Essex Succulent Review

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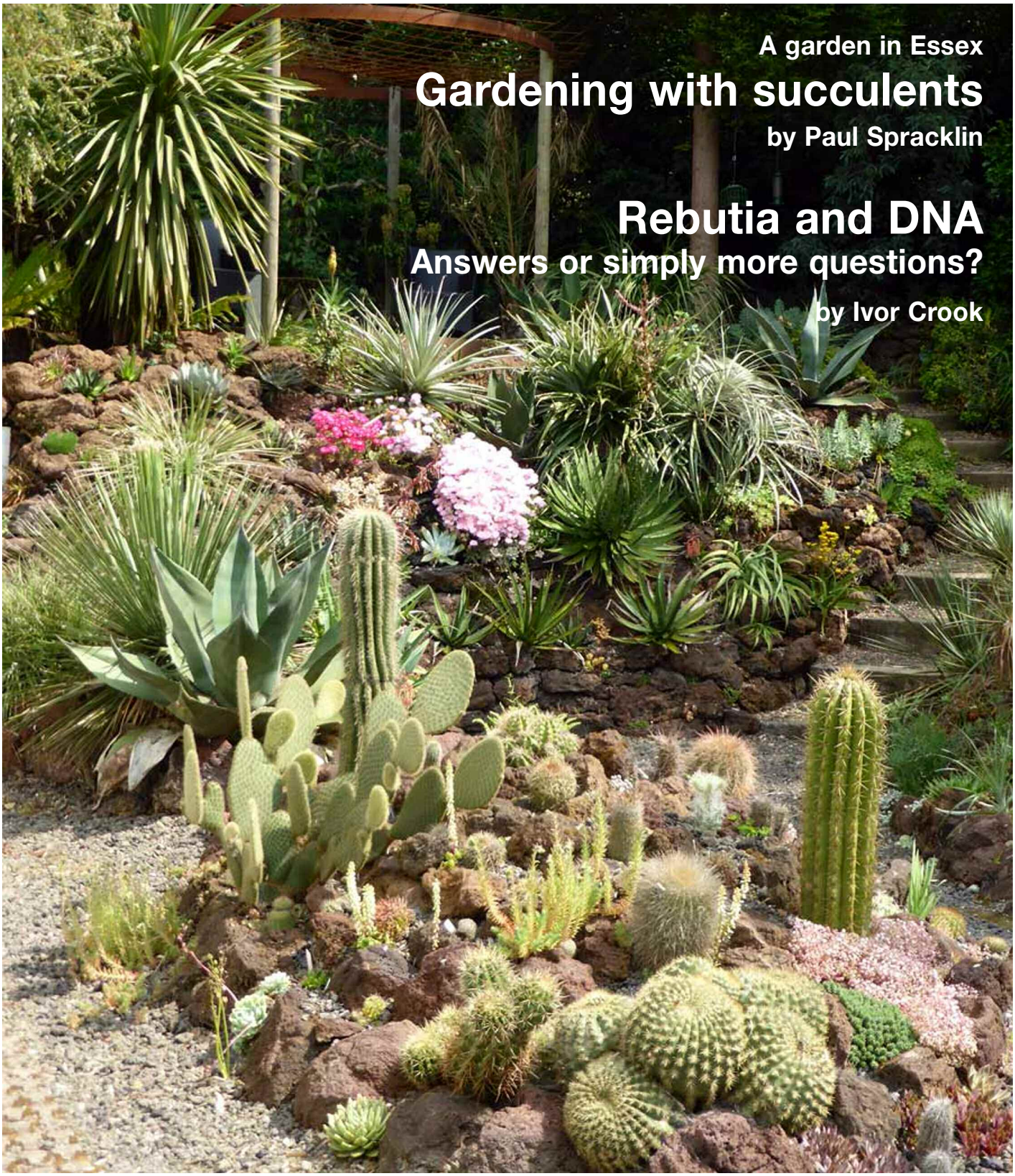

A garden in Essex

Gardening with succulents

by Paul Spracklin

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by Ivor Crook

British Cactus and Succulent Society – Zone 15 Newsletter

Editorial

Welcome to the Essex Succulent Review.

At the end of 2014 the Ilford Branch of the BCSS, formerly the Essex Branch, was amalgamated with Havering Branch.

The Essex Succulent Review was originally a newsletter, produced by the Essex Branch, with the first issue being published in December 1963. At the time the Essex Branch, which had been in existence since 1953, had 'about 100 members' of which some 35–40 regularly attended meetings. The first issue of the Essex Succulent Review was sent, free of charge, to all members, who were invited to pay an annual subscription of 4/- (20p) to continue to receive it.

Today, of course, an on-line 'subscription' to the Essex Succulent Review is completely free. Just send me an email to the address below and I will add you to the notification list. You can stop this at any time simply by telling me to do so.

Essex **Succulent** Review

The Essex Succulent Review is published quarterly in March, June, September and December.

It is available on-line free of charge. Just send an email to sheilacude@blueyonder.co.uk to receive notification of each issue when it is available.

Past issues are archived at www.zone15.bcss.org.uk/esr.html

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Zone 15 Events 2015

Saturday 23 May **12noon–5.00pm**
Lea Valley Branch Annual Show:
Capel Manor College, Bullsmoor Lane, Enfield EN1 4RQ
The plants remain on display over the May Bank Holiday weekend and the show includes sales of cacti, succulents and garden plants. Capel Manor offers extensive gardens and our greenhouse display of mature cacti and succulent plants.

Saturday 6 June **11.00am–4.00pm**
Havering Branch Annual Show
North Romford Community Centre, Collier Row, Romford RM5 3QJ

Saturday 13 June **11.00am–4.00pm**
Southend-on-Sea Branch Show:
United Reformed Church Hall, Kings Road, Leigh-on-Sea SS0 8PP

Saturday 11 July **10.30am–4.00pm**
Waltham Forest Branch Show:
Chingford Horticultural Hall, Larkshall Road, Chingford E4 6PE
Plant sales from 9.00am

Saturday/Sunday 18/19 July **11.00am–4.00pm**
Zone 15 Annual Show **each day**
RHS Garden Hyde Hall, Creephedge Lane, Rettendon, Chelmsford, Essex CM3 8ET

A new Zone 15 Show venue

This year's Zone 15 Show will be held at the RHS Garden, Hyde Hall, near Chelmsford.

The garden extends over 360 acres and includes a number of different growing areas, a lake, ponds and woodland walks.

Of particular interest is the dry garden, created in 2001 on a south-facing slope, featuring garden plants which are drought tolerant.

Last year the Chelmsford Branch staged a display of plants at Hyde Hall in July which attracted a lot of interest from the public (see ESR Vol 51 No 3, September 2014) and it is hoped that the Zone Show, which extends over two days, will do the same.

Spalding Branch looks forward to welcoming you to the

Spalding Cactus Mart

Saturday 25 April 2015

10.00am – 3.00pm

at

Holbeach Community Centre

Fishpond Lane, Holbeach

Lincs PE12 7DG

At least 13 growers and nurseries will be participating
see www.spalding.bcss.org.uk/cactusmart.html for a list of these

An extensive selection of refreshments will be available all day

There will be ample FREE parking and admission is FREE!

Fig. 1 Mediolobivia steinmannii 'cincinnata'

Rebutia and DNA

Answers, or simply more questions?

by Ivor Crook

For hundreds of years mankind has wanted to classify the natural world by placing similar living organisms into groups. As our knowledge expands it is necessary to revise these classifications. The development of DNA technology has changed our perception of these classifications dramatically over the last 25 years.

If the classification of any group of plants has been thrown into utter confusion with the advent of DNA technology, then that group is surely *Rebutia*. To understand why this happened we need to start at the beginning.

The father of modern taxonomy is surely the great Swedish scientist Carolus Linnaeus (1707–1778). Prior to Linnaeus, plant names were often a short Latin description, for instance the humble tomato was referred to as '*Solanum caule inermi herbaceo, foliis pinnatis incisis, racemis simplicibus'*. Linnaeus made two major contributions to classification. He determined that all organisms be referred to by two names, the first being the genus (plural genera) and the second the species name. Together these should form a unique combination across the whole of the plant and animal kingdom. In other words no two different living organisms should have the same scientific name.

Secondly he realised that there was a hierarchy or tiered system of classification. There was often more than one species in a genus. For example, the wild horse, donkey and zebra all look different but are also very similar in a lot of ways and all belong to the genus *Equus*. Horses, giraffes, monkeys and humans all have hair and are warm-blooded therefore, at a higher level of classification, they are all mammals. At a higher level still, along with reptiles, birds and amphibians, they are all chordates, that is animals with a backbone.

The next major breakthrough occurred in 1859 with the publication by Charles Darwin of his famous work,

Fig. 2 A typical Aylostera flower in section showing the narrow tube with contents fused in the lower part and hairs on the tube

'The Origin of Species'. We all know that Darwin proposed evolution as a process of change, in which the best suited to a changing environment survived while others died out. What is often not fully realised is that Darwin also set the rules for 'a good genus'. He was the first to suggest that all species in any genus should have evolved from a common ancestor in the past, and that the genus should contain all organisms, living or extinct, that evolved from that point.

Thus, as more and more cacti were discovered and named, they had to fit into this framework. Before the 1990s there was no DNA technology applied to plants. So, how were they classified? The answer is, by the only means known at the time. Plants were classified and placed into genera, as were all other organisms, by factors they had in common. Cacti with flowers that have no areoles, hair or spines were placed in the genus *Gymnocalycium*. Plants with flat pads were all placed within *Opuntia* and so on.

The first *Rebutia*, *Rebutia minuscula* was named by Karl Schumann in 1895. By the time Britton and Rose published 'The Cactaceae' in 1923, five species were included in the genus *Rebutia*, namely, *minuscula*, *fiebrigii*, *pseudominuscula*, *pygmaea* and *steinmannii*. The plants were placed in the genus for two reasons. Geographically, they all grow at high altitude in the South American Andes of Bolivia and Argentina. Secondly, they are all small, globular or short cylindrical plants and have a flower with a distinct tube.

Fig. 3 Aylostera fiebrigii 'hoffmannii'

By 1997, when John Pilbeam's book, '*Rebutia*' was published, 71 species had been divided into three subgenera, *Rebutia*, *Aylostera* and *Mediolobivia*. When I talk to people in the hobby, this is what most people seem to understand by the word *Rebutia*. The plants all fit the similarities defined by Britton and Rose, but are split into three groups or subgenera on the grounds of differences in the form of the flower. Subgenus *Rebutia* has flowers without, or almost without, any hair. Subgenus *Mediolobivia* contains plants with a few hairs or bristles at the base of a short, relatively broad flower. Finally, plants in the subgenus *Aylostera* have much narrower flowers with more hair.

Next came the 'lumpers' movement'. This was an initiative by botanists to look for the similarities between plants rather than their differences. The lumpers' heyday was back in 2006 with the publication of the 'New Cactus Lexicon' by David Hunt and others. At this point, *Weingartia* and *Sulcorebutia*, along with *Cintia*, *Mediolobivia* and *Aylostera,* were transferred into the genus *Rebutia*.

The first paper on DNA sequencing applied to South America cacti in detail was published in 2007. It had dramatic consequences for the genus *Rebutia* in the sense of the New Cactus Lexicon. Now a completely new system was used to classify plants. Rather than relying on just the outward look of the plant, DNA sequencing allowed a closer look at the genetic make-up of the plant. Most botanists feel this gives a more reliable indicator of the true relationship between plants because it can show the differences and similarities between their DNA. This enables scientists to more accurately predict which plants shared a

common ancestor at some time in the past which, as we saw above, was Darwin's indicator of a good genus.

I think it is important to see this DNA paper as the next step and not the final solution to classification of *Rebutia*. It makes advances to our understanding of how South American cacti are related to each other but also poses some new questions.

The DNA evidence appears to show an early major split into two large groups. The first being many of the genera found today in Brazil along with cacti found in valleys on the eastern side of the Andes of Peru, Bolivia and Argentina. These include *Arrojadoa* and *Coleocephalocereus* from Brazil and *Echinopsis*, *Matucana* and *Gymnocalycium* from closer to the Andes.

Within this large group is a smaller group that includes *Rebutia,* subgenera *Aylostera* and *Mediolobivia,* and the species referred to as *Rebutia einsteinii* in the New Cactus Lexicon. *R. einsteinii* appears to have branched off from an early ancestor of present day *Mediolobivia*. In effect they are sister groups, that is *R. einsteinii* and *Mediolobivia* shared a common ancestor in the past. If we now consider this as a group it, in turn, is a sister group to *Aylostera*.

The second major group includes *Rebutia,* subgenera *Rebutia*, *Sulcorebutia* and *Weingartia* along with *Cintia*. Interestingly, this group shows a close relationship with the genus *Browningia* which are cereoid plants found today in the valleys on the western side of the Andes. The DNA study splits *Weingartia* and *Sulcorebutia* into two groups on a geographical basis with a north-south split. Plants of both *Sulcorebutia* and *Weingartia* are present in both the north and the south group.

This suggests that, along with *Cintia*, these plants should all be included in the same genus so as to have a genus with all members of a common ancestor contained within it. I find this difficult to

Fig. 4 Rebutia fabrisii 'aureiflora'

Fig. 5 Aylostera fiebrigii 'narvaecensis'

Fig.6 Mediolobivia pygmaea 'nazarenoensis'

accept as plants of the genera *Sulcorebutia* and *Weingartia* are easily distinguished by characters of general appearance and their flowers.

So, in conclusion, what has DNA shown us about the genus *Rebutia*? The genus *Rebutia*, as currently accepted by the New Cactus Lexicon, is not a good genus by the current definition of the term. A good genus should be monophyletic. This means it should contain all plant species that have developed from a common ancestor at some point in the past and only these plants. For the current genus *Rebutia*, in the sense of the New Cactus Lexicon, to be able to fit this criterion it would need to be split into a minimum of two genera. One for the current subgenera *Aylostera*, *Mediolobivia* and *R. einsteinii* which are closely related to plants from the east of the Andes while a second genus would need to contain subgenera *Rebutia*, *Sulcorebutia* and *Weingartia* which developed from plants situated on the west of the Andes. My personal preference would be to revive *Sulcorebutia*, *Weingartia*, *Aylostera* and *Mediolobivia* as genera and to follow the lead of John Donald many years ago to revive the genus *Cylindrorebutia* for *R. einsteinii*.

Fig. 7 Mediolobivia pygmaea 'torquata'

Subgenus *Rebutia* appears to be closely related to *Browningia*. To me this is no surprise. When the Andes were younger, and not as high as they are today, tall, cereoid (tall and thin) cacti were at an advantage and this is still the case today as *Browningia* continue to grow at around 2000 to 2500 metres altitude. As the Andes rose to their present height, a smaller globular shape became more advantageous than the cereoid growth form, therefore subgenus *Rebutia* evolved in this higher location.

As a final summary, my interpretation of the DNA data for the genus *Rebutia,* in the sense of the NCL, is that there is good evidence that the current subgerera *Rebutia*, *Sulcorebutia*, *Weingartia*, *Aylostera* and *Mediolobivia* should all be elevated back to full generic status. In addition, evidence in DNA and morphological features of the plant suggest *R. einsteinii* should revert to the genus *Cylindrorebutia*. The move by the New Cactus Lexicon to place all the plants in one genus was based on similarities in their flowers but, in reality, they have evolved to their present location on different sides of the Andes and their flowers only look similar because, in their current habitat, they all share the same or similar pollinators. ■

Photos: Ivor Crook

References

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Gardening with succulents

Part 1 A brief introduction

by Paul Spracklin

‘Exotic’ or ‘subtropical’ style gardening has waxed and waned in popularity as garden trends move on but, for nearly 30 years, it has been – and remains – for me an all-encompassing passion.

Like many initiates, I was first seduced by large jungly leaves and filled my garden with tree ferns, banana plants, palm trees and other such luscious exotica. However, I live in south-east Essex, one of the driest parts of England where, in an average year, we can expect just 52cm of rainfall. I soon discovered that big leaves = big water bills, not to mention the time and effort involved in supplying it to the plants.

Fig. 1 A fine Agave in Paul’s garden

So I started seeking out plants that are suited to my arid growing conditions yet fulfilled my need to grow dramatic, architectural plants. And I found cacti and succulents!

Question: Surely cacti and succulent plants cannot be grown outdoors in the UK?

The short answer is ‘Yes, they can’. Of course not every succulent plant can be grown by everyone, everywhere in the UK but anyone, wherever they live, could grow some succulents if they wish.

That range increases depending upon how mild and/or dry your local climate is, or by taking easy steps to protect plants in winter.

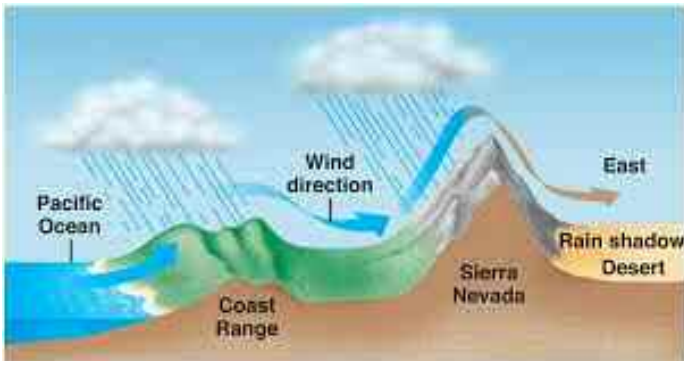
To many long-time growers of cacti and succulent plants the idea of growing outside year round is a fairly alien concept but coming, as I do, from a landscape background rather than as a collector of cacti and succulents, it seems to me a logical extension of our hobby.

This brief introduction, the first in a short series of articles, outlines some of the important issues to consider when taking the plunge to landscape with cacti and succulent plants.

Provenance

The term ‘provenance’ refers to the origin of an object so, in this case, where the plants actually come from. Of interest to gardeners:

- Latitude. The further north or south one travels from the equator, the cooler it gets.
- Altitude. Air temperature drops by an average of 0.65°C per 100m gain in altitude.
- Local weather patterns. Humid air from the ocean rises when it gets to land, eventually falling as rain. At a certain point the air loses its moisture, usually at altitude, resulting in a dry area of ‘rain shadow’.



Contrary to common belief, many succulent plants do not come from deserts – they are simply adapted to climates that are seasonally dry. Most plant genera will find themselves growing, in nature, in a particular range of habitats but there are usually one or two species that are at the furthest extent of that range. Therefore, as plants are adapted to growing in their environment, we should ideally choose succulent plant species that grow in more northerly, higher and wetter regions.

Fig. 2 Nolina nelsonii

Take *Agave montana* for example. This is a species that chooses to grow in the understorey of pine and oak woodland at 3000m altitude in north-eastern Mexico. These are 'relatively' moist woods, often bathed in mist and fog with regular rainfall and regular frost and snow in winter.

Other factors are at work, of course, but provenance is a good place to start. Thus it can be seen that species choice is critical – place any old cactus outside and the odds are stacked against it surviving. Start with a species that comes from somewhere damp and cold and you have a chance.

Drainage

One of the single most important factors for successful succulent growing in the UK is to plant in a raised bed and into a freely-draining medium so that rainfall moves quickly through the root zone. No succulent plants can tolerant sitting in cold, waterlogged soil.

There are many ways to construct a raised bed – different materials and methods will depend upon the style of garden or border you require. Using rock as a retaining material can give a naturalistic appearance to a garden or border. More formal arrangements can be easily and quickly achieved by using railways sleepers or a wooden retaining wall.

Pictured here (Fig. 2) is a splendid specimen plant of *Nolina nelsonii* going into my rock garden at home. If you are fortunate enough to garden on a slope making raised beds becomes a lot easier, as you only have to raise the downhill side!

Many species of succulent plant are found in nature growing on vertical cliff faces. With a little imagination it is possible to construct what is, in effect, a dry stone wall with succulent plants growing out of the crevices.

However you choose to construct the raised bed, surround the rootball of your plants with a mixture of large and small particles – anything from builder's rubble, ballast, half bricks (even whole ones!) or grit to sharp sand.

For smaller plants, a handful of soil in the planting hole helps them get away to a good start.

Winter Protection

There are some succulent plants that can survive in the UK climate in the open garden all year round but the range of species available opens up dramatically if you can protect them from rain and snow.

The 'wrong type of snow' – is a much-derided expression used by rail services one winter but, actually, very true. In this country we get wet, slushy snow that penetrates and freezes, as opposed to light powdery snow that insulates. Some succulents can live with this, most not. By simply providing a cover to keep the weather – and snow in particular – off the plants you could make the difference between life and death to many of them, and also grow perhaps 10 times the number of species than if you left them completely to their own devices.

Covers can be in many forms. Plastic umbrella cloches, as pictured, are a cheap and easy method of providing cover. I know some growers who cover entire borders with temporary polytunnels, erected

Fig. 3 Plastic umbrella cloche

in a couple of hours with the onset of winter and dismantled as easily each spring. But it can be as simple as a sheet of fleece or an old blanket placed over a large plant, then removed when the threat of snow has passed.

Putting it all together

Using succulent plants as landscape subjects opens up new opportunities within the hobby as, generally, the space available outside is greater than that available within the confines of a greenhouse.

Larger-growing genera such as *Yucca*, *Dasylirion*, *Nolina*, *Agave* and even some columnar cacti can be considered to give structure to the planned borders, with smaller subjects giving interest, contrast and texture. Suitable companion plantings such as selected palms and other Mediterranean style shrubs give substance, smaller alpines fill cracks and crevices. (See the front cover picture.)

In future issues I will discuss plants in greater detail, which plants I have tried with success, which plants have been failures, which I would recommend and for what purpose. The next article will cover 'Big plants, with impact!' ■ **Photos: Paul Spracklin**

Paul Spracklin is a garden designer with a specialist interest in gardening with succulents.

See his website Oasis Designs for more information.

Fig. 4 A fine flowering Trichocereus

Sarcostemma insigne by Philip Greswell

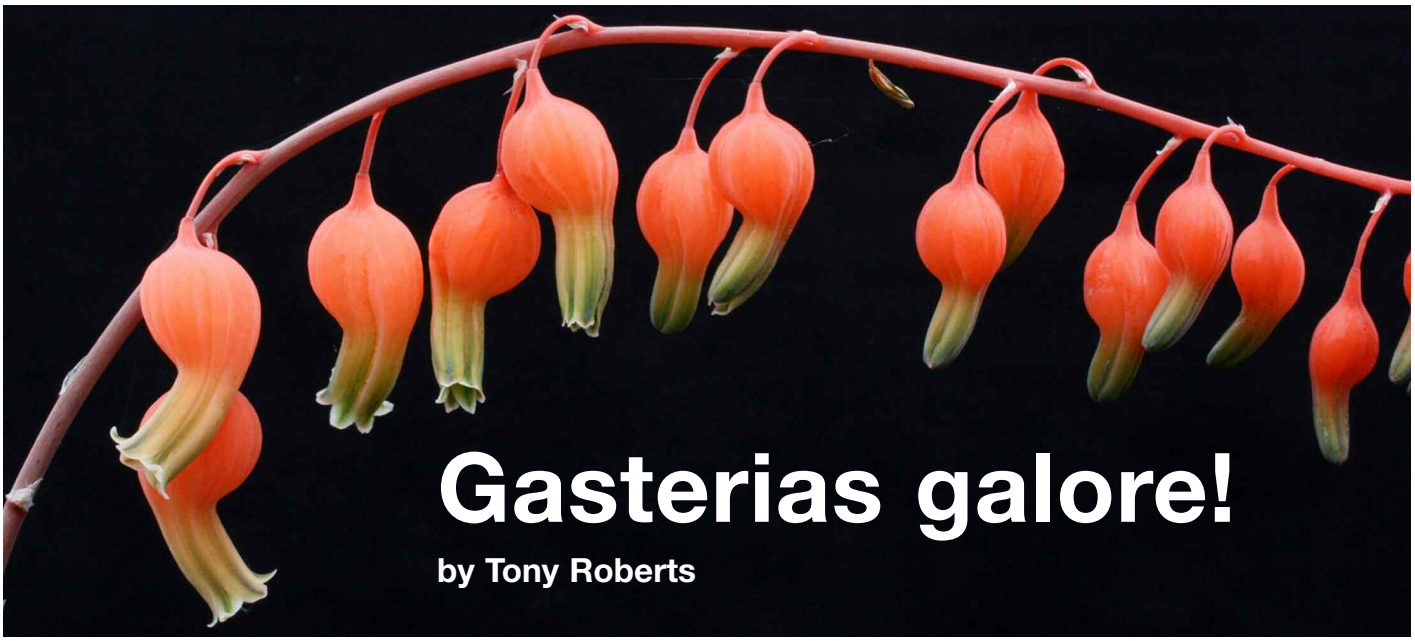
In 2009 when visiting René Geissler's nursery, where you can always find something a bit different, we bought a *Sarcostemma insigne*.

Sarcostemma insigne

Each year it has pretty scented flowers – last year it flowered in October. We keep it in the conservatory, where it is shaded, and grow it in the usual well-drained cactus mix.

Hermann Jacobsen in his 'Lexicon of Succulent Plants, 1974', states that it comes from Madagascar and is a member of the Asclepiadaceae, needing a warm greenhouse. Flowers to 15mm, campanulate with lobes broadly triangular. It is propagated from cuttings and seeds.

The Directory of Plants, distributed by International Succulent Introductions (ISI) 1958–2001 compiled by Harry Mays, gives the following description: – 'The Sarcostemmas are easily grown succulent perennials or subshrubs in the milkweed family with stems varying from very slender to finger-thickness. Given strong light they also flower freely with small umbels of relatively subtle, pale flowers, but often with strong perfume of lemon, jasmine or other sweet fragrances. The slender vermicelli like stems of *S. insigne* form an easy to care for hanging basket. Its broadly saucer shaped flowers, beige with reddish veins emit a sweet perfume reminiscent of stock (*Matthiola incana*). Collected in 1975 on a hill by J Lavranos 50km from Tananarive, Madagascar'. ■ **Photo: Philip Greswell**



Gasterias galore!

by Tony Roberts

When writing about tephrocacti last time, I happened to say 'I know how and why my passion for gasterias began (a story for another time perhaps?)'. Our ESR editor encouraged me to tell you more, so here is the story of how I first became involved with this genus and where the journey has taken me over almost 20 years.

Prior to 1995 my collection had consisted of mainly cacti (mammillarias, notocacti, rebutias and cleistocacti inter alia) with just a few representative other succulents (including plants such as *Crassula ovata* and *Adromischus cooperi*). While I had grown many cacti from seed over the previous decade, I had propagated very few succulents other than some *Lithops*. It was in spring 1995 that the Haworthia Society offered many different batches of Gasteria seed from Ernst van Jaarsveld. David Offord, from Waltham Forest Branch, came up to me one day in May 1995 and presented me with several packets of these very seeds and said, 'You propagate lots of cacti, Tony, try a few of these'. And that was where it all started!

It was 29 May 1995 when these seeds were sown; they germinated well and were pricked out into two seed trays about a year later. When we moved house from Hertfordshire to Kent in June 1997 the juvenile plants were still in those trays and they were not potted up into individual pots until April 1998. I gave David Offord quite a few of these plants, keeping just a few to add to my collection. So it was that the first gasterias I owned were *Gasteria acinacifolia* (G5, HSoc seed EvJ95-7), *Gasteria ellaphieae* (G6/A and G6/B, HSoc seed EvJ95-13) and *Gasteria bicolor var. bicolor* (G7/A and G7/B, HSoc seed EvJ95-9). (Plants with the accession numbers G1 to G4 were all gymnocalyciums.) I still have all these early plants in my collection, each of them having been potted on six or seven times from their original 6cm pots to pots between 15cm and 23cm.

One of these plants in particular fascinated me and that was *G. ellaphieae*. It quickly grew from a distichous seedling into a small rosette but has then grown quite slowly into a mature specimen, occasionally having offsets which have been removed over the years. The endearing feature of this clone was its markings, many white dots and, given just the right amount of light in the summer, the green colour of the leaves almost disappeared leaving a plant which was predominantly pink and white in colour. As autumn approached, its greenness returned (fortunately!). Fig. 1 shows this very plant in 2013, looking rather battle-scarred now, but having great sentimental value.

Fig. 1 G. ellaphieae

Having grown these plants from Ernst's seeds, it was not long before I tracked down his book which had been published a few years earlier in 1994 (Ref. 1). It had originally been printed as a small print run, mainly for subscribers, but had proved very popular and

sought-after so was reprinted the following year. Ernst had spent more than a decade extensively studying plants from this genus both in his 'nursery' at Kirstenbosch Gardens in Cape Town and out in habitat. He subsumed many of the historical and ill-defined names from the literature and the net result was a modern listing of just 16 species and a further six varieties. Studying this book convinced me that here was a genus worthy of my detailed attention and I started acquiring plants to add to what I hoped might one day become a 'Reference Collection' for the genus *Gasteria*.

The species which was top of my 'wants list' at that time was *G. rawlinsonii.* I had never even seen any of the various clones of this plant but I was fascinated by its uniqueness. Finally, in August 2001, I acquired my first specimen when I was presented with a tiny plant by Doug Sizmur at a BCSS Dartford Branch barbecue held at his nursery. Was I excited, or what?!

This tiny plant was potted into a 6cm pot the very next day and has grown on slowly. It turned out to be the form with relatively small leaves but which slowly spirals. It has been potted on just four times since then (most recently in 2013), some offsets being removed each time, and it now resides in a 19cm pot (Fig. 2) taking pride of place in my collection. It has taken more than 10 years for the main stem to complete just half a revolution, so just another decade to go!

Perhaps the more usual form of *G. rawlinsonii* is the one where the leaves stay totally distichous and stacked one on top of the other. As small plants these grow upright (Fig. 3), but as the stems get longer (and longer) they become pendulous. Over the years I acquired other variants of this species, it became my favourite, and I longed for that day when I would be able to see it in its natural habitat – but more of that later!

Another species I had an early liking for was *G. armstrongii*. I had seen huge clumps of this species at National Shows but also really liked to see it as a chunky single-stemmed plant. In my early travels around the country, giving talks to BCSS branches, I always looked on the sales tables and if I ever saw a *G. armstrongii* which looked a bit different I snapped it up quickly to grow it on for a few years to see if it turned out to be any different. One such plant is shown in Fig. 4.

Gasterias where the leaves remain distichous have always caught my eye, and another such species is *G. brachyphylla*. The type variety has shiny leaves which develop a distinct upward curve as they mature (Fig. 5) but there is also a miniature variety (var. *bayeri*) which has much smaller, matt leaves

Left:
Fig. 2
G. rawlinsonii
spiral form

Right:
Fig. 3
G. rawlinsonii
straight form

Fig. 4 G. armstrongii

resulting in a very compact plant (Fig. 6). I have said nothing about flowers yet – for I am sure most of you know that gasterias are so named for their stomach-shaped flowers – see the illustration at the head of this article which is *G. glomerata*. This always flowers so well in culture, often early in the year in the UK.

The most exciting thing about gasterias is that there are still totally new species of plants out there (in South Africa) waiting to be discovered, or so it seems. Indeed the current 'accepted list' of gasterias, as I write this (in January 2015), consists of 25 species, with a further ten varieties and two subspecies making a total of 37. The first of these species to be found after Ernst's book was published was *G. glauca* (1998) followed by *G. polita* (2001) and *G. tukhelensis* (2005). Most recently, in 2014, *G. barbae* and *G. loedolffiae* were described.

Fig. 5 G. brachyphylla

My gasteria experience became even richer when I was able to hear Ernst speak at a Haworthia Society Convention in October 2009, including his discovery of *G. tukhelensis* on the banks of the Tugela River while travelling downstream in a dinghy. Talking with Ernst convinced me that my next 'holiday' must be to South Africa. Two years later my ambition to see gasterias in habitat came to fruition when I spent three weeks in the Western Cape and Eastern Cape with Al Laius and Derek Tribble. I will not cover this trip in detail here for I have already reported it elsewhere (Refs. 2 and 3) but, suffice it to say, seeing *G. rawlinsonii* at Gert Smitskloof was a real highlight (Ref. 4).

So where are we now? The collection that started with G5 in 1998 has now reached accession number G609, a clone of *G. pillansii* var. *ernesti-ruschii* acquired in October 2014. All species and varieties, except the two newest ones, are well represented, with many fully-documented specimens, so I believe I have achieved that initial aim of building up a 'Reference Collection'. Under the staging and benches, the floor of my 11m long greenhouse, is full of gasterias with little room to manoeuvre. Where will the next plants go? Never mind the fact that I need to have a major potting-on session in 2015.

In conclusion, what has my passion for gasterias given me? Much more than a fabulous collection of plants to enjoy, that is for sure. Over the last few years I have met many new friends giving talks on 'Gasterias in the flesh' and recently 'Gasterias in habitat and culture' at more than 45 BCSS Branches around the UK, and hopefully recruited a few converts to the genus too. I have been privileged to meet with and discuss gasterias with many 'experts' in the UK, Europe and around the world. I will not name you, for I might miss someone out, but you know who you are, so 'Thank you!' ■

Photos: Tony Roberts

Fig. 6 G. brachyphylla var. bayeri

References

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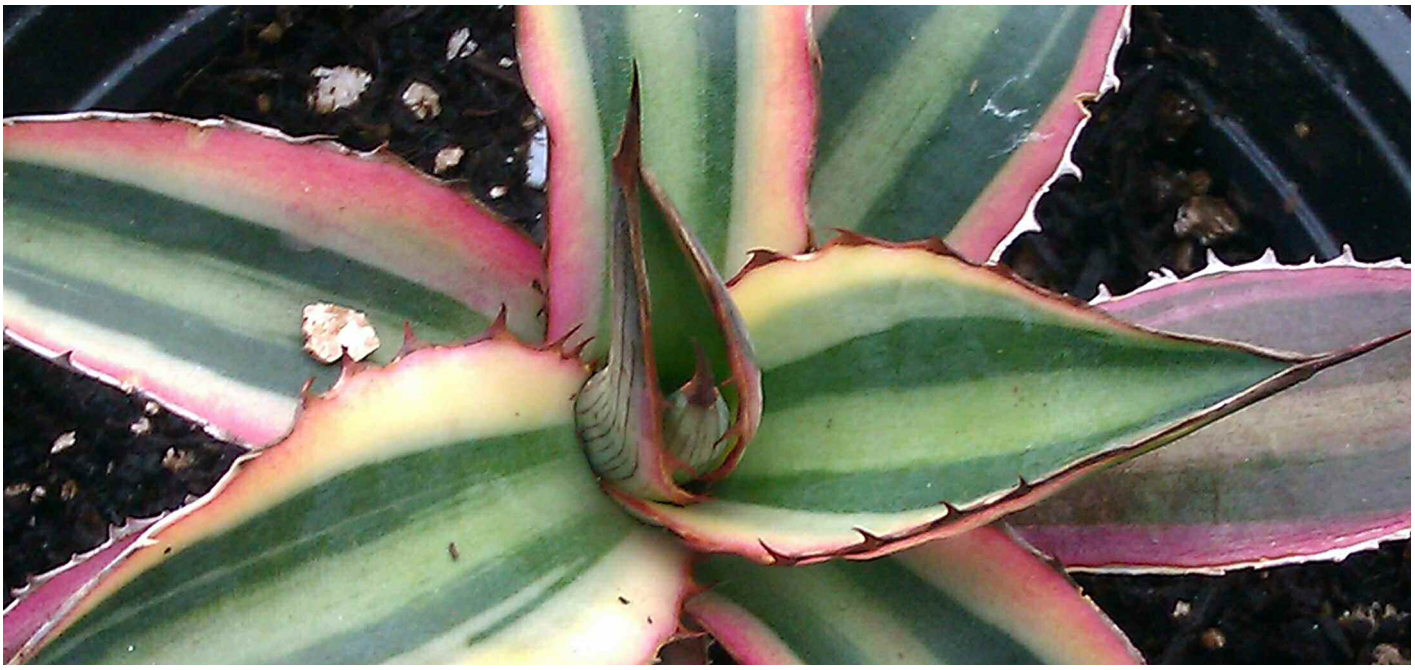


Variegates

by Chris Coombes

I bring good news! The mutated, stretched, confused and downright ugly plants have been scrutinised and dispensed with, so we can now venture into the next group of weirdos. The far more appealing world of the variegates.

Variegated plants have always been popular within the hobby with high prices being paid for plants with a particularly nice pattern or for those which display a large area of different or unusual colours.

Historically nothing has changed. Going back to 1714 an astute nursery heard about the first *Agave americana marginata*, discovered in a well-tended garden in Holland, and sold it on to a businessman and keen horticulturist for 500 guilders (approx £17,000 in today's money). Interest in these plants has always been high. Richard Bradley studied the phenomenon of how leaf variegation can be transmitted by grafting, and wrote about it in his book as far back as 1718. The first documented book exclusively on these plants was published in Japan in 1827.

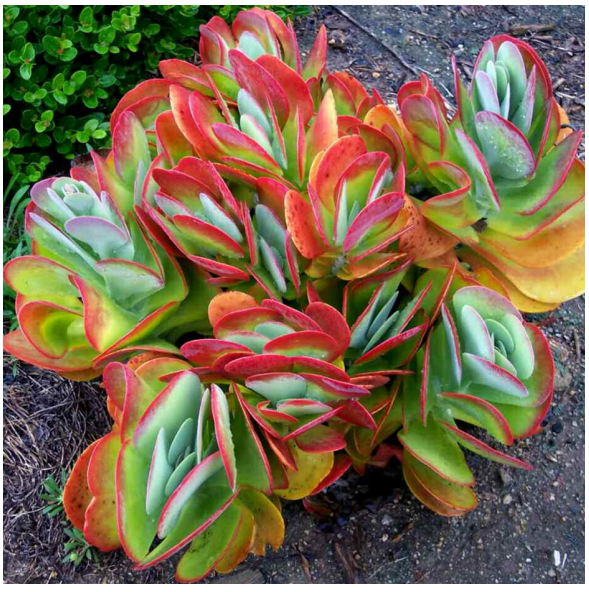
But before you decide to splash out your hard-earned cash on them, some words of warning. Some plants can suffer from 'false' or 'stress' variegation. Chemical changes within the plant due to excesses of heat, cold, direct sunlight, or a lack of water or certain trace elements, can lead to the plant exhibiting highly coloured leaves and attractive patterning. Yet as soon as the plant is happy again it will quickly return to its normal green colour.

A good example of this is *Agave* 'creme brulee' which, in the UK, usually has a lovely pink flush to it in March, when the nurserymen place it front and centre on their stalls. But this colouring is simply due to the lower temperatures and lack of water during the winter months.

A plant often seen in garden centres is *Kalanchoe thrysiflora* which displays many wonderful shades when left outside and ignored during the summer, but quickly turns green when placed on a window sill and watered.

Examples of stress variegation.
Above:
Fig. 1
Agave lophantha 'quadricolor'

Below:
Fig. 2
Kalanchoe thrysiflora



Another thing to watch out for is 'burn variegation'. This can occur when the plant's epidermis is damaged by too much sunlight early in the season. The effects of this can lead to patches of yellowing, similar to a naturally variegated plant but, of course, the plant will either suffer and not grow properly in the future, or slowly return to its normal colour if the damage is not too deep.

Some plants have what is termed 'true variegation'. Many of the aloes, most noticeably the aptly named *A. variegata* but also others, always have attractive stripes or spots of non-green areas on their leaves. This colouring was found to be layers of air bubbles covering the green tissues. This must be genetically controlled by the plant as the areas are very well defined and perfectly arranged, unlike the random variegates detailed below, although what benefit this brings to the plant, unless it is a form of camouflage, is unclear.

Above and below Figs. 3 and 4 Examples of random variegation found in Gymnocalycium

So what is random variegation? Basically the colour that we see in our plants is due mainly to the many organic chemicals within them. Chloroplasts, containing chlorophyll, which are coloured green and situated just below the transparent epidermis are what give our plants their natural colour. However if, by a genetic quirk, this chlorophyll is missing or produced in lesser amounts, then other chemicals come to the fore and start to show us their own colours.

Betalains are pigments found in cacti and many other flowering plants that regularly show up as orange or yellow colouring on the stem and leaves see Figs 3 and 4. The darker colours, purples, reds and blues are usually formed when the cell sap pigments escape from the vacuole and flood the rest of the cell contents, see Fig 6. A change in pH. can also alter a plant's colour.

Some plants, echinopses are notorious for it, contain unstable genes which randomly turn their chlorophyll production on and off, forming blocks of brilliantly coloured heads. But without enough chlorophyll, which absorbs the sunlight needed for photosynthesis, the plant will die.

So what percentage of the plant needs to remain green to enable it to survive? There does not appear to have been any recent studies but, in 1899 after some research, Roland Gosselin stated that it must have at least 1/8th of its normal green cells to continue growing on its own roots. Some plants seem to be able to manage with far less than this. In reality however these specimens do contain reduced, but sufficient, amounts of chlorophyll but it is masked by other colours. They will, however, have a much slower rate of growth due to the sunlight being filtered through several other chemical layers.

Some specimens emerge as seedlings containing no chlorophyll at all and can only survive a very short time, living on the endosperm (food) within the seed, before they have to be grafted on to a green stock plant. Many wonderful examples can be seen displaying

fantastic intense colours and the rarer ones are much sought after and can be very expensive. But many customers of these coloured jewels are disappointed when they find that the colour fades or becomes tainted with blotches a short time later.

Remember I mentioned that pH can play a part in this phenomenon? Well that is usually the cause of this frustration. The plant will have been repotted as soon as it was introduced to its new home. Many continental nurseries tend to grow plants in light peat-based composts which naturally have an acidic or low pH. Once this is replaced by the traditional John Innes and grit mixture, the pH value increases significantly and alters the various chemical reactions within the plant, thus modifying the colour. The best way of ensuring that the colour remains as it was, is to measure the pH of the soil before repotting and then try to match this as closely as possible by adding other materials with acidic properties into your mix. Please be aware when doing this that pH also plays a huge role in nutrient availability.

The Japanese have always been at the forefront of researching and producing variegated plants of all types and, in the year 2000, speculated that plants inherit this trait from the female chromosomes. They experimented with some haworthias, back crossing was tried, and some success achieved. During the last few years several tissue culture laboratories, both in Japan and Europe, have achieved the ability to artificially induce variegation into plants although so far there is no guarantee of the percentage of coloured areas, where the colour occurs or, in my experience, the stability of the affected areas.

As for the cultivation of these plants I can only comment from my own endeavours with them. I find that the white and yellow colours will burn easily under normal conditions and therefore need at least some shading. Unfortunately, and at odds with this, all variegates only reach their full potential in good light, so I try to move them about a bit to balance these needs and find the best place for them.

The dreaded mealy bugs seem to prefer them to the all-green plants, with greater numbers clustered on the coloured parts of some partially variegated plants. I have no idea why. Very odd and most annoying! As is to be expected they also tend to grow much more slowly and generally remain smaller than the all-green versions. I also find that they are more sensitive to cold and overall tend to be more short-lived. Or that could just be my poor growing methods!

Although these plants may be more expensive, some may say unnatural looking, and need a little bit more care and attention, I find them an excellent addition to any grouping of what would otherwise be a mass of various shades of green. That dramatic splash of colour or subtle hue brings a renewed perspective to the whole collection and offers a huge spark of interest to those visitors who would otherwise just pass by. Very often when showing (with little chance of winning anything!) I enter a couple of variegated gymnocalyciums into a suitable class, and those two plants get more interest and attention from the general public than any others. If they serve no other purpose than to get more people into the hobby, then that is good enough for me. ■

Above: Figs. 5 and 6 Examples of variegation in Astrophytum myriostigma

Matucana intertexta

by Sheila Cude

I bought this plant in September 2011 from a garden centre. There was one bud visible at the time which subsequently opened in October. Since then it flowered during both 2012 and 2013, but last year it produced a total of six flowers at intervals during the summer, either in groups of two or singly.

The flowers are beautiful, the yellowy-orange petals delicately edged with a deeper shade of orange. They also seem to be very difficult to photograph, and my pictures do not really do them justice. The flower colour is typical for this species but it can be variable including some plants with almost pure yellow flowers.

The genus *Matucana* was erected by Britton and Rose in 1922 and has approximately 20 species, with new discoveries still being made. *M. intertexta* was first described by Friedrich Ritter in 1963. All Matucana species are endemic to Peru and *M. intertexta* is found in the Cajamarca region (an area in the north-west of Peru) at altitudes of about 2000–2600 metres. It has a restricted range of only some 800 square kilometres and so is considered to be threatened in habitat.

My Matucana intertexta in July 2014

It is well-known that some Peruvian plants from lower altitudes need warmer winter temperatures. As I grow my plants in a conservatory it is easy enough to keep *M. intertexta* warm over the winter, although I do not know if this is really necessary. During the summer it has as much sun as I can give it, and plenty of fresh air. I am sure the better summer of 2014 contributed to its excellent flowering. ■