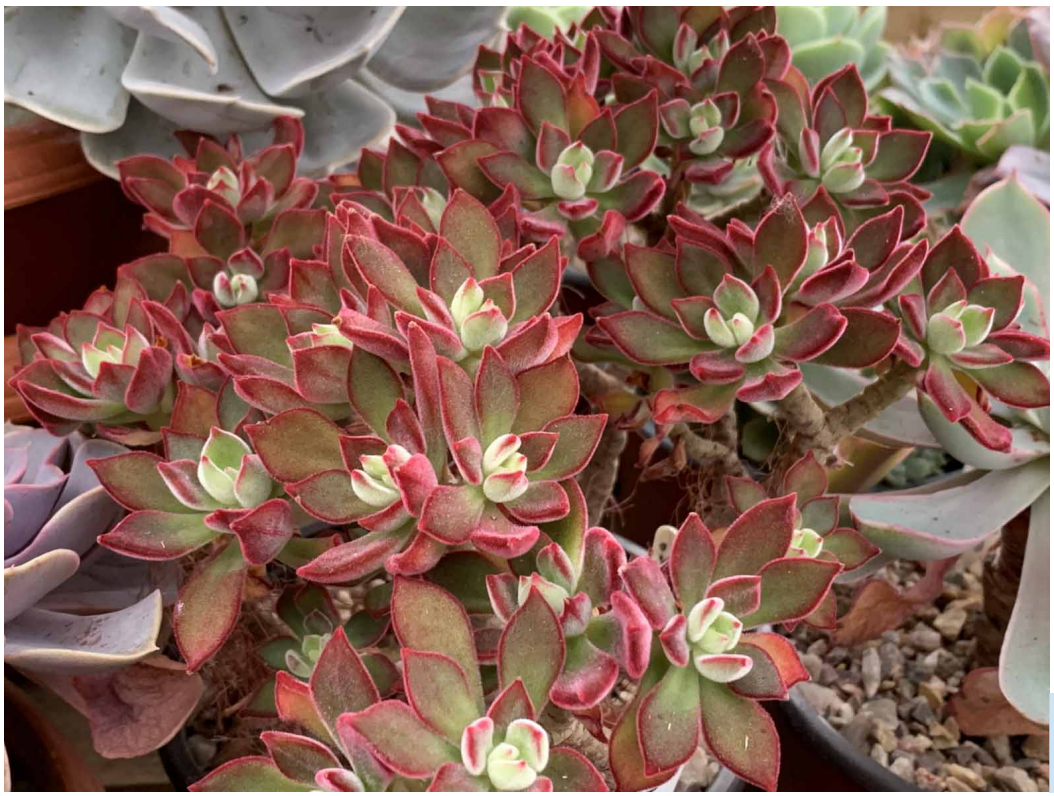
It's a long process and something I did not feel I could enter into lightly. Before I even submitted a proposal to Plant Heritage I came across my first stumbling block.

As a prerequisite to holding a National Collection, it is understood that the collection must be open for public viewing either on open days or by appointment. The realisation hit; although I feel I am quite organised, my organisation is like the inside of my head, quite haphazard.

I had plants spread out in various greenhouses and although I knew where every plant was, this just would not do. If the collection was to be open to the public, I needed the plants all in one place and not a single one of my greenhouses was big enough to hold the full collection.



Pachyphytum rzedowskii



Echeveria pulvinata 'Devotion'

My poor husband Bernie heard those fatal words, "I've been thinking". If I remember rightly his reply was along the lines of, "How much work is this going to involve?" I explained my quandary and possible solution; with tape measure, pad and pen in hand, he took me to the 'big greenhouse' and began working out if it would be feasible to extend it. It was! Problem one was resolved. This extension was going to make a difference and allow all the collection plants to be in one place.

The Process

Before a plant collection is accepted and given 'National Collection' status, an initial proposal needs to be completed detailing information about the collection, briefly outlining its scope and background, along with a plant list.

My initial proposal went to the Plant Collections Committee in June 2024 and was accepted. I was invited to submit a full application, which was sent to Plant Heritage in August.

Once the proposal was accepted the hard work began. Bernie had already started work on the greenhouse. Once completed the plants could be arranged in there. That work is currently still ongoing! The team at Plant Heritage has been extremely helpful, adding my plants to their database, 'Persephone'. To date we are around a third of the way through uploading the collection.

Plant Heritage arranged for an area coordinator to do a site visit and submit a report to the 'Plant Collections Committee'. My local coordinator, Martin Walker, was a fount of knowledge. This visit was helpful in my understanding of becoming a National Collection holder.

On 4 December 2024 I received an email with an enclosed letter from the Plant Collections Committee saying that my application had been approved. I now hold the National Collection of *Echeveria*, *Graptopetalum* & *Pachyphytum* species, cultivars & hybrids (incl. intergeneric hybrids). ■

Photos: Tracey Coogan

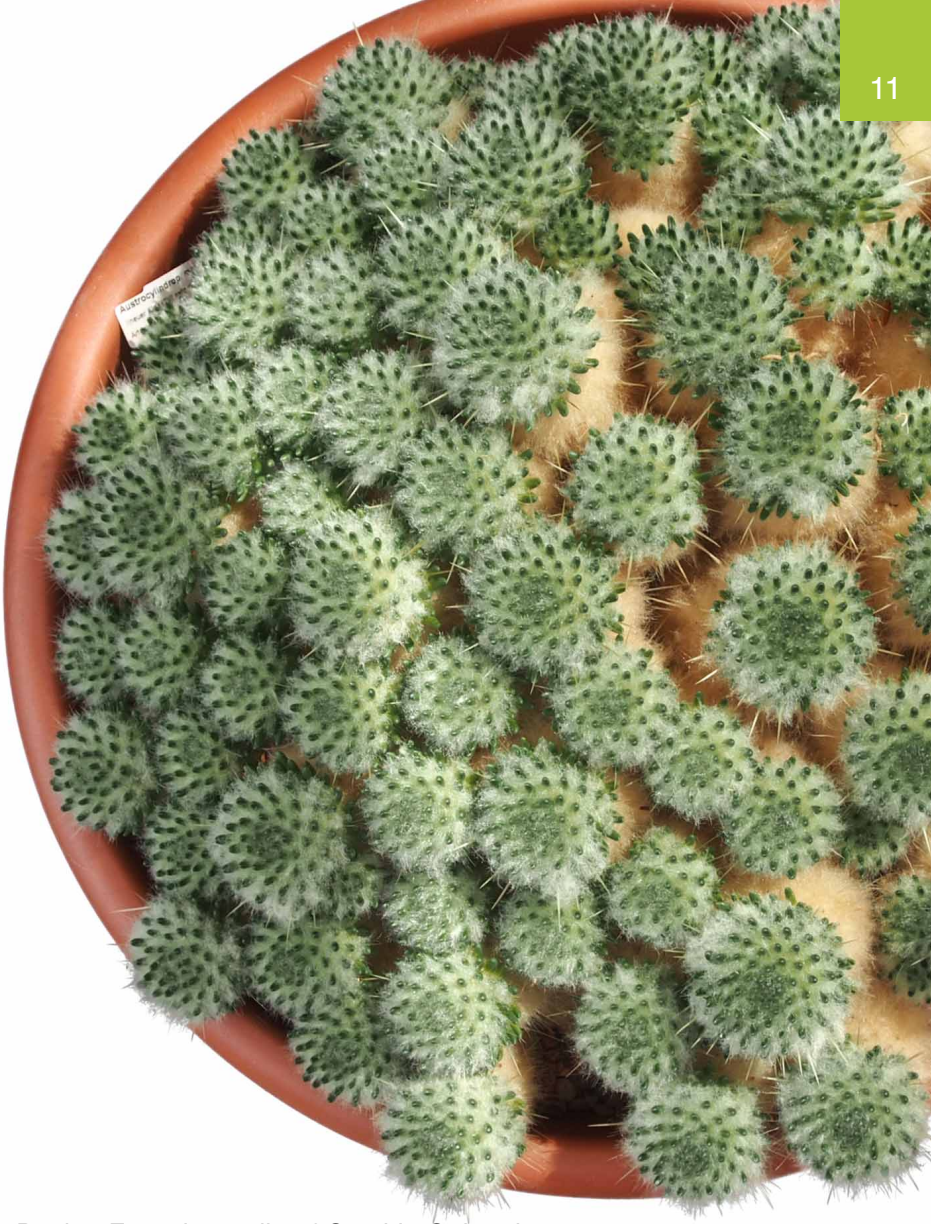
Eastoft
Echeveria
Quality UK grown plants

Holder of the National Collection of Echeveria, Graptopetalum & Pachyphytum species, cultivars & hybrids (incl. intergeneric hybrids).

The National Collection is open to the public on selected dates or by appointment. *See details on our website*.

Online shop is now open with over 300 varieties of Echeveria, Graptopetalum and Pachyphytum for sale. All our plants are grown in our nursery from seed, offsets or cuttings.

See us online at:
Website **Facebook** **Instagram** **YouTube**



Punotia lagopus

by Phil Crewe

I have always liked opuntias – my first cacti were three opuntias – and when I rekindled my interest in cacti and succulents in my early 30s I was keen to add some to my new collection.

This time, however, I was more interested in the South American plants that I'd seen in books, such as *Tephrocactus*, though I quickly had to get to grips with some unfamiliar genus names.

I'd grown *Austrocylindropuntia vestita* as a child and knew vaguely the even fluffier *A. floccosa*, of which I had seen colour habitat photos in Edgar and Brian Lamb's *Pocket Encyclopaedia of Cacti in Colour* in which it was shown as large rafts of short, upright stems. *Austrocylindropuntia malyana* (a synonym of *Punotia lagopus*) was a new name to me when I encountered it first in Ian Robinson's plant list and later in Michael Kießling's.



Fig. 1

Punotia lagopus plants, grafted on *Austrocylindropuntia subulata*. The left-hand plant from Michael Kießling, the right-hand plant from Ian Robinson
Photo: June 2010

My first plant came from Ian in August 2006, freshly grafted on to *Austrocylindropuntia subulata*. When I ordered some plants from Michael in early 2010 I decided to buy a second specimen, having seen photos on his website of strongly growing plants. His arrived grafted on the same stock, though it was a larger piece (Fig. 1).

Side by side, the new plant's leaves appeared to be a much darker shade of green. At the time I put this down to environmental factors, such as better soil nutrients, but the difference has persisted. During 2011 I removed the first small branch produced by my new plant and grafted it on to an unrooted pad of *Opuntia humifusa*.

Punotia lagopus was described as *Opuntia lagopus* by Schumann in 1903 based on plants collected by Augusto Weberbauer. The species name is derived from ancient Greek, meaning 'rabbit (or hare) foot'. It seems the plants did not survive their trip to Europe so collectors did not become familiar with it. Subsequently, the name was confused with forms of *A. floccosa* as the real plant became forgotten.

Walter Rausch, encountering it on his travels in Peru, redescribed it in 1971 as *Tephrocactus malyanus*. It was not until a century after its discovery that a photo in a publication by Weberbauer allowed the true identity of *O. lagopus*, and the synonymy of *A. malyana*, to be confirmed (Crook, Arnold & Lowry 2003).

DNA work (Ritz et al. 2012) placed the species sister to all species of *Austrocylindropuntia* and *Cumulopuntia* (meaning it could belong to neither) and led David Hunt to coin a new genus name, *Punotia*, which is both an anagram of *Opuntia* and a reference to the department of Peru (Puno) where it lives.



Fig. 2

Strong spring sunshine induces the production of more hair, often quite unevenly



Fig. 3

The same two plants as in Fig. 1 in May 2018

It grows mainly in Peru (and just over the border into Bolivia) at very high elevations, perhaps it is the second highest growing of all cacti (Hoxey 2016). Its preferred altitude range, 4300–4600m, means it grows in a narrow band along the contours south-eastwards from near Macusani. At this northern end of its distribution, where it is most frequently photographed, the plants endure moderate cold, wet and light snow.

My plants just about manage to stay in growth through hot summers here in Greater Manchester but some growers report that it can become dormant in heatwaves. It has a reputation for being difficult to root from cuttings, which is why it is frequently grafted. This may be due to the behaviour of the clone most often grown in the UK in the past; newer material to cultivation can be rooted, though I confess I have never tried. On its own roots, plants are said to need some moisture through the winter, whereas my grafted plants are allowed to dry out without harm. They continue growing nevertheless, as shown by the sudden increase in wool that gives plants a scruffy appearance when the sun strengthens in early spring and that draws attention to the less hairy winter growth (Fig. 2).

Away from the extreme solar radiation levels of upland Peru, and grafted on *A. subulata*, there is a tendency for plants to elongate unnaturally. Grafting a piece on *O. humifusa* was done in the hope of controlling one of these factors but it made little difference: that clone grew more tightly than my original plant whichever stock was used (Fig. 3). Stems on the ex-Ian Robinson plant sometimes need trimming as they become pendent over the sides of the pot.

I never anticipated seeing a flower from this particular species, so I was pleasantly surprised to discover a bloom on my largest plant (ex-Michael Kießling) in late June 2018 (Fig. 4). I made attempts to set fruit using pollen from both *A. vestita* and *Cumulopuntia corotilla* but, unfortunately, without success, nor did the reverse crosses yield any results.

In 2019, I remained vigilant for buds and managed to spot one at an early stage on the smaller ex-Michael Kießling plant (Fig. 5), which eventually opened in early July (Fig. 6). However, attempts to cross it with *C. rossiana* were also unsuccessful. The flower lasted for three days but never opened widely.

The flower on my largest plant open to its maximum extent
Photo: June 2018



Fig. 4

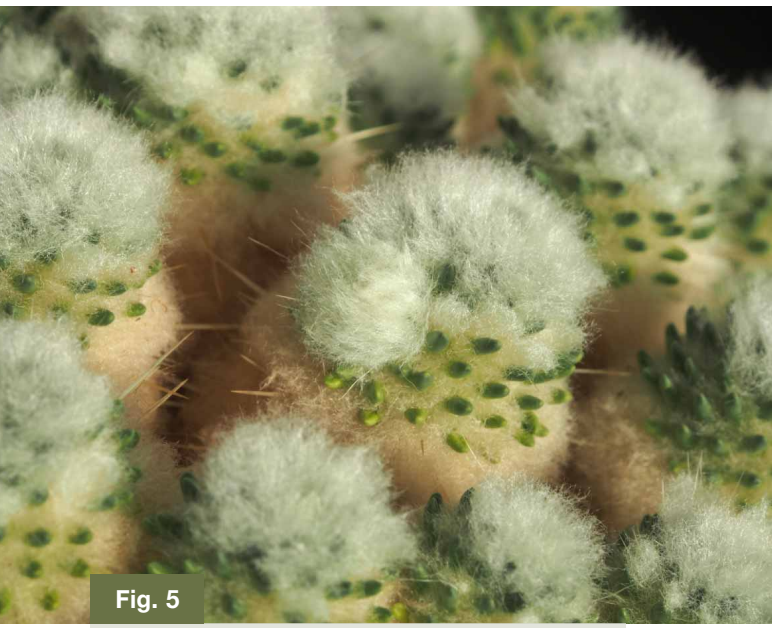


Fig. 5

Flower bud at the centre of the photograph



Fig. 6

Close-up of the flower on the smaller plant

In 2020, I was excited to see a third flower, this time on the larger plant once again. All three plants, however, have recently been affected by mealy bugs, leading to a lack of new flowers and causing them to appear a bit tired (Fig. 7). I am also concerned about the poor performance of *O. humifusa* as a long-term grafting stock: nearly all the grafts I made with other cacti ultimately failed, so I plan to check the root systems of each plant and conduct a repotting this year to help rejuvenate them. ■

Photos: Phil Crewe

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Fig. 7

The largest plant in July 2024 with fewer green leaves compared to previous years. Due to the thick hair, the plant stems are very pale, with photosynthesis probably being confined to the leaves



Fig. 1

Stapeliinae of Socotra

by Alain Buffel

When people talk about the special vegetation of the Socotra archipelago, and the main island of Socotra in particular, they often talk about the iconic and better-known species such as the symbolic *Dracaena cinnabari* but also about *Adenium socotranum*, *Dendrosicyos socotranus* and, to a lesser extent, some special species from the Euphorbiaceae.

The early separation from the African continent (about 6 million years ago) created a veritable laboratory of life in the Socotra archipelago which resulted in a species-rich flora and fauna with many endemic species. Hence, I want to zoom in here on that part of the Apocynaceae (ex-Asclepiadaceae) family that we mostly know as 'stapeliads' but more correctly as stapeliinae. Stapeliinae is a subtribe of the Ceropegieae tribe consisting of about 35 plant genera, many of which are concentrated in Africa, Arabia and Asia.

It should, therefore, come as no surprise that the island of Socotra, despite its limited size (3625km^2), also hosts a great diversity of stapeliads due to its isolated location. Geographically, the island has three distinct areas: the coastal plains, a limestone plateau (the Ma'alah Plateau) and the Hajhir Mountains with the highest point being Mashanig Haggier (1519 m).

Botanists believe that the flora on Socotra is among the ten most endangered island flora in the world. The biggest culprits in this area are the numerous free-roaming goats that attack many plants while grazing.

Above: *Caralluma* (*Monolluma*) *socotrana*

Here is an overview of some of those stapeliads I saw during a trip in spring 2024. (E) stands for endemic.

Caralluma (Monolluma) socotrana

Let me start straight away with the largest species and the one with the widest range on the island. *Caralluma socotrana*, contrary to what its name suggests, is not entirely endemic to Socotra but also occurs sporadically in Ethiopia, Somalia and the desert regions of Kenya.

The plant has upright grey-green stems up to 45cm tall. The flowers are usually deep red but can be other colours also, which are less common. The crushed plant stems are sometimes used by locals to clean and disinfect their hands. The tips of the stems are said to be thirst-quenching.



Fig. 2



Fig. 4



Fig. 3



Fig. 5

Figs. 2-5

Caralluma (*Monolluma*) *socotrana* including the flower and opened fruits



Fig. 6

Above and below: *Caralluma* (*Monolluma*) *socotrana*

Fig. 7





Fig. 8

Duvaliandra dioscoridis with unopened flower buds

Duvaliandra dioscoridis (E)

This monotypic genus was formerly known as *Caralluma dioscoridis* but in 1980, because of its isolated location, only in one habitat (the Addo Dhemalu pass in the Hajhir Mountains), it was classified in the new genus *Duvaliandra;* this because of its similarity to the genus *Duvalia*.

Only two plants were seen in habitat during my 2024 trip, hidden under small low shrubs for protection from predation. Unfortunately, we were just too early to see the flower buds present open (Fig. 8). The plant is quite common in collections, where it has flesh-coloured hairy inflorescences.



Fig. 9

Duvaliandra dioscoridis



Fig. 10

Schematic representation of the inflorescence of *Duvaliandra dioscoridis*



Fig. 11

Echidnopsis insularis

Echidnopsis insularis (E) :

This species, known from three growing sites, has stems up to 10cm long with a thickness of 5 to 11mm and bell-shaped inflorescences. The plants grow at an altitude of 200/350m, mostly in the shade, between cracks of rocks where they are inaccessible to goats and other grazers.

Unfortunately, I was too late to photograph flowering specimens of this species although flower remnants were visible.

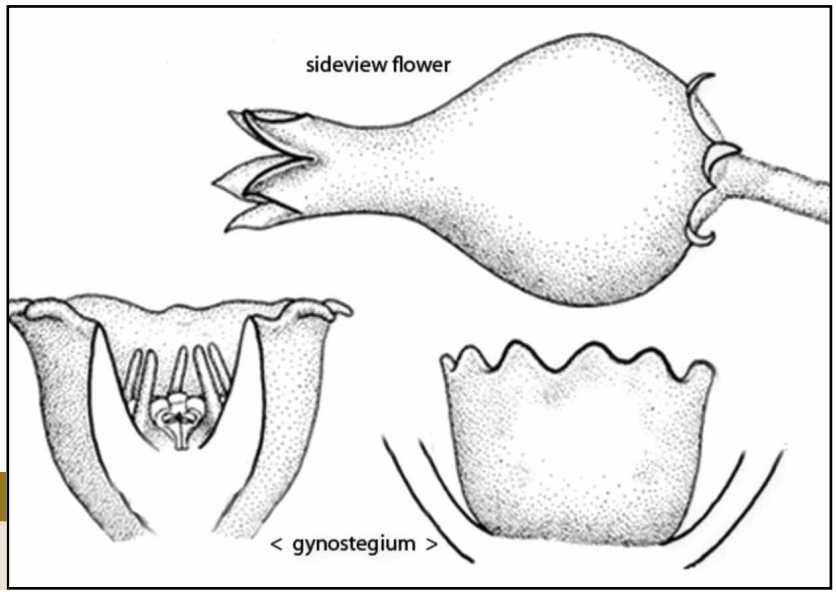


Fig. 12

Echidnopsis insularis flower details



Fig. 13

Echidnopsis insularis with my wristwatch placed next to the plants to better show their size



Fig. 14

No, this is not a search for someone's wedding ring but an afternoon out to track down *Echidnopsis socotrana*

Echidnopsis socotrana (E)

This species is not rare at its sites but the sites are very limited, making it considered vulnerable. It grows hidden under rocks where it grows in the shade or among bushes at altitudes between 500 and 700m. It often grows in holes in rocks where it is inaccessible to grazers.

The search for these plants can often take some time (Fig. 14).



Fig. 15

Fig. 16

Above: a typical growing site of *Echidnopsis socotrana*. They also occur in some more accessible places or under rock outcrops.

Inset: a plant with a fruit, a closed flower bud and an open flower.



Fig. 17

Echidnopsis socotrana growing in the shade of rocks

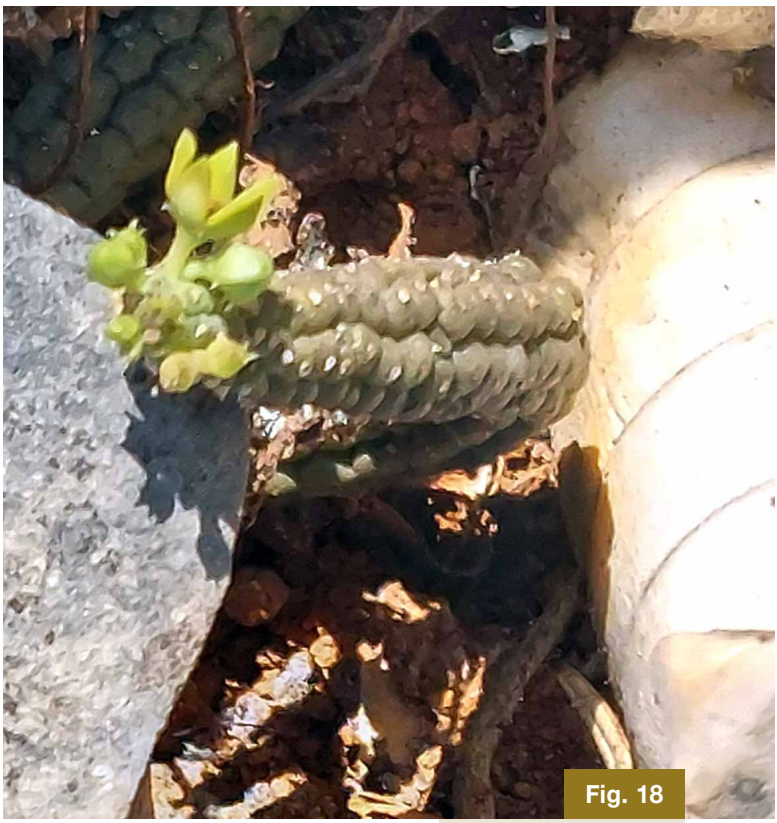


Fig. 18

Echidnopsis socotrana with a cluster of flower buds and one opened flower

Stems are up to 10cm long and 6 to 10mm thick. The corolla is greenish-yellow with red rings at the base. Flowers appear at the tips of the stems. Note the darker colour of the plant in Fig. 17, which is growing in shade rather than sun.

The genus *Echidnopsis* is represented on Socotra with three other species besides the two shown, all are endemic:

Echidnopsis bentii with dark purple to dark brown flowers.

Echidnopsis inconspicua with cream-coloured flowers with a dark centre.

Echidnopsis milleri with pink flowers.



Fig. 19

Echidnopsis socotrana

Edithcolea grandis

Again a monotypic genus, although there is some debate about this because of the large variation in flower colour and stem shape over its wide range.

I have seen the plants in several places on Socotra but unfortunately never with flowers; although I have seen it once in full bloom in Ethiopia, near Arba Minch, with particularly red flowers. The late Darrel Plowes considered this to be a new species.

This plant also occurs in Somalia, Kenya, Sudan, Tanzania and Uganda. Again, most of the plants on Socotra grow hidden between rocks (Figs. 20 and 21).



Fig. 20

Echidcolea grandis growing among rocks

Fig. 21

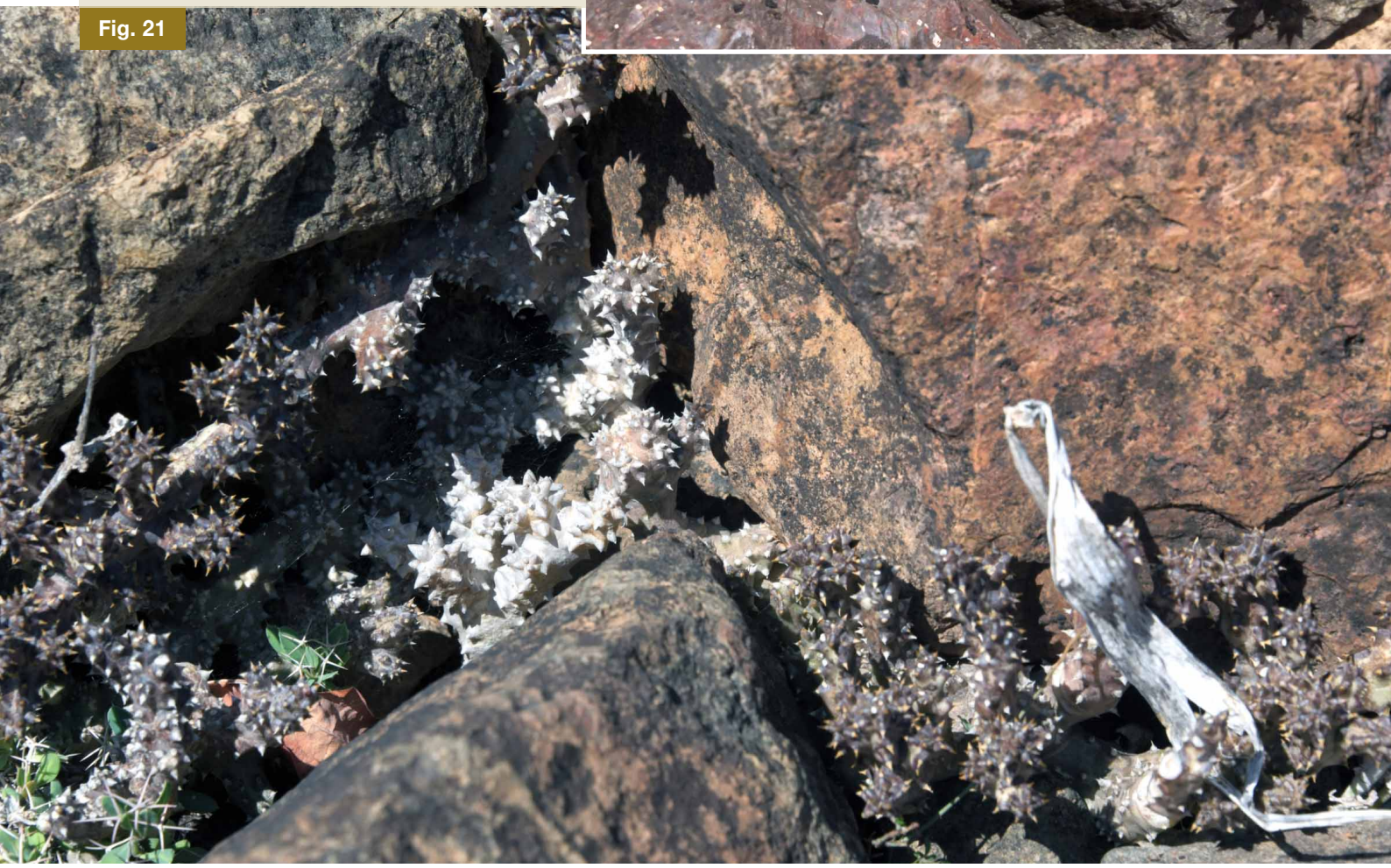




Fig. 22

Socotrella dolichocnema

Socotrella dolichocnema (E)

Another monotypic genus, known from only two sites in the western part of Socotra.

When not blooming with their small but very pretty bright yellow flowers, these uncommon plants are practically undetectable because only the tops of the stems rise above the ground, while they seem to branch underground.

Those tops also seem to hide under short bushes and in rock crevices, again because there they are inaccessible to hungry animals.

When the flowers appear, however, these gems are beautiful to see.

Fig. 23





Fig. 24

Camping in Socotra near the *Dracaena cinnabari* forest

Since, during our stay, our international group of 14 people saw plants of the five genera found on Socotra that can be counted as Stapeliinae, we can consider this mission a success.

The travel facilities may not have been what one would expect on an average trip, but waking up at dawn in the individual tents and seeing so much natural beauty soon makes one forget any inconvenience (Fig. 24). ■

Photos: Alain Buffel

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Turb blurb

by Graham Evans

The genus *Turbinicarpus* has expanded exponentially since Backeberg's *Cactus Lexicon* was updated by Walther Haage and published in English in 1976.

The now widely accepted separation of *Rapicactus* (the species with long necks and sharp white or glassy spines) and growing support for *Kadenicarpus* (essentially *T. pseudomacrochele* and its relatives) notwithstanding, there are still nearly five times as many species recognised today as in that long hot summer when James Hunt smoked Marlboro, Barry Sheene rolled Rizlas, supergroups wore flares and smiling yokels sang of sharing combine harvesters.

Much of the expansion is due to new discoveries but there have also been species imported into *Turbinicarpus* from other genera. We had a look at *Rapicactus* in the *Essex Succulent Review*, Issue 16, March 2018 and later that year we touched on *Turbinicarpus* with some pages on the *T. schmiedickeanus* complex in the *Essex Succulent Review* Issue 19, December 2018 (the *Essex Succulent Review* is now the *Cactus and Succulent Review,* see 2018 Back Issues). More recent DNA analysis incidentally strongly suggests that only *T. andersonii*, *T. gracilis* and *T. rubriflorus* actually belong as subspecies beneath the type; the remainder appear to be good species.

Turbinicarpus valdezianus clearly showing the distinctive plumose spination



Turbinicarpus valdezianus. An old two-headed plant probably damaged as a seedling

In this article, we will look at two of the imports, which are among the most attractive and sought-after members of the *Turbinicarpus* genus: *T. pseudopectinatus* and *T. valdezianu*s.

Both species share the appealing traits of numerous appressed radial spines and no centrals. The spines are white or off-white and virtually cover the plants, reflecting ultra-violet light and protecting the stems from damage. Both species have also been nomenclatural nomads, continually being moved mercilessly by tyrannical taxonomists from one name to another, but hopefully they have now found themselves a forever home.

Turbinicarpus valdezianus

The first to be validly described was *T. valdezianus*. Originating from Coahuila state (but also found in Nuevo León) in north eastern Mexico it is a very small-growing geophytic cactus, solitary and rarely more than 2.5cm wide and tall in habitat, although it can reach a height of 8cm in cultivation and occasionally form clumps, especially when grafted.

The stem is bright green but normally obscured by the spines, which are all radial, short, white to cream-coloured and number up to about 30. They are faintly feathery, neatly arranged around circular

A paler-flowered form of *Turbinicarpus valdezianus*



areoles (so not actually pectinate) on tiny tubercles and appressed closely to the body, giving the plant a seemingly soft and most appealing appearance.

The flowers appear from the centre and can vary considerably, with the width and intensity of the pale pink to dark magenta midstripe offering an impressive range of hues. The whitest forms sometimes carry the varietal name *albiflorus* (technically invalid in *Turbinicarpus*).

The taxon was first named *Pelecyphora valdeziana* by Heinrich Moeller in 1930 and a superficial resemblance to the genus is immediately apparent but it lacks the characteristic hatchet-shaped tubercles. Never seeming to quite fit anywhere, it was subsequently transferred with varying degrees of sense into *Echinocactus* (Boedeker, 1930), *Thelocactus* (Borg, 1937), *Mammillaria* (Kelsey & Dayton, 1942), *Gymnocactus* (Backeberg, 1966) and *Normanbokea* (a new genus of which it was the type species, Kladiwa and Buxbaum, 1969) before Charles Glass and Robert Foster correctly placed it in *Turbinicarpus* in 1977, supported by stem, fruit and seed morphology and later confirmed by molecular data. More recent attempts to move it into *Neolloydia* (Anderson, 1986) and *Pediocactus* (Halda, 1998) never found much favour.

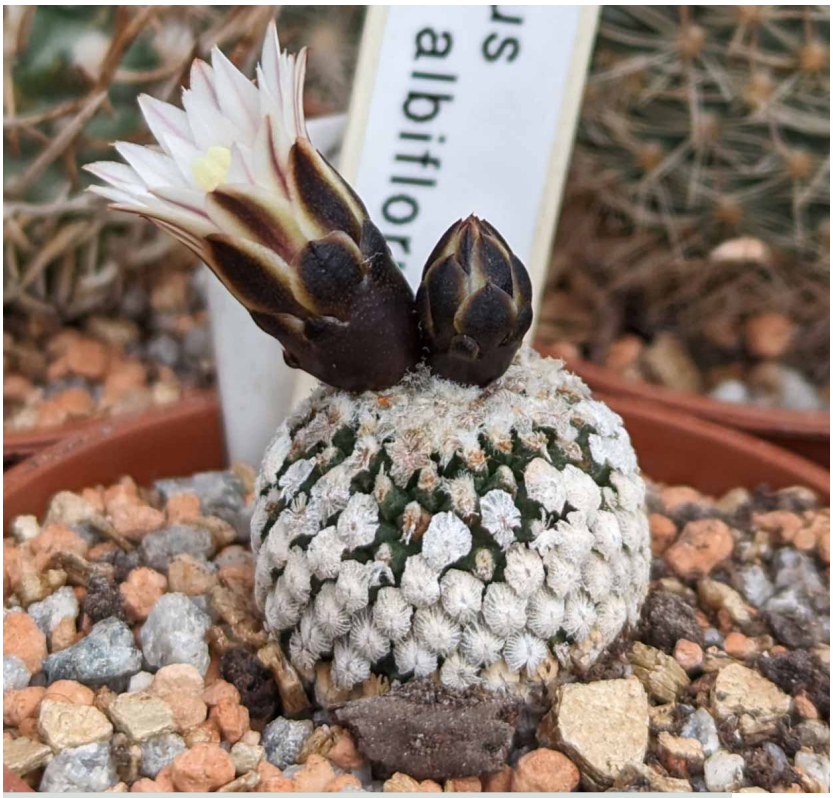
Turbinicarpus pseudopectinatus

Turbinicarpus pseudopectinatus was first found in Tamaulipas state, Mexico but, like the preceding species, also grows in Nuevo León. It is one of the most beautiful of all cacti with up to 50 short, pure white genuinely pectinate spines, that is to say arranged comb-like either side of an elongated areole. Unlike those of *T. valdezianus*, these are never plumose but still almost completely obscure the stem, giving plants an exquisite smooth white countenance.

Habitat plants measure about 3cm x 3cm but cultivated specimens can be twice this size, more on grafts. Stems are normally solitary and very rarely branch unless damaged. The flowers, borne from the centre, are white with a midstripe that can vary in hue from pink to reddish purple. The darkest forms are sometimes offered as var. *rubriflorus* or subsp. *jarmilae*.



Turbinicarpus valdezianus ‘Albiflorus’ (Photo: Sheila Cude)



Turbinicarpus valdezianus ‘Albiflorus’ (Photo: Vicky Davies)

This taxon also has a horrible history of names and would surely be forgiven any crisis of self-identity. The tale begins badly with the very moniker, which means the 'false *pectinatus*'. Aside from what would doubtless be considered today discriminatory disrespect and a breach of floral rights, this affront also turned out to be unnecessary because the first description in 1930 was invalid.

At the time the plant we know today as *Mammillaria pectinifera* was widely regarded as *Solisia pectinata* and it was to the same genus that Curt Backeberg thought the new discovery belonged because of its obvious similarity on first acquaintance, hence he named it *Solisia pseudopectinata*. The flower location and structure, not to mention the fruits, make the combination clearly erroneous and so Backeberg coined *Pelecyphora pseudopectinata* in 1935, preserving the specific epithet, which is the first valid name for this plant. Later host genera



Above and below flower colour variation in *Turbinicarpus pseudopectinatus*



include *Mammillaria* (Kelsey & Dayton, 1942), *Thelocactus* (Anderson & Boke, 1969), *Normanbokea* (Kladiwa & Buxbaum, 1969), *Neolloydia* (Anderson, 1986) and *Pediocactus* (Halda, 1998). It was once again Glass and Foster in 1977 who made the correct combination of *Turbinicarpus pseudopectinatus*. The invalid name *Pelecyphora pulcherrima* is occasionally encountered on sale plants or seed lists and is clearly referable here. It seems most often applied to pink-flowered forms.

Cultivation

Both these species are very slow growing and will take many years from seed to reach more than a couple of centimetres in size, spending a good proportion of their initial energy developing napiform taproots.

The good news is that tiny plants less than 1cm across are capable of flowering and can do so in their second year. Unlike many turbinicarpus, which flower throughout the growing season, *T. pseudopectinatus* and *T. valdezianus* are obligate spring bloomers and are among the very first cacti to provide colour each year, commencing with little dark dots appearing in the areoles at the centre of the plants. In fact, most plants should at least be in bud by the time you read this.

Although slow, neither species is especially difficult given a very porous mix, careful watering and excellent light. The nature of the spination and the consequent ability to hold water against the stem makes overhead watering potentially risky if there is a chance of dull weather; watering around the top of the pot avoiding the plant or from underneath is recommended. In winter the plants should be completely dry and will withstand temperatures as low as freezing for short periods. A cool rest improves flowering and initial watering should be delayed until the buds start to show some shape, otherwise the plant tends to expand and swallow them up.

Here's to spring! ■

Photos: Graham Evans unless indicated otherwise



Turbinicarpus pseudopectinatus; a great profile profile – better than Barrymore!

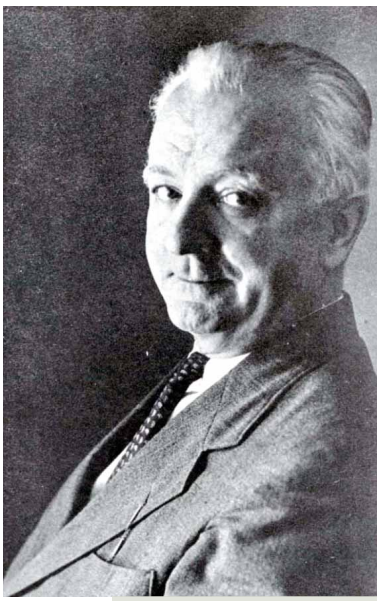


Turbinicarpus pseudopectinatus subsp. *jarmilae* Note the tiny dark buds (in the centre of the right head) which appear in late February in the UK

Louis C. C. Krieger

Botanical artist

by Joseph Shaw



Louis C.C. Krieger, circa 1930 (Harvard University Herbaria & Libraries, photographer unknown)

Louis Charles Christopher Krieger (1873-1940) worked with mycologist Wilson Gilson Farlow Griffiths at Harvard University and later with David Griffiths at the plant introduction centre at Chico, California.

Introduction

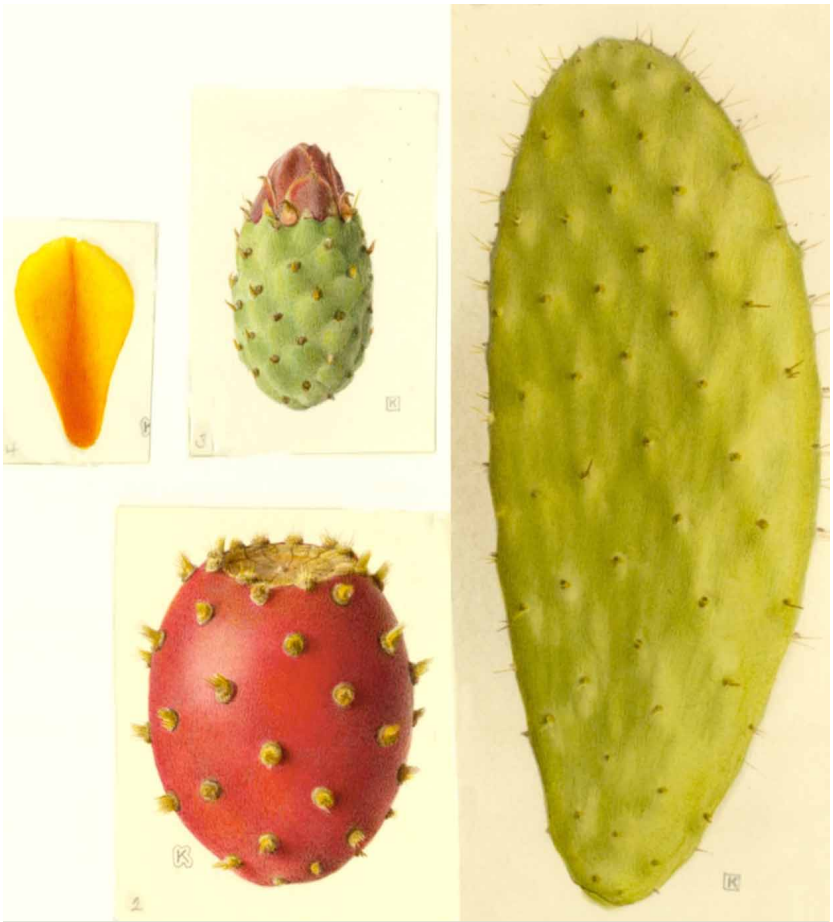
Early in his career Krieger worked for the Division of Microscopy at the Department of Agriculture and spent time painting mushrooms found in the District of Columbia.

In 1902 Krieger started working as a botanical illustrator for mycologist William Gilson Farlow at Harvard University, a position that lasted for the next decade. During this time he painted over 350 images of mushrooms. His attention to anatomical and morphological detail was exquisite and his work is still featured in some modern writings on botanical art. (See Wiegand and Fields: Botanical Art of a Different Kind.)

It's as a painter of opuntias, however that Krieger is featured here.



Caesar's Mushroom (*Amanita caesarea*) A plate from 'Common Mushrooms of the United States' an article by Krieger which appeared in the National Geographic Magazine in 1920, and included 16 full colour plates painted by him.



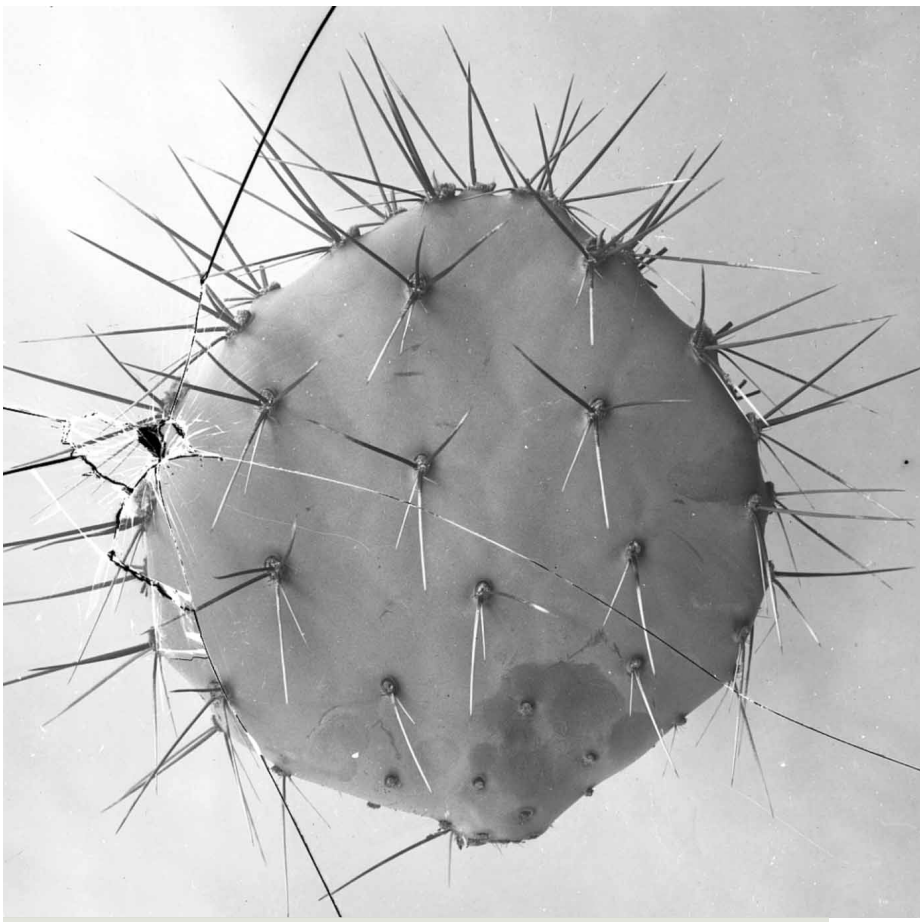
Opuntia icterica (*Opuntia tomentosa*) flower bud, fruit and cladode

Opuntia Paintings

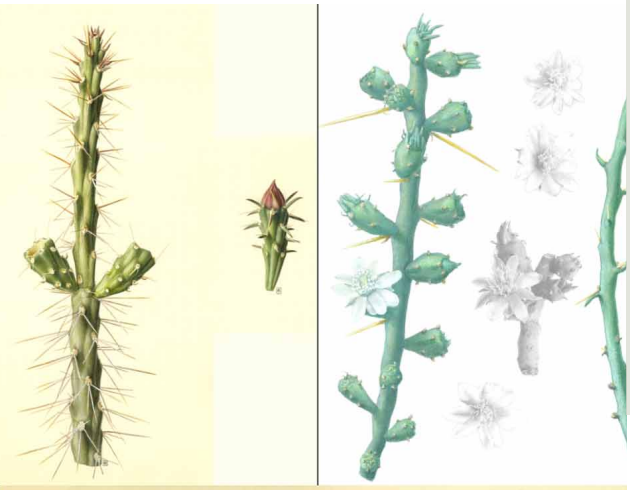
In 1912, Krieger began work with David Griffiths at the Plant Introduction Garden in Chico, California.

Griffiths was a scientist studying the forage potential of opuntias (Griffiths, 1920), who produced thousands of black-and-white photographs documenting his work. Many of these are stored as glass negatives at the Smithsonian Institute Archives (Washington DC).

Krieger used a unique method to create accurate colour paintings from black-and-white photographs. He produced hundreds of colour illustrations by painting with watercolours over lightly printed photographs. Some of his work can be found in *The Cactaceae* (Britton and Rose, 1919-1923) and he also wrote on the art of botanical illustration.

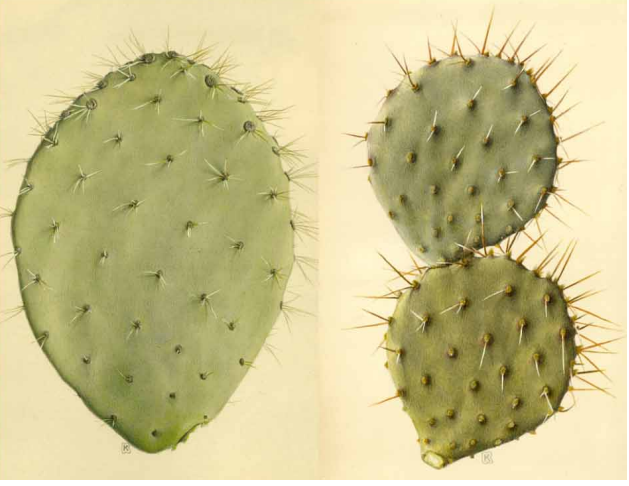


Opuntia phaeacantha, one of the Griffiths' glass plate negatives



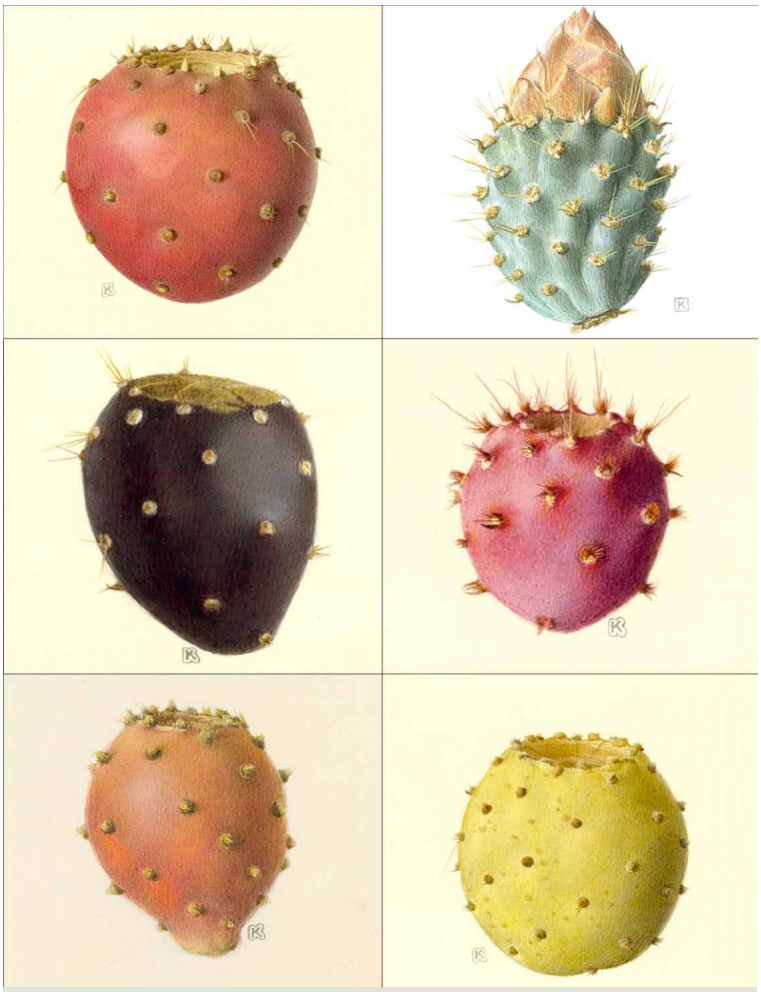
(Top left)
Opuntia ×*tetracantha* (*Cylindropuntia tetracantha*)
(Top right)
Opuntia leptocaulis (*C. leptocaulis*)
(Bottom left)
Opuntia guerrana (*O. robusta*)
(Bottom right)
Opuntia mackensenii





(Top left)
Opuntia austrina
(Top right)
Opuntia kleiniae (*Cylindropuntia kleiniae*)
(Bottom left)
Opuntia lindheimeri (*O. engelmannii* var. *lindheimeri*)
(Bottom right)
Opuntia pyrocarpa (*O. engelmannii* var. *lindheimeri*)





Opuntia fruits
(Top left) *O. effulgia* (Top right) *O. tribuloides* (*O. ficus-indica*) (Centre left) *O. dillei* (*O. orbiculata*) (Centre right) *O. stenopetala* (Bottom left) *O. affinis* (*O. velutina*) (Bottom right) *O. ficus-indica*



A half-finished painting of *Opuntia anahuacensis*

Some of his opuntia paintings are held by the Smithsonian Museum of Natural History Department of Botany Collections. A simple search by artist or species will bring up scanned images of Krieger's work. The large colour reproductions of his work may be downloaded.

The names in the figure captions are those supplied by the Department of Botany. They represent the names of the taxa as they were understood at their time of painting. Where appropriate currently accepted names are shown in brackets. ■

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The marginate agaves of section Heteracanthae

Part 1

By Colin C. Walker

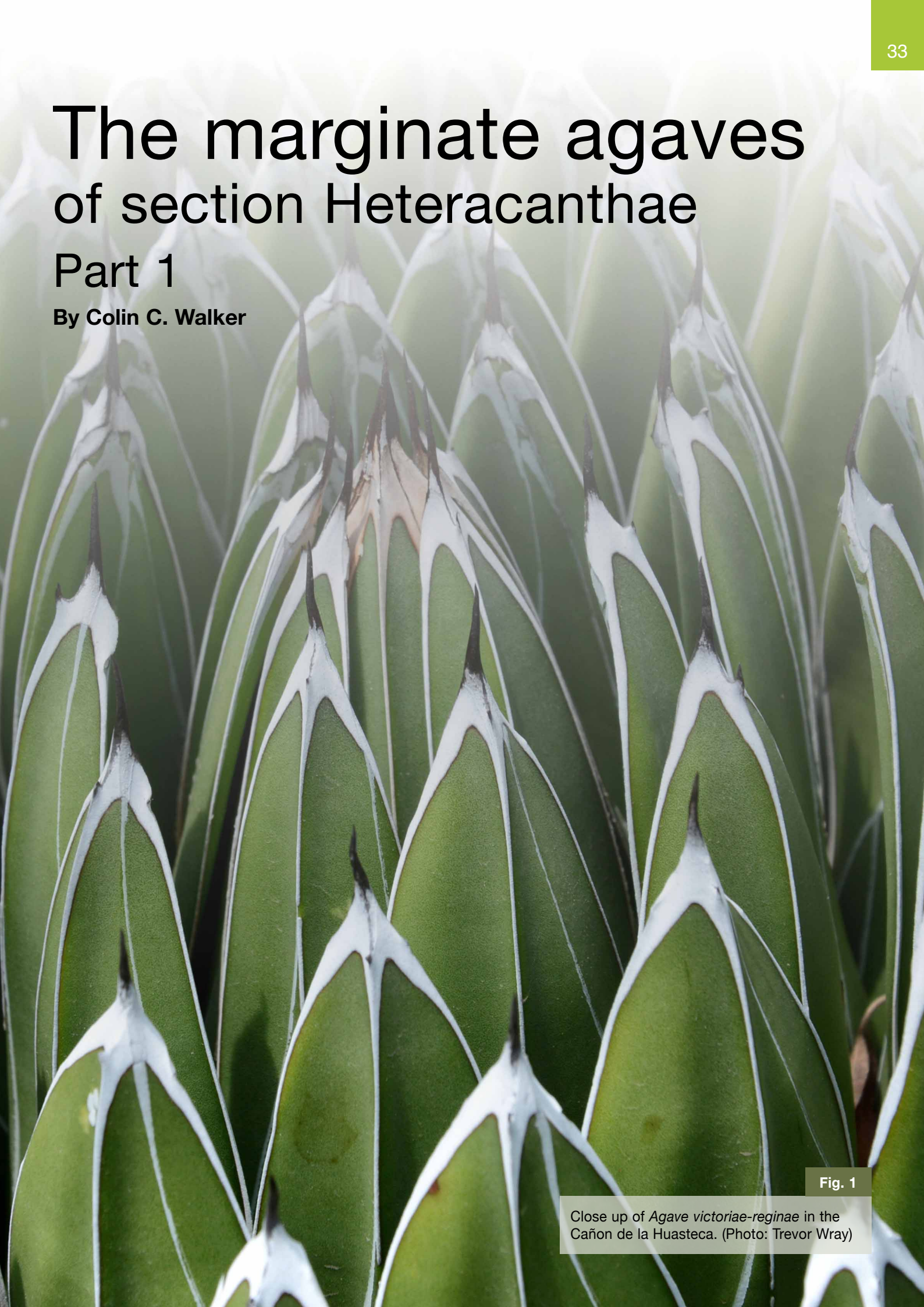


Fig. 1

Close up of *Agave victoriae-reginae* in the Cañon de la Huasteca. (Photo: Trevor Wray)

Introduction

Thiede (2020) published the most recent survey of the genus *Agave* which was divided into three subgenera. Of these, subgenus *Littaea*, which is of interest here, includes species with unbranched, narrow, spike-like (spicate) inflorescences.

The genus is further subdivided into 32 sections of which section *Heteracanthae* is the largest with around 30 species. Its distribution ranges from the southern USA, south through Mexico, where it is most diverse, to Guatemala where just a single species occurs naturally.

This section is characterised by having rosettes of stiff, straight leaves, usually bearing continuous horny margins with conspicuous marginal teeth and prominent leaf bud imprints. Terminal leaf spines are also usually very prominent and sharp. Their flowers are relatively uniform being usually small, short and openly funnel-shaped.

Earlier in his monumental monograph of *Agaves of Continental North America*, Gentry (1982) included these species in his informal group *Marginatae* but this name has been replaced by the earlier name *Heteracanthae*, which translates as 'mixed spines', for the variety of spines on their leaves. Informally these plants can be referred to as the marginate or margined-leaved agaves.

In addition to Gentry (1982) and Thiede (2020) other useful recent books are by Starr (2012), Pilbeam (2013) and Spath & Moore (2021) which are predominantly picture books particularly featuring plants in habitat.

In terms of cultivation these plants exhibit the full range of difficulty. Species such as *Agave lophantha* and *A. xylonacantha* are very easy to grow in pots; plants offset readily and hence are easily propagated. The very popular *A. victoriae-reginae* and *A. nickelsiae* are relatively slow but grow well to produce magnificent show-worthy specimens.

At the other extreme are *Agave impressa*, *A. pelona* and *A.* × *pumila* which are, at least in my very limited experience, exceedingly difficult to grow well. Most frustrating of all is *A. pintilla* that has proved to be virtually impossible to grow at all, such that my lone specimen is barely alive!

What follows is a survey of this group of agaves but it is not comprehensive because there are several species, notably *Agave angustiarum*, *A. convallis*, *A. difformis*, *A. ensifera*, *A. kerchovei*, *A. megalodonta, A. perotensis*, *A. potrerana*, *A. quiotepecensis*, *A. triangularis* and the very recently described *A. yucuanensis,* of which I have as yet no experience in cultivation.

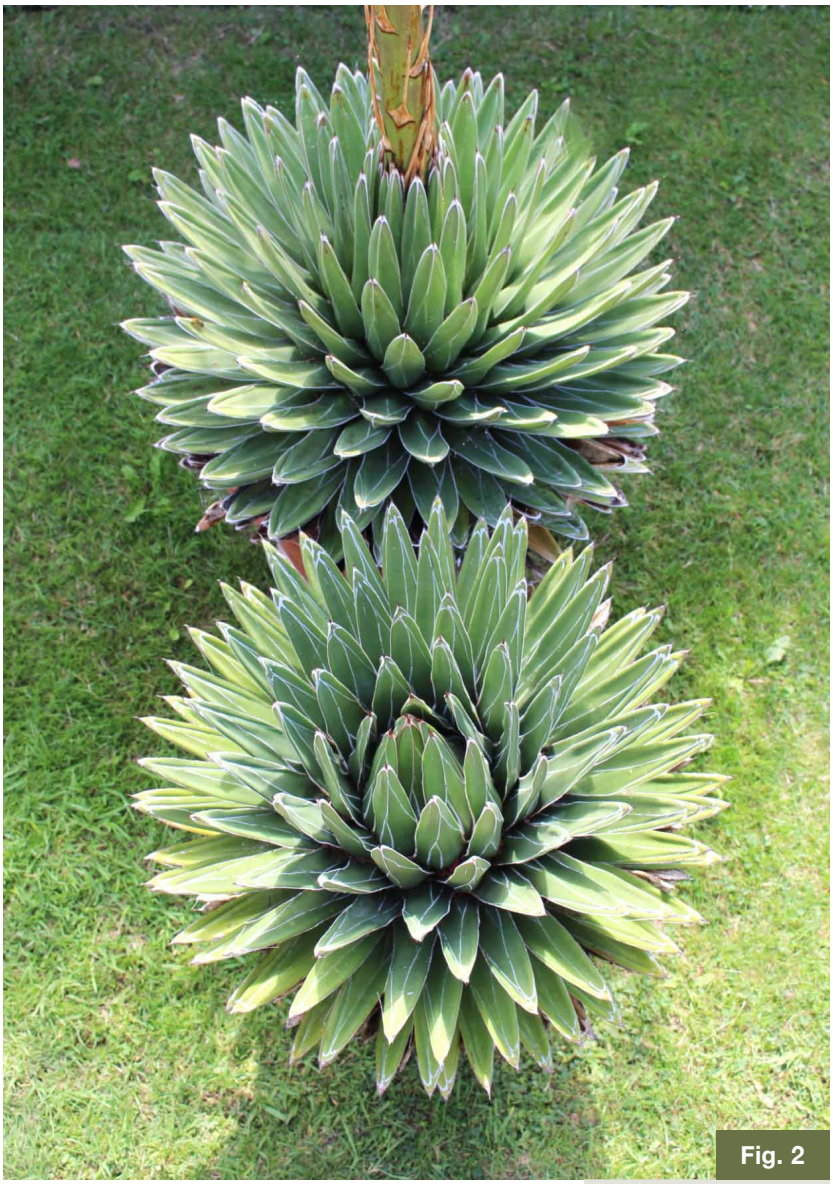


Fig. 2

30-year-old specimens of *A. victoriae-reginae*

Agave victoriae-reginae, *A. nickelsiae* and *A. pintilla*

These three species are treated together because they are among the most architectural of all the agaves and hence are very popular in cultivation. They are very closely related being characterised by the toothless margins to their leaves, which have a continuous white border and decorative white bud prints, together with short but very sharp and hence potentially dangerous terminal spines.

This group of species is, therefore, somewhat distinct compared to the rest of section *Heteracanthae*. A significant feature of all three species is that they are especially slow-growing in cultivation compared to many other agaves.

I have already written an extensive article on these (Walker, 2017) so what follows is an updated summary.

Agave victoriae-reginae is a well-known and deservedly popular species. After *Agave americana* it is probably the commonest, horticulturally interesting species of this large genus in cultivation.

In habitat this species is as stunningly attractive as it is in cultivation. It has a widespread distribution in the Mexican states of Coahuila, Durango and Nuevo León (Gentry, 1982), illustrated here from the latter state (Fig. 1).

Agave victoriae-reginae is very slow growing in pot culture, which I consider to be another feature of its attractiveness, compared to other faster growing species that require a lot of space quite quickly. Another general feature of *A. victoriae-reginae* in my experience in pot culture is that these plants generally do not offset, although there are a few clumping clones in cultivation.

As a consequence of its slow growth, this species takes a long time to reach maturity and flowering age and size. A specimen flowered for me at around 30 years old (Figs. 2 and 3). Its flower spike reached a height of 1.8m and it took four months from initiation of the spike to the opening of the first flowers. The flowers are arranged in clusters of 2–3. Since it was an unbranched rosette this plant died after flowering, exemplifying the monocarpy exhibited by most agaves.

A recent trend in agave cultivation has been the appearance of a wide range of variegates of the smaller-growing species: a good range of these is included by Pilbeam (2013) in his attractively illustrated *Gallery of Agaves*. A prime target for the production of attractive variegates has been *A. victoriae-reginae*, just one of which, 'White Rhino', is illustrated here as the most spectacular of them all (Fig. 4).



Fig. 3

The peak flowering of *Agave victoriae-reginae*



Fig. 4

Agave victoriae-reginae 'White Rhino' (Photo: Tina Wardhaugh)



Fig. 5

For comparison *Agave nickelsiae* (left) and *Agave victoriae-reginae* (right

Agave victoriae-reginae is not unique in the genus as there are two other lookalikes. The first of these, *Agave nickelsiae*, is another really attractive species first discovered in 1895 and named for Anna B. Nickels, a nineteenth century Texan cactus nurserywoman. Despite this, it is still often encountered under its later synonym, *Agave ferdinandi-regis*.

For comparison, the two species are shown in Fig. 5 and a single specimen of *A. nickelsiae* is shown in Fig. 6 (see also Page 42) This species is distinguished from *A. victoriae-reginae* by having fewer, more bulky, leaves, up to 9cm wide at the base, triangular in cross section and up to 20cm long in a large specimen. It has prominent chalky white markings up to 4mm wide, the white lines being continuous or broken and irregularly arranged. The black leaf tip is up to 1.5cm long with three short spines and a more prominent central spine up to 1cm long.

Agave nickelsiae is a micro-endemic which, according to Starr (2012), is restricted to south-eastern Coahuila, north-east of Saltillo, Mexico. It grows sympatrically (together) with both *Agave asperrima* and *A. lechuguilla* and hybridises with both of these species.



Fig. 6

Agave nickelsiae flowering in the cactus and succulent house at Glasgow Botanic Gardens

Agave pintilla in habitat (Photo: Jeremy Spath) See also front cover



Fig. 7

My plants of this species have yet to flower but I encountered a flowering plant of *A. nickelsiae* in the cactus and succulent house at the Glasgow Botanic Gardens. The impressive feature of this flowering was the height of the inflorescence which I estimated to be about 4.5m (see Page 42) The flower spike was very slender which contrasts with the flower spike on my plant of *A. victoriae-reginae* at a mere 1.8m tall, so inflorescence size is another significant difference between these two closely related species.

Agave pintilla is the third member of this closely related trio of species and was only described in 2011. The specific epithet '*pintilla*' refers to the common name 'pintillo' with which this plant is known due to its obvious white-striped leaves.

It is the most westerly distributed in the group, restricted to south-eastern Durango (Fig. 7). It closely resembles *A. nickelsiae* but differs in its smaller rosettes composed of fewer leaves and, unlike the latter species, it does not grow on limestone.

For me, in cultivation *A. pintilla* has been really difficult such that my plant is not currently at all photogenic!

Agave xylonacantha

The name of this species comes from the Greek '*xylon*' meaning 'wood' and '*acantha*' meaning 'spine' for the prominent woody, often irregular marginal teeth that are characteristic (Fig. 8). It develops openly-spreading rosettes up to 1.2m in diameter composed of relatively few leaves.

In habitat it is apparently solitary or more rarely caespitose, whereas in pot cultivation in my experience it freely offsets to form large clumps. Its leaves are rigid, up to 90cm long and 10cm across, green to yellowish-green, with or without a pale midstripe but always with a horny convoluted margin of broadly flattened woody teeth. Its terminal leaf spines are up to 5cm long.

In 2013 this was the first agave to flower in my collection after 24 years so I estimate that the plant was around 30 years old, with a main rosette about 70cm across (Fig. 10). The spicate (spike-like and unbranched) inflorescence was roughly 4m tall bearing hundreds of pale yellow flowers (Fig. 9).



Fig. 8

A young plant of *Agave xylonacantha*



Fig. 9

The flower spike of *Agave xylonacantha*



Flowering clump of *Agave xylonacantha*

Fig. 10

According to Thiede (2020) this species can be likened to an exaggeratedly-spined form of *Agave lophantha* but in fact it is more closely related to *Agave megalodonta*, a species with which I have no experience in cultivation.

Agave xylonacantha was first described in 1859 but has since accumulated a large number of synonyms and is now relatively popular in cultivation. It is widely distribution in the Mexican states of Tamaulipas, San Luis Potosí, Guanajuato, Querétaro and Hidalgo where it grows on dry limestone slopes and valleys on the desert side of the Sierra Madre Oriental. Thiede (2020) also reports that this species exhibits low genetic diversity relative to other species, which he suggests might be accounted for by a recent evolutionary origin. A popular cultivar has been named 'Frostbite' which has green leaves bordered by a wide creamy-yellow edge that turns white as the leaves age (Starr, 2012).

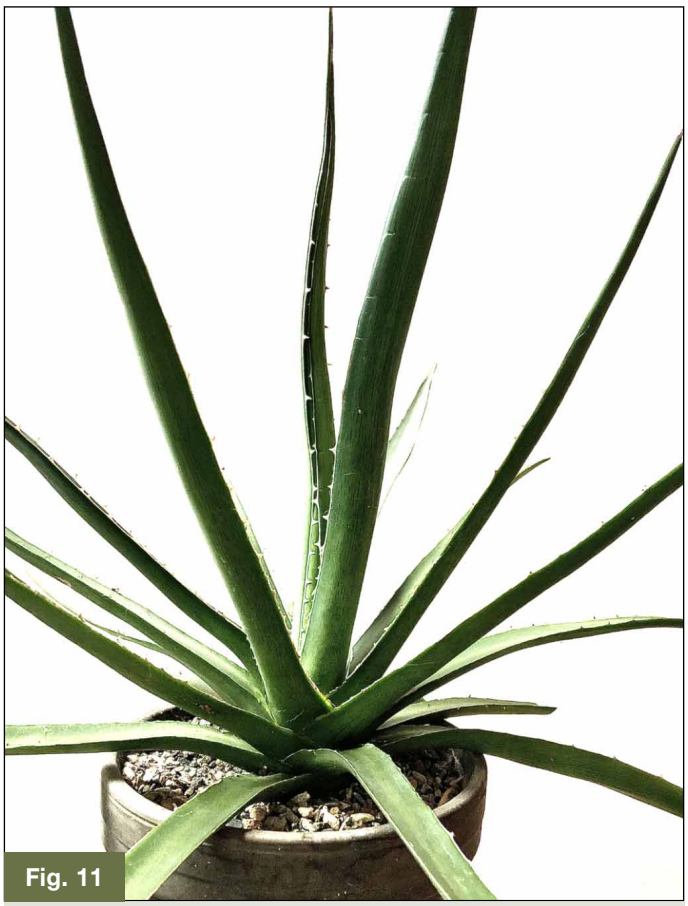


Fig. 11

Agave albomarginata in an 18cm diameter pot

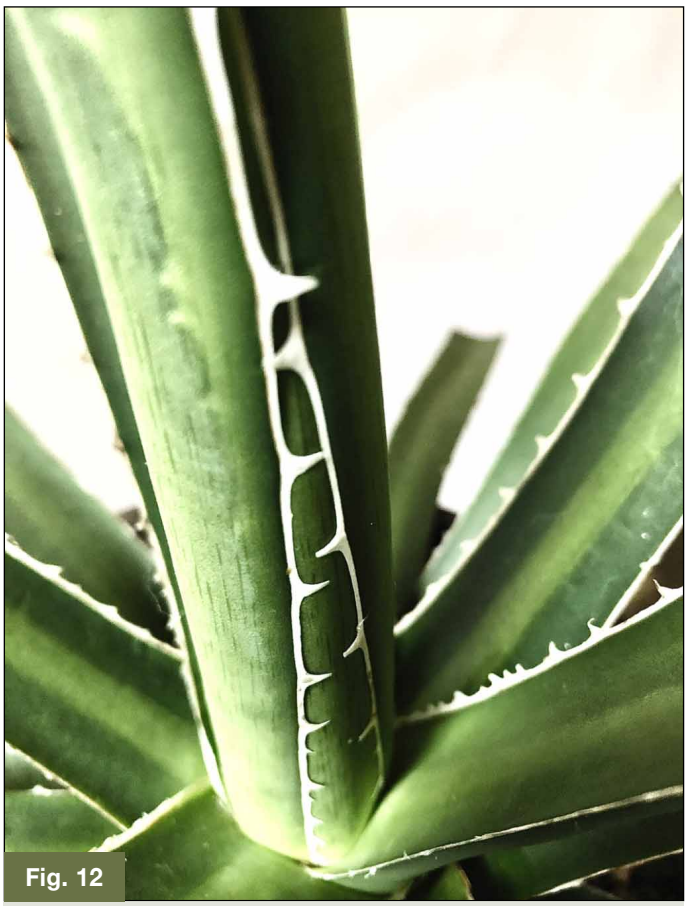


Fig. 12

Close-up showing leaf margins of *Agave albomarginata*

Agave albomarginata

This species exemplifies this group of agaves with its conspicuous, prominently toothed horny leaf margins which in this case are white (Figs. 11 and 12). Of all the species in this group this has proved to be one of the most rapid growers for me and the plant shown here is an offset from my larger parent plant. This has a loosely-arranged, open rosette consisting of long narrow leaves up to 35cm long and 3cm across at the base but in time these can grow up to 1m or more in length on a short stem. The terminal spine is relatively short being only 1cm long with a sharp dark tip.

When first described, this species was only known from plants in cultivation at the Huntington Botanical Garden in California but it has since been rediscovered in habitat in the Mexican state of Querétero (Thiede, 2020).

Agave arcedianoensis

This species is rare in cultivation such that Spath & Moore (2021) indicated that they were unaware of it being cultivated. In habitat it has solitary rosettes up to 1.5m in diameter but my cultivated plant has offset (Fig. 13). This is not unusual in that several agaves are more prolific when pot grown.

Its leaves are numerous, rigid, fleshy, lanceolate (spear-shaped), 60–70cm long and 10–12cm wide, dark green with a light yellow to yellowish midstripe along the whole length and a greyish horny margin bearing numerous marginal teeth, grey to silver and a dark brown terminal spine 2–4cm long. When first described it was compared to *A. angustiarum* from which it apparently differs in having smaller

Agave arcedianoensis in an 18cm diameter pot

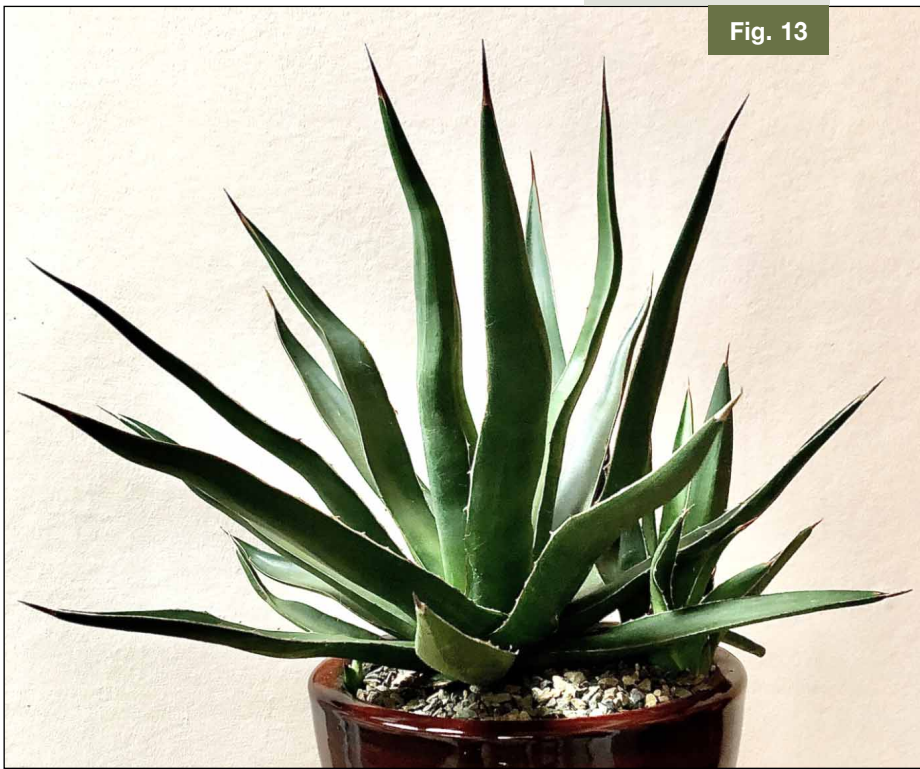


Fig. 13

rosettes, longer and narrower leaves with more widely spaced marginal teeth and reddish-purple flowers.

It is endemic to the Mexican state of Jalisco where it occurs in the Colimilla Canyon and is recorded as being extremely rare. It grows on rocky vertical cliffs and was named for the Arcediano Dam.

Agave funkiana

This is one of several species in this group that is not especially distinctive, at least from its vegetative features. It was described in 1860 in honour of Herr M. Funke, Director of the gardens at Schloss (Castle) Dyck near Dusseldorf, home of Prince Salm-Dyck (1773–1861), renowned collector and author on succulent plants, who published a review of *Agave* in 1859.

This species is now known to be distributed throughout the Mexican states of Nuevo León, Tamaulipas, San Luis Potosí, Querétaro and México, where it grows on rocky hillsides and slopes, in oak forests and in mixed woodlands (Thiede, 2020). It forms open rosettes up to 1.8m across and is freely offsetting.

My plant (Fig.14) has grown slowly in its nine years in my collection and has yet to offset. It is now only about 35cm across with leaves up to 20cm long, 4cm across, with a pale midstripe, the margins are horny bearing small downward pointing short teeth; the terminal dark brown spine is sharp and about 2cm long.

Thiede (2020) suggests that it is closely related to *A. lophantha* “but differing in its larger size, regular and linear slightly concave leaves with nearly straight fine margins and numerous regular fine teeth”. It is illustrated in habitat by Pilbeam (2013) but it is not covered by either Starr (2012) or Spath & Moore (2021).

Agave garciae-mendozae

This species was described in 2002 in honour of Abisaí García Mendoza in recognition of his contribution to the study of Mexican Agavaceae. It is relatively uncommon in cultivation but is known to have a wide distribution throughout the Mexican states of San Luis Potosí, Querétaro and Hidalgo where it occurs on mountain slopes and rocky outcrops, often in canyon bottoms, in limestone soils, in scrub and in oak-pine forests (Thiede, 2020).



Fig. 14

Agave funkiana in a 22cm diameter, tricorne-like pot



Fig. 15

Agave garciae-mendozae in a 25cm diameter pot

It is very similar to *A. funkiana,* which also has open rosettes up to 1.75m across and is freely offsetting. My plant (Fig. 15) has grown relatively quickly and is now 50cm across and 40cm tall with leaves up to 35cm long, 3.5cm across with a very pale midstripe. The leaf margins are horny, bearing small but ferociously sharp, downward–pointing, variable straight or curved grey teeth tipped reddish-brown; the terminal grey spines are also very sharp, grooved and about 1.5cm long. Its closest relative appears to be *A. horrida* from which it differs in its open rosettes and the colour and larger size of its leaves and the grooved terminal spine.

Agave ghiesbreghtii

This is one of the older species in this section, being discovered in Mexico by the collector Auguste Ghiesbreght and brought into cultivation and named by the famous Verschaffelt nursery in Ghent, Belgium in 1862 (Thiede, 2020). It was renamed by the renowned French botanist Charles Lemaire in 1864 using the incorrect spelling *A. ghiesbrechtii,* under which it is often encountered today, even though this error was corrected a long time ago.

Fig. 16 shows a plant in cultivation at Kew. It forms compact smallish rosettes up to 70cm across with deltoid to lanceolate leaves up to 40cm long and 12cm across, being broadest at the base, light to dark green, sometimes with a paler midstripe. The margins are horny, bearing strong brown to greyish teeth that are triangular, frequently straight but sometimes curved upwards or downwards, up to 15mm long. The brown to grey terminal spines are up to 4cm long.

This is a somewhat nondescript species "of uncertain circumscription, closely related to *A. kerchovei* but different (*sic*) by its shorter and broader leaves with fewer and smaller teeth on narrower and darker horny margins" (Thiede, 2020). I personally have very limited experience of this species in cultivation.

In habitat it has a wide distribution in the Mexican states of México, Guerrero, Puebla, Oaxaca, Veracruz and Chiapas, then southwards into western Guatemala, where it grows on limestone rock slopes and outcrops in desert scrub, tropical deciduous forests and pine-oak forests (Thiede, 2020). It is the most southerly-growing species in section *Heteracanthae* and the only species growing naturally in Guatemala. ■

Photos: Colin C. Walker unless otherwise indicated

Part Two of this article will appear in the Cactus and Succulent Review June 2025

Acknowledgements

I am deeply indebted to Jeremy Spath, Marjorie Thorburn, Tina Wardhaugh and Trevor Wray for use of their excellent photos. My wife Marjorie is also thanked for comments on an earlier draft of this article.



Agave ghiesbreghtii photographed in the reserve collection at Kew

Fig. 16

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Agave Diaries 2013-2024

Colin C. Walker

The challenge...

Photographing flowering agaves is very challenging so here I explain how, with assistance, I went about the tricky process of recording the flowering of three species.

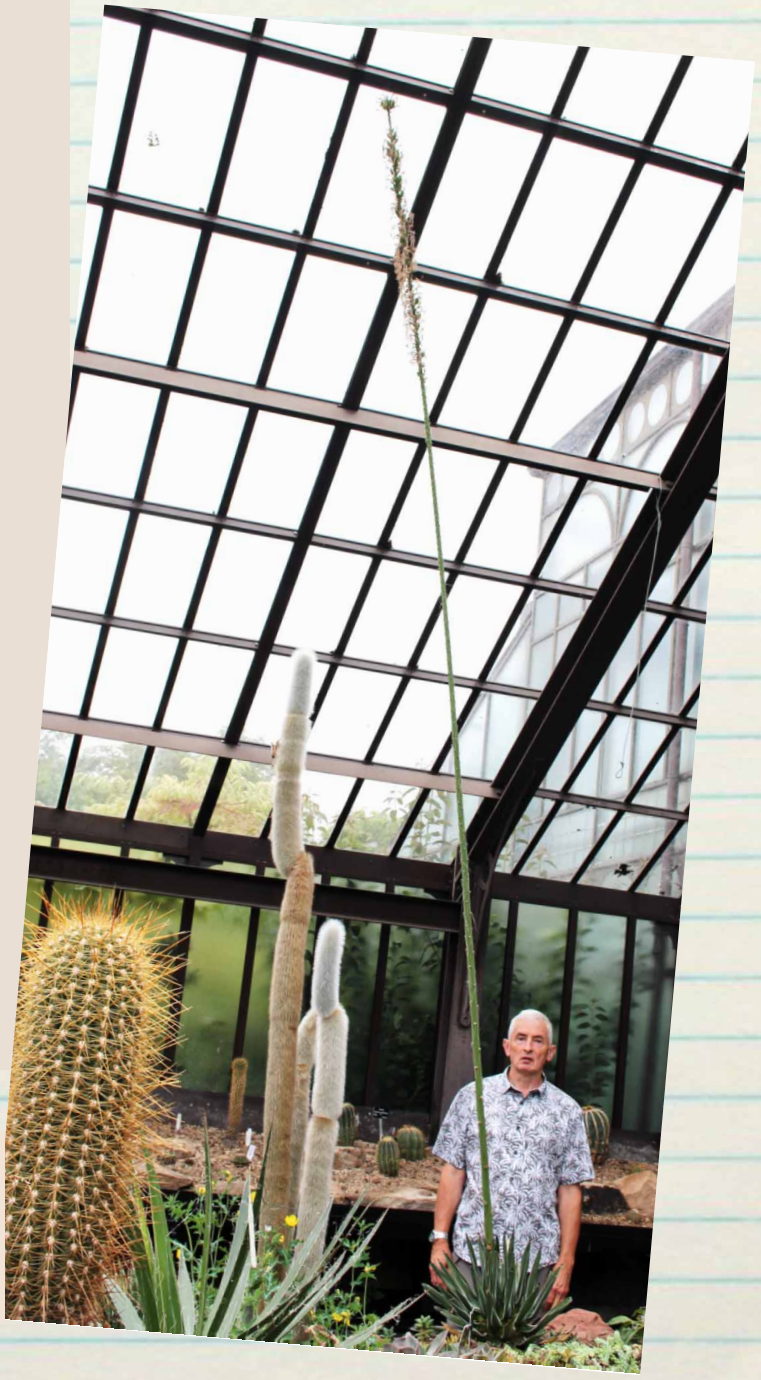
The main challenge is the large size of their inflorescences which can be up to 12m tall in species such as *Agave americana* and *Agave franzosini,* neither of which I have yet observed in flower.

In contrast, the tallest flower spike I have so far observed and photographed was that of *Agave nickelsiae,* a mere 4.5m tall.

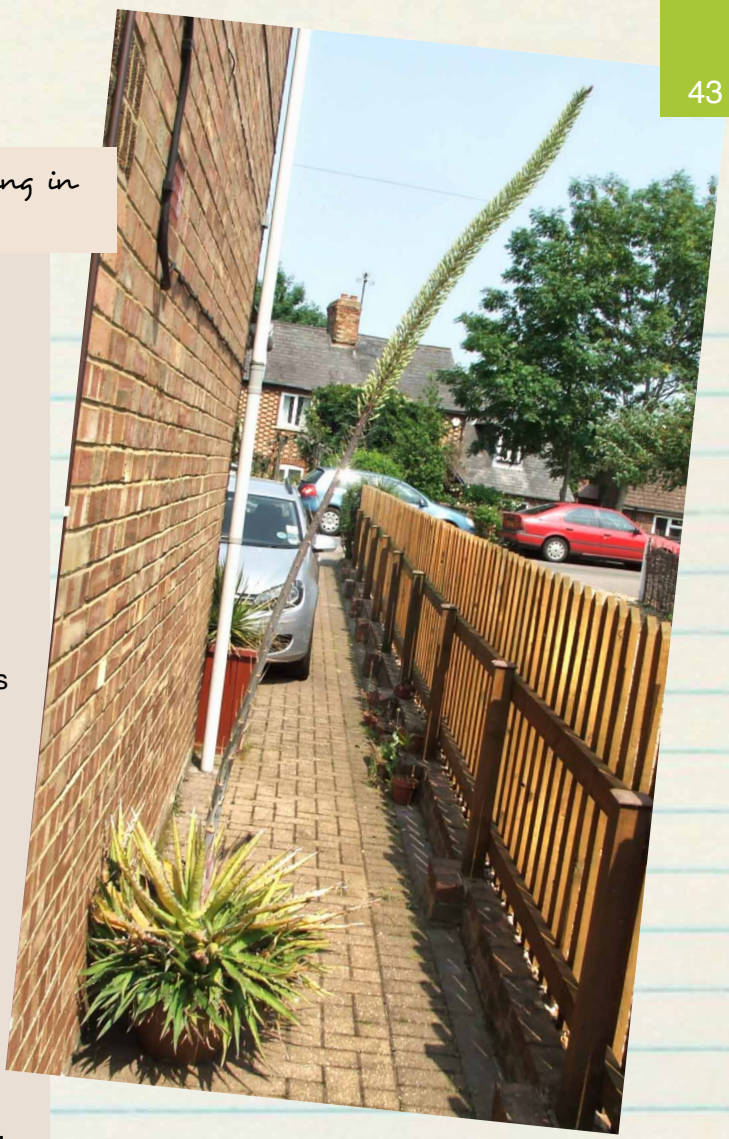
The tallest so far

The picture was taken in the cactus and succulent house at the Glasgow Botanic Gardens. Unfortunately I had missed the flowering phase and the small number of flowers still attached to the spike were either dying or developing into fruits. There was visible fruiting at the top of the spike.

As shown the spike is very slender being just 3cm across at the base, tapering very gradually upwards.



The flower spike of Agave nickelsiae with the author providing a sense of scale (Photo: Marjorie Thorburn)



Agave xylonacantha flowering in Bedfordshire

I take up the camera

To date I have flowered eight agaves in my collection, the first being *Agave xylonacantha* in 2013. I was an inexperienced photographer then and my initial attempt is shown here.

The plant was heavy and very unwieldy with its tall flower spike but somehow I managed to move it from the rear garden to the path at the side of the house. As you can see cars, houses and other objects got in the way as poor backdrops so it was really tricky to achieve a neutral background.

One of my best images is shown on Page 38 with the sky as the backdrop but even here telephone wires got in the way!

The next attempt

When my oldest specimen of *Agave victoriae-reginae* flowered a few years later I was determined to be more professional.

Initially I had assistance to provide a sense of scale provided either by our cat, Symba, or myself.



Symba lends a paw



The author with Agave victoriae-reginae (Photo: Marjorie Thorburn)



Heavy equipment is deployed

Heavy equipment in the form of step ladders was employed to obtain the best shots with my wife Marjorie holding a dark brown coloured sheet as a backdrop on one ladder with me as the cameraman on a second ladder.

This is how images such as that shown on Page 35 were obtained.

Looking ahead

Nowadays, on the rare occasion that a new *Agave* flowers, I aim to provide a neutral background whenever possible.

I have several old plants that must be reaching flowering size/age, so I hope to be able to record future flowering events in the not too distant future with suitable backgrounds.

The outdoor photographic studio used to record my first flowering of Agave victoriae-reginae

Photos: Colin C. Walker unless indicated otherwise

Spring has sprung

Some cacti of the Chihuahuan desert

by Roger Ferryman



Echinocereus reichenbachii

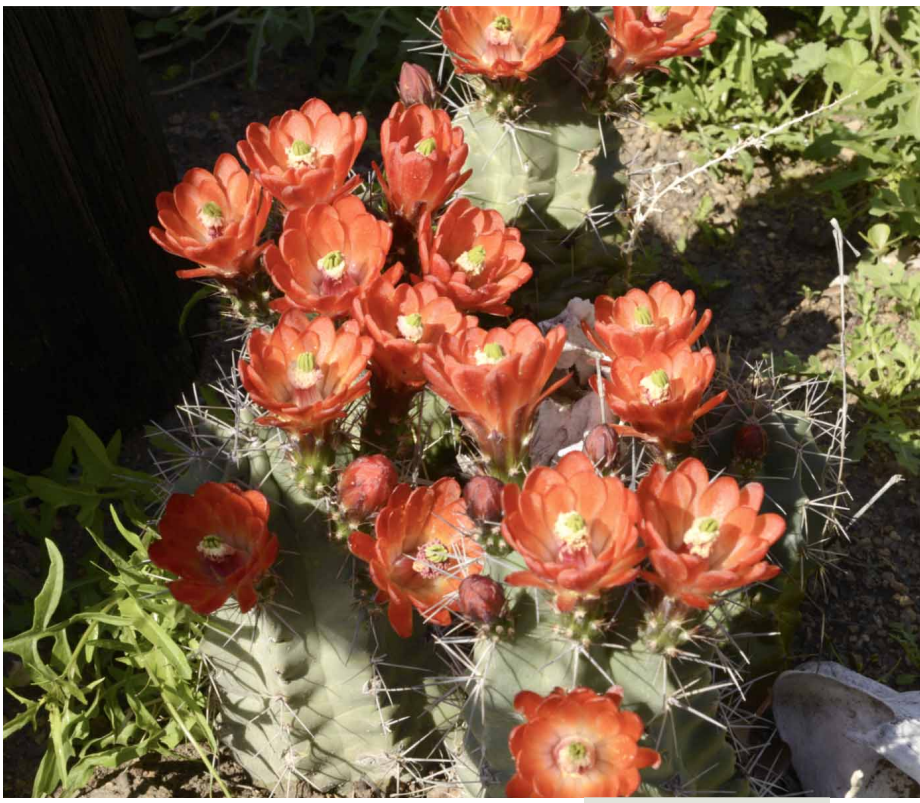
The cacti of North America rejoice at the turn of March into April and May with spectacular flowering, provided of course winter has produced sufficient rainfall.

I made numerous trips to the US side of the Chihuahuan Desert while I was resident in Texas and continue to be drawn back to this fascinating area now I am back home in the UK.

The Chihuahuan Desert runs from northern Mexico through Texas into New Mexico and Arizona. The National reserve known as the Big Bend offers freedom to walk and drive which is why it welcomes so many tourists. There are also plenty of hotels and the fact the locals speak the same language (well almost) explains the popularity.

Much of the desert is owned by private ranchers and access to many areas outside the park is difficult. I have never had issues gaining access to these private ranches but spring also sees the arrival of new born cattle and deer. The young offspring are a particular concern for ranchers, and I have heard many bad stories of trespass creating some hostility towards cactus enthusiasts

A great many cacti can be found outside the park and driving along the I-10 you will see lots of flowering plants, generally *Echinocereus*.



Echinocereus coccineus by the roadside

The widespread *Echinocereus coccineus* is very common from the hill country south of the park along the I-10 motorway. Flowering throughout it sets the scene for what is to come.



Echinocereus coccineus



Echinocereus viridiflorus



Echinocereus sp.

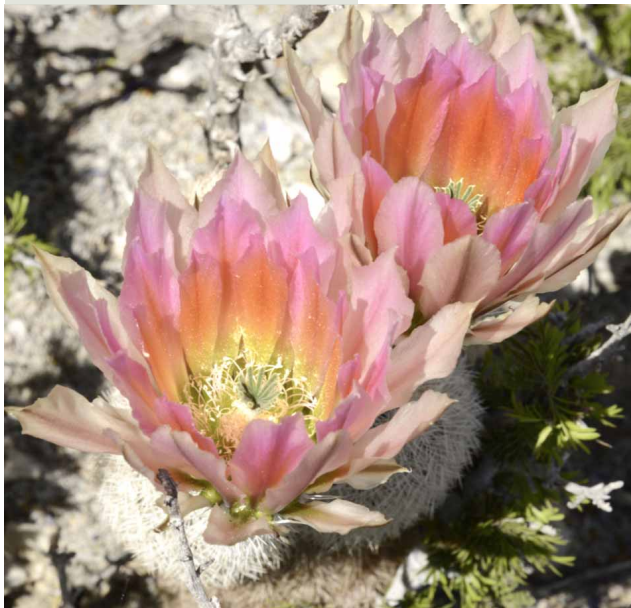


Echinocereus stramineus and inset *Echinocereus stramineus* flower

Echinocereus ×*roetteri* var. *neomexicanus*



Echinocereus dasyacanthus





Echinocereus dasyacanthus with *Opuntia* sp and inset *Echinocereus dasyacanthus* flower

Enter the Big Bend National Park and a whole host of flowering plants can be found without too much difficulty or walking.

Opuntia and *Echinocereus* abound as well as the impressive *Yucca* stands.

It is almost impossible not to find *Ariocarpus fissuratus* but that flowers much later in September.

Some of the smaller plants, like *Mammillaria lasiacantha*, *Echinocereus davisii*, *Glandulicactus uncinatus*, *Epithelantha*, *Escobaria* and *Echinomastus* take a little more searching.

Stopping anywhere you are guaranteed to see a number of species like the horse crippler, *Echinocactus texensis, Neolloydia*, *Mammillaria* and the pretty *Echinocereus pectinatus.*



Opuntia macrocentra



Yucca sp



Echinocactus (Homalocephala) texensis



Epithelantha micromeris



Opuntia macrocentra flowers

Thelocactus bicolor



Glandulicactus uncinatus





Echinocactus horizonthalonius

My interest in *Echinomastus* grew with every visit, fuelled, I guess, by their reputation for being 'difficult' and their scarcity in collections. There are five maybe six species of which three are present in the US side of the desert.

Echinomastus warnockii is probably the most common, inhabiting limestone outcrops throughout Big Bend.

The beautiful small *Echinomastus mariposensis* is not so common but again not difficult to find on limestone outcrops.

These plants flower early in the year, and I have encountered flowering plants in early February although they can be unpredictable. In April generally you see flowers but in 2023 fruits had already been set early in the month.



Echinomastus warnockii



Echinomastus mariposensis



Echinomastus mariposensis

The third species in this area is *Echinomastus intertextus*. The best populations grow in the grasslands of New Mexico, a very different habitat.

Echinomastus have a reputation for being difficult in cultivation both from seed and as mature plants. They are included by some in *Sclerocactus* which grow outside the desert and inhabit several different types of terrain in New Mexico, Utah etc.

Echinomastus flowers are not as showy, being small and white or pale coloured. *Sclerocactus* have much larger flowers, seed pods and seed. But hey what's in a name? The labels on these plants generally live longer than the plants anyway!

During my last trip to the US, in spring 2023, I found the real *Echinomastus dasyacanthus* (often referred to *E. intertextus*). Possibly no more than a form but it seems to me to be closer to *E. warnockii* than *E. intertextus*.

Echinomastus intertextus



Echinomastus intertextus





Echinomastus dasyacanthus



Echinomastus dasyacanthus

This was flowering well and, like *Sclerocactus* and other species, flowers appear a little later in April to May.

Growing from seed is challenging for both *Echinomastus* and *Sclerocactus* but I have found germination is better if sown at lower temperatures. In fact, I sow my seed in January in an unheated greenhouse and bring them into a heated house in late April when the daytime temperature will lift sufficiently. I can't profess to having mastered seed raising but some degree of success is better than my previous attempts. ■

Photos: Roger Ferryman

Sclerocactus parviflorus



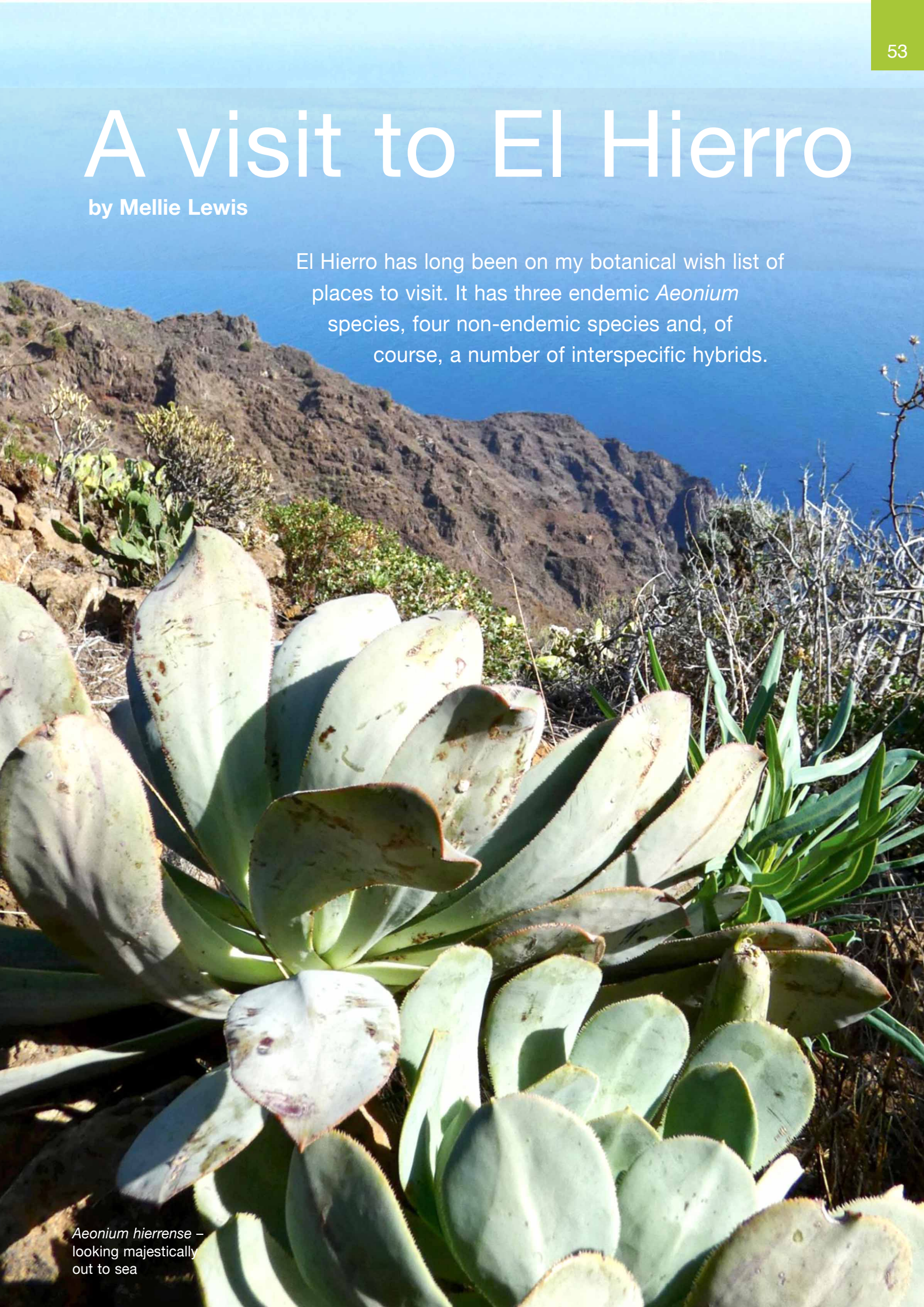
Sclerocactus parviflorus



A visit to El Hierro

by Mellie Lewis

El Hierro has long been on my botanical wish list of places to visit. It has three endemic *Aeonium* species, four non-endemic species and, of course, a number of interspecific hybrids.



Aeonium hierrense – looking majestically out to sea

Aeoniums are succulent plants belonging to the Crassulaceae (or Stonecrop family). They are predominantly endemic to the Canary Islands but there are also two species on the island of Madeira to the north and on the Cape Verde Islands to the south, where a single species is found, albeit a rather variable plant.

My travels began by leaving home for London and catching a flight from Luton airport to Gran Canaria, where I overnighted before catching a much smaller aeroplane to El Hierro the following day. The flight was interesting and exciting, taking approximately 50 minutes from Gran Canaria and passing Tenerife with its mighty mount Tiede.

As I looked out of my window Tenerife was replaced by the beautiful island of La Gomera, known as the whistling island. 'Silbo Gomero' is a UNESCO recognised language, used for thousands of years by the inhabitants of La Gomera, in which a series of whistles replaces speech, enabling the islanders to communicate across the deep ravines and narrow valleys that radiate through the island.

The Canary Islands



El Hierro, (coloured red on the map) is the westernmost island of the Canary archipelago. It covers 268.71 km2 (103.75 sq ml).

It is the second smallest of the major islands and the least populous with fewer than 12,000 inhabitants.

The whole island was declared a Biosphere Reserve in 2000

One of the first things I noticed on arrival on El Hierro was the lack of traffic; the major roads are excellent and clearly signposted. Moreover, in general, the stillness and peaceful ambiance struck me to a point where I felt quite emotional!

El Hierro *Aeonium* species

The island of El Hierro has two of its own endemic *Aeonium* species, four non-endemic species and of course interspecific hybrids of the six species.

Endemic:
A. valverdense
A. hierrense
A. canariense subsp. *longithyrsum*

Non endemic
A. arboreum subsp. *holochrysum*
A. aureum
A. canariense subsp. *christii*
A. spathulatum

Naturally occurring interspecific hybrids:

A. canariense subsp. *longithyrsum* × *A. valverdense* = *Aeonium* ×*lambii*

A. arboreum subsp. *holochrysum* × *A. spathulatum*
= *Aeonium* ×*holospathulatum*

A. arboreum subsp. *holochrysum* × *A. hierrense*
= *Aeonium* ×*isorense*

A. canariense subsp. *longithyrsum* × *A. hierrense*
= *Aeonium* ×*jacobsenii*

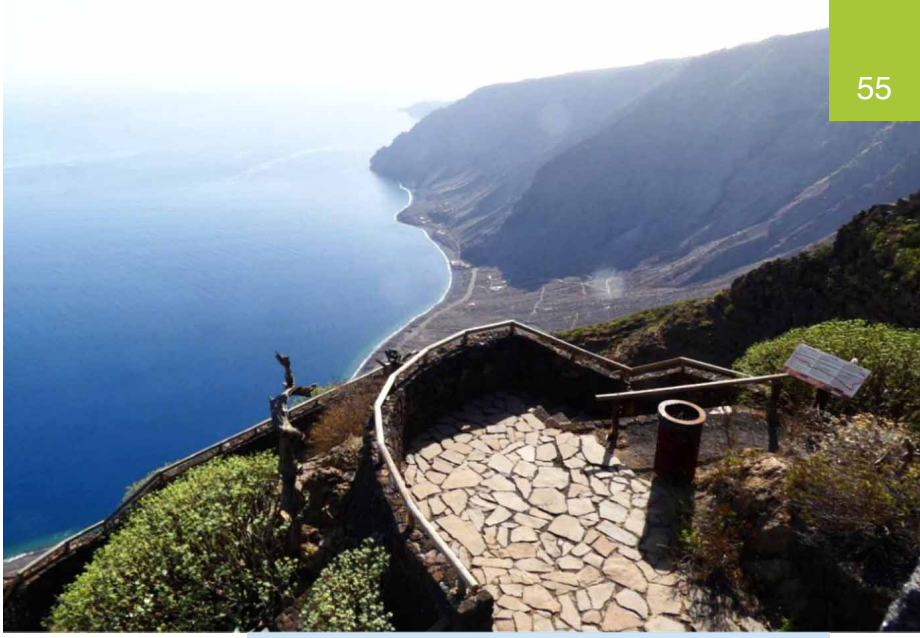
A. hierrense × *A. valverdense*
= *Aeonium* ×*ombriosum*

A. arboreum subsp. *holochrysum* × *A. canariense* subsp. *christii*
= *Aeonium* ×*wildpretii*

A. arboreum subsp. *holochrysum* × *A. canariense* subsp. *longithyrsum*
= *Aeonium* ×*wildpretii* nothosubsp. *jinamense*

Day 1 I was also both optimistic and excited; my accommodation was very comfortable and on the outskirts of the small town of Isora. I was glad to find a small grocery shop and a tiny bar-cum-café and general hub. The people were extremely friendly and happy to help and before my first day fell into darkness I had already found some fabulous *Aeonium* specimens!

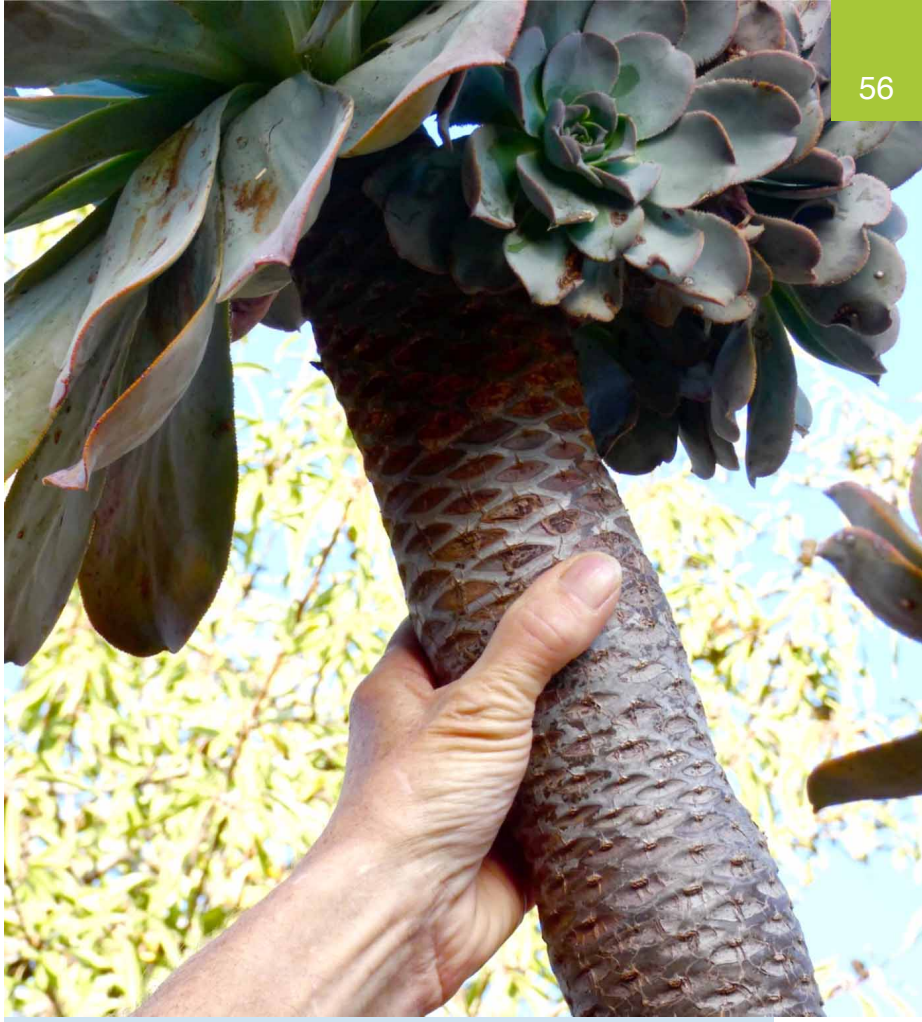
Near to my accommodation was a coastal path at Mirador de Isora and Barranco de Isora and here I found some rather grand aeoniums.



Mirador de Isora, coastal path and viewing point

Aeonium valverdense on the clifftops of Barranco de Isora





Aeonium ×ombriosum showing the incredible girth of the stem

Back in Isora, walking around the quiet country lanes, there were many fine examples of aeoniums growing out of ancient stone walls and the boundaries of crop-growing areas and gardens. Nothing could have prepared me for the thickness of the stem on some specimens:

The first hybrid of my visit was *Aeonium ×holospathulatum* (*A. arboreum* subsp. *holochrysum* × *A. spathulatum*). It is not a terribly good photograph and for this I offer the reader my apologies. It was growing in an abandoned plot between its parents but in a very elevated position; to get a decent enough photograph was difficult as it was a case of holding my camera way above my head and shooting in its general direction.

An interspecific hybrid occurs when two species cross pollinate and produce a hybrid plant which has characteristics of both parents. This can lead to evolutionary novelty, promoting adaptation and speciation.

These hybrids can be quite rare as the two co-occurring species often flower at different times of the year. In the case of *A. hierrense*, for example, which blooms during the months of March through to April and *A. valverdense* which flowers from March through to June, where the two species co-exist, as in the Isora area, there is a greater chance of cross-pollination with a two-month window when both plants are in bloom.



Aeonium ×holospathulatum

The plant shown below is *Aeonium arboreum* subsp. *holochrysum* and, interestingly, this plant is partially fasciated. Fasciation is a genetic mutation of a plant's growing tip or meristem causing a very visible distortion. It can visibly affect the stem, flowers or fruits. It often leads to multiple extra flowers or, in the case of aeoniums, distortion of the rosette and stem with many extra leaves which are crammed together and a flattened palm-shaped stalk. Possibly the growing tip has been damaged at some point (note the stump), perhaps munched by goats or chopped back for passing traffic.

Aeonium arboreum subsp. *holochrysum*

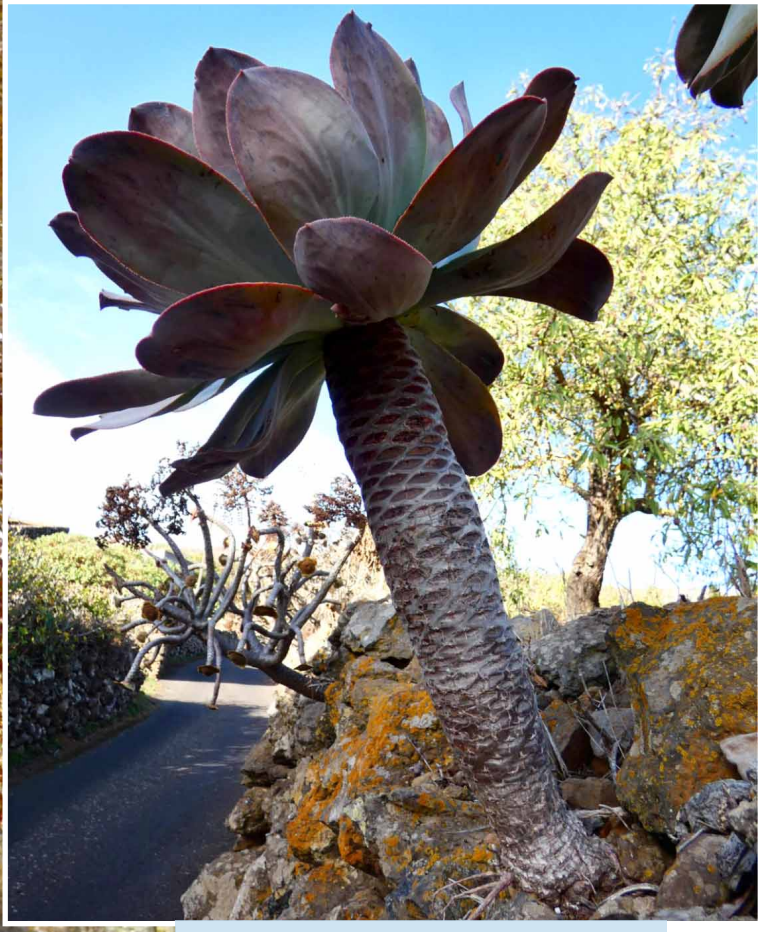




Aeonium hierrense – the incredible infloresence

Day 2 I spotted *Aeonium hierrense* growing on a wall near my accommodation. Note the incredible leaf-scar pattern on the stem. These leaf scars are often used to identify aeoniums as each species has its own unique pattern.

Also pictured is the amazing spent pyramidical inflorescence of the same plant; many thousands of seeds will have been produced from this seed-head and been broadcast by wind and even passing disturbances by animals or motor cars, for instance.

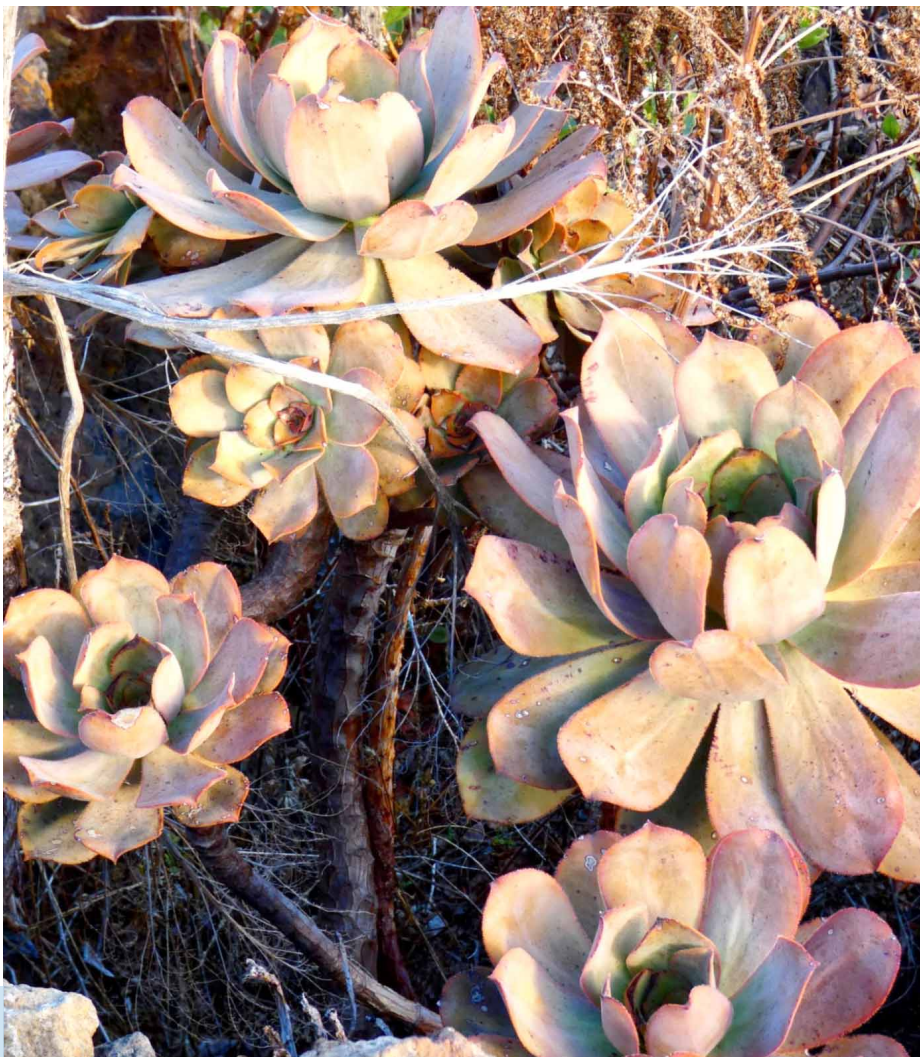


Aeonium hierrense growing from a wall

Close to this location I found a second interspecific hybrid, this plant a cross between *A. hierrense* (previous page) and *A. valverdense.* Its botanical name is *Aeonium* ×*ombriosum*. It branches like *A. valverdense* whereas *A. hierrense* does not branch in general.

Note that the stalk is much rougher than that of *A. hierrense* and has a browner appearance like *A. valverdense.* The rosettes, however, look more like those of *A. hierrense*.

The geographical area around Isora plays host to co-occurring *A. hierrense* and *A. valverdense*. Some of the aeoniums in the area that looked like *A. hierrense* had branched, but did not look like the interspecific hybrid. I wondered whether there had been previous hybridisation which had crossed again with one of its own original species, creating a hybrid with slight differences.



Aeonium valverdense



Aeonium ×*ombriosum*



Aeonium ×*ombriosum* an older plant



Aeonium valverdense growing in the lava fields of the Restinga region

I travelled to the lava fields of the southern tip of the island in the Restinga region, where there were many *A. valverdense* to be found. This was a much more isolated colony of plants where the conditions are exceedingly harsh, exposed and arid; the plants rely heavily on their xeromorphic attributes for survival.

One large specimen of *A. valverdense* had more than 40 rosette heads but this was a stressed plant in desperate need of a good drink. I gathered that the rains had failed to occur after talking to a local who also emphasised that there had been 'too much heat'!

Alarmingly on every Canary island I have visited locals have said the same thing: the rains are slow to start and, when they do, they are heavy but short-lived. They say their climate is changing for the worse; it is not so predictable, hotter and more turbulent. This is not good news for aeoniums and many other Canarian plants that have adapted to the islands' predictable and stable climate over the past millions of years.



A large specimen of *Aeonium valverdense* with more than 40 heads

Day 3 On my third day I travelled westward, meandering through the pine and laurisilva cloud-forests that are cloaked in lichens, mosses and ferns! Many interesting plants, such as two forms of *Aichryson* and at least two forms of *Sonchus*, tree heathers and hanging Spanish mosses (*Tillandsia usneoides*), were in abundance too. Here, I started to see *Aeonium aureum* growing on vertical escarpments and noticed that on El Hierro they had slightly more tapering leaves than on Gran Canaria.



Aeonium aureum with many mosses, lichens and ferns

Inset: *Aeonium aureum*, a beautiful, almost blue specimen

What a colour!

The road changed from meandering to a steep decline heading towards Frontera with many bends and twists and some dramatic roadside views which rather flipped my stomach at times!

View from the road to Frontera



As I descended I began to observe *A. canariense* subsp. *longithyrsum*. This plant varies slightly from other Canarian forms having slightly longer leaves than those of the described *A. canariense* subsp. *christii*. *A. canariense* from El Hierro is a sticky and more glutinous form.

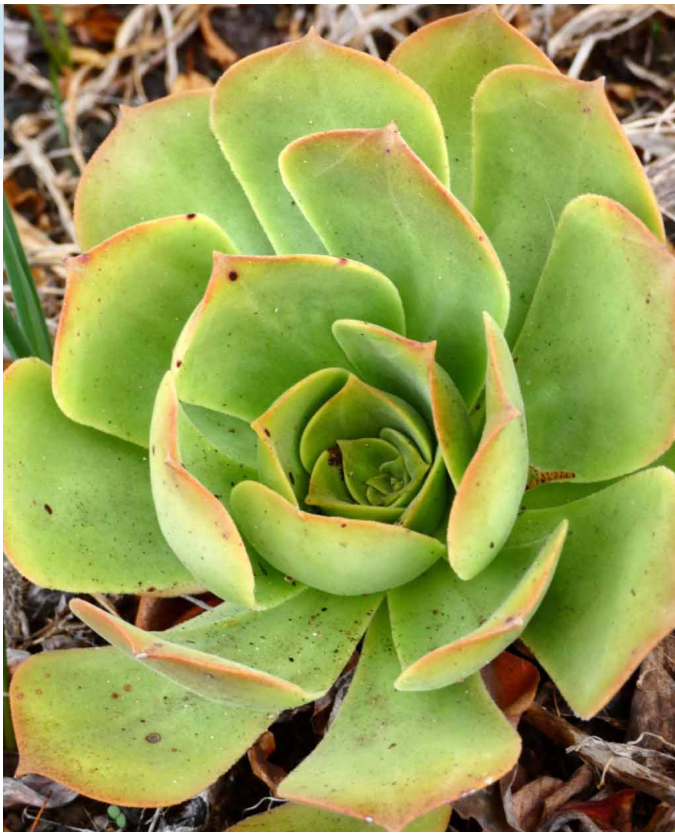
A kilometre or two further down the road, I came across an incredible find: *Aeonium ×jacobsenii* – a rare interspecific hybrid between *A. canariense* subsp. *longithyrsum* and *A. hierrense*. It has such wonderful veining on the leaves similar to its parent *A. hierrense* and a beautiful peachy tinge and velvety feel to the leaf, with hardly any stalk like its other parent. The cilia around the leaf margin are fine and almost invisible to the naked eye.



Aeonium canariense subsp. *longithyrsum* growing with hare's foot ferns *(Davallia canariensis)*



Left and right: *Aeonium ×jacobsenii*



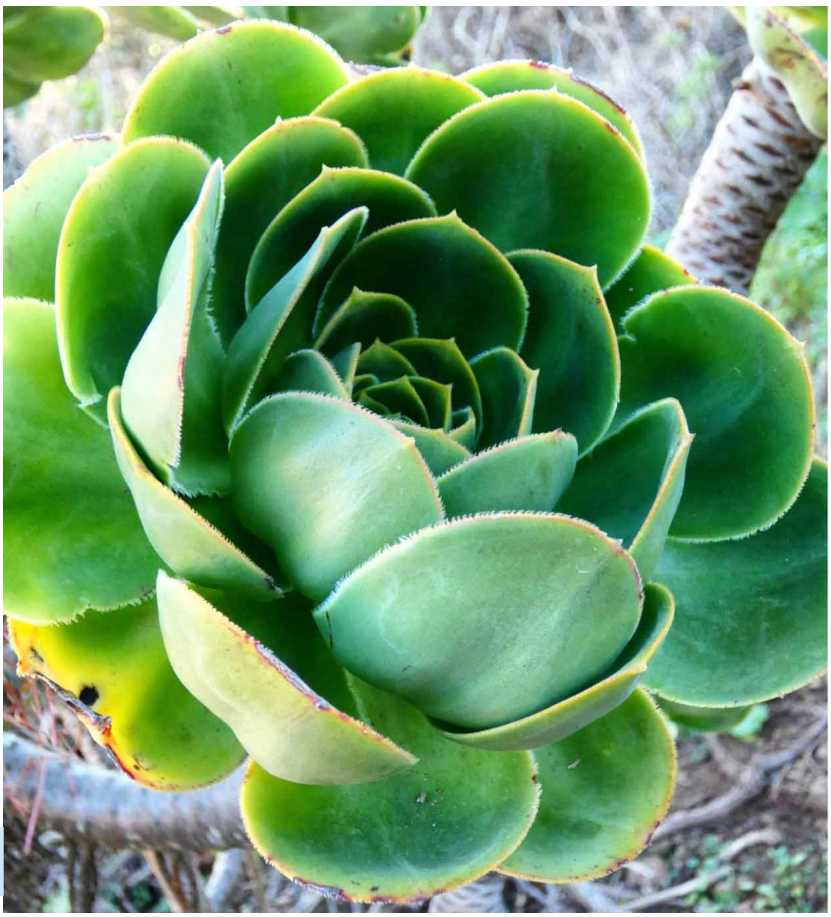


Aeonium arboreum subsp. *holochrysum* El Hierro form

Day 4 After the rather intense driving of the previous day I spent my fourth day exploring the area around La Cuesta not too far from Isora where I was staying. This area has an abundance of *Aeonium arboreum* subsp. *holochrysum*. Some of these specimens were more like shrubs or small trees with trunks in excess 40cm in circumference.

Here I was able to find an interspecific hybrid of *A. arboreum* subsp. *holochrysum* and *A. hierrense* that is *Aeonium* ×*isorense* named after the village near to which I was staying. An example of the plant was soon discovered; pictured here is a close-up of the rosette, which is larger and more cupped than the rosette of *A. arboreum* subsp. *holochrysum.*

In the village of Isora there was another example of the cross with one of its parents directly in front of it, albeit a young specimen, but you can see how much bigger and more cupped the rosettes are of *A.* ×*isorense* which is growing directly behind.



Aeonium ×*isorense*



In the foreground *Aeonium arboreum* subsp. *holochrysum* and behind it, with the much larger rosettes, *Aeonium* ×*isorense* (*A. arboreum* subsp. *holochrysum* × *A. hierrense*)

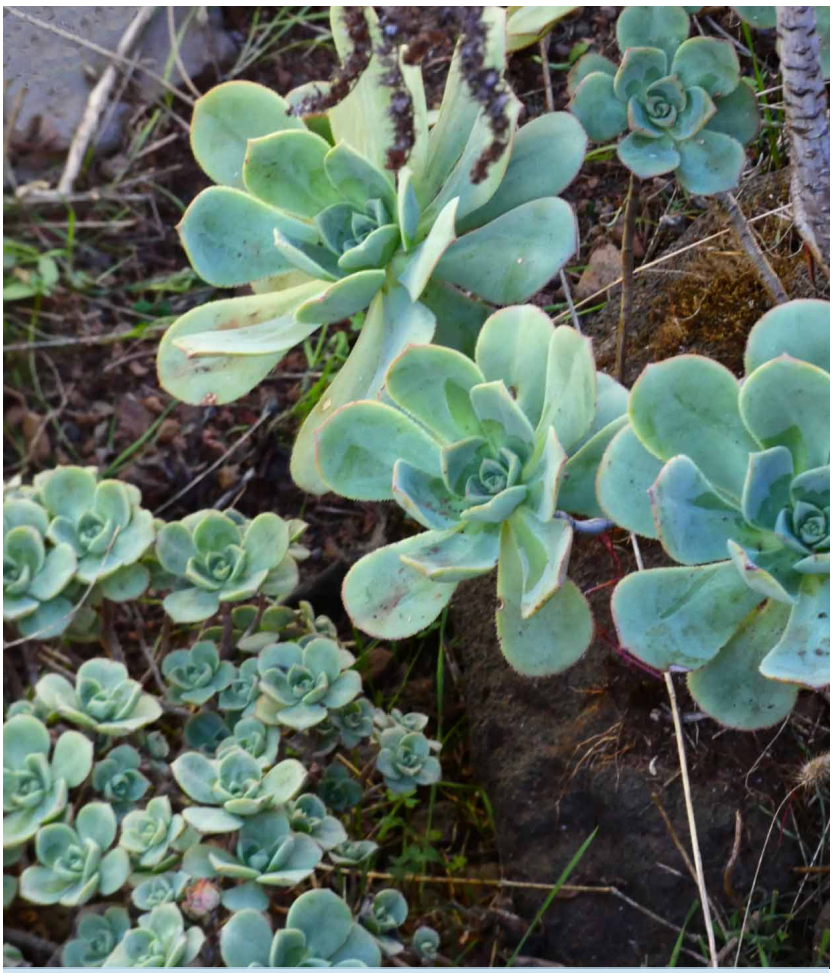
Now for not such good news: on my travels across the island I kept coming across completely incongruous aeoniums.

Aeonium haworthii is an endemic plant to Tenerife and should not be found on any other of the Canary Islands. These islands are a wonderful example of insular radiation and endemism but sadly human interference has had what could be a significant effect and influence on the islands' native plants. I photographed *A. haworthii* and, rather shockingly, a hybrid of *A. haworthii* and *A. hierrense*.

Disturbingly there were quite a few *A. haworthii* and its hybrids in this area. Across the island I counted and photographed several plants in different locations, most in semi-rural areas, probably garden escapees!

You may wonder why this greatly concerns me but, sadly, this is how species can easily be lost; hybrids are often quite robust and quick-growing. This particular rather beautiful rogue had already flowered and spread its seeds, possibly long term, causing further dilution of the species. In another location, about two kilometres away, I found another *A. haworthii* hybrid. This plant had also flowered and produced many thousands of seeds. This is in a semi-rural area with a smattering of dwellings and garden areas; note mid-left a cultivar, *Aeonium* 'Swartzkopf', further bad news for the two endemic species that grow in this area!

Aeoniums are having a tough time, what with climate change, invasive species, loss of habitat and also feral goats. Goats have become a problem on many of the islands; they were once kept by the islands' inhabitants as valuable sources of meat, milk and cheese and most likely pelts. Many cultural changes have taken place over the last few decades and many islanders have chosen a different lifestyle moving away from that of their forebears. Goats and rabbits, once domesticated, have found their way into freedom but this has come at a great cost of damage to rare native plants. Many aeonium enthusiasts and botanists have noted complete loss of colonies of aeoniums across the islands due to goat damage. We must not demonise these once domesticated animals, but unless action is taken to rid the island of free-roaming goats, much of the botanical damage which has already been done will simply continue.



On the right we have *Aeonium haworthii* x *hierrense* and next to it on the left *A. haworthii* both incongruous plants to El Hierro

Another *Aeonium haworthii* hybrid



Day 5 My final day on El Hierro was spent studying *Aeonium spathulatum* which seems to only occur in El Hierro in a small, isolated location near Isora, which I found following a tip-off from my friend Marco Cristini. The plant seems to have a preference for the old stone boundary walls that separate family plots used for growing vegetables, grains and fruit trees. Here these walls have decades and decades of detritus and mud bonding the stones together; in shadier locations the plant seems to thrive, but on the sunnier walls, I found many dead plants where the hotter, dryer weather caused by climate change has taken its toll. Will this small colony of plants survive the next few decades? Time will tell but from what I saw this looks doubtful particularly if the climate continues on its present trajectory!

Sadly two interspecific hybrids I did not manage to find were *Aeonium* ×*wildpretii* and *Aeonium* ×*lambii,* although I think I spotted the latter on the road heading to the airport but there was nowhere to pull over, so sadly I was unable to stop to examine the plant at close quarters. Hybrids are often found on roadsides, probably due to the seed blowing along the smoother surfaces of the road and finding nooks and crannies in which to settle and germinate; rainfall also runs along the conduit made between road surface and sidings. Finding *A.* ×*wildpretii* is like searching for the holy grail on El Hierro, so not a huge surprise it went undiscovered by me.



Goat damage *Aeonium hierrense* chomped into pieces

I will leave you with one last photograph of a tiny specimen of *A. spathulatum* that had seeded and was growing out of… a rock? ■

Photos: Mellie Lewis



Aeonium spathulatum in habitat

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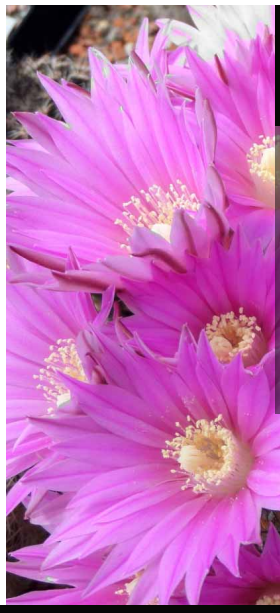
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