BULBS

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International Bulb Society

Bulbs

The Bulletin of the International Bulb Society

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COVER PHOTO

Siphonochilus aethiopicus by Graham Duncan

First Words

Tony Palmer – Editor

I don't know if it is just my advancing age accompanied by some slowing down, but every year seems to be even more busy than the last. Looking forward a few years to when I retire, I can't see things changing very much apart from maybe not having nearly enough spending money. I am hoping to expand our mail order bulb nursery at that point, just as some of my contemporaries who have been running nurseries for a living all their lives are talking about quitting – and I'll believe that when I see it! The trick, rarely achieved, is to keep it all to a manageable size so that it doesn't become a burden. Wish me luck!

I am not alone in these thoughts of course. Most people complain about being too busy these days. We are therefore fortunate indeed that some of these busy people are still prepared to put pen to paper for our bulletin. This issue we have a major article by Alison Summerfield on her biosystematic study of the seven minor genera of the Hyacinthaceae. Many changes have been made and Alison helpfully includes a table of currently recognised species, together with their synonyms. She also provides keys as well as distribution and habitat information for the genera *Daubenya*, *Polyxena and Massonia,* and distribution information for *Whiteheadia.*

Alison's father Gordon Summerfield has written a complementary article on creating the right environment and conditions for the cultivation of South African winter rainfall bulbs and corms, with some very helpful tips and tricks.

I'm pleased to say I've finally been able to persuade Eric Walton to write us a comprehensive article on the South American genus *Cypella* and its closest relatives. I think you'll agree that it has been well worth the wait. His knowledge and love of his subject are both very obvious.

Another labour of love has been Joan Wright's lifelong plant breeding efforts, with the aim of producing a summer flowering gladiolus with a stronger fragrance than that found in the few softly scented gladioli then (in 1955) available from the USA. We share the tortuous and often frustrating journey to her goal. It is probably not surprising that few of us are serious plant breeders!

One of the nice things about this job is that every so often articles turn up out of the blue without my having had to indulge in any cajoling and nagging beforehand. One such in this issue is about a plant I was not familiar with, namely the African ginger lily, *Siphonochilus aethiopicus,* and it is contributed by Graham Duncan of Kirstenbosch. He includes plenty of information on the cultivation and propagation of this delightful plant.

Love of the subject also applies to the shorter article this time. It is by Bill Dijk on his beloved Tecophilaeas, accompanied by some of his stunning photographs of them. Few can claim the success that Bill has growing and more importantly multiplying these little beauties.

Rachel Saunders gives a sometimes scary but often hilarious account of her seed collecting adventures with her husband Rod with some lovely pictures to illustrate it. I'll never look at those seed packets in quite the same way again!

We end with a review by Kathy Andersen of the book *Daffodils in Florida* a guide to which are the best types of daffodils to grow in warm climates.

LOOMING RESTRICTIONS ON THE INTERNATIONAL TRADE IN PLANT MATERIAL

Sadly the dark clouds of restrictions on the international trading of plants and seeds are gathering again. I have an e-mail from Joyce Fingerut of North American Rock Garden Society which I will share with you here and which outlines the current situation, future proposals and possible courses of action:

" Organizations that mount international seed exchanges have recently found their efforts greatly hampered by the United States' decision, in January, 2002, to begin enforcing the requirement for a phytosanitary certificate to accompany all shipments of seed entering the U.S. This rule affected all US organizations with overseas members who donate seed, as well as organizations based outside the states with US members who request seed.

The North American Rock Garden Society (nargs.org) successfully led a petition to the United States Department of Agriculture (USDA) to eliminate this phyto requirement, in favor of requiring only an import permit (applied for and held by each US importer). This change in regulation should be completed within the next six months, and will greatly ease the burdens on all seed exchanges. But there are now far-reaching new changes being planned for the

US regulations governing the importation of nursery stock, including seeds.

These regulatory changes will affect not only those societies with US members, but all cross-national organizations, since we are finding that governments in many countries are likewise erecting regulatory barriers to imported plants and seeds, either as protection against the entry of pests, pathogens or invasive plants, or as retaliatory measures to the US restrictions.

Furthermore, new International Standards for the worldwide movement of plants and seeds are currently being formulated, under the aegis of the International Plant Protection Convention (IPPC), a part of the United Nations' Food and Agricultural Organization (FAO). These could have a chilling effect on the operation of any organization's seed exchange with members anywhere outside its own country.

In order to have a voice in these discussions and proposals, it would be very helpful to form an umbrella organization, composed of those societies whose memberships and seed exchanges cross national boundaries. I have found, through personal knowledge and online searches, that there are well over a hundred such organizations. The mere listing of their names, showing the broad extent of their reach, can be a powerful tool in working with government agencies.

Of course, no such list should be assembled without the assent of each of the societies. It would be productive to form a loose collaboration: a listing of like-minded organizations, or perhaps an online listserv for discussions of these questions. The backing of a confederation of over one hundred groups would bring considerable weight to bear at any governmental or international discussions. Our own government agency, in the USDA, has told me that such a body would enhance discussions with them; no doubt the same would be true in other countries, as well.

The North American Rock Garden Society is willing to be a part of such an overarching group. Would the International Bulb Society be interested in joining such an undertaking? All that is needed at the moment is an expression of your interest in exploring this idea, the name of a contact person representing the society, and suggestions as to the format this should take or topics of concern.

Thank you for your consideration of this new concept, as well as any ideas you may have to forward it. Joyce Fingerut Government Liaison, North American Rock Garden Society "

Well there you have it. In an e-mail a few days later Joyce told me about a meeting happening at the moment of the North American Plant Protection Organization (under the UN's IPPC) which is writing the latest draft of an international standard for the global movement of plants (and seeds and bulbs, of course). Their intention is to present a final Standard for comment and approval at the NAPPO annual meeting in October.

Joyce also wrote:...."on the US front, the proposed revisions for their plant import regulations (known as Q37) are on our Federal Register's website. Among other things, they are proposing a new classification for imported plants: excluded pending a pest risk assessment and approval. This should cause an enormous amount of mischief and hardship among the world's horticultural establishments and organizations. I believe that there will be a Stakeholders meeting at the USDA-APHIS headquarters in late May, and I hope to speak about the problems this new classification would cause. If this umbrella organization has begun to coalesce by then, I would be bringing a louder, clearer voice to the table. At present, over 40 societies have expressed positive interest."

IN MEMORY OF JACK ELLIOTT

Jack Elliott was certainly a man who enriched many people's lives with his generosity in sharing seeds and bulbs with others worldwide before these restrictive regulations were more than a twinkle in bureaucrat's eyes. Sadly his own life came to an end in 2004 after a lengthy battle to recover from the effects of a stroke after heart surgery.

Although I never met him I felt I knew him well as a result of our contacts over the internet, and I was greatly looking forward to meeting him and his wife Jean on a trip they were planning to make to New Zealand, which I had helped him make the arrangements for. Tragically it was not to be.

I very much enjoyed our time together on the sub-committee for BULBS when Cathy Craig was Editor. It was a great privilege to work with someone of such great knowledge, friendliness and above all common sense. He was always able to use those qualities to calm things down if they got a bit heated, and he also came up with many practical suggestions that helped make BULBS what it is today. He is truly missed.

Siphonochilus aethiopicus

– NOTES ON AN AFRICAN GINGER LILY

Graham Duncan

PHOTOS BY THE AUTHOR

Several rampant Indian and southeast Asian members of the ginger family (Zingiberaceae) including the sweetly-scented white and yellow-flowered *Hedychium coronarium* and *H. flavescens,* respectively, have naturalised along water courses in South Africa and overwhelmed the indigenous vegetation in numerous temperate and subtropical

Siphonochilus aethiopicus

parts, and have been declared noxious weeds. However, few are aware that two members of this family of 53 genera and well over a thousand species from the tropics and subtropics occur naturally in southern Africa. They belong to the genus *Siphonochilus* that comprises some 20 species endemic to Africa, and were previously included under *Kaempferia*. *Siphonochilus aethiopicus*, commonly known as Natal ginger, occurs in the South African provinces of Limpopo and Mpumalanga, and in Swaziland. It also used to occur in the province of KwaZulu-Natal in eastern South Africa. Its distribution extends further north over a vast area of tropical Africa to the northeastern and western parts of the continent. It is highly valued for its medicinal and magical properties by the indigenous peoples in the eastern and northern parts of southern Africa, and holds large, as yet untapped potential in ornamental horticulture. The closely related *S. kirkii* has an entirely tropical distribution extending from the Caprivi Strip in the far northeastern part of Namibia, northeastwards to east Africa.

The subterranean storage organ in *S. aethiopicus* is a series of cone-shaped rhizomes tightly packed together, producing strong fibrous roots that form elongate, tuber-like swellings towards their tips. The rhizomes emit a pungent spicy aroma and it is this portion of the plant for which a seemingly insatiable demand exists in regional ethnomedicine. Its plethora of medicinal applications include relief from malaria, coughs and colds, rheumatism, toothache and neuralgia, while its magical attributes are focused primarily on protection from lightning and evil spirits. The bright green, lance-shaped foliage is borne alternately along an erect, narrow pseudo stem reaching up to 60 cm high.

The leaves of *S. aethiopicus* are partially hysteranthous, emerging directly after flowering commences, or simultaneously with the flowers, once sustained hot weather sets in from early November to mid-December in the Southern Hemisphere. Inflorescences are only produced from the current season's growth and consist of two to ten flowers. Several inflorescences may be produced by the same rhizome, and although individual blooms last just one day, a succession of flowers is produced over a period of two to three weeks. Large established clumps afford a really spectacular display. While the narrowly lance-shaped petals are translucent white and somewhat inconspicuous, the flower is dominated by an extraordinary lavish lip that is quite startling in its pinkish-mauve hues, with a prominent deep yellow band in the centre. The flowers have an almost hypnotic effect and one finds oneself gazing at the spectacle for inordinately long periods of time! Borne at ground level, they have subterranean ovaries and are heavily sweet-scented (reminiscent of *Gladiolus orchidiflorus*), especially in the early morning and at dusk. Another unusual feature of this species is the occurrence of hermaphrodite (bisexual) and somewhat less showy female flowers. Certain clones only produce

hermaphrodite flowers (such as those under cultivation at Kirstenbosch), while others produce both hermaphrodite and female flowers from the same plant, on separate inflorescences.

Although *S. aethiopicus* is firmly established in small scale commercial cultivation in South Africa for the purposes of medicinal trade, attempts at introducing it into general horticulture here appear to have been met with limited success, probably due to a lack of awareness among the gardening public as to its ease of cultivation, and difficulty in obtaining propagative material.

Successful cultivation of the plant presents no great difficulty, but bringing it to flowering stage has been somewhat problematic in that optimum conditions for flowering have not been clearly understood, stemming mainly from the erroneous belief that the plants require shaded conditions. For many years, a large stock of mature *S. aethiopicus* plants propagated by tissue culture were maintained in the Kirstenbosch bulb nursery in deep raised beds, under what were considered to be ideal, shaded to partially shaded conditions, yet they steadfastly refused to flower. Then several years ago, the old fibreglass bulb house roofs were removed, fortuitously in late October, as part of the phased erection of new nursery facilities. This effectively exposed the bed of dormant ginger lilies to full sun for the first time. Subsequently, within a matter of days of receiving their first heavy drenching, and much to my surprise and delight, several plants burst into flower.

Hermaphrodite clone of *Siphonochilus aethiopicus* flowering in the Kirstenbosch bulb nursery

During the early 1980's, several hermaphrodite clones of the plant were obtained by horticulturist *extraordinaire* Geoff Nichols, formerly of the Durban Park's Department, South Africa, from various sources in KwaZulu-Natal, and were propagated at the Department's Silverglen Medicinal Plant Nursery. Thousands of plants have subsequently been produced from the Silverglen nursery and established in commercial cultivation all over KwaZulu-Natal for purposes of the herbal trade. Material of one of these clones was also provided to the erstwhile Laboratory for Endangered Plants at Kirstenbosch, where Dr Hannes de Lange succeeded in establishing the species in tissue culture and making plants available to the public. It is material of this clone that is currently being grown in the Kirstenbosch bulb nursery.

In their excellent treatise of *S. aethiopicus* in the most recent edition of *Flowering Plants of Africa* (Volume 58, 2003), Dr Neil Crouch, Prof. Gideon Smith and Gillian Condy confirmed earlier reports that the species had not been found in the wild in KwaZulu-Natal for more than 80 years. Accordingly they consider it extinct in nature in that province as a direct result of over-exploitation for the medicinal plant trade. The authors further state that although the plant still survives in very limited numbers in Limpopo, Mpumalanga and Swaziland, 65% of the remaining sites fall outside the boundaries of nature reserves, and are thus at continued high risk of exploitation. Its current conservation status is not surprisingly categorised as 'critically endangered'.

The most notable causes of habitat destruction of S. aethiopicus in the northern provinces of South Africa have been large scale commercial forestry activity and agricultural extension, but the continued harvesting of rhizomes from the wild for the muthi trade has had by far the greatest impact on population numbers in the wild (Crouch et al., in Herbertia 55, 2000).

Cultivation

Natal ginger lilies are easily maintained under cultivation provided certain conditions are met. The plants are tender, deciduous and strictly summer-growing, and should ideally have a completely dry winter rest period. The preferred growing medium is a slightly acid one with high humus content and excellent drainage, such as three parts well decomposed compost and one part coarse river sand. The rhizomes should not be planted too deep and should ideally rest 2–3 cm below soil level. The plants perform very well in deep

raised beds and are also well suited to rock garden pockets, as subjects for large containers, or placed towards the front of the herbaceous border. In cold climates of the Northern Hemisphere they are most suitably grown in a heated greenhouse. It should be borne in mind that the plants have a vigorous root system and when grown in containers, need to be repotted every other year, failing which flowering performance diminishes and finally ceases. Deep plastic pots with a diameter of 25 cm are suitable for plunging into garden beds in spring in winter rainfall areas, and can then simply be lifted in late autumn and stored dry over the winter period. Larger pots with a diameter of 30–35 cm are recommended when grown as specimen plants. When grown under shaded or partially shaded conditions, luxuriant foliage is produced, but for successful flowering to take place, a minimum of full morning sun or very bright light for as much of the day as possible is required. Where shaded to semi-shaded conditions prevail, the foliage of this plant can also be put to good use, providing welcome contrast to other shade-loving foliage plants.

Natal ginger lilies benefit from regular heavy drenching at least once a week, applied from early summer to late autumn. They are gross feeders and respond very well to supplementary fertilisers applied either in liquid or pellet form; the application of the non-burning, non-toxic organic pellet fertiliser Neutrog Bounce Back delivers excellent results. Towards late autumn the foliage begins to die back, and watering should then be withheld for the duration of the winter months, during which time they are best kept as dry as possible, but remaining in soil to prevent desiccation of the swollen root tips. As an experiment, several potted, plunged specimens of *S. aethiopicus* that were displayed in the newly developed 'Garden of Extinction' at Kirstenbosch over the 2003/2004 summer period, were purposefully left in their plunged positions for the duration of the winter months in order to test their reaction to winter rains during dormancy. Although the rhizomes easily survived the wet and cold conditions, they have failed to flower so far this summer, and vegetative growth has been significantly delayed when compared with that of the nursery stock that experienced a dry, relatively warm winter.

Propagation

For the home gardener, increasing stocks of *S. aethiopicus* is most conveniently achieved by separation of thick rhizome clumps towards the end of the winter rest period, or up until late spring, just before flowering and leaf growth commences in early summer. Ensure that separated clumps each have a strong growing point and replant them immediately in order to prevent excessive desiccation of the roots. As the plants multiply rapidly under ideal conditions, allow sufficient spacing of about 30 cm around each clump. Propagation by seed is problematic in that the seeds develop and mature below ground level, and are thus not easily found. Even when seeds can be located, germination is erratic and according to Geoff Nichols, can take up to one year. For large scale production, plants are most successfully raised by means of tissue culture.

At Kirstenbosch mature plants have proved to be generally pest and disease-free, the only troublesome encounters to date being with small grey snout beetles, whose nocturnal forays result in unsightly brown marks on upper leaf surfaces and along leaf margins. Snout beetles chew the leaves of a range of summer-growing and evergreen bulbous genera in southern Africa, including *Clivia, Crinum* and *Nerine*. The culprits are only active at night, hiding between the leaf bases during the day, and are exceptionally sensitive to vibration, dropping to the ground within split seconds where they become instantly camouflaged. Fossicking around the leaf bases by day when they are inactive yields a certain number of them but inevitably one misses a few and the damage caused by just one individual can be severe. Catching them the environmentally friendly way by torchlight at night is best achieved by carefully placing a large bowl underneath the leaves, then shaking them off and crushing their hard exteriors by hand. In severe infestations, spraying with a cypermethrin-based insecticide such as Garden Ripcord is highly effective. Fungal rotting of the rootstocks is common where the soil medium remains excessively wet for long periods over the winter dormant months.

References:

Crouch, N.R., Smith, G.F. and Condy, G. 2003. *Siphonochilus aethiopicus.* *Flowering Plants of Africa* 58: 56-68.

Nichols, G.R. 1989. Some notes on the cultivation of Natal ginger (*Siphonochilus aethiopicus*). *Veld & Flora* 75 (3): 92-93.

Watt, J.M. and Breyer-Brandwijk, M.G. 1962. *The medicinal and poisonous plants of southern and eastern Africa*. Livingstone publishers, Edinburgh.

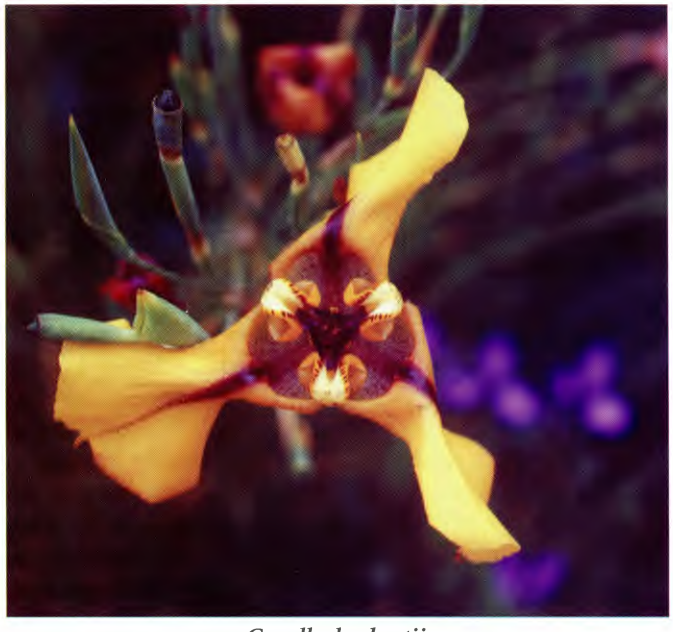
Crouch, N.R., Lötter, M.C., Krynauw, S and Pottas-Bircher, C. 2000 *Siphonochilus aethiopicus* (Zingiberaceae), the Prized Indungulu of the Zulu – an Overview Herbertia 55: 115-129.

The Genus Cypella & its closest relatives

Dr. Eric Walton

ALL PHOTOS BY THE AUTHOR

Quite a number of South American Iridaceae can be grown readily outside in the region of New Zealand where I used to live. Of the South American Iridaceae, the species with particular appeal to me are those in the genus *Cypella* and its close relatives. There is some debate among taxonomists as to the boundaries of many of the South America Iridaceae genera, and in this article I will also discuss the species that are, or have been (depending whether you follow the taxonomic lumpers or the splitters) in the genera *Hesperoxiphion*, *Larentia* and *Phalocallis*. In total, these genera comprise something like 25 species.

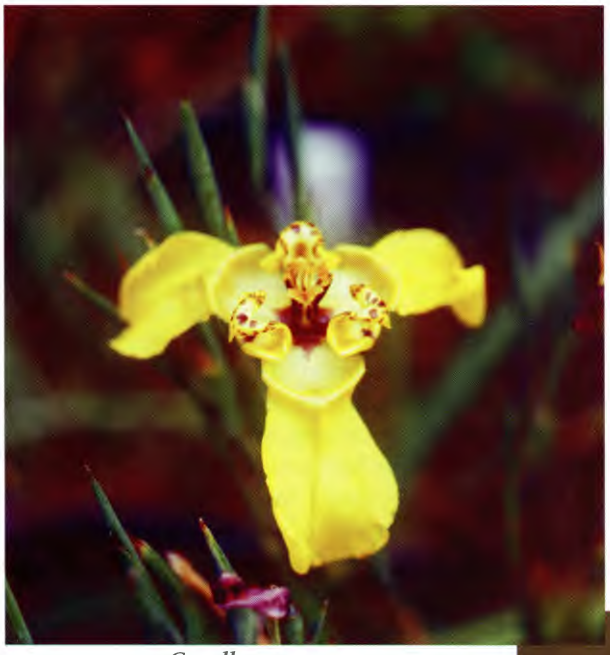


Cypella herbertii

The name *Cypella* comes from the Greek for 'cup' and refers to the shape of the flowers. Members of the genus have bulbous rootstocks, plicate (pleated) leaves and flowers with three spreading outer tepals (the large 'petals') and three folded inner tepals.

The most commonly grown *Cypella* in New Zealand is *Cypella herbertii*. It is also the most widespread species being indigenous to Brazil, Paraguay, Uruguay and Argentina. The leaves are approximately 20 cm long, but the plant grows to about 45 to 60 cm high when in flower. The outer tepals are a rusty orange colour with a dark brown stripe down the middle of each. The inner tepals are similar in colour to the outer tepals, but with a white stripe down the centre and brown flecks joining the orange and white bands. The flowers only last one day, but a well-grown clump will produce several hundred flowers over the summer and so is quite showy in its own quiet way. The specific name refers to Dean William Herbert, the renowned bulb taxonomist in Britain in the early 1800s. There is a subspecies of this plant grown in New Zealand, namely *C. herbertii* ssp. *brevicristata*, which is a much smaller plant, growing to perhaps only half the height of the type. The other major differences are that the flowers are canary-yellow and do not have the brown stripe down the centre of the outer tepals. I understand there is an opinion that this plant should be considered a species in its own right rather than a subspecies of *C. herbertii*.

There are a number of other species grown with flowers similar in form to *C. herbertii* and these include *C. armosa*, *C. fucata* and *C. osteniana*. Under my conditions, these species are similar in height to *C. herbertii* ssp. *brevicristata*. *C. armosa* is indigenous to Argentina and the flowers are pale lemon yellow in colour and are distinct in that the outer tepals hang nearly vertically. *C. armosa* gets its specific name from the rather long style-arms that are the extensions to the style. The flowers of *C. fucata* are very similar in colour to those of *C. herbertii*, but are of a slightly darker and more intense shade. It also has long style-arms and in that respect is not dissimilar to *C. armosa*. The specific name *fucata* means 'painted' and I assume this refers to the faint dark lines on the outer tepals. This species is



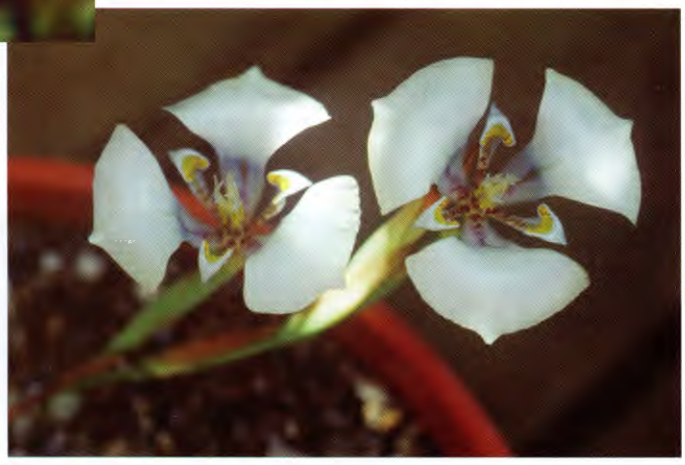
Cypella armosa

indigenous to Brazil and north-eastern Uruguay. *C. osteniana* has very beautiful creamy-white flowers with a buff or pale-brown shading. In addition, the inner tepals are marked with black and yellow making it one of the most beautiful species I have grown. It is indigenous to Uruguay. *C. armosa*, *C. fucata* and *C. osteniana* all have limited distributions in the wild and are all threatened by human activity, but unfortunately I believe *C. fucata* is near extinction. I have another species in my collection that is supposed to be *C. laxa*, a plant indigenous to Brazil, but I am uncertain of its identification. The plant is similar in size to *C. armosa* and the flowers are yellow, a shade about half way between those of *C. herbertii* var. *brevicristata* and *C. armosa*. The flowers also have a few spots at the base of each tepal.

All these species are easily grown in well draining soil or in pots in full sun. They are semi-evergreen, in that they never go fully dormant nor do they lose all their leaves in winter. These species are quite hardy in the garden I had in the Waikato (which is just south of Auckland), even when grown in pots. In fact, I suspect the plants require a certain amount of cold during winter to flower well the following spring and summer. I should say more about the Waikato climate – it is what should be called warm temperate with warm, not hot summers and cool, not cold winters. Frosts were not uncommon in winter but tended not to be very severe and were of relatively short duration.

Another species I grew was *C. hauthalii* ssp. *opalina*, a dwarf plant only growing to about 10 cm in height. The flowers are creamy-white and the outer tepals have an opalescent lustre, which is reflected in the subspecific name. The culture of this plant is similar to the previously mentioned species, but I believe this plant requires a little more warmth during winter to do well. The plant is indigenous to Argentina.

Quite different again is *C. aquatilis*. As the specific name suggests this plant grows under very wet conditions on the sides of streams and is indigenous to Brazil. The flower colour is what could be described as a somewhat burnished golden yellow and they are much larger than any of the fore mentioned species, but also have proportionally larger 'cups'. This species is also unusual in that after flowering, the inflorescence



Cypella hauthalii* ssp. *opalina

stems produce bulbils at most axils. These are a useful way to propagate this plant, as the clone I have has never set seed. This plant should be grown in a moderately large container as it is a rather vigorous species and can multiply rapidly. The container should be stood in a deep saucer (say, up to half the depth of the container) and this should be kept continually filled with water if you want your plants to do well. Under my conditions, this plant flowers over several weeks in early summer.

The second most commonly grown *Cypella* in New Zealand is *C. coelestis*. It should be noted that this plant has gone through numerous name changes and 'misidentifications', but I believe it is currently 'resting' in *Cypella*. However, if you follow the taxonomic splitters, and recognise the genus *Phalocallis* (means shining or bright beauty), the plant would be known as *P. coelestis*. As I understand it, the debate revolves around the degree of

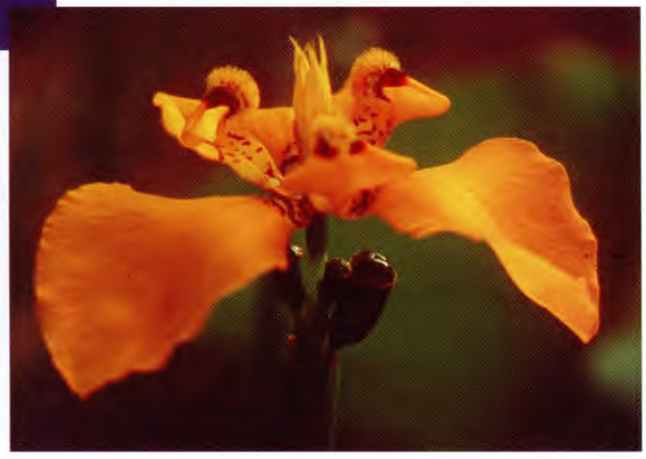
Cypella coelestis

importance placed on flower form and inflorescence morphology. The plant was, until relatively recently, known as *C. plumbea,* but is often distributed in New Zealand as *Herbertia platensis*, a name of no standing. *Herbertia* is a taxonomically valid genus of plants related to *Cypella*. One of the main differences is that the inner tepals of *Herbertia* are reduced to small tongue-shaped structures that curl under them. Another generic name that crops up from time to time for this plant is *Alophia* (which is also often confused with the true *Herbertia*!), but *Alophia* is a different genus again, which is also taxonomically valid. It is characterised by, in part, the shape of the anthers, which are lyrate or fiddle-shaped.

Cypella coelestis grows taller than *C. herbertii*, to about 75 to 100 cm and the leaves are larger and, what I can best describe as, 'more coarse'. The outer tepals are pale-blue (*coelestis* means sky-blue) and the inner tepals are pale-yellow and white. At the bases of both the inner and outer tepals there is banding, rusty-red in colour. The plant is semi-evergreen and flowers in mid summer. It readily sets seed – so much so that it used to pop up all over my garden. It was never weedy and you always had plants to give away without disturbing the main clump! A point to note – the seed of *C. coelestis* are a lot larger than the other *Cypella* species I grow, being up to 3 to 4 mm in length and not as hard. The bulbs are also curiously different in that they are a bright rusty-red colour.

Another group of 'cypella' are those species in the genus *Hesperoxiphion,* which I believe is currently recognised, so I will use that here. Taxonomically, *Hesperoxiphion* are different to *Cypella* in that the inner tepals have a single pubescent (finely-hairy) band and different inflorescence morphology. The species I grow are also 'horticulturally different' to other species I grow in that they go completely dormant in winter and the bulbs are deciduous. Under Waikato conditions, the first frosts of winter cut back the foliage and the bulbs remain dormant until the temperatures warm in the following spring. The origin of *Hesperoxiphion* is rather interesting as hespero means western and xiphium means sword, which was the Greek name for a gladiolus.

Hesperoxiphion peruvianum (or *Cypella peruviana*) is probably the most commonly grown



Hesperoxiphion peruvianum

species in the genus and, as the specific name implies, is indigenous to Peru. It is a very beautiful and desirable plant and is one of the most favoured iridaceous plants I grow. I have two forms, one with yellow flowers collected from near Puno, and the other with orange-yellow flowers collected near Machu Picchu. Each bulb produces an abundance of flowers in late summer. The Machu Picchu form is more robust, and infinitely more desirable, having flowers approximately 10 cm in diameter on well-grown specimens, which have a very strong, almost overpowering scent similar to *Freesia*. Unfortunately, this is only on hearsay – I cannot smell them! Many visitors to my garden are given the 'sniff' test to see if they can smell *H. peruvianum*. Curiously, in my limited test, people who cannot smell it can smell *Tigridia van Houttei* – a plant with fetid, musty smelling flowers similar to *Lilium pyrenaicum* – but not both! Sad, but true, I can only smell the *Tigridia*! *H. peruvianum* readily sets seed, but also offsets rapidly. I used to grow my bulbs of this species in black plastic pots, the idea being that the soil would

warm more rapidly in the spring and the bulbs come into growth sooner. This ensured that a high number of flowers are produced before the first frosts. However, now that I have many more bulbs, I also grow them in the ground and they do even better – there are more flowers and they multiply even faster!

An interesting point to note is that a large clump of say 50 individual *H. peruvianum* bulbs will flower synchronously every second or third day through the flowering season. I suspect that this response may be mediated by the gaseous plant growth regulator ethylene. Synchronousity is only lost as the temperatures cool as the autumn approaches.

Cypella herbertii* var. *brevicristata

H. peruvianum, being from the high Andes, is quite hardy in the Waikato and bulbs may be left in the ground year round in well draining soils. Bulbs can also be dug and stored dry, as can be done with tulips and daffodils, and this approach may be useful for people in climates with very cold winters. However, I have found some dry potting mix around the bulbs while in storage stops excessive desiccation and this is better in the long run.

A word of warning for everyone, but particularly for those readers who live in New Zealand, is that the bulbs of *H. peruvianum* are very tasty to our native bird, the pukeko (swamp hen or purple gallinule, *Porphyrio porphyrio*). They will start at one end of a row, and in short order, will lift each bulb and eat it. The foliage is left behind tidily windrowed!

I also grow *H. niveum* and *H. herrerae*, both of which are indigenous to Peru. This former species is also very beautiful, with vivid white flowers, the colour of which gives this plant its specific name. It is only about half the height of *H. peruvianum* but is as easy to grow. The flowers of *H. herrerae* are royal blue and quite beautiful. I haven't been as successful with this species – I suspect it may be a tad fussier. I have another *Hesperoxiphion* of uncertain identity. It has a flower very similar to *H. peruvianum* in size and form, but the colour is a yellowish tan and the plant is quite short – less than the height of *H. niveum*. If anyone knows the true identity of this plant, please get in touch with me. I was once given a bulb of *H. huilense*, a white flowered species in this group from Colombia, which is supposed to be semi-evergreen. Unfortunately, the bulb was delayed in the post during the Christmas holiday period and rotted on planting. I was also sent seed of this from the same source but these on flowering were *Gelasine azurea*, now known as *G. coerulea*. I'm sure I am not the only one who has received seed of a much coveted treasure to find after several years of cosseting, that on flowering it is not what one had dreamed of!

The fourth and last genus in the *Cypella* group that I will discuss is *Larentia.* I am uncertain of the taxonomic status of this genus – whether it is in vogue or not. However, I understand it is comprised of two species, namely *L. rosei* and *L. linearis*. The former species has pale blue flowers and the latter has dark blue flowers. These are tropical species from low elevations in Mexico from areas that are seasonally wet. I have purchased seed of *L. rosei* several times and had good germination and that was about it! I am uncertain whether I should have kept them wetter or hotter or both. I suspect that they are likely to require warm greenhouses to perform well anywhere in New Zealand. However, I would welcome to be proved wrong!

A few final thoughts, which hopefully do not sound trite! All species that I have grown respond well to regular applications of fertiliser. The better the plant is grown the more flowers are produced. If the plants are kept well watered, flowering will continue into the summer for *C. armosa*, *C. fucata*, *C. herbertii* and *C. osteniana*. Sometimes if a watering is missed the plants will temporarily stop flowering, but will resume when watered again if the break is not too long. The bulbs should not be allowed to dry out when being transplanted with the exception of those species in the genus *Hesperoxiphion*. I believe the time out of the ground should be kept to a minimum, because of the never really dormant nature of most species.

Cypella osteniana

Cypella fucata

If only a few bulbs are required, the easiest way to propagate *Cypella* is by division of an existing clump. For the semi-evergreen species, under my conditions, I believe this is best done in autumn, just prior to the flush of growth that comes with the autumnal rains. This also allows the bulbs to re-establish well prior to the main flowering period in the spring. In very cold districts it may be better to wait until spring. The exceptions to this are *C. hauthalii* ssp. *opalina* and the members of the genus *Hesperoxiphion* because of their different growth cycles. The former should be divided in late summer and the latter should be divided in spring, prior to the recommencement of growth in both species.

Alternately, or to produce large numbers of bulbs, the plants are easily propagated from seed. In my experience, the seed should be sown as soon as ripe in a very freely draining, gritty potting mix. The seed may take some time to germinate, particularly if old. In the past I have kept pots for two or three years in the hope something might appear, particularly if it is rare. Now, I chit all the seed (carefully cutting off the corner of the seed with a scalpel, aiding the entrance of water into the seed) and sow in warm conditions (say 20 – 25 °C) until something germinates. I have a feeling that a period of chilling temperatures to imbibed seed may be beneficial for the germination of *Hesperoxiphion peruvianum* but I have never really put this to the test.

The biggest problem in growing rare and unusual bulbs is acquiring the plant in the first place. Good luck with that and good luck when you find them – they are beautiful and interesting plants to grow!

Eric Walton is a plant physiologist in New Zealand whose current research is focused on identifying genes that control dormancy in kiwifruit. He has been growing plants for nearly as long as he can remember and has been a member of the International Bulb Society, and its antecedent organisation, since 1979. In addition to bulbous plants, his current garden is planted with a subtropical theme and contains a wide range of other plants, including palms, cycads, aroids, gingers, bromeliads, ferns, bananas and Marantaceae that perform well in the Auckland climate.

The Joys of Growing *Tecophilaea cyanocrocus*

By Bill Dijk

ALL PHOTOS BY THE AUTHOR

When it's the flowering season of my pet subject I get all excited, and have been known to go into uncontrollable raptures of delight and reverence! I am of course talking about the winter-flowering *Tecophilaea cyanocrocus* and its varieties.

A cold climate, hardy bulb for the keen grower and collector and without doubt the most sought after of all the smaller flowering bulbs – the fabulous Chilean Blue Crocus. They are now believed to be critically endangered in the wild, mainly because of over-collecting and intensive grazing by cattle and sheep to the point of becoming extinct.

Fortunately they are not difficult to grow, and, although rare in cultivation, given the right environment they will not be lost from the planet. Their supreme beauty and rarity make them a must in every connoisseur's collection.

They are usually grown in an alpine house or cold glasshouse and because they are so unique and beautiful, these plants justify such special attention and treatment. Plant the bulbs in a well drained fertile potting mix 5 centimetres (2 inches) deep. They should remain cool until growth appears from mid to late winter. They start growth early in the season, but appear to be hardy in all but very exposed areas. Young growth can be scorched with severe frost, but will soon harden. They need very good drainage.

Water only when in growth, but be careful not to over-water in warm humid conditions. When flowering is finished, gradually reduce water to allow bulbs to go dormant and dry in summer.

In view of their small size and rarity *T. cyanocrocus* species are best cultivated in a container or some other "protected" situation where they can thrive and receive the special attention they deserve. A pot of them is always treasured by keen collectors.

Bulbs multiply slowly; the best method of increase is to propagate from fresh seed, sown in autumn in a gritty seed mix. Seed will develop more readily when hand

A collection of *Tecophilaea cyanocrocus* and its varieties

pollinated, which requires a deft, delicate touch with a very fine camel-hair brush if it's going to be successful. I sow seeds in April-May (Southern Hemisphere) in a well-drained seed medium in deep seed trays, with plenty of course sand and/ or pumice for good drainage and topped off with ½ inch of finer mix or river sand. The seed normally germinates in 6 to 8 weeks and seedlings will reach flowering size when grown on for another 3–4 years.

Tecophilaea cyanocrocus:
one, often two flowers are produced per stem. They are an intense vivid gentian blue with a white throat. Flowers are 5 centimetres (2 inches) across when fully open.

T. cyanocrocus,* var. *leichtlinii:
the same beautiful plant with 5 centimetre (2 inch) sky-blue flowers and large white centres.

T. cyanocrocus* var. *violaea:
an attractive but rare variety, whose bright violet blue flowers have great charm.

Tecophilaeas are always much admired and when flowering en masse are a sight never to be forgotten.

Bill Dijk lives and grows in Tauranga, New Zealand, zone 8-9.

Tecophilaea cyanocrocus

Tecophilaea cyanocrocus leichtlinii

Tecophilaea cyanocrocus* var. *violacea

The Elusive Fragrant Summer Flowering Gladiolus

Joan Wright

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In 1955, I started work to try to produce a summer flowering gladiolus with a stronger fragrance than that found in the few softly scented gladioli then available from the USA. Those had no fragrant species in their ancestry, but may have been carrying the trait recessively.

MATERIAL USED

1 The strongly scented *Acidanthera bicolor* var. *murielae* which has now been re-classified as a *Gladiolus* species – *G. callianthus* var. *murielae*
2 Several small flowered *Gladiolus* cultivars strong in desirable traits that were lacking in *G. callianthus* var. *murielae*

The latter had only 3-4 florets that were white with dark blotches on petal bases and throat and were suspended by long styles, well clear of the flexible flower spikes. Because of this pendulous kind of attachment, the florets tended to face downwards, but as it was the only fragrant summer flowering species available, I used it in the hope that the opposite good traits in the gladiolus cultivars would overcome the weak points in *G. murielae* and only its beautiful scent would be dominant in the progeny.

G. murielae failed to set seed when pollinated by the gladiolus cultivars, but used as pollen parent on them, a few seeds were obtained ranging from 2 to 10 in each seed pod. Altogether 150 seed were harvested. 116 of these grew and flowered in their second growing season. Of these 114 were similar to the *Gladiolus* parent with no trace of *murielae* features, but the last two, rather smaller, plants to flower were apparently hybrids. Both had typical dark purple throat blotches and some *murielae* fragrance. Their seed parent, *Gladiolus* 'Filigree', had modified *murielae's* long style, though the florets still tended to face downwards. The flower spike was upright and gave promise of carrying more flower buds with more florets than *murielae*. One plant had white florets (B66) and the other pink, similar to 'Filigree'. This was the nicer of the two, but sadly was soon lost.

Plans were made to improve B66's rather plain appearance, while retaining its slight fragrance, by crossing it with *Gladiolus* cultivars having all the desirable traits. Many seedlings were raised, but none seemed better than B66 and the few that were fragrant were weak in this respect.

Finally B66 was self pollinated and again without an improved form appearing. I was about to abandon my fine plans and just keep B66 as a memento. Then my local high school horticultural instructor referred

'Rose Shape' (F3 x *Gladiolus* cv.)

V121 'Diana' (N99 x 'Rose Shape')

me to Dr. J.A.Rattenbury who was then Senior Lecturer in charge of the sub Department of Genetics at the University of Auckland. He became interested in my project and the many chromosome counts he did revealed some of the reasons for my poor results. Because 'Filigree' was a tetraploid (4N=60) as most gladiolus cultivars are, and *murielae* was a diploid (2N=30), the hybrid B66 was a triploid (3N=45)

As such it had irregular contributions of its chromosomes to its ova. Crossed with gladiolus varieties, the progeny were sub-pentaploids – around or less than 70 chromosomes. Though quite normal in appearance, they were sterile and what fragrance a few of them had was barely discernable. Studies of the pollen grains in B66 found them to be very variable in size; the larger were probably from 'Filigree' and seemed the only viable ones – only gladiolus-like seedlings resulted and none had any fragrance.

Dr Rattenbury suggested that B66's irregular chromosomal distribution could be utilised if it behaved as did those in a study reported by Jones and Bamford in the American Journal of Botany, Vol 29 No 10 1942. They found that gladiolus species hybrids sometimes passed all their chromosomes to some of their ovules. If B66 did this, any such ovules would have 45 chromosomes, and if fertilised by pollen from a diploid, the 15 chromosomes it contributed would bring the total up to 60, a neat tetraploid number that would have regular chromosome pairing and distribution to the ovules. Any progeny in turn would have improved potential as parents. So B66 was backcrossed to its diploid parent, *G. murielae*, there being no other suitable diploid available. Very few B66 flowers set seed but 18 were eventually harvested. Only 6 seeds germinated with 4 surviving to flower 2 years later.

Chromosome counts showed that these new plants were tetraploids (4n = 60). Though having an extra set of 15 chromosomes from *G. murielae*, they were not any more like it than B66 in appearance, with the important exception that they had better scent, but still not as strong as in *G. murielae*.

Using the strongest plant (numbered F3), numerous crosses were made with good quality gladiolus cultivars and a reasonable number of seeds obtained. Using F3 as the seed parent gave the best results. Progeny mainly resembled the *Gladiolus* parent and nearly all had some fragrance, though again less than the hybrid. The *Gladiolus* parent seemed to influence this factor with some enhancing it and others depressing it.

F3 – named 'Lucky Star'
(B66 x *Gladiolus callianthus* var. *murielae*)

So I had proved that F3 would pass some scent to its seedlings in crosses with non fragrant gladiolus cultivars, but usually less than it had itself. Because of its genetic makeup, it could contribute only one set of gladiolus cultivar chromosomes and one set of *G. murielae* chromosomes to each ovule, literally halving the scent producing genes each seedling would receive. As mentioned above some gladiolus cultivars seemed to enhance the *G. murielae* fragrance, but the small numbers of seedlings I was raising from each cross was probably not exploiting all the possibilities for the progeny to show the best combination of both good form and fragrance. Breeding much larger "families" seemed a possible solution. But other work responsibilities meant there was no time to do the extra work. There was also a serious shortage of animal-proof areas in which to grow them. Some potentially good material had already been lost in this way. Rather than run the risk of losing any more, it was decided that corms of F3 should be distributed to other enthusiastic hybridists to experiment with as they saw fit.

In 1966, Dr Rattenbury and I presented a joint paper detailing its development at a Genetics Society meeting at Massey University. We also wrote articles about 'Lucky Star', as it had been officially named, for the North American Gladiolus Council Bulletin, and the British Gladiolus Society Annual. Eventually several overseas and commercial hybridists obtained corms. Most reported they liked 'Lucky Star' when it flowered for them and were hopeful it would be the bridge over which *G. murielae* would pass its scent to non fragrant gladiolus cultivars. Mr Clark, in England, produced a nice specimen by crossing 'Lucky Star' with 'Acacia' which was one of the best softly scented American gladioli.

Actually I had attained my original goal of breeding a summer flowering gladiolus with fair scent when F3 appeared on the scene. Though it seemed advisable to release it to other hybridists before I had produced a "world-beater" with lovely florets and fragrance, I still thought of ways to increase the scent that F3 progeny would inherit. Because of the unique behaviour of gladiolus species hybrids at meiosis, making another triploid by crossing F3 with *G. murielae* seemed a possibly successful first step. Such plants would have one set of gladiolus chromosomes and one set of *G. murielae* chromosomes from F3, and one set of *G. murielae* from *murielae* itself.

A few years later I had moved to a new home with a larger area of animal-proof garden. I still had a few plants of F3 and *G. murielae* and couldn't resist trying to produce such a triploid. The few plants duly raised strongly resembled *G. murielae* and had almost as much scent, but they seemed sterile and were not pretty enough to be kept for decorative purposes.

Then I tried using *G. murielae* as the seed parent (never before successful as such) and a strongly growing self pollinated seedling from F3 as pollen parent. Surprisingly a few seed were obtained. Four of these grew but only one survived to bloom in the third season of growth. From a very large corm, N99 was a taller plant than either parent. It had rather untidy florets which sometimes lacked the throat blotches, and the fragrance was nearly as good as that of *G. murielae*. A chromosome count revealed it was a tetraploid (4n=60) and not the triploid expected. It would only cross with

B66 – *Gladiolus* 'Filigree' pollinated by *Gladiolus callianthus* var.

gladiolus that had *G. murielae* one or more generations back in their pedigree. Few seeds were obtained from each cross and the progeny all had slightly better fragrance than those F3 had produced, but not remarkably so. Then two seedlings appeared that had fragrance just as strong as in N99. The pollen parent had been a faintly fragrant good type of flower. These two new plants – one light pink and the other medium pink – were quite attractive and seemed

worth multiplying. The medium pink, numbered V121, was the better propagator so was the one selected to increase with the aim of commercial release.

I had marketed 'Lucky Star' myself but the newer regulations regarding the obtaining of permits to export (and import) dormant corms seemed more involved than before, so the stock of V121 was sold to a commercial bulb grower in Palmerston North. His plan to sell it to American firms was not realised and it has not been widely distributed in New Zealand.

Because he had exclusive rights over V121, I did not try to publicise it myself. The New Zealand Gladiolus Council Bulletin gave it brief and favourable mention and reported it as the winner of a class at a Christchurch flower show. Though the Palmerston North Bulb Farm has cancelled its exclusive control over 'Diana', as they named it, ill health has prevented me from taking advantage of this by way of writing articles for gardening magazines here and overseas – until now, just 50 years since my project began! Gladiolus fans of novelty types will find 'Diana' good in the garden and very suitable for flower arrangements. It needs similar treatment in every way to that required by any other gladiolus.

V121 'Diana' (N99 x 'Rose Shape')

B66 – *Gladiolus* 'Filigree' x *Gladiolus callianthus* var. *murielae*

N99

Seed Collecting in Africa

Rachel Saunders

ALL PHOTOS BY THE AUTHOR

"What a wonderful job and what a wonderful life" is the reaction of most people when we tell them what we do. And yes, sometimes it is, but, like all jobs, sometimes it isn't! Our job takes us all over Southern Africa from the southern most tip near Cape Town, to the north of Zambia, about 4000km away; from the Atlantic Ocean in the west of Namibia to the Indian Ocean in the east. We see deserts, grasslands and lush forests; rain, snow and boiling heat; mountains and rolling plains. We also see environmental destruction on a massive scale, varying from pine and eucalyptus plantations to urban sprawl, golf estates, mining operations and agriculture such as wheatlands and vineyards.

To put it in a nutshell, what our job involves is travelling through the country collecting seeds from as many species as possible on the way. We travel in a 4 wheel drive pick-up Landcruiser, and we walk as much as we can. We have a small fridge in our car to keep the beers cold, and at night we sleep in a roof-top tent which keeps us away from the dust and dirt and animals on the ground. We collect seeds in friend's gardens, on road verges, on farms and in forests, on the sea-shore and high in the mountains. And obviously, during our travels, we have many experiences – some wonderful, and some not so wonderful!

Firstly, the weather. Living in a tent, walking in the mountains and collecting seeds, we are 100% exposed to whatever weather conditions the gods throw at us. We have had several not to be recommended experiences in the mountains while walking, most of them involving rain and snow. Once in the Drakensberg we spent the night in a cave high in the mountains close to the Lesotho border. In the morning we set off in beautiful clear weather with the sun shining warmly down and a gentle breeze. As we walked into Lesotho over the collapsed border fence, for some reason I tied a small piece of plastic to the fence above the cave. We walked all morning

Walking in Northern Namibia – could also be Tough Job!

collecting seeds and had lunch near a clear and lovely stream. Early in the afternoon we noticed some small clouds, which rapidly grew into bigger clouds and half an hour later we were enveloped in thick mist. By then we had walked several kilometers, and we suddenly realized that we had to find one small cave in a large white landscape! We kept our heads, turned in the direction that we thought we should be going and tried to walk in as straight a line as possible towards the escarpment. After 45 minutes or so, we hit the border fence, so our straight line was pretty good! Keeping the fence on our left, we walked up hills and down valleys until we finally saw our little piece of plastic, waving in the breeze! With great relief we climbed over the fence, found the cave and had a hot cup of tea! The next morning we woke up to thick snow on all the surrounding high peaks – a beautiful sight.

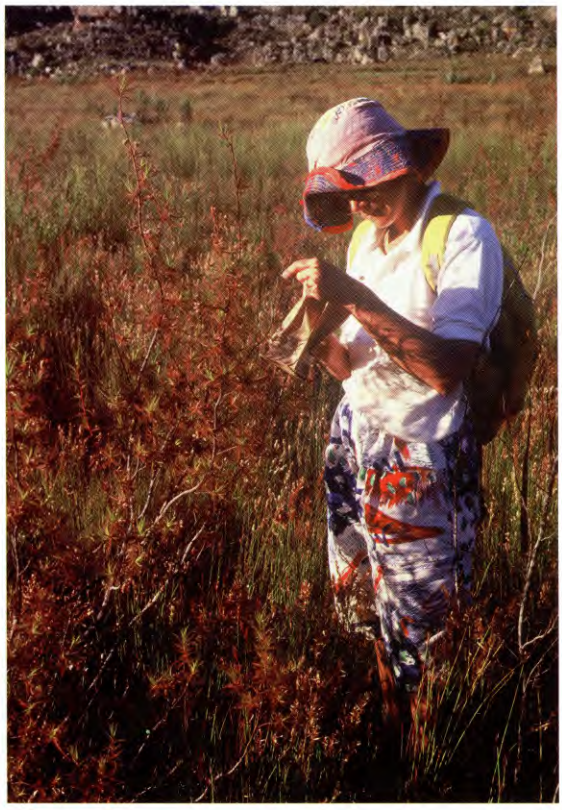
On another occasion we were walking in the Chimanimani Mountains in eastern Zimbabwe in winter, the dry season. During the night, to our surprise, we heard the sound of rain on our tent. By morning, our tent was floating and our flat plain had turned into a shallow lake! We packed up in the rain and decided to head for our car which was parked at the base of the mountain, a day's walk away. We were unfortunately on the wrong side of a major river which drains the mountains, and we soon found that we couldn't cross the river which was now in flood. Our only option was to stay on our side of the river and to walk to a large and comfortable cave that we knew of 2 or 3 hours away. So off we went, but our memories of the route were not too accurate and we had forgotten that we had to cross 3 side rivers, which of course were also in flood! With our packs on our heads and clutching onto half submerged trees, we managed to get across them and by lunch time we reached the cave. By then our clothes were soaked but our warm sleeping bags were dry, so we had lunch huddled in our bags at the back of the cave, watching the rain pouring down. Later in the afternoon the rain stopped and a rather watery sun emerged from the clouds. "By morning the river should be down and we will be able to cross easily" said Rod, so we spent the afternoon collecting wet seed into paper bags. However, as the sun set, the clouds rolled back in and as we ate our rather meager supper, down poured the rain again! By morning we felt desperate – our food was running out, the rain was still bucketing down, and a brief excursion to our little nearby stream showed us a raging torrent! Clearly the main river would still be uncrossable. Finally by lunch time the rain stopped and in the late afternoon we decided to pack up and

Packing the car!

walk as far as we could on our side of the river, and then try to cross. So off we went. Shortly before darkness fell we found a spot where the river narrowed with a large rock on our side. Rod threw his rucksack across the river and then leapt after it, thankfully getting across. After throwing my pack towards Rod, I jumped and was hauled across by my ski pole walking stick, landing with one foot in the river. I burst into tears with relief, and after sorting ourselves out, we walked until we found a level spot where we put up the tent and ate our last slice of bread for dinner!

Normally however, we curse the heat far more than the cold and rain, and we more often collapse exhausted and hot into cold mountain pools to seek relief. Often while driving through the Karoo or Namaqualand, we look for farm dams or reservoirs, and leap in, sometimes clothes and all to cool off.

Obviously the weather also has a huge effect on the seeds that we are collecting. If it has been too dry, we frequently find no seed at all – the flowers simply fade away, setting no seed. If it is too cold and wet, the same may occur as most pollinators need temperatures of at least 16 C to fly. Cold weather also affects the time seeds take to ripen – most Irid seeds normally ripen in 6 weeks, but cold weather



Collecting *Roridula (carnivorous plant) seeds*

Rachel and her Ostrich

can retard this to as long as 8 weeks. Similarly hot dry weather can shorten ripening to 5 or even 4 weeks. This results in our most frequent lament "green or gone!" Particularly annoying when one has traveled 1000km to collect some special seed, to find one missed it by a week! If we find slightly green seed, it can often be ripened in jars of water which are precariously arranged in the back of our vehicle, but there is nothing that can be done about "gone" seed.

Secondly, the actual process of seed collecting can also be "hazardous". Like the day we were collecting seed of *Rhus pendulina*, a large tree frequently used as a street tree in low rainfall towns. We collected the seed into an upturned umbrella which is efficient and very quick, and transferred it into a paper bag. We then went into the local shop to buy some lunch, and drove on our way. About 10km further on, Rod suddenly shrieked "There's something in my beard. STOP!!" I hurriedly stopped, peered into his beard, and burst out laughing – it was a baby chameleon! It had obviously fallen out of the tree into his beard while we were collecting the Rhus seeds. We wondered how many people in the shop had noticed, but its camouflage was perfect!

Another amusing encounter with chameleons was on a cold winter's day in Johannesburg. We were collecting *Combretum* seeds – these seeds hang in clusters and are easy to collect in great handfuls. As I grabbed a bundle of seeds, I felt a cold and almost clammy thing in my hand, and dropped it with a scream. We dug around in the seeds to see what it was and found a tiny chameleon in hibernation in the middle of the seed cluster! Rod make some remark about feeble hysterical women, but a minute or two later he also let out a scream – he had found one too!

Another day was potentially more disastrous. Rod went wandering off while I packed up the lunch, and suddenly he came running back, waving his arms and shouting "Get into the car" – so I did! He opened the door and leapt in, together with a large number of bees, buzzing angrily around his head. He had unfortunately chosen to have a pee on top of a bee nest, in the ground under some grass! They had taken exception to this, and had come out fighting! African bees have a well deserved reputation for being fierce, and fierce they were. Rod drove off rapidly and opened all the windows trying to shoo the bees out. He got stung about 10 times, but I am allergic to bee stings, so my efforts at bee removal were frantic! We stopped a short distance down the road to clear the car of the last stragglers and I realized that I had a bee under my shirt. Without

thinking I desperately tore my shirt off, to the amazement of all the motorists on the busy highway, but I didn't get stung!

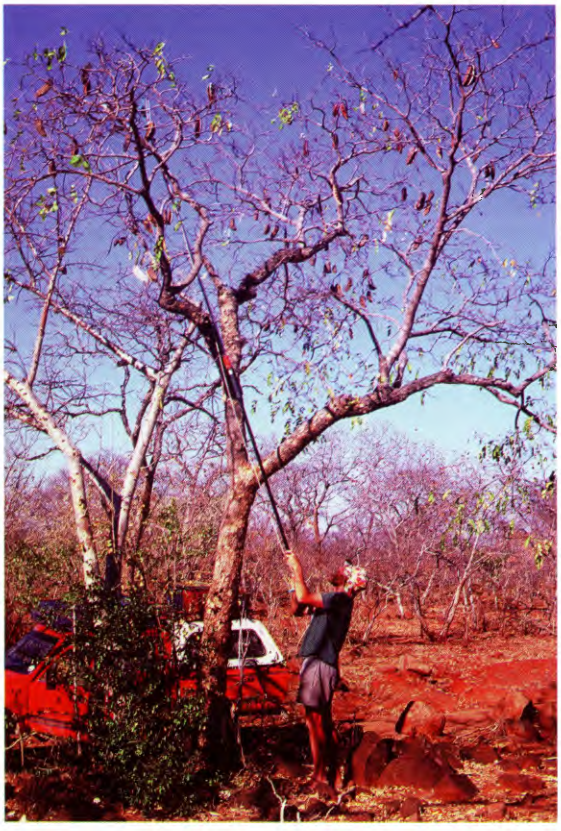
Travelling as we do in some very out-of-the-way places, we often encounter wild life of varying sorts. One day in Namibia we were lucky to see a herd of gemsbok, 2 jackals and a pair of honey badgers early one morning in the middle of the Namib Desert. In the Drakensberg we were woken up one night by noises around our tent, and we realized that something was eating our ripening seeds propped up in their jars of water. We leapt up shouting and whatever it was ran off. We went back to sleep muttering about "damn donkeys, the scourge of Africa". Next morning we peered out of the tent to find a herd of Eland, looking longingly at our *Agapanthus* and *Galtonia* seed spikes which were now safely out of reach. Not donkeys at all!

And of course we quite often see snakes – sometimes pythons or mambas that reach right across the road, but more often fat lazy puff adders which are very poisonous snakes that often bite when walked on. They love the warmth of the road, and because most people run over them deliberately if they see them, we always stop to move them from danger. We carry a long handled pole pruner with us, and it is very useful for prodding snakes out of the road!

Probably our funniest encounter with wild life was the day we met an ostrich! We were walking in a nature reserve in Swaziland and suddenly noticed that we were being followed by an ostrich. It was right behind us, and each time we stopped to look at a plant, it stopped too, and scratched around in the soil, looking for insects to eat. We walked about 6 or 7 km, with our ostrich accompanying us all the way. We came round a corner and almost fell over a litter of warthog babies which seemed to have lost their mum. They ran towards us, squealing madly, and we nearly had a fit – warthog mothers are extremely fierce and charge without hesitating, and we didn't really want to meet mum! We turned round and fled, and our ostrich fled with us – she obviously didn't want to meet mum either! All 3 of us walked back to the camp site for supper – a barbecue for us and bread for the ostrich.

We do quite often have problems with donkeys, cattle and sheep, particularly with bulb seeds. Normally each year we try to visit an area in flower, and then we go back 5 to 7 weeks later for seed. And frequently during our absence, the farmer puts his stock into the field, and that's the end of our seeds. Particularly *Gladiolus* spikes and almost always, it is a rare *Gladiolus* that grows a long way from home!

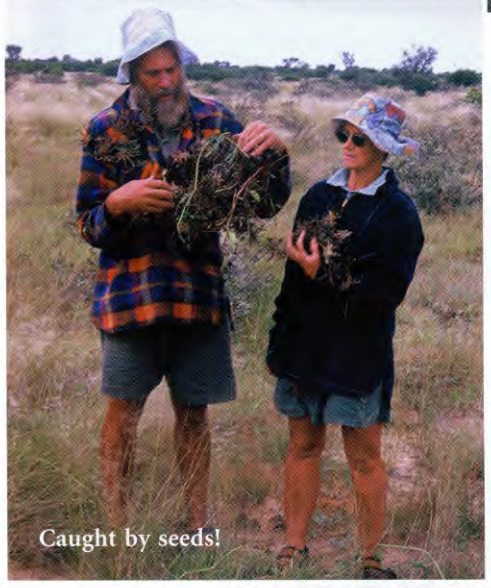
Grass seed collection in Zimbabwe



Rod collecting tree seeds using a pole pruner

Camp site in *Brachystegia* woodland in Zambia

Camp site on the Kafu River in Zambia



Caught by seeds!

Another strange problem we have had was with mice. Quite a few of the seeds that we collect are expelled from their seed capsules by an explosive or extrusion mechanism. Explosive capsules include the Rutaceae such as *Agathosma* and *Coleonema*, and those that are pushed out or simply fall out include Proteaceae such as *Paranomus* and *Serruria*, and Irids such as *Nivenia*. The simplest method of collecting these seeds is to either envelop the entire plant in a net made of net-curtain material, or to cover the flower head with a stocking tied around the base. One hot summer's day we spent a couple of hours at a population of *Serruria* tying stockings onto old flower heads with string. About a month later we returned to the site to see if the seeds had been released yet, and found that they had. So we began removing the stockings, untying them carefully over a paper bag to catch any seeds that fell out. As Rod clutched a stocking prior to untying the string, it wriggled! He jumped backwards in fright and then burst out laughing as a mouse peered out of a hole, whiskers bristling! *Protea* seeds are oily and very nutritious, and a population of lucky mice had

Our tissue culture lab with annual seed production in foreground

Annual seed collection using a vacuum cleaner

discovered our bags full of seeds. Needless to say, we got no *Serruria* seeds that year!

However, despite all the hazards and trials and tribulations, we do have some good days too. Those early spring days in the Cape mountains when the weather is warm but not too hot, the ground is wet from the previous day's rain and the flowers are magnificent. Or summer days in the rolling foothills of the Drakensberg mountains in undisturbed high altitude grasslands. This is the habitat for sheets of kniphofias, hundreds of species of ground orchids, *Agapanthus* and *Eucomis* in the gullies and Lammergeier eagles soaring above. Or if seed collecting becomes too much on wet rainy days or on hot summer days, we can always go wine tasting at one of the wineries in the SW Cape, or head for the beach! Then we agree with all those people who think we have a wonderful life!

Kniphofia baurii

Moraea falcifolia

Hesperantha luticola

Gladiolus kamiesbergensis

Lapeirousia oreogena

Gladiolus serpenticola

Gladiolus carmineus

Ixia versicolor

Nerine platypetala

Ornithogalum multifolium

Moraea tulbaghensis

Hessea breviflora

Lapeirousia silenoides

Lachenalia pustulata

Babiana villosa

A Synopsis of the Biosystematic Study of the Seven Minor Genera of the Hyacinthaceae

Alison Summerfield

The family Hyacinthaceae is characterized by geophytes of which the underground part is a bulb, the inflorescence a simple raceme, the perianth segments free or united at the base and the fruit a capsule. It includes, amongst others, the following South African genera: *Amphisiphon, Androsiphon, Daubenya, Massonia, Neobakeria, Polyxena* and *Whiteheadia.*

The taxonomic history of the minor genera of the Hyacinthaceae largely reflects the significance that has been placed on morphological differences among the Hyacinthaceae in the past. Particular value has been placed on floral differences, resulting in the description of several monotypic genera for newly discovered species that were more or less distinctive in their flowers. Great significance was also attached to differences in leaf morphology, resulting in several new species of *Massonia*, which are now placed mostly in synonymy under *Massonia depressa* or *Massonia echinata*. Within the Hyacinthaceae, the taxonomic position of the genus *Neobakeria* has always been problematic as it has been recognized by some authors and completely ignored by others.

With the advancement in science and technology more tools become available for unraveling taxonomic relationships. One of the latest tools, the DNA analysis, was used in this study and provided a useful phylogenetic analysis of the minor genera of the Hyacinthaceae. The main phylogenetic analysis revealed three distinct lineages i.e. *Massonia, Polyxena* and *Daubenya* with *Whiteheadia bifolia* remaining on a branch of its own outside of the *Massonia* clade.

The species within the *Massonia* clade are *Massonia depressa*, *Massonia echinata*, *Massonia*

PHOTO BY BILL DIJK

Daubenya zeyheri

grandiflora, *Massonia jasminiflora*, *Massonia hirsuta*, *Massonia sessiliflora* and *Neobakeria heterandra*. The DNA data indicates that *Neobakeria heterandra* should be transferred to the genus *Massonia*. Morphological evidence also supports this as both the flowers, with the characteristic sigmoid curve in the perianth and the paired, ovate to suborbicular leaves of *Neobakeria heterandra* are very similar to that of the other *Massonia* species. Müller-Doblies and Müller-Doblies (1997) stated that the correct name for *Neobakeria heterandra* should be *Massonia pygmaea* Schlechtendal ex Kunth and although they based their research purely on the study of herbarium specimens, with no contribution of DNA data, they were correct in the assignment of the name *Massonia pygmaea*.

Polyxena

PHOTO BY BILL DIJK

Daubenya alba

Massonia grandiflora differs from *Massonia depressa* only in the size of the flowers and leaves, which are slightly larger in *M. grandiflora*. *Massonia grandiflora* has, however, often been considered deserving of its species rank by previous authors. DNA data shows the

Massonia depressa

PHOTO BY BILL DIJK

PHOTOS BY BILL DIJK

genetic sequence of *M. grandiflora* to be identical to that of *M. depressa*, thus indicating that it should be reduced to the synonymy of *M. depressa.*

Jessop (1976) considered *Massonia hirsuta* to be a synonym of *Massonia echinata,* but Müller-Doblies and Müller-Doblies (1997) resuscitated it to species level, with which I agree. *M. hirsuta* shows sufficient morphological variation, especially with regard to the leaf morphology and the hairy bracts (which are not found in any other species) to deserve its species status.

Polyxena paucifolia

The *Polyxena* clade includes the species: *Polyxena brevifolia*, *Polyxena corymbosa*, *Polyxena longituba*, *Polyxena maughanii*, *Polyxena paucifolia*, *Polyxena pygmaea* and *Lachenalia pusilla*. The latter was included in the DNA study because of the differences in morphology exhibited between it and other *Lachenalia* species, as well as the similarities it showed to species in the genus *Polyxena*. The DNA results showed a close relationship between the genus *Lachenalia* and *Polyxena.*

Polyxena brevifolia (Ker-Gawl.) A.M. van der Merwe is the correct name of the '*Polyxena corymbosa*' specimens from Gordon's Bay. Jessop (1976) considered *Scilla brevifolia* Ker-Gawl. to be a synonym of *Polyxena corymbosa*, but according to the original description *Polyxena corymbosa* has a corymbose inflorescence whereas *Polyxena brevifolia* has a racemose one. Sequence data supports the morphological differences between the two species and justifies the species status of *Polyxena brevifolia.*

There appears to be a very close relationship between *Polyxena maughanii* and *Polyxena ensifolia.* Morphologically the two species differ only in the length of their stamens, which in *Polyxena maughanii* are included in the perianth tube with the three longest ones just reaching to the mouth of the tube, while in *Polyxena ensifolia* the three longest stamens are exserted beyond the tube. Both species share the same general distribution area, but *Polyxena maughanii* is restricted to limestone outcrops within this area. These two taxa should be lumped into a single species with separate varieties *Polyxena ensifolia* var. *ensifolia* and *Polyxena ensifolia* var. *maughanii,* providing for the minor difference in stamen length and the preference of *Polyxena maughanii* for limestone substrates.

Polyxena longituba, although also very closely

Daubenya daurea

related to *Polyxena ensifolia,* reveals sufficient morphological variation both in flower shape and size and leaf shape to retain its specific rank. *Polyxena pygmaea* shows sufficient variation, both in the DNA data set and morphological characters to retain its species status. *Polyxena paucifolia* and *Polyxena corymbosa* are very closely related, but they differ in flower morphology as well as in the number of leaves per species, with *Polyxena paucifolia* only having two leaves per plant, whereas *Polyxena corymbosa* has four to six. The pink flowers of *Polyxena corymbosa* are characterised by a short perianth tube, which is only about one third of the length of the perianth segments, while in *Polyxena paucifolia* the flowers are dark lilac to purple with a perianth tube that is equal in length to the perianth segments.

The *Daubenya* clade includes all the monotypic genera (except for *Whiteheadia bifolia)*, as well as *Neobakeria comata*, *Neobakeria namaquensis* and *Neobakeria angustifolia*. Two collections of *Neobakeria angustifolia* were made, one from Sutherland and one from Saldanha. These two specimens differ remarkably with regard to both inflorescence type and floral morphology. The flowers of the *Neobakeria angustifolia* specimen from Sutherland are yellow and firm textured, with yellow or orange stamens, while those of the specimen from Saldanha are white with a papery texture and purple stamens. In the Saldanha specimens the perianth tube is also much narrower than that of the Sutherland specimen. DNA analysis also reveals two different genetic sequences, confirming the morphological differences and justifying splitting the species into two. It has since been determined that the respective names of the species should be *Massonia marginata* Willd. ex Kunth (Manning & Van der Merwe in press) for the Sutherland specimen and *Massonia zeyheri* Kunth (Muller-Doblies & Muller-Doblies 1997) for the Saldanha specimen. DNA data shows that *Amphisphon* shares a close relationship with *Massonia zeyheri* and *Massonia marginata,* but there are sufficient morphological differences to retain separate species status. DNA data also shows that *Daubenya aurea* is closely related to *Amphisiphon stylosa, Massonia marginata* and *Massonia zeyheri*. Although *Androsiphon capense* and *Daubenya alba* appear to be closely related,

Daubenya capensis

Daubenya marginata

they differ morphologically in that the flowers of *Daubenya alba* are white to pale lilac, whereas those of *Androsiphon capense* are bright yellow to orange. Another significant difference is the disc present on the top of the staminal tube in *Androsiphon capense,* that is lacking in *Daubenya alba*. DNA data clearly shows that the species in the *Daubenya* clade (*Daubenya alba*, *Daubenya aurea, Amphisiphon stylosa, Androsiphon capense*, *Massonia marginata, Massonia zeyheri, Neobakeria comata* and *Neobakeria namaquensis*) should be placed together in a single genus. As *Daubenya* is

Daubenya stylosa

Daubenya comata

the oldest genus within the group, the other species will all be transferred to *Daubenya* and will be known as *Daubenya alba*, *Daubenya aurea*, *Daubenya stylosa*, *Daubenya capensis*, *Daubenya marginata*, *Daubenya zeyheri*, *Daubenya comata* and *Daubenya namaquensis*.

Whiteheadia bifolia is the only species that retains its monotypic status, and the DNA analysis supports the unique morphology of the species as it appears on a branch of its own on the outside of the *Massonia* clade

In the past most taxonomic classifications have been based solely on morphological differences or similarities, and although some of these classifications are still viewed as valid, many others have been proven incorrect as new data has become available. Morphological characters are the easiest to use when classifying taxa, as they are the most obvious to the eye. However, it is sometimes difficult to exercise objectivity when viewing them, as very often there are superficial resemblances between plants that support the pre-conceived ideas we have as to the relationships between them. The most reliable and realistic phylogeny can only be produced through the combination of all known data on the taxa, including morphological, anatomical, palynological and molecular information. In this thesis phylogenetic characters were used to bring clarity to the morphological characters and the morphological characters were used to test the phylogenetic tree.

Daubenya namaquensis

Polyxena corymbosa

Polyxena brevifolia

Daubenya zeyheri

Massonia depressa

Massonia echinata

Massonia pygmaea

Massonia pustulata

Massonia jasminiflora

Key to the species of *Daubenya*

Filaments united into a narrow, cylindrical tube 9-20 mm long

Flowers slightly zygomorphic; white to lilac-tinged ..... ***D. alba***

Flowers actinomorphic; yellow to orange

Tepals prominent, 11-15mm long, spreading from base of staminal tube; disc present on top of staminal tube; styles non-persistent on capsules ..... ***D. capensis***

Tepals reduced, up to 2mm long, minute at top of perianth tube; staminal disc absent; styles persistent on capsules ..... ***D. stylosa***

Filaments free or united into a short, wide tube ca. 3 mm long

Lower flowers of inflorescence strongly zygomorphic with three large tepals and three smaller ones, differing greatly from upper flowers; coma of bracts absent ..... ***D aurea***

Lower flowers of inflorescence slightly zygomorphic or actinomorphic; lower and upper flowers subsimilar or the same; coma of bracts present

Perianth tube of lower flowers 25-45 mm long; tepals recurved; filaments all free ..... ***D. comata***

Perianth tube of lower flowers 10-25 mm long; tepals suberect or spreading; filaments all or partially united into a tube

Flowers bilabiate, tepals equally fused, linear; flowers scented ..... ***D. namaquensis***

Flowers not bilabiate, tepals not equally fused, ovate to lanceolate; flowers unscented Inflorescence conical, protruding well above leaves; tepals yellow to orange, somewhat fleshy; stamens yellow to red; conspicuous coma of orange or yellow bracts ..... ***D. marginata***

Inflorescence capitate, hardly protruding above leaves; tepals white, papery; stamens red with purple base; inconspicuous coma of small green bracts ..... ***D. zeyheri***

Geographical Distribution and Ecology

Daubenya alba occurs in scattered colonies along the edge of the Roggeveld escarpment, between Calvinia and Middelpos. The species grows in heavy doleritic clay, as do most of the other *Daubenya* species. Plants appear to be restricted to the lower-lying drainage areas. The flowers are strongly scented during the day and night. Flowering time is from May to June.

Daubenya aurea is known only from a few localities between Sutherland and Middelpos on the Roggeveld escarpment. The plants occur in abundance in colonies, in low-lying areas in heavy doleritic clay. *D. aurea* shares this habitat with *D. marginata* (Willd. ex Kunth) J.C. Manning & A.M. van der Merwe, although the two species do not flower at the same time. The flowering time of *D. marginata* stretches from May to June and that of *D. aurea* from August to September. *D. aurea* occurs in two colour forms, the more abundant brilliant red form and the less common canary yellow form. Occasionally a dull orange form has also been observed. The two colour forms seem to differ slightly in flowering time, with the yellow form coming into flower a few weeks before the red one and the fruits also taking longer to reach maturity, remaining green long after the fruits of the red form have dehisced.

D. capensis is endemic to the Nieuwoudtville area, where it occurs in abundance in several populations around the village. It shares this habitat with *D. stylosa*, although it flowers much later than the latter. It is restricted to the red clay soil of the seasonally moist doleritic flats. Flowering time is June to July and the flowers emit a rather unpleasant, yeasty smell.

Of all the *Daubenya* species, *D. comata* is the most widespread, occurring from Beaufort West in the Northern part of the Western Cape to De Aar and Colesberg in the Northern Cape, through the Free State as far north as Bloemhof in the North-West Province. Plants grow in colonies in red, doleritic clay that is seasonally waterlogged. This species receives late summer rains, as is also the case with *D. namaquensis*. The rest of the *Daubenya* species fall mostly within the winter rainfall region. *D. comata* flowers from the middle of April to the middle of May and the flowers are strongly scented.

Daubenya marginata is widespread across the Roggeveld Escarpment and the western Karoo. It occurs from near Calvinia to Sutherland and eastwards along the Nuweveld scarp and inland near Fraserburg and Loxton. There are also a few isolated populations on the Knersvlakte, north of Vanrhynsdorp. In the Sutherland area plants occur together with *D. aurea* in red doleritic clays in seasonally moist depressions. In other areas they are more often found in silt or gritty clay. Flowering time is May to July, but sometimes extends into August.

Daubenya namaquensis is known only from a few collections from the semi-arid flats east of O'okiep and Springbok. This area lies on the extreme western edge of Bushmanland and is on the boundary between winter and summer-rainfall regions. *D. namaquensis* occurs in small colonies in lower-lying drainage areas in deep red sands. The bulbs are extremely deeply buried enabling the plants to make full use of any soil moisture. Flowering time is from the middle of May to the middle of June and flowers are strongly scented.

Daubenya stylosa is a highly local endemic and like *D. capensis* occurs only around Nieuwoudtville. It is known from a few populations in the immediate vicinity of the town, the Wildflower Reserve and the Farm Glenlyon. Plants are abundant in these populations and grow in the red doleritic clays so typical of this genus. Flowering time is May.

Daubenya zeyheri is restricted to the west coast area of the Western Cape. It is known from two populations, one at Paternoster and the other at Saldanha. The plants grow in dense clusters on sandy calcareous soils that are overlying limestone, unlike all the other *Daubenya* species which grow on doleritic clay. Flowering time is from the end of May until the beginning of July and flowers are unscented. Nectar is often visible in the ring of the staminal collar.

Key to the species of *Polyxena*

Leaves narrow, linear and canaliculate, 2–6 per plant

Inflorescence distinctly corymbose ..... ***P. corymbosa***

Inflorescence subcorymbose or racemose

Perianth tube very short, ¼ of the length of the perianth segments, inflorescence distinctly racemose, flowers campanulate ..... ***P. brevifolia***

Perianth tube equal in length to perianth segments or longer, inflorescence subcorymbose, flowers funnel-shaped

Perianth tube equal in length to perianth segments, stamens included in perianth tube, leaves always 2 ..... ***P. paucifolia***

Perianth tube at least double the length of the perianth segments, stamens exserted above recurved perianth segments, leaves 2 or 3 ..... ***P. longituba***

Leaves lanceolate or ovate, obtuse, 2 per plant

Perianth tube 3x the length of the perianth segments, perianth segments strongly recurved ..... ***P. pygmaea***

Perianth tube up to double the length of the perianth segments, perianth segments erect to spreading

Stamens included in throat of the perianth tube ..... ***P. ensifolia var. maughanii***

Stamens exserted beyond the throat of the tube ..... ***P. ensifolia var. ensifolia***

Geographical Distribution and Ecology

P. brevifolia is restricted to the Western Cape Province and occurs in scattered populations from Harmony flats between Gordon's Bay and Strand, to Stellenbosch, Paarl, Tulbagh and Ceres and as far north as the Clanwilliam area. The plants grow in low-lying drainage areas in sandy or clayey soil. Flowering time is April to June and flowers are pleasantly scented.

P. corymbosa is restricted to the Cape Peninsula and was originally collected on Lion's Head. The species occurs in isolated patches around Greenpoint, Bantry Bay and Camps Bay. Plants grow in sandy soil or

sometimes in gravely soils and rock crevices. Flowering time is from April to June and flowers are pleasantly scented.

Polyxena ensifolia var. *ensifolia* is widely distributed and occurs mostly on clay or granite flats from Namaqualand through the Western Karoo, and as far east as Bathhurst. Flowering time is from April to June and flowers are strongly scented.

P. ensifolia var. *maughanii* has a very limited distribution in the Western Karoo and Bokkeveld mountains. This variety shares its distribution area with *P. ensifolia* var. *ensifolia,* but is always restricted to dolerite outcrops. Flowering time is from May to June and flowers are pleasantly scented.

P. longituba occurs abundantly, but localised, in the Komsberg area in the Northern Cape, growing in damp lower-lying areas. Two separate populations are known, with one population having flowers that are off-white to pale pink and the other with more robust lilac flowers. Flowering time is from late April to May and the flowers emit a sweet, yeasty smell and they close at night. Flowers appear to be self-pollinated and the peduncles elongate during seed ripening.

P. paucifolia is restricted to the coastal granite and limestone outcrops of the Paternoster and Langebaan areas in the Western Cape Province. The plants grow in quite densely populated colonies scattered in this area. Flowering time is from April to June.

Polyxena pygmaea is known from two areas that are relatively isolated from each other, occurring in the Riversdale area and also in Namaqualand. The species grows on sandy flats, or sometimes in rocky localities on calcareous outcrops. Flowering time is from May to June and the flowers are highly scented.

Key to the Species of *Massonia*

Flowers robust and fleshy, perianth tube cup-shaped, 6-10mm in diameter ..... ***M. depressa***

Flowers delicate and membranous, perianth tube narrow, up to 5mm in diameter

- Outermost bracts hairy, coma of green bracts present in centre of inflorescence ..... ***M. hirsuta***
- Outermost bracts glabrous, coma of green bracts absent from centre of inflorescence
  - Stamens biseriate, of 2 lengths; leaves glabrous or pustulate but then with long hairs ..... ***M. pygmaea***
  - Stamens uniseriate, all of equal length, leaves glabrous, echinate or pustulate, but seldom hairy
    - Filaments long, 17-24mm; style long, 10-30mm; leaves pustulate ..... ***M. pustulata***
    - Filaments short, 2-8mm; style short 5-10mm; leaves glabrous, echinate or minutely pustulate
      - Perianth tube twice the length of the perianth segments, perianth segments sometimes lacking sigmoid curve; filaments 2-4.5mm; restricted to the Eastern and Northern Cape Provinces and Lesotho ..... ***M. jasminiflora***
      - Perianth tube equal in length to perianth segments or slightly longer; perianth segments with sigmoid curve; filaments 5-8mm; widespread in the Western Cape Province ..... ***M. echinata***

Geographical distribution and ecology

Massonia depressa is widespread in the winter rainfall regions of the Western Cape and Namaqualand and also occurs in the Karoo. This species occurs in a wide range of habitats on both sandy flats and rocky slopes, either growing in the shade of other plants or in the open sun. Flowering occurs in July and August. The flowers usually have a yeasty scent and produce large amounts of nectar which accumulates in the cup formed by the short staminal tube. According to Johnson *et al.* (2001), *M. depressa* is pollinated by rodents which visit the plants at night to consume the nectar.

Massonia echinata is widespread in the Western, Northern and Eastern Cape Provinces from Calvinia in the north to Riversdale in the south and as far east as Middelburg in the Eastern Cape. *M. echinata* occurs in open, sandy areas, clay soils or rock crevices, mostly in the full sun. Flowering time is from May to July and flowers are sweetly scented.

Massonia hirsuta has a wide inland and southern coast distribution. It occurs from Mossel Bay in the west

to Port Elizabeth in the east, and as far north as Barkly West in the Kimberley area. It is also known from a few isolated populations in Namaqualand. *Massonia hirsuta* occurs mostly in sandy soil or doleritic clay, growing in the full sun. Flowering time is from May to July.

M. jasminiflora occurs in the summer rainfall area of the Eastern Cape, the Free State and Lesotho, extending to the west near Kimberley in the Northern Cape. *M. jasminiflora* occurs mostly in open grassveld, or sometimes in limestone gravel or calcrete. Flowering time is from May to June and flowers are highly scented.

M. pustulata is quite widespread in the Western Cape Province occurring from Calvinia in the north to Bredasdorp in the south and as far as Port Elizabeth in the east. It usually grows in the open in coastal sand, in dry inland areas and sometimes on clay. Flowering time is from June to September and flowers are sweetly scented.

Massonia pygmaea occurs along the mountain ranges of the Western and Northern Cape Provinces from Villiersdorp in the south, along the Cedarberg mountain range to Leliefontein in the Kamiesberge in the north. It is known to inhabit high altitudes in sand and in rock crevices. Flowering time is from April to May.

Geographical Distribution and Notes on *Whiteheadia*

Whiteheadia bifolia occurs in the western part of the Western Cape Province and Namaqualand and has also been recorded from the extreme south of Namibia. It grows amongst rocks and boulders, usually in pockets of humus-rich soil, in both dry and damp habitats. Flowering time is from June to July and flowers are unscented.

Taxonomic note: Müller-Doblies and Müller-Doblies (1997) described a new species of *Whiteheadia* from Namibia, thus altering the monotypic status of this genus. They have named the species *W. etesionamibensis* U. & D. M-D. According to their description, this species differs from *W. bifolia* with respect to the perianth tube which is much shorter (2–3mm) than that of *W. bifolia* (4–8mm) and the perianth segments which are much longer (in *W. etesionamibensis* 9.5 –14mm and in *W. bifolia* 5–7mm). Unfortunately, although they state that an isotype of this newly described species is housed at the NBG herbarium, the herbarium has not as yet received such a specimen and I have been unable to verify the status of this species.

Table of Species Currently Recognized Together with their Synonyms

SPECIES	SYNONYMS
Genus Daubenya	
D. alba A.M. vd Merwe	-
D. aurea Lindl.	*Daubenya fulva* Lindl. *Daubenya coccinea* Harv. ex Baker *Daubenya aurea* var. *coccinea* (Harv.) Marloth
D. capensis (Schltr.) A.M. vd Merwe & J.C. Manning	*Androsiphon capense* Schltr.
D. comata (Burch. ex Bak.) J.C. Manning & A.M. vd Merwe	*Massonia comata* Burch. ex Baker *Polyxena comata* (Burch. ex Baker) Baker *Neobakeria comata* (Burch. ex Baker) Schltr.
D. marginata (Willd. ex Kunth) J.C. Manning & A.M. vd Merwe	*Massonia marginata* Willd. ex Kunth *Polyxena marginata* (Willd. ex Kunth) Baker *Massonia rugulosa* Lichtenst. ex Kunth *Polyxena rugulosa* (Lichtenst. ex Kunth) Baker *Polyxena haemanthoides* Baker *Neobakeria haemanthoides* (Baker) Schltr. *Massonia angustifolia auct. non M. angustifolia (=M. echinata L.)*
D. namaquensis (Schltr.) A.M. vd Merwe	*Neobakeria namaquensis* Schltr.

D. stylosa (Barker) A.M. vd Merwe & J.C. Manning	*Amphisiphon stylosum* [‘*stylosa*’] Barker
D. zeyheri (Kunth) J.C. Manning & A.M. vd Merwe	*Massonia zeyheri* Kunth *Polyxena zeyheri* (Kunth) Dur. & Schinz *Massonia pedunculata* Baker *Massonia burchellii* Baker *Neobakeria burchellii* (Baker) Schltr. *Massonia angustifolia* auct. non *M. angustifolia* (=*M. echinata* L.)
Genus *Massonia*	
M. depressa Houtt.	*Massonia latifolia* L.f. *Massonia sanguinea* Jacq. *Massonia obovata* Jacq. *Massonia grandiflora* Lindl. *Massonia brachypus* Baker *Massonia triflora* Compton
M. echinata L.f.	*Massonia scabra* Thunb. *Massonia muricata* Ker-Gawl. *M. longifolia* Jacq. var *candida* Burch. ex Ker-Gawl *Massonia huttonii* Baker *Massonia setulosa* Baker *Massonia tenella* Soland. ex Baker *Massonia versicolor* Baker *Massonia calvata* Baker *Massonia latebrosa* Masson ex Baker *Massonia amygdalina* Baker *Massonia parvifolia* Baker *Massonia dregei* Baker *Massonia cocinna* Baker *Massonia candida* Burch. ex Baker *Massonia modesta* Fourc. *Neobakeria visserae* Barnes *Massonia angustifolia* L.f. *Polyxena angustifolia* (L.f.) Baker *Neobakeria angustifolia* (L.f.) Schltr.
M. hirsuta Link & Otto	*Massonia orientalis* Baker *Massonia bolusiae* Barker *Massonia inexpectata* Poelln. *Massonia sessiliflora* (Dinter) U. & D. M-D.
M. jasminiflora Burch. ex Baker	*Massonia bowkeri* Baker *Massonia greenii* Baker
M. pustulata Jacq.	*Massonia schlechtendalii* Baker *Massonia longipes* Baker
M. pygmaea Schlechtendal ex Kunth	*Polyxena bakeri* Dur. & Schinz *Neobakeria heterandra* Isaac *Massonia heterandra* (Isaac) Jessop
Genus *Polyxena*	
P. brevifolia (Ker-Gawl.) A.M. vd Merwe	*Scilla brevifolia* Ker-Gawl. *Dipcadi brevifolium* (Thunb.) Fourc. *Scilla brachyphylla* Roem. et Schultes

	Periboea gawleri Kunth *Hyacinthus gawleri* (Kunth) Baker
P. corymbosa (L.) Jessop	*Hyacinthus corymbosus* L. *Massonia corymbosa* (L.) Ker-Gawl. *Scilla corymbosa* (L.) Ker-Gawl. *Periboea corymbosa* (L.) Kunth
P. ensifolia (Thunb) Schönl. var. *ensifolia*	*Polyxena ensifolia* (Thunb) Schönl. *Mauhlia ensifolia* Thunb. *Agapanthus ensifolius* (Thunb.) Willd. *Massonia ensifolia* (Thunb.) Ker-Gawl. *Massonia odorata* Hook.f. *Polyxena odorata* (Hook.f.) Baker *Massonia uniflora* Sol. ex Baker *Polyxena uniflora* (Sol. ex Baker) Dur. & Schinz *Polyxena calcioli* U. & d. M-D.
P. ensifolia var. *maughanii* (Barker) A.M. vd Merwe	*Polyxena maughanii* Barker
P. longituba A.M. vd Merwe	-
P. paucifolia (Barker) A.M. vd Merwe & J.C. Manning	*Hyacinthus paucifolius* Barker *Periboea paucifolia* (Barker) U. & D. M-D. *Periboea oliveri* U. & D. M-D.
P. pygmaea (Jacq.) Kunth	*Polyanthes pygmaea* Jacq. *Hyacinthus bifolius* Boutelou ex Cav. *Massonia violacea* Andr.
Genus *Whiteheadia*	
W. bifolia (Jacq.) Baker	*Eucomis bifolia* Jacq. *Basilea bifolia* (Jacq.) Poir. *Melanthium massoniaefolium* Andr. *Whiteheadia latifolia* Harv.

I am a single mom with 3 children – Joshua (8) and twin girls Jessica and Danielle (5). I studied a BSc at Stellenbosch University with the idea of becoming a Biology teacher, but Botany caught my interest so I did my Honours and MSc in Botany. After I got my MSc I worked in the Botany department for a while before registering for my PhD. I got my PhD in 2002 and then worked as a part-time lecturer in the Botany department at Stellenbosch University. At the moment I am studying at UNISA (University of South Africa) to get my teaching diploma so that sometime in the future I will be able to teach Biology at school level. I have an avid interest in plants, especially the fynbos and geophytes and love to go camping. I enjoy wakeboarding and water skiing and look forward to playing hockey again once my studies are over.

– All photos by the author except where noted –

Creating the Right Environment and Conditions for Cultivation

By Gordon Summerfield

It is never my intention to tell people how to grow South African winter rainfall bulbs and corms, but rather to share my experience of growing them over the past 15 years or so.

The illustrated Oxford dictionary defines;

ENVIRONMENT: as – surroundings, region, conditions or influences and

CONDITIONS: as – circumstances, especially those essential to a 'things' existence.

With this in mind, I have adopted, over the last couple of years, a very simple common-sense approach to growing bulbs and corms.

My main interests are the winter rainfall geophytes of the Western Cape, Northern Cape, Namaqualand and to a lesser degree the Southern and Eastern Cape, and currently I have approximately 950 species under cultivation.

Until recent times little was written, documented and published on the active cultivation of our indigenous geophytes. Fortunately the Kirstenbosch Gardening series by Graham Duncan and the very recent "Color encyclopedia of Cape Bulbs' by Manning, Goldblatt and Snijman have helped to remove much of the previous 'myth' that these bulbs and corms were difficult, if not impossible to grow.

There are certain genera and species that do prove more difficult to grow, such as *Gladiolus bullatus*, *G. cardinalis* and *G. nerinoides* – however, by creating the right environment and conditions (similar to their natural habitat) it is possible to cultivate them, and others, successfully. In the "Color encyclopedia of Cape Bulbs" the authors state 'Most bulbs (and Cape bulbs are no exception) respond best in cultivation if their natural growth requirements are duplicated as closely as possible".

Provided one uses a sound nutritious, (probably neutral) well-drained soil medium, the three next most important denominators for successful cultivation are:

- Aspect (ie. situation)
- Planting strategy
- Feeding (and watering)

ASPECT: Ideal is a south/south-east aspect – preferably benefiting from morning sun, although full sun is not essential. The late afternoon setting sun can prove quite harsh, particularly in late Autumn or late Spring when temperatures on the whole are quite raised. In their natural habitat, far more geophytes (and general Fynbos) will be found on the cooler and damper S/SE facing aspects. Of course there are those plants which favour the drier and warmer N/NW aspect. A point of interest: many of the Iridaceae species will naturally flower facing S/SE.

HOUSING: Where one experiences heavy night/early morning dew, it is advisable to grow the softer leafed species, such as daubenyas, lachenalias, gethyllis, massonias as well as certain freesias, romuleas and geissorhizas amongst others, under cover. However, always ensure that there is sufficient natural light and good, free air movement. I certainly have enjoyed far greater success since adopting this approach; it has reduced incidences of crown rot, *Botrytis* and *Fusarium* infections to almost nil. One does, however, have to be extremely vigilant and most wary of infestations of mealy bug, aphids and red spider mite (due to the drier conditions) and take the necessary curative action. There is also a noticeable reduction in the incidence of rust to which certain species of lachenalias, such as *L. unifolia, L. variegata* & *L. viridiflora* are particularly prone. The need for full sun (whilst probably ideal) is not from experience essential or indeed necessary. Yes, one will produce slightly lankier plant growth, but then that is also what happens in their natural habitat when growing from under the protection of fynbos/shrubbery.

PLANTING: I always start with a good neutral, well-drained (ie. porous) soil medium, made up of ±60% river sand and ±40% commercial potting soil (containing no superphosphates!) to which I add additional nutrients/additives throughout the growing season. An aspect of planting that I overlooked for many years, to my detriment, is the depth that one plants mature bulbs and corms. Consider the normal growth cycle from seed. The plant pulls itself down to the optimum level before producing flowers. When planting mature or near-mature bulbs/corms, err on the shallow side rather than too deep. Too deep and you will produce spindly plants that will finally give up the ghost. On the other hand, planted too shallow, they might require a little more time to flower properly. Also don't be shy to plant your bulbs/corms grouped together ie. in the middle of the container. I am convinced there is a symbiotic influence. Certain corms such as lapeirousias, romuleas and hesperanthas are bell-shaped with a flat bottom – plant these at an angle to assist their movement down to the optimum level (I always make a note of the depth of existing bulbs/corms when re-potting).

FEEDING: An absolute no-no is the addition of any phosphates to the winter rainfall geophytes. However, they do respond well to a regular feeding (once per month) of magnesium sulphate (good leaf structure), potassium sulphate (bulb and flowering development). Agricultural limestone should also be added for those requiring a raised pH above neutral which are most of the winter rainfall species and certainly all of the summer rainfall species. Associated with feeding is of course watering – provided one adopts a good growing medium ie. one that drains well, you can never, never over-water your bulbs and corms. Also another never, never is to allow your container to dry out! Where one experiences crown rot, provide water from below.

Finally temperature does have its part to play. Generally bulbs/corms are tolerant of extremes in temperature. For certain of our 'Alpine' types, such as *Gladiolus cardinalis* & *G. nerineoides* (to name but two), to flower successfully one needs to provide a cool S/SE aspect – for they flower in the Western Cape's warmer months, but at high altitude and thus much cooler.

Many myths and indeed untruths have been created and espoused around the difficulty of cultivating S.A. indigenous bulbs/corms which has unfortunately had a profoundly negative effect of creating an ethos of 'conservation through cultivation'. Fortunately in recent times a reasonable amount of good seed and bulbs/corms has become available to the enthusiast.

My first interest in the winter rainfall geophytes started in 1983 when we moved from Benoni (in the then Eastern Transvaal)to Cape Town.

Soon after moving to Cape Town I joined the Botanical Society and the Indigenous Bulb Society of SA (IBSA). I became a committee member of IBSA in 1989 and chairman in 1993 until 2001.

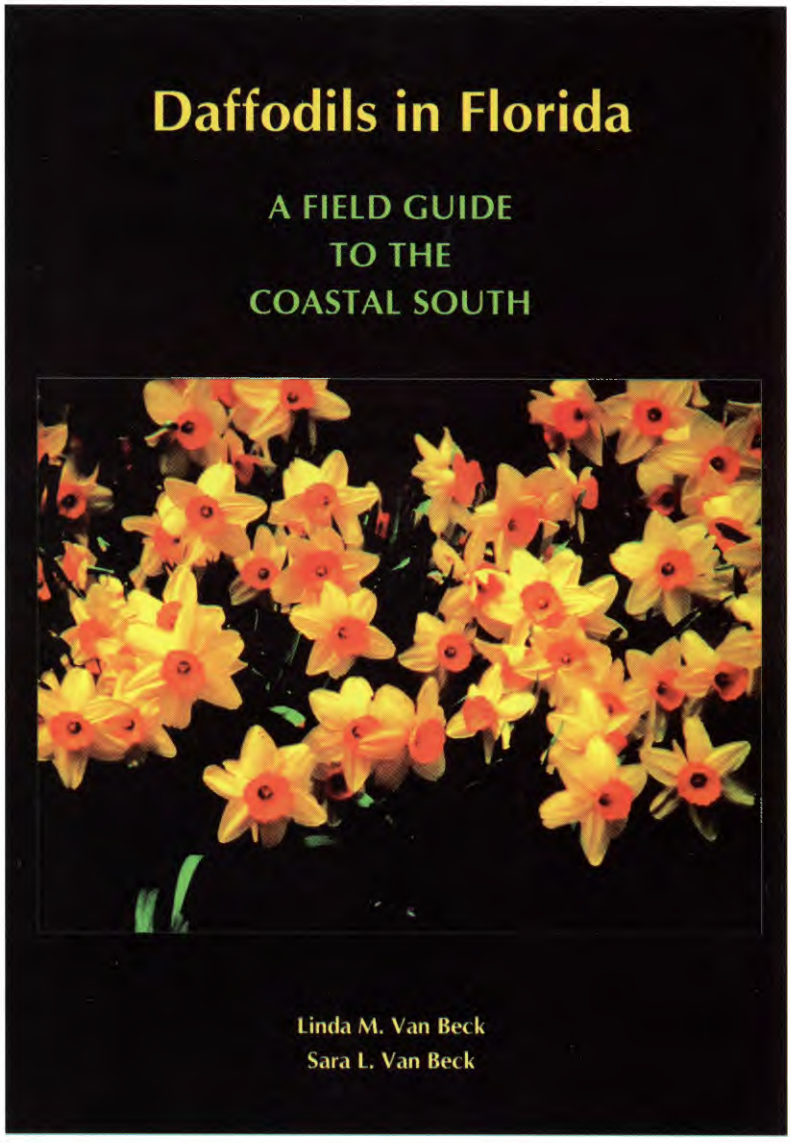
I retired from Norwich Life (previously Norwich Union) in 1996 with the idea of turning my ever growing hobby into a mail order business, spurred on by the lack of availability of winter geophytes, as well as the lack of understanding of how to grow them successfully.

I currently cultivate in excess of 40 genera and 900 plus species.

Book Reviews

by Kathy Andersen

DAFFODILS IN FLORIDA, A FIELD GUIDE TO THE COASTAL SOUTH. Linda M. Van Beck and Sara L. Van Beck. Self-published, Tallahassee, FL. Hardcover, 179 pp, 141 photos, 12 illus. including hardiness and heat zone maps. $24.00 + shipping and handling. (www.FlaDaff.com). ISBN 0-9759216-0-6. 2004.



Wishing to carry on the work of the late John Van Beck, husband of Linda M. and father of Sara L, these authors have expanded his initial research on growing daffodils in Florida. The text is suitable for those wishing to experience success with daffodils in the "Live Oak – Spanish Moss" belt from Beaufort, South Carolina to Houston, Texas. Bulb basics are clearly laid out along with practical know-how and much daffodil history.

Through test gardens established with help from the Florida Daffodil Society, Van Beck determined which daffodils thrived in his climate. Many of those which grew well were found established around abandoned homes, along roadsides and in old area cemeteries. He often had greater success with pre-1940 cultivars than with many of the more modern ones. Problems encountered in this zone 8 climate are lack of a dry season, high heat and excessive humidity. High temperatures in March can cause buds of late flowering cultivars to blast (overheat before opening and die without flowering). Cultivars which require a cold period to bloom and those which must be kept dry in summer do not succeed.

Perhaps most valuable, are the evaluation lists generated from test garden results: cultivars that do not grow in the area, those that are marginal and those that multiply. The answers for success are not always predictable, but a look at species in the heritage is important, *e.g.*, all hybrids derived from N. jonquilla thrive in the alkaline soils of the region. This book is an invaluable resource for those wishing to establish daffodils in such areas.

Thank You

Dear Members

A very special "Thank You" to all those loyal IBS members that unselfishly gave their bulbs, seeds, rhizomes, etc. for the IBS, Bulb and Seed Exchange, in 2004. Without your generosity, our Bulb and Seed exchange would not have been such a success.

Herbert Kelly Jr.

Director IBS Bulb and Seed Exchange 2004
(IBS BX & SX)

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