Editorial

I think, and hope, that we are all aware of how fragile our existence on earth is. If we hadn't thought about it before, it was brought home to us all this Christmas with the catastrophic tsunami in the Indian Ocean. Our planet, spinning at a more or less constant angle on its axis, held at a particular distance from the sun by gravitational forces, is extremely unstable. Not only is its position in space precarious and liable to change, but on the surface of the earth things are not much better. We live on tectonic plates that are moving constantly, beneath an atmosphere whose gaseous composition, vital to our life, is capable of changes, and we are all dependent on water for everything we do, and for life itself. Through its entire existence, conditions on earth have never been static – warm periods have followed cold, dry periods have followed wet, plants and animals have lived and perished. These cycles have occurred more or less every 100 000 years. It has always been assumed, due to lack of concrete evidence, that these changes occurred slowly over hundreds or thousands of years. But we are now realising that changes can happen much more quickly, even in one human life time, and at present the climate on earth is changing at an unnerving rate.

Conditions on earth have been relatively stable for the past 10 000 years, and we are possibly due for a change. This would probably have occurred even without the influence of man. However, human activity, particularly the burning of fossil fuels leading to the build up of greenhouse gases, has caused this process of change to speed up dramatically. CO_2, methane and nitrous oxide together help keep the earth temperate by cooling the planet (by radiating heat) and by warming the surface (by trapping heat). Until the mid 1800s the levels of these gases remained very stable, and then all three started to increase, more rapidly after 1950.

Some examples of what is happening:

- The Glacier National Park in the USA had 150 glaciers in 1900. Today there are fewer than 30.
- The snow on Kilimanjaro has melted by more than 80% since 1912.
- Arctic sea ice has declined by 10% in the past 30 years and has thinned by 40%.
- Global sea level has risen 20cm in the past 100 years, and the prediction is a rise of up to 1m before the end of the century.
- The atmosphere's CO_2 level has increased by 100 parts per million over the last 140 years, and the CO_2 levels in the ocean are rising rapidly.

The ocean conveyer belt system is changing. The ocean currents, critical in cooling, warming and watering the land, move round the planet propelled mainly by the prevailing winds and differences in water density. Warm salty water flows from the tropics towards the poles in currents such as the Gulf Stream. The warm water loses heat to the air, gets colder and more saline and sinks. Surface water moves in to replace it and the cold water moves back towards the tropics. This fragile system can be easily disrupted by changes in ocean temperature and salinity. Too much ice melt means less salinity for example. If the conveyer system slows down or even halts, it could cause dramatic climate changes in short periods of time.

So what does all this doom and gloom mean for us? No one really knows as all predictions are based on fairly short term measurements and this has never happened to us before! What is certain is that our climate is changing – the world is hotter than we have ever known it, and this may not halt. Predictions suggest that the weather will become more extreme – the hot days will be hotter, the cold ones colder, dry areas will experience more droughts and wet areas may become wetter. The rise in sea level is potentially disastrous – more than 100 million people worldwide live within 1 meter of the mean sea level. We only need to think of the devastation that one huge wave caused this December to realise how many people will be affected.

Plant wise, what will happen? In the past, changes often occurred slowly and many species could adapt and avoid extinction. Animals and plants could possibly retreat to higher altitudes and latitudes, but now man is usually in the way, preventing this migration. However, pollen evidence has shown that, historically, one entire vegetation type in a forest was replaced by another in a time period of 200 to 500 years, showing that rapid change has happened before. Flickerings in the climate have occurred in the past – within long cold periods there have always been short periods of warming, coming in bursts like the flickering of a switch, in time scales of tens of years (rather than in thousands). Within our past "stable" 10 000 years, blips have occurred. For example 4000 years ago there was a 200 year drought in northern and eastern Africa which caused the Nile flood to fail for 50 years. So have we flipped the switch and triggered new abrupt changes, or are we simply experiencing different climatic conditions due to increased greenhouse gases?

In the SW Cape we are experiencing the worst drought for many years. We have had two very dry winters due to cold fronts missing the Cape and dropping their rain south of us. Apparently this is due to a shift in the pressure systems over South Africa, causing a high pressure system to sit over the country preventing the low pressure systems from moving in. At present our dams are less than 40% full and the water shortage is critical. This lack of rain has had marked effects on the plants, including the bulbous and cormous plants. In 2003 the bulbs in Nieuwoudtville and Namaqualand did not even break dormancy. In the rest of the SW Cape, many did grow and flower, but most did not set seed. In 2004 most bulbs did grow and flower over the whole SW Cape, but again many did not set seed as hot dry conditions followed the rain too quickly and the bulbs went dormant. This means that over the whole region no new recruitment of plants has occurred for at least the last two years, and presumably many older plants died due to lack of rain. Bulbous/cormous plants are well adapted to survive drought, due to their storage organs and to their ability to go dormant if conditions are bad. However, their long term survival depends on other factors as well, such as are the pollinators still alive, and does their habitat still exist? The relationship between plants and their pollinators is often a highly specific one, and if one partner disappears, the other one will suffer. Take for example a butterfly which pollinates one specific Gladiolus. If this Glad does not flower one year, or perhaps two years, what happens to the butterfly?

What will happen to our weather this season? Obviously no one knows, and all we can do is wait and see, and observe what some scientists have called "a remarkable uncontrolled experiment" in the climate of the earth.

(Much of the information for the Editorial came from National Geographic, Sep. 2004) ♣

Gladiolus pubigerus

Cameron McMaster

Fire is a natural phenomenon in the grasslands of the summer rainfall areas and all grassland species are adapted to regular spring flowers. In fact many species are dependant on regular fires to flower, set seed and germinate in the brief window of opportunity after a grass fire. A rare and fascinating Gladiolus is one such species.

On 7 September 2000 a devastating fire swept the eastern spur of the Amatola Mountains above Stutterheim in the Eastern Cape, destroying hundreds of hectares of pine plantation. While the loss of the timber was a tragedy, the hundreds of hectares of mountain grassland adjacent to the plantations that had been protected from fire for many years was also burned, triggering a profusion of spring flowers. The grassland areas adjacent to the plantations are almost pristine, having been protected from grazing livestock for many years. However, being also protected from regular fires, many fire-dependant species had not had the opportunity to flower for some years in the moribund sward. At this time my wife and I were engaged in a survey of the flowering plants of the Amatolas and the fire afforded us a unique opportunity to record these species.

On 25 October, nearly six weeks after the fire, I set out after the early mist had cleared to explore Kologha Ridge near Dohne Peak. Near the summit of the ridge my heart skipped a beat when I saw at my feet, a number of small gladioli that in 30 years of exploring these wonderful mountains, I had not seen before. An interesting feature was the yellow-green inflorescence cocked at right angles to the stem. I spent the next half hour happily taking pictures and preparing a specimen for pressing and identification. We subsequently identified it as *Gladiolus pubigerus*, a species having only been recorded twice before in the Eastern Cape in the 1800s. A quest to unlock the secrets of this rare plant was to be an important part of my botanising for the next few years. Extensive searching rewarded us with another small population a little lower down on the northern slopes of Dohne Peak – these were growing with *Gladiolus wilsonii* – a fairly common species in this area. On 29 October I explored an area about one kilometer east of the first site and was again rewarded by another population of *G. pubigerus*, this time growing in the company of *Gladiolus longicollis. G. wilsonii* and *G. longicollis* are not dependant on fire for flowering.

On 2 November I observed another single specimen on the lower slopes of Protea Hill some 5 kilometers to the west of the original discovery and later in the day a further single specimen on Red Ridge, a high point near the top of the range. By now my thirst for new populations was insatiable and the very next day, 3 November, I climbed Mt Thomas, a further 5 kilometers eastwards along the range. This part of the range is accessible to cattle and is heavily grazed – the grass was cropped short. While unpalatable species such as *Cyrtanthus tuckii* and *Cyrtanthus suaveolens* were widespread, it was only after very careful searching that I came across one degenerate specimen each of G. *pubigerus* and *G. longicollis* on the lower slopes. On 12 November I went back to the second site on the lower northern slopes of Dohne Peak where I saw *Gladiolus pubigerus* with seed capsules forming, and also a pink specimen, confirmation of the observation in the description that the occasional pink form occurs.

Why had we not noticed it before and why had it not been recorded regularly in the Eastern Cape? Confined to the montane grassland, it is uncommon and not widespread, occurring in small isolated populations here and there. Plants have only two and rarely three leaves. The lower one is basal, sheathing the lower half of the flowering stem, giving the plant a very grasslike appearance. Its flowers are inconspicuous and can easily be overlooked. Finally, it appears to be dependant on fire to flower. Repeated visits to all the sites where we first found it did not reveal any further flowering plants in years that there was no fire.

According to Peter Goldblatt and John Manning (Gladiolus in Southern Africa, 1998, p.158) the first record of *Gladiolus pubigerus* appears to be a collection by C.F. Ecklon and C.L. Zeyher in October 1832 when they were in the Eastern Cape. A second collection was made in 1860 in "British Kaffraria" by Thomas Cooper. His specimen formed the basis for G Baker's *G. pubescens,* described in 1876. Realising the name was a homonym, G.J. Lewis renamed the species *G. pubigerus* in 1954. Known from just a handful of collections, *Gladiolus pubigerus* was found again by O.M. Hilliard and B.I. Burt in Natal in the 1970s. Believing it to be an undescribed species they named it *G. pugioniformis* in 1979, but this name now falls into synonymy. *Gladiolus pubigerus* appears to be fairly widespread, occurring from the Amatola mountains in the Eastern Cape to near Pilgrims Rest in Mpumalanga and except for the Natal Midlands, appears to be rare. Ours was one of the few records from the Eastern Cape and there are no records from the Transkei.

It was on 31 October 2002, two years later, that we came across it again on the recently burned road verges on the farm Quagga Heights in the Cathcart district. This farm is on an elevated spur on the northern foothills of the Amatolas at an altitude of 1320m and about 10km east of our original record. We found it in seed and were able to identify it as *G. pubigerus* by the right-angled tilt of the upper flowering stem and the pubescent leaves sheathing the short lower stem. Anxious to obtain seed we marked the plants with strips of coloured plastic bag tied to the fence. This action had a serious consequence. The landowner, Michael Sheard, who had been plagued by stock theft, suspected that these markers might have been placed there by prospective thieves and reported them to the local police. Fortunately we were able to explain them later and the Sheard family are now aware of the rarity of this plant and the importance of preserving it and the many other special species that occur on their farm.

In 2003 there was another fire in the same area and a wider search along the Toise/Quanti road on 31 October and again on 4 November, revealed numerous specimens in full flower on either side of the road near the entrance to the farm Patchwood. These were most numerous within the road enclosure where they have been protected from grazing livestock, together with the numerous species of ground orchids that occur in the area. The importance of road verges as a repository of many of our rare and endangered species is highlighted by this observation. Once again flowering specimens were only seen in areas of the grassland that had recently been burned. We kept this population under close observation and were able to photograph the seed capsules. On our last visit on 6 December, the seed was ripe, a period of six weeks having elapsed between flowering and ripe seed. ♣

Dazzling Ginger Lilies

Graham Duncan

In South Africa most of us are familiar with the sweetly-perfumed white or yellow blooms of several rampant Indian and southeast Asian members of the ginger family Zingiberaceae, such as *Hedychium coronarium* and *H. flavescens*. They have naturalised along water courses and overwhelmed the indigenous vegetation in numerous temperate and subtropical parts, and have been declared noxious weeds. Far fewer are aware that two members of this family of well over a thousand species 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 provinces of Limpopo and Mpumalanga, and in Swaziland, and used to occur in KwaZulu-Natal. 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 highly agreeable, strong 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 pseudostem 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 are 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, the flowers 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 for the purposes of medicinal trade, attempts at introducing it into general horticulture 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, effectively exposing 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.

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, 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 to exploitation. Its current conservation status is not surprisingly categorised as critically endangered.

Cultivation

Natal ginger lilies are easily maintained under cultivation provided certain conditions are met. The plants are 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 a 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. 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 per week, applied from late October to late May in the Southern Hemisphere. They are gross feeders, responding 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 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 just by 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

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Drought!

Marion Went

We in the Western Cape, in the Cape Floral Kingdom, are suffering from severe water restrictions as we had a very dry winter. Those of us wise enough to grow only the plants from our region should not have to suffer too much, in sympathy with our plants, under the Draconian water restrictions currently in place. The trouble starts when we fall in love with the plants from the summer rainfall area of the country and have to nurse them diligently with second-hand (if necessary) water and hope they survive the soap / shampoo / bath oil / detergent content. It's all very depressing watching lovingly tended plants succumb.

What joy, then, to suddenly find a *Gethyllis linearis*, bought at the last Rare Plant Sale, in flower! Of course the other *Gethyllis* pots were checked and a few days later a *G. villosa* popped up cheerily. This was followed by no less than seven stunning *G. ciliaris* flowers in succession, from plants rescued a few years back from a ploughed area in the North West Cape by two of our members. To compensate for the possible lack of pollinating agents, I got to work with a small paint brush and hopefully await results.

Several years back, during a trip to the Eastern Cape, Chris and I chanced upon a *Gethyllis* fruit on disturbed, heavy, clayey ground. There was no sign of the mother bulb. On our return I planted the seeds, resulting in a fairly successful germination rate. During the next few years there seemed to be progressively fewer signs of life but I did not want to disturb the plants by turning them out of the pot. There have not, to date, been more than two leaves to a plant – slightly glaucous, smooth with a gentle double spiral, standing ±9-10cm (4-4.5") high. Lo and behold, this year three beautiful, creamy flowers appeared! So far I have not been able to identify them from any references (strictly amateur) to hand. Fortunately Chris took a few photos, but unfortunately is still finding out how to work the camera software, so there is no photo accompanying this report.

Oxalis – weeds or gems?

Jim Holmes

To many people, Oxalis are simply weeds to be removed, and indeed there are a few species that are extremely weedy, with "Bermuda Buttercup", *Oxalis pes-caprae* top of the list. But actually less than 3% of the species have this trait, and some are extremely difficult to maintain in cultivation.

Oxalis is an enormous genus which, according to various authors, encompasses between 600 and 800 different species worldwide, mainly from South America and the Western Cape province of South Africa. This genus was well established when the continents drifted apart some 280 million years ago. There is unfortunately a dearth of current literature available on the genus, with the last revision of the South African species being done by TM Salter 60 years ago (The genus Oxalis in South Africa). Some texts identify 270 species in South Africa, and Goldblatt and Manning in "Cape Plants" list 118 species in the Cape. This is the largest group of bulbous plants in the region, and it seems possible that as many as 50 new species may be added when the revision is complete.

It is a unique and fascinating group of bulbous plants which differs from other plants in several ways. Firstly they appear to have no close relatives. Secondly they are the only dicotyledonous plants to produce a true bulb. All South African species studied to date do produce a true bulb, although this is not the case with many of the South American species. Thirdly the pollination structure of Oxalis is unusual in that they follow a strict trimorphic heterostyle in which "like" arrangements are sterile, and "opposite" arrangements are fertile (explained later).
Many people consider that only monocots can produce bulbs, but when you look at the definition of the word "bulb", it is described as a "specialised subterranean organ consisting of a very short compressed stem (basal plate) in a vertical orientation, with a regenerative bud or growing point, and food and moisture being stored in fleshy succulent leaf bases or leaf-like scales". All species of Oxalis studied in the Cape Province so far fit this description and are considered to be true bulbs.

During recent years, Dr L Dreyer from the University of Stellenbosch has taken up the taxonomic challenge, and published a Palynological Review (pollen structures) of Oxalis. She studied some 570 species covering 21 different subsections of the genus. 40 of those species were found to be new or did not fit into any of the subsections. The pollen grains were classified according to size and shape and were coded. Polyploidy was found to affect grain size with the more "primitive" species having the smallest pollen and the polyploids the biggest. She produced a grid of the species according to their pollen and this was found to coincide with Salter's revision, with one exception. This was in the subsection Crassulae where *Oxalis cathara* and *namaquana* do not fit in with the *O. flava* group in the section. *Oxalis monophylla* appears to stand on its own, separated from all the other species with small bulbs embedded in a nest of soft tunics.

To put some of the species into perspective I will list a few of the better known species under their subsections:

Multifolia includes	*Oxalis palmifrons*	*O. tomentosa*	*O. engleriana*
Stictophyllae includes	*O. purpurea*	*O. rubro-punctata*	
Foveolatae includes	*O. pulchella*	*O. depressa*	*O. convexula*
Angustatae includes	*O. pardalis*	*O confertifolia*	*O. massonian*
Linearis includes	*O. ciliaris*	*O. polyphylla*	*O. versicolor*
Crassulae includes	*O. flava*	*O. salteri*	*O. fabaefolia*

Recent studies suggest that the species with many flowers in each umbel are more "primitive" and those with single flowers are more advanced. Likewise the tri-foliate leaf forms appear to be more primitive and the multifoliate and unifoliate are more advanced. The leaves are extremely variable with *O. dregei* producing heart shaped leaves, *O. salteri* with single round leaves pressed against the ground and looking more like a Primula, and *O. bifida* where the three leaflets have split about 80% of the way through giving the appearance of 6 leaflets.

Pollination of Oxalis is interesting, and is best understood with a diagram:

Pollination pattern of a tristylous species. Tall anthers ( ) pollinate tall stigmas ( ) etc. as shown by the arrows.

This mechanism ensures that cross pollination of the plants occurs.
Throughout a given population of plants, each plant will produce flowers with only one of the three arrangements, and an approximately equal number of plants will have each arrangement. All South African plants studied to date follow this strict code, although it may not be the case with all the South American species.
After pollination, the flower stem bends like an elbow to deposit the ovary close to the ground away from browsing animals. Some weeks later it rises again to dehisce the seeds. The capsules split violently and the seeds are catapulted a meter or more away. The seeds of most species do not have a seed coat and germinate immediately if conditions are right. Otherwise they die within a few days. This means that the only reliable way to propagate Oxalis is by bulbs, as seed collection and distribution are both almost impossible. ♣

Where have all the varieties gone?

Andries de Villiers

In almost every monograph of the 1950/1960's many species were supported by a plethora of varieties and sub-species. In the modern monographs very few species are qualified in the same way. Why? The short answer is that there used to be inadequate field study and morphological investigation so that it was easier and more convenient to hide smaller differences as varieties. This denies a philosophical question of great importance. A variety might be just a local form due to habitat factors including pollinators. These varieties were essentially aspects of the species. But some varieties hid the fact that they arose from a significantly different genetic mutation. They were related to the species but not an out flow from them. They were distinct taxa with distinct DNA. This question relates to all genera but its resolution is most obvious where we have access to two monographs of comparable authority but separated in time. For most of us the convenient genus is *Gladiolus* for which we can compare the earlier Lewis & Obermeyer (L&O) with the later Goldblatt & Manning (G&M). The difference between a sub-species and a variety was dictated by the same inexactitude, with sub-species perhaps considered closer to the species rather than being a local form.

- In L&O the specie *maculatus* was divided by Obermeyer, contrary to Lewis' own manuscript, into four sub-species. Of these G&M retained *maculatus, meridionalis* and *eburneus,* the latter under the name *G.albens*, as full species, i.e. taxa arising from different significant taxonomic events. Subspecies *hibernus* was dropped as a local form. Curiously L&O did not list a variety which could well have been shown: the yellow flowering *meridionalis* of the Port Elizabeth area.
- A similar situation is found in the floribundus complex where L&O listed five sub-species : *floribundus, miniatus, milleri, fasciatus, rudis.* G&M raised *miniatus* to species status partly on its colour (orange is very rare in *Gladiolus)*, and its pollination strategy which differs markedly from *floribundus. Milleri* was sunk into an old species *grandiflorus* which L&O had considered part of *floribundus* sub-species. *Fasciatus*, an essentially local form wherever it occurred, was split among *grandiflorus, floribundus and miniatus*. In each of these decisions a geographic factor was considered, and this deserves explanation. If two taxa are separated by a physical barrier or are to be found only in disparate soils this supports the implication that a significant genetic mutation occurred co-incident with morphological differences.
- Other sub-divided species in L&O were *oppositiflorus*. The ssp *salmoneus* was sunk into *oppositiflorus* though some specimens, on examination, conformed to *G. sericeovillosus.* L&O had a second s-sp of *sericeovillosus* named *calvatus*. G&M retained this ssp partly on some morphological detail, but mainly on separate but adjacent geographical location.
- L&O listed a variety of *G. varius* as *var. micranthus* which G&M raised to species as *G. ferrugineus.* There is already a *G. micranthus* which is a Eurasian taxon.

- L&O list *macowanii* as a variety of *G. ochroleucus* raised by G&M to species status as *G. mortonius*.
- L&O list three sub-species in *G. ecklonii*. G&M raised both to species (*vinoso-maculatus* and *rehmannii*). It would seem that L&O had found it difficult to allocate them.
- L&O list a var *longifolius* under *G. appendiculatus* which is dropped by G&M.
- Under *G. permeabilis* L&O list also sub-species *wilsonii* and *edulis.* G&M raise *wilsonii* to a species but retained *edulis* as a sub-species of *permeabilis* mainly on geographic grounds. L&O show these varieties under *G. virescens : virescens, lepidus, roseo-venosus*, both of which are dropped by G&M, the latter much to members' disgust.
- G&M made a major division of the five varieties of *G. alatus* (L&O); *alatus, melisculus, speciosus* and *pulcherrimus* are raised to species. Var *algoensis*, which probably no longer exists, if it ever re-appeared would probably be considered *alatus.*
- In L& 0 neither *G. citrinus* nor *G. tenellus* have varieties. They are grouped together by G&M under the old name *G. trichonemifolius.* This jawbreaker invokes a very old (1812) name for *Romulea* and refers to the Romulea-like leaves.
- Another major revision in G&M was the dropping of var. *cochleatus* from *G. debilis* and the raising to species level of *variegatus.* The elimination of *cochleatus* was wise. Some specimens found by members were more like *G. carneus* than *G. debilis*.
- G&M retained *platypetalus* as a sub-species of *G. longicollis.* The range of the two varieties overlaps slightly. However, the sub-species *platypetalus* from the old northern Transvaal is markedly different from the *longicollis* from the southern and eastern areas.
- L&O divided *G. tristis* into three varieties: *concolor* (markings missing) and *aestivalis* (a late flowering form) which G&M combine within the species. There is a pink form, not in the literature, which grows (or did a couple of years ago) on the side of the road between Kirstenbosch and Alphen.
- L&O had two varieties under *G. punctulatus* now both together as *G. hirsutus*. The second variety, *autumnalis*, is a late flowering form in the Heidelberg area.
- L&O listed two forms of *G. carinatus*, the second (*parviflorus*) is now *G. griseus* (G&M). The yellow *carinatus* was not recognised by either L&O or G&M, though to most members it is a separate species. G & M do mention it. Thunberg listed it as var. *luteus*.
- L&O have a second variety of *G. gracilis (latifolius*) which is sometimes mistaken for *G. caeruleus* or even *G. recurvus*, and has been dropped by G&M.
- L&O show *G inflatus,* ssp *inflatus*, var *inflatus* and var *louiseae* and ssp *intermedius.* In G&M all are simply *G. inflatus.*
- L&O show two varieties for *G. rogersii.* The second (*graminifolius*) grows in the Karroo and is tougher but otherwise not significantly different; sunk by G&M.
- L&O have a second variety of *G. pritzelii* named var *sufflavus* which G&M have raised to a species.
- Under *G. vaginatus* L&O list a var. *subtilis* which has been sunk by G&M.

- In *G. brevifolius* L&O listed four varieties. These are all local forms sunk into the species. *Brevifolius var obscurus* is differently (and dully) coloured. It grows at Malmesbury and possibly on Pikeniers Pass.
- L&O listed two varieties under *G. pillansii.* The whole species has been sunk into *G. martleyi*. *G. martleyi* ex *pillansii* is easily mistaken for *G. brevifolius* with which it sometimes grows (Shaw's Pass). It is scented and tends to have more blue in it.

Although G&M do not list varieties, most conspicuous local forms are mentioned in the species discussions and members anxious to grow all forms of a species should read the entry in G&M very carefully. It is also useful to retain L&O if you have a copy, avoiding nomenclature differences. It is normally the case that the "senior" subspecies bore the name of the species. In the following table that L&O sub-species is shown under "species" and "retained unchanged". The notation "sunk without trace" is not strictly correct. An L&O sub-species or variety might be split up among several existing species or into one existing species and traces will be found in the species to which transferred, in the descriptive text.

The story behind the naming of *Clivia miniata*

John van der Linde

Clivia miniata was introduced to Europe in the early 1850s, and rapidly became popular as a showy pot-plant, yet it was only in 1864 that it was given its current name.

The story begins 90 years earlier in 1774, when a bulbous plant with lovely large trumpet-shaped flowers resembling those of *C. miniata* was collected in the Southern Cape. It was taken back to Europe and, because it readily made offsets, was soon quite widely grown. It was named *Vallota speciosa* (meaning 'showy') for Pierre Vallot, an early French botanical writer, and was the only plant in the genus *Vallota.* More about this plant later, but first something about the confusion it caused.

James Backhouse, a nurseryman from York had imported plants we now know as *C. miniata* from Natal (with seeds?). One of these plants, in full and glorious flower, was exhibited at a meeting of the Horticultural Society in London in February 1854. It created quite a stir, and within a few years seedlings were being grown in several countries. Yet no one was sure what it was! Lindley, who had named *C. nobilis* back in 1828, scratched his head over this one, which had leaves described as 'stout', and such a different flower to *nobilis* that he was not convinced they belonged in the same genus. Because the flower seemed similar to that of *Vallota speciosa*, he doubtfully identified the plant as *Vallota? miniata* (meaning 'coloured with red lead').

Hooker, on the other hand, felt this new plant was nearer *Clivia* than *Vallota*, but, because of the very different flowers, wasn't sure either. So he doubtfully named it *Imantophyllum?* (meaning 'strap-like leaves') *miniatum* .

This confusion, caused by the Vallota-like flowers, seems to have existed for 10 years until 1864, when Eduard Regel (1815 –1892), the eminent German botanist settled the matter: In a short one-page article in "Gartenflora", the journal for German, Swiss and Russian plant people, he pronounced that, although the flowers were trumpet-shaped and more upright, unlike the tubular pendulous flowers of the other two *Clivia* species then known, the plant belonged in the genus *Clivia*, as established by Lindley.

His words carried weight, his brief *CurriculumVitae* being: he worked at botanic gardens at Gottingen, Bonn, Berlin, Zurich - where he lectured at the University and got his doctorate, and St Petersburg, where he was Scientific Director and finally Director General. Regel introduced many plants, chiefly from Central Asia, described them and distributed them liberally to botanic gardens and nurseries outside Russia. He was a founder of both the Swiss and Russian Horticultural Societies and a prolific author. The genus *Regelia* of five flowering shrubs from W. Australia was named in his honour.

So, at the end of the day, that is why Regel's name is included in the full botanical name of this plant, which is now so admired throughout the world: *Clivia miniata* (Lindl.) Regel.

Now, to return to the plant which had given rise to all the confusion, *V. speciosa*. It has been known over the years by various names, including *V. dumbletonii, Amaryllis purpurea, A. elata,* and *Cyrtanthus purpurea*. Some people may know it by one of it's common names, George lily, Knysna lily, or Scarborough lily. In some parts of the world it is still known in the trade as *Vallota,* but it is indeed the most famous of all the *Cyrtanthus* species, *C. elatus*, with it's beautiful trumpet-shaped scarlet flowers. Almost as desirable as *C. miniata?* Certainly the amaryllis lily borer thinks so!

For brevity I have not listed references, although I have them available. I would like to thank Keith Hammett for sending me information on Regel and also the article from 'Gartenflora". ♣

Romulea atrandra and *Romulea luteoflora*

Andries de Villiers

Romulea atrandra has long been a favourite of IBSA members and *R. luteoflora* something of a mystery. We all know, or think we know, what *R. atrandra* looks like, although the only line drawing in the de Vos monograph is of *R. atrandra var esterhuysenia* (p 212, 213) and there is no drawing of *R. luteoflora* at all (p 210, 211). *R. atrandra* was collected, briefly discussed and named by Gwendoline Joyce Lewis in 1934. It is the only *Romulea* listed among the new species (73) of that year in the Report of the National Botanic Gardens, credited to Lewis who is also credited with two *Babianas*, an *Ixia* and a *Psilocaulon*. Lewis was already working on *Babiana* but was cooperating with de Vos on *Romulea* as can be seen from the lists of collections printed in the *Romulea* monograph (de Vos) of 1972. The written description of *R. atrandra* in the monograph is by de Vos, not by Lewis. Lewis did draw *R. atrandra* in 1934 for Flowering Plants of Africa, and that drawing, in black and white, appears in the 1952 issue (no. 29; 1135) and again in the 1965 issue (p 138, 140). At that time *R. luteoflora* was named, by de Vos, as *R. atrandra var luteoflora* and a drawing by de Vos is in the 1952 issue.
If you read the introductory paragraphs of any major monograph carefully, you will be able to extrapolate the philosophical progress of the author and, in the case of *Romulea,* you will see that de Vos differentiated similar specimens according to colour and chromosomes, separating red/pink forms from yellow ones.

sp name given	colour	chromosome no.
rosea	pink	18
obscura	yellow	22
triflora	pink	24
hirsuta	yellow	24
atrandra	pink	22
luteoflora	yellow	20

Thus de Vos raised *R. atrandra var luteoflora* to species status as *R. luteoflora* in the 1973 monograph. What is not disclosed in this chronology is that there was a painting of *R. luteoflora* by Lewis, probably in 1945 for the 1952 issue of Flowering Plants of Africa, a painting which has been unknown until now and can, I think, be admitted as the iconotype. Lewis was a botanical artist as witnessed by the paintings in the *Babiana* monograph and by a few *Gladiolus* examples in the Lewis and Obermeyer monograph of 1972. The *Babiana* paintings are in the Compton Herbarium collection. According to SA Botanical Art, Peeling back the Petals, much of her artwork went to the NBI in Pretoria. But in neither is there a reference to her picture of *R. luteoflora*. We can only surmise that it was among her papers on her death in 1967. Most of her *Gladiolus* paintings were burnt in a house fire, and if anyone remembered the *Romulea* painting, it is probable that it was assumed to have been burnt.
However, in 2003 A.W. de Villiers found it in an antique shop at Kalk Bay, and it is now in my personal collection. What we have not yet established was its whereabouts from 1967 to 2003. It is a very fine painting and it is a botanical triumph that it has been recovered and can be studied on request by aficionados of the genus *Romulea*.

We are indebted to J. Manning for his research into the taxonomy of the two species & to A.W. de Villiers for his discovery and his generosity in presenting it to me for my painting collection.

♣

Scadoxus pole-evansii

Rachel Saunders

Several years ago we were given 6 large bulbs of *Scadoxus pole-evansii* by a Zimbabwean farmer who was leaving his farm. Unfortunately he dug the bulbs out in March, while they were in full growth, and to transport them he cut all the leaves and most of the roots off. When we received them we thought that they would not survive as their roots were extensively damaged. However we drenched them in fungicide and planted them immediately in a well drained but fairly rich potting soil, watered them well and put them into a cool spot in shade. The bulbs went dormant for the remainder of that growing season. During the winter we kept the bulbs moist, but not wet, by watering them once every 3 or 4 weeks. To our great joy, in December of the following year, we saw small shoots emerging from each pot – our bulbs had survived! We watered them regularly and that summer we established their rather strange growth cycle. The bulbs only break dormancy in late December or even in January and by February they are in full leaf. They continue to grow well into winter, and only go dormant in about June or July. For a bulb that comes from eastern Zimbabwe this seems rather strange, as in its habitat it really only gets summer rain. However, on further thought we realised that the Chimanimani Mountain area does get some winter rain, and it certainly gets mist and damp weather in winter, so perhaps the plant has adapted to that. For the next 3 years our plants continued to grow, and then this year, for the first time, 4 of them flowered. We had given 2 plants away to 2 friends, and both of those flowered, plus 2 of ours. What excitement, and what a beautiful flower! It emerged from the ground well before the leaves, quite unlike *Scadoxus multiflorus* ssp *katherinae*, and the stem grew to about 40cm before the large red flowers opened. We pollinated the flowers and we have quite a few seeds forming. Hopefully next year all of our plants will flower, resulting in more seed set.

Paradigm changes, methodological reflection and the Sociology of South African botanical knowledge

Charles Craib

In the IBSA Bulletin of 2002 I introduced readers to the Sociology of South African botanical knowledge. In this article I would like to focus on specific aspects of the knowledge production process.

Botanists may well ask what this has to do with their pursuits in areas such as systematics and taxonomy. The answer is that an understanding of the Sociology of knowledge, particularly the concepts it uses to examine the knowledge producing process, assists botanists maximise or change the use of existing theory. In addition the methodological reflection that the concepts in the sociology of knowledge precipitate, may also lead to the paradigm changes so necessary for advancing scientific thought.

One of the greatest problems found by botanists and other scientists is that their university curricula do not usually include courses in philosophy or the Sociology of knowledge. The philosophy of science is often restricted to a consideration of specific issues, whereas philosophy in general and the sociology of knowledge, lend a rich understanding of the techniques in knowledge production. The challenge to universities is to develop curricula where the principles of botany and the techniques of the knowledge producing process reflect backwards and forwards upon themselves.

Pure philosophy has the advantage of training the intellect to distinguish poorly constructed arguments from thoroughly constructed ones. Those who have studied philosophy have the advantage of readily identifying the types of arguments advanced in any reasoning process. In this way, arguments, unsuited to particular kinds of explanations can be discarded early on in the knowledge producing process.

South African botany, in its initial stages, was faced with the enormous task of classifying the vast number of families, genera and species present in the country. As various species in different genera were described it became evident that there were anomalies. Revisions reduced a number of names to synonymy and on occasion the transference of species in one genus to another. This is all a predictable sequence of events in the knowledge producing process. In recent years genera themselves have been reassessed necessitating further changes to the categories under which knowledge is presented.
The conceptual problem at present is that genus and species are constructs. In many instances in plant classification their existence cannot be proved empirically. Constructs are a knowledge type that exists for the purpose of classification and quite often they are wrongly assumed to have an objective reality.

They are better viewed as vehicles for classifying and arranging knowledge in the knowledge producing process. It is for this reason that systematics and taxonomy will always be

characterised by the regular changes of plant names. Name changes are endemic, therefore, to the use of constructs in the binomial system.

Binomial classification is usually used without criticism since there has not yet been a paradigm change precipitated by enough problems in the binomial system. The tendency is currently to save the existing constructs. Knowledge production processes abhor vacuums and there at present there is not a system sufficiently adept at organising knowledge as the concepts of genus and species.

It is significant to note that whereas genus and species are constructs which arrange and classify knowledge, related techniques of science can be demonstrated empirically. Chemotaxonomy and DNA sequencing which have been popular analytical tools recently, are but two examples. From the point of view of knowledge classification we are dealing with taxonomy as a descriptive art explained with reference to the characteristic techniques of science which can be demonstrated empirically.

The user of plant revisions will be increasingly confronted with alternative models for classifying and understanding various plant genera. It has quite often been assumed that the latest revision is the “correct” one. What is in fact happening is that different scientists interpret the constructs of family genus and species differently. As constructs cannot be proved empirically, the end user must rationalise his or her preference for using one type of revision of a genus rather than another.

The choices which confront the users of plant revisions need to be informed ones. The sociology of botanical knowledge has a significant role to play in this respect. ♣

Amazing Amaryllids

Lilian Birch

I have in my garden four small patches of *Amaryllis belladonna*- the "March" lily. Three of the patches flower when they ought to, in February or March. But one patch flowers regularly in January. Last year in April, a friend’s relative, who had a long driveway full of March lilies gave us permission to collect seed to grow on and to take a few bulbs each. This we did, and the bulbs were planted with the "January" patch. The leaves came up just about three weeks after their companions and no more was thought of them until in December - well before Christmas- they flowered. The January bulbs flowered as usual in January. Now the question in my mind is: is the "right" time to transplant hysteranthus bulbs immediately after the seed sets and before the leaves appear?

South African bulbous plants in Dutch professional magazines

Peter Knippels

In The Netherlands we have two specialised professional magazines in which articles are published on South African bulbous plants. The first one is the weekly issued magazine 'Vakblad voor de Bloemisterij', a magazine on growing and forcing cut flowers and ornamentals. The magazine 'BloembollenVisie' is a specialised magazine on growing flowerbulbs and is issued every two weeks. Both have published articles on South African bulbous plants in 2003 and 2004, mostly on the production and marketing by Dutch companies, and this article summarises these.

Clivia

In number 29 of the 'Vakblad voor de Bloemisterij' (18 July 2003) the article '*Clivia* staat nog maar aan begin tweede leven' was published. Clivias have been cultivated by Dutch and Belgian growers for more than century. The Dutch call *Clivia* a 'Belgian plant', as the main production is by growers from that country. The market is small and stable - in 2002, 376 000 plants were sold at the Dutch flower auctions. Almost all of these were orange flowered *Clivia miniata*. This is one problem. The other is that consumers find Clivias traditional - you could also say they are old fashioned. In both countries there are several small growers and a few bigger ones who are now active in breeding and growing plants with other flower colours. Each company has its own breeding program and aims. Their first objective is a 'new' colour for the flowers: yellow. The Dutch grower Jacob Keijzer from Ter Aar bought plants of *Clivia miniata* var *citrina* from Belgium and the United States in the nineties. He started a breeding program in which he used *Clivia miniata* and *C. miniata* var. *citrina* as parents. His first aim is to produce a yellow flowering plant with short leaves. The results of the breeding show that it is quite difficult to get yellow flowering plants, and most hybrids have orange coloured flowers. Another Dutch company, Dynaplant, and the Belgium company ID'Flor, are doing similar work to get an alternative for the traditional orange *C. miniata*. To increase the number of plants in a short time one can propagate plants by tissue culture, but the yellow flowering types have proved difficult to culture. Despite these problems, the three companies are positive that their breeding activities will lead to interesting Clivias, but this will take some time.

Scadoxus

I was really surprised when I read the article 'Beperkt en tijdelijk aanbod sterke punten van haemanthus' in the 'Vakblad voor de Bloemisterij'. The topic of this article is the production of cut flowers of *Scadoxus multiflorus ssp. multiflorus* by one Dutch flower forcer. (Personal remark: The Dutch still have problems with the correct name of this plant which they still call *Haemanthus multiflorus*. I have taken the opportunity to teach them the right name!) During the period February – August, the flower forcer sells about 100,000 pieces of this *Scadoxus* as a cut flower at the Dutch flower auctions. This is a very small market, but the wholesalers who buy these flowers don't mind, as it's an exclusive product and they get a good price. On the other hand most retailers are unfamiliar with this *Scadoxus*, so the demand is low. The market

could get larger, but then there is still a lot to learn on how to grow and force *Scadoxus multiflorus ssp. multiflorus*.

The magazine 'BloembollenVisie' has always taken an interest in specialty bulbs as they realise that there is more than only tulips, daffodils, lilies and dahlias. To show the Dutch bulb growers other interesting and beautiful bulbous plants, in the past 4 years three series on all sorts of speciality bulbs have been published. The third series started over a year ago and will finish within a few months, with over 30 articles having been published by then. The emphasis in the articles in this series is on the experiences of the grower: what are the growing and marketing possibilities. Many interesting bulbous plants have been reviewed: *Corydalis*, *Crocus*, *Colchicum*, *Curcuma*, *Ranunculus*, *Erythronium*, etc, but also some South African species.

Crocosmia

Crocosmia was presented in one of the first articles of this series. It is not a new crop for Dutch bulbgrowers and wholesalers, but has been grown for many years and is quite popular as a plant for the garden, especially the red coloured varieties, like 'Lucifer'. Nursery Davelaar, owned by Willem Heemskerk and his son Martijn, has specialised in growing and breeding *Crocosmia*. They grow about 75 varieties with a total acreage of 6.5 ha. They don't only produce plants for dry sales or as a garden plant, but they also grow it for cut flower production, and father and son Heemskerk see a lot of possibilities for *Crocosmia*. Producing corms is one thing, but you also have to sell them and sometimes find new markets, therefore they have contact with growers and forcers, and also with the buyers of the corms and the flowers. Nursery Davelaar has it's own website www.crocosmia.nl. (Personal remark. A lot of flowerbulb growers in The Netherlands are good at one thing - the production of bulbs, preferably in large quantities, and they take little interest in the selling of their bulbs and hardly know their market).
Dwarswaard, A. Crocosmia sterk in warme zomerkleuren. Bloembollenvisie, 18, 4 September 2003.

Ornithogalum

The company H. Vreeburg & zn. from Hillegom specialises in the growing and forcing of various Ornithogalum species: *thyrsoides*, *saundersiae* and *magnum*. The company grows a total of 5-6 hectares of Ornithogalums, mostly *thyrsoides* varieties and selections, plus a few selections of their own such as 'Alaska', 'Antartica' and 'Mount Everest'. Furthermore they have a breeding program and have selected varieties for flower production (larger than the existing varieties) and some for pot culture. They expect a lot from these new varieties. The cultivation is difficult and their main problems are fungal diseases both in the field and also in the storage of the dry bulbs. H. Vreeburg & zn. does their own promotion: they show how the plants can be used as cut flowers or as potted plants and in the last few years the dry sales wholesalers received bulbs to test. The wholesalers are enthusiastic, as they are always looking for something new.
Dwarswaard, A. Uitkijken naar nieuwe Orni's. Bloembollenvisie, 26, 25 December 2003.

Rhodohypoxis

Koos van Dijk and Jannie van der Berg, the owners of Nursery Alpine, first became interested in *Rhodohypoxis* when they saw the plants for the first time in England 15 years ago. Now they grow 50 to 60 varieties, mostly varieties/selections of *R. baurii*. There are two main aspects of the cultivation that require attention. Firstly the plants are not resistant to frost, so Koos and Jannie have to grow the plants outside in pots and take them into the greenhouse in autumn. Furthermore the plants need sufficient water, especially before and during the flowering period. Pests and diseases are still absent, and there are no problems with snails, aphids, thrips or fungal diseases. Nursery Alpine sells the corms to wholesale companies for dry sales. They also attend several horticultural shows where they sell them as flowering plants directly to the consumers. Most consumers are very enthusiastic as the *Rhodohypoxis* varieties are easy to grow and they flower for a long period in summer and the beginning of autumn. (Personal remark. I have only had disappointing experiences with trying to grow flowering plants from the dry corms, and I am not the only one. The corms are too dry and do not sprout again.)
Dwarswaard, A. Maandenlang één bloemenzee. Bloembollenvisie, 38, 10 June 2004..

Lachenalia

John van der Vossen of Vosbol International has been enthusiastic for many years about the *Lachenalia* varieties his company grows and sells, and he puts a lot of his time into the promotion of the plants. He travels all over the world to show the plants to potential consumers, growers and flower forcers. The reactions are positive, and people are interested in the Lachenalias shown as potted plants. Vosbol International grows ten varieties, e.g. 'Rupert', 'Rosabeth' and 'Rolina', under the brand name 'African Beauty'. The bulbs are grown in South Africa. Research has shown that the best period to sell the forced plants is November-April, although year round production is possible. Vosbol International is not only active in growing, selling and promoting the bulbs, but also in breeding. They are working on new varieties for pot culture, and also for cut flower production. For cut flowers the flower stem must be at least 40 cm long. Last winter the company of Van der Vossen sold the first *Lachenalia* cut flowers and the buyers were very interested. The next goal in the breeding program is to get more varieties with fragrant flowers.
Dwarswaard, A. 'Consument koopt iets moois uit Afrika'. Bloembollenvisie, 39, 24 June 2004.

Ixia

Ixia has been grown by Dutch commercial bulb growers for more than a century. One of the companies involved in breeding and growing Ixias is W.F. Leenen (www.wfleenen.com) from Sassenheim. This company has grown Ixias for more than 50 years and has it's own breeding program which has resulted in various interesting varieties like the white flowering 'Gemini' and the pink-orange 'Ursus'. W.F.Leenen is one of the only *Ixia* growers in The Netherlands who grows varieties, most other growers grow mixtures of various colours. The company is very positive about the potentials of *Ixia* as a cut flower as well as in dry sales. In the cultivation the only aspects which need attention are *Fusarium* and weeds. W.F. Leenen has tried to grow species bought from South Africa. They cultivated them for a couple of years, but it was very difficult to grow them under Dutch conditions.
Dwarswaard, A. Ixia mooi artikel voor massaal gebruik. Bloembollenvisie, 41, 22 July 2004.

Babiana

In the late 1980s Gebroeders Beelen from Lisse had to take some decisions to ensure the continuity of the company. The company cultivated dahlias and hyacinths and was looking for another summer growing crop. They came into contact with Nic Dames, a Dutch IBSA member, who is interested in South African bulbs, especially the Iridaceae. The contact led to the foundation of the company Dames & Beelen and the first attempts were made to grow crops like *Chlidanthus*, *Babiana*, *Moraea*, *Sprekelia*, *Tritonia*, *Chasmanthe* and *Watsonia*. (Personal remark. Dames & Beelen have grown a yellow and an orange selection of *Moraea ochroleuca* on a commercial scale for some years now.) The Babianas the company Dames & Beelen grew proved to be interesting, mainly because they could be grown in the Dutch climate. The company grows two selections based on selections of the former Dutch company Van Tubergen and material from South Africa. The corms are planted when there is no more risk of frost. After planting the only attention the crop needs is weeding which is done either by hand or mechanically. The corms are harvested from the end of September, and the saleable sized corms are sold to wholesale companies which use them for dry sales all over the world: Europe, Japan and the United States. Growing a crop like *Babiana* means investing a lot of time and energy in the promoting of the plants and in personal contacts with potential buyers. Besides that, the company shows flowering *Babiana* plants at several professional meetings to show the interesting rich flowering plants to the potential buyers. Dames & Beelen have tried to grow species like *B. rubrocyanea*, but this was not successful, so they have stuck to their selections.
Dwarswaard, A. Babiana langdurig kleurrijk. Bloembollenvisie, 43, 19 August 2004 ♣

Cultivation of *Gladiolus bullatus*

Matthew Kemp

In Bulb Chat no. 37 (October 2003) there was a note regarding the difficulties of growing *Gladiolus bullatus* in pots. In Tasmania, Australia, I have 5 plants, 3 of which flowered this year for the first time. Two plants produced a single flower while a third plant had 2 flowers. Interestingly the largest of the bulbs was one of the two not to flower. The seed was sown in February 2002. I have followed the advice of most growers and have kept the bulbs slightly moist all summer. Last January we received soaking rain (85mm) and I decided to store all of my winter growing South African bulbs in brown paper bags until repotting in early March. When I tipped *G. bullatus* out of its pot after the rain, I was surprised to see a substantial amount of new root growth (the same with *Romulea autumnalis*). I repotted the bulbs immediately and had leaf growth by late February. It is certainly a long growing season given that the flowers didn't open until the 8th of October. I grow all of my winter growing bulbs in a mix of 5 parts coarse sand (sold locally as sharp sand), 1 part peat moss and 1 part composted pine bark. To this I add a small amount of 8-9 month Osmocote Plus (half the recommended rate). All of my Gladiolus plants were grown in partial shade and sheltered from the few light frosts that we get each year. ♣

Garden Gladioli

Andries T. de Villiers

We all know that these are descended from South African indigenous species but we may not all know how. Actually barely a dozen formed the matrix of the basic hybrids and of these probably only seven or eight are significant. Initially Western Cape species were used but the greatest subsequent advances came from the Eastern Cape and other summer rainfall species. Before commercial horticulturists became active, Dean William Herbert raised a large number of hybrids in the period 1807 until 1847 when he died. His were all Western Cape species, but none are in cultivation today. They were never used in any parallel or later work, though traces of them may exist in some modern specimens.

It was Colville who raised the first hybrid of lasting merit. A nurseryman from Chelsea he produced *G. colvillei* in 1823. It was an early flowering plant, scarlet with yellow lanceolate patches on the lower tepals. It was described by Sweet in the "British Flower Garden" in 1826. Herbert described it as a cross between *G. cardinalis* and *blandus* (now *carneus*), but Sweet thought it more likely to be *G. cardinalis x tristis (concolor*). There have been various differing descriptions because the plant "threw" sports and varieties from 1860 onwards. The first white form was produced in Holland in 1872. It was named "The Bride" and is still popular in America and Europe. A white form, not synonymous with "The Bride" appeared in the Index Londinensis in 1885.

G. ramosus occurred in the nursery of Voorhelm Schneevoogt of Harlem in 1830. Originally vermillion with plum coloured blotches and white stripes on the lower tepals, it is thought to have been perhaps *G. oppositiflorus x cardinalis*. Another chance-come hybrid was *G. insignis* which flowered from a corm of Herbert's stock in 1839. This was owned by Lacombe Pince & co. who bought all the stock of Herbert at the sale of his Chelsea nursery. This plant had deep red flowers with violet blotches on the lower tepals. Although *G. colvillei* remains fairly distinct, there was a plethora of other early flowering hybrids under such names as *G. praecox, nanus, floribundus, delicatissimus*, etc.

A most significant hybrid was grown in 1837 (exhibited in 1839 and 1840) by Belinghaus, gardener to the Duc d'Aremberg of Enghien. One seedling was sold to van Houtte of Ghent, and he named it *G. gandavensis*. This was almost certainly *G. oppositiflorus x psittacinus* (now *dalenii*). It was late flowering and rich in colour in shades and mixtures of red and yellow, often variegated with many flowers open at the same time. Souchet, gardener of Napoleon III at Fontainbleau, raised a number of hybrids (1852 to 1880) between *G. gandavensis* and *G. insignis, G. ramosus* and *G. floribundus*. In 1875 Victor Lemoine of Nancy took pollen from certain varieties of *G. gandavensis* and used it on flowers of the deep yellow and heavily purple blotched *G. purpureo-auratus* (now *G. papilio*). In 1878 one of these flowered. This was named *G. lemoinei* and from it was raised a fine race of hybrids, in time yielding a wide range of exceedingly rich colours. These were exhibited at the International Exhibition in Paris. Disadvantages were that only a few flowers opened at any one time, and that the small flowers were bell-shaped so the inside could not be seen. In 1872 *G. saundersii* flowered at Kew. Lemoine used pollen of his *G. lemoinei* on *G. saundersii* and from that developed the *G.*

nanceianus hybrids in 1885 (exhibited in 1889). These had big very open flowers with beautifully marked throats. The varieties of *nanceianus* were used by James Kelway of Somerset to produce the famous Kelway hybrids. Meanwhile another race was developed in 1874 by Max Leichtlin of Baden Baden in Germany, using *G. saundersii* and *G. gandavensis*. This hybrid flowered in 1877 and was named *G. leichtlinii*. In 1882 he sold his whole stock to V.H. Hallock and son of New York, who worked the strain and sold it in 1891 to J.L. Childs, also of New York. This group came on the market in 1893 as *Gladiolus childsii*.

These notes suffice to indicate the origin of the enormous range of garden Gladoili that exist today. I cannot claim any particular credit for these notes which are principally a précis of the outstanding article by L.B. Creasey in the 1937 Journal of the Botanical Society. The similarity between some of the early hybrids to the *G. dalenii* which appears on the dustcover of Lewis and Obermeyer will not have escaped the reader. For details of other Gladiolus hybrid races, see L.B. Creasey's article pp10 – 14 of the above Journal, an outstanding piece of research. ♣

Of Plant Names and Sacred Cows

Rod Saunders

I trained as a horticulturist in amenity horticulture and worked for many years tending parks & open spaces, sports fields & motorway verges. Mid-way through my career I had a crisis, decided that I did not want to do this for the rest of my life & had the impudence to apply for the post of nursery manager at South Africa's premier Botanic Garden. To my surprise I got the job! For the first few months I lived in awe working at Kirstenbosch. Here I was surrounded by all those experts who previously I had only read about in botanical journals, and now I could count them as colleagues!

Working a few minutes past home time one night, a friend ambled past my desk, idly flicked a white Agapanthus flower onto it and wished me good night. A wicked thought passed through my mind and with the single white bloom I went into the nursery. I selected and filled a pot with soil and placed the flower at ground level so that it seemed to emerge from the soil. I then cut some *Notoscordum* leaves (onion weed) and arranged them in a fan with some florists wire, and they too were placed emerging from the soil next to the white flower. The entire pot surface was covered with some decorative gravel to hide my handiwork and I sought a plant label with which to name my specimen *Albocrocus virgineus.* I accorded it an author and a fictitious collection and accession number, left the specimen on my desk and went home.

The next day I arrived early, took my specimen into the tea room where we commenced the day's activities, and showed off the beautiful flower which had emerged overnight. What had started off as a light hearted joke now developed into a serious discussion on the beauty of *Albocrocus*! My colleagues had heard of it, yes, and knew that it wasn't South African, and it was the first time that any of them had seen it. I could barely contain myself as I answered their questions regarding growing and flowering the plant. The bubble had to pop somewhere! One of the volunteers working in the garden walked into the tea room, looked quizzically at the plant and said "It looks just like an *Agapanthus*", and thus ended my subterfuge. My credibility was in tatters and nobody ever believed me or took me seriously ever again! ♣

The NCCPG Collection of Veltheimias

Jonathon Hutchinson

I first came across Veltheimia 17 years ago whilst at Horticultural College - a large greenhouse bench was full of *Veltheimia bracteata* all resplendent with their luxuriant glossy green undulating leaves below spikes of pink and green pendant tubular flowers. They really did look in the peak of health and happiness! I was unaware at that time of the wealth of fabulous bulbous plants from South Africa. Now years later with a green house full of South African bulbs and other wonderful things, Veltheimias still remain a firm favourite.

In 2002 I decided to apply to the National Council for the Conservation of Plants and Gardens (NCCPG) as a National collection Holder for Veltheimias. In 2003 my collection received National Collection Status.

The Genus Veltheimia is very small with only two species. *Velthimia capensis* is found through the drier winter rainfall areas of Namaqualand, western Karoo and Little Karoo. The foliage of this species is glaucous and flowers are pushed up along with or just after the new foliage has emerged. It has a definite dry summer dormant season.

In my experience the other specie, *Veltheimia bracteata* is a stronger growing plant with a much more forgiving nature to the grower who on occasions may slip with the watering can! I would say this is largely due to the plant's native habitat which stretches from Humansdorp up into Natal where it is found in coastal forest. The dormant season for *V. bracteata* is much shorter and some say unnecessary - certainly on occasions some of my plants have hardly died down before the new growth is starting to show itself in the early autumn.

The collection so far consists of 20 separate accessions which just happen to be made up of 50% of each specie. All the *V. bracteata* are ex.hort, three of which are named varieties 'Lemon Flame', 'Rosealba' and 'Rebbeca Jope' (said to be the same as or very similar to 'Lemon Flame'). Most of these plants are of flowering size and other than the cultivars mentioned, vary in flower colour from pale salmon pink to deep pink. Leaf textures can also vary from a soft dull green appearance to a very thick juicy leaf with a wonderful gloss finish. Leaf edges can be very undulate or less so.

In contrast the plants of *V. capensis* are largely of juvenile state but a small percentage of these are of known wild source which had been collected as seed from the parent plants. Two plants so far have flowered, both varying slightly in degree of pinkness. The leaf textures of the plants seem reasonably similar though the leaf edge undulations may be there to a greater or lesser degree.

What I hope to achieve with this collection is to try and build up a picture of the natural variations of each specie and hope to find out if flower colour and leaf form varies within localised populations, or whether specific forms come from particular areas of that species distribution. Certainly at one time a small growing form of *V. capensis* was given specific rank as *V. deasii*. I wonder does this smaller growing plant occur throughout the range of *V. capensis* or is it restricted to a particular area?

In the mean time I intend to bulk up the plants that I have already got as these plants are so rarely seen and have such a wonderful growing period, particularly through Britain's long and dreary winter months when they continue to give me such a huge amount of pleasure and satisfaction! ♣

Why do some plants bloom in summer?

Written by Joe Shaw for the Pacific Bulb Society

It has been known for many years that some plants respond to day length to control certain activities such as flowering, dormancy, and general growth, etc. This ability is called photo-periodism, and it is not limited to plants. Many organisms take cues from the number of hours of daylight (or number of hours of darkness). In more recent years a number of proteins have been identified called photoreceptors; these molecules respond to different wavelengths of light and have been shown to effect some of the plant responses to light (e.g., shade avoidance and choloroplast movement within cells).

One of the more obvious photoperiodic responses of plants is flowering. How do plants know when to flower? Many plants can grow in cool temperatures and even flower, but it would be folly to flower too early in the season as a late frost could destroy all of the flowers, which tend to be tender. Thus, many plants have evolved a mechanism to delay flowering till days are longer, when the season is more advanced and chances of a frost are reduced. Of course, there are many other reasons plants bloom at a certain time, and one major factor is the presence of a pollinator. There are many plants that bloom only at the precise time their pollinating insect can be expected to be present. In fact some insect-plant pollinator relationships are very fine tuned, and the flowers and insects are only active for a few weeks each year. If they miss each other it might spell doom for both species; no seed set for the plant and no pollen or nectar for the insects.

A molecular mechanism that controls flowering in Arabidopsis has been worked out in the past few years. The mechanism turns out to be fairly simple. Photoreceptors are activated by light and when they are active they can prevent the degradation of a protein called CONSTANS. In turn, CONSTANS can activate certain genes that promote flowering. As with any fine tuned system there are opposing controls. Other photoreceptors cause the degradation of CONSTANS. So there is a balance between the gain of CONSTANS and the loss of CONSTANS. The two opposing mechanisms occur at different times of the day, either late in the day (stabilizing CONSTANS) or early in the day (degrading CONSTANS). The effect is that levels of CONSTANS rise and fall each day. However, the stabilizing effect is enhanced as days become longer and more CONSTANS is able to survive. Finally, when the hours of light reach a critical value, enough CONSTANS accumulates to activate flowering genes.

Plants are clever indeed. From what we know about them it seems likely that CONSTANS is only one way plants regulate flowering by day length. Probably we'll know more in the next few years. ♣

Some Experiences with South African Woody Irids

Martin Grantham

The South African woody irids are a fascinating and little studied group of plants in the Iris family that can grow to be true shrubs producing thickened woody stems that arise from woody caudices. The largest species and the one with the longest cultivation history, *Nivenia corymbosa*, can exceed nine feet in height with a woody base more than a foot and a half across! There are three genera: the monotypic *Witsenia, Klattia* with 3 species, and *Nivenia* with 10 species. All have leaves in two ranks making stiff fans of foliage along flattened stems. The genus *Patersonia* in Australasia shares many features with the South African woody irids and may be their closest relatives. *Patersonia* also produces woody growth, but only in underground stems. The previous genera along with *Aristea* and *Geosiris* have all been placed in the subfamily Nivenioideae within the Iridaceae based primarily on the pairing of the basic irid flowering unit, called a rhipidium, to form binate rhipidia.
I am growing the following species:
Nivenia corymbosa
N. stokoei
N. binata
Witsenia maura
Klattia flava
These were grown from seed either purchased from Silverhill Seeds or shared with me by friends in South Africa. I grow them all with similar care. The free draining soil mix I use includes fine peat, coarse peat, Felton sand, and pumice. I top dress with a layer of pure pumice. I feed with Dr. Greens fertilizer distributed by E. B. Stone in Sasoon, CA, but I think fish emulsion or kelp fertilizers would work as well. These plants produce a large root mass for their size and a relatively large pot is in order. The roots like to be cool, so a black pot hit by full sun can be a problem. I never allow the soil to dry completely between waterings. The plants appreciate bright light and good air circulation. Beyond the seedling stage, the only pest damage experienced has been a bit of nibbling on the leaves by cucumber beetles.

The definitive reference to the South African woody irids is Peter Goldblatt's beautifully illustrated 1993 monograph entitled "The Woody Iridaceae", published by Timber press. Dr. Goldblatt has since published an additional species of *Nivenia, N. parviflora*, in Bothalia, 27,2: 101-103 (1997).

Now I'd like to share with you some of my experiences with a few of these plants beginning with the genus *Nivenia*, plants with flowers in exquisite blues to rival the gentians. These wonderful blue flowers are produced in the heat of the summer by 8 of the species and in the spring by 2. Individually flowers last at most 2 days in sun, but each inflorescence can produce flowers in clusters over several weeks. Numerous inflorescences are initiated over a period of a month so that they are out of phase, prolonging the flowering period which can be up to 2 months. Cut inflorescences in water continue to flower for a month or more. Fires occasionally burn plants back to their woody bases and they can resprout vigorously.

Nivenia corymbosa is the largest, best known, and longest grown of the woody irids. I first saw flowering plants in 1989 while a horticulturist at UC Berkeley Botanical Garden. Former UCBG Director Dr. Robert Ornduff had grown plants for studies on heterostyly. *N. corymbosa* is one of the 6 heterostylous (more exactly, distylous) species in the genus, meaning that individual plants produce either long-styled flowers with short stamens or short-styled flowers with long stamens. These were typical "post research" plants in that they were underpotted and filled with weeds. They still flowered wonderfully with many 5/8 in. deep blue flowers with white throats. The soil was a light, sandy clay and much of it pushed out by copious root production. Later, while briefly in charge of the African Plant collection, I was able to find that these plants are easily rooted from cuttings of vigorous shoots direct from the caudex, treated with low level rooting hormone, and stuck in a 50/50 peat and sand mix with bottom heat. Cuttings from flowering plants can flower themselves in one or two years from rooting and go on to develop a basal caudex just like a seedling. In 1995 at the end of a work/study program funded by the International Plant Propagators Society I was able to see plants in habitat at Bainskloof in western South Africa with Rod and Rachel Saunders. I ordered seeds of 3 species from Silverhill that year: *N. corymbosa, N. stokoei*, and *N. binata*. I also obtained seed of *Witsenia maura* via friends from Betty's Bay. Planted without special treatment in the fall of 1995, these seeds followed a germination pattern which indicated they might have a seed dormancy. Germinants appeared in the fall of 3 successive years. I later made tests of *N. corymbosa* that indicated aged seed germinated well (near 50%) without special treatment, that a GA3 soak at high concentration could increase germination about 10% and make it occur earlier by a week, and further that smoke extract alone delayed germination about a week. Seedlings proved susceptible to two problems in a greenhouse: spring aphids seem to illicit an almost toxic response with yellowing and rapid death at moderate levels of infestation, Botrytis (grey mold) attacked the first senescent leaves and progressed into the stems. Both problems might have been lessened by growing outdoors in higher light where the young plants would produce a tougher cuticle. I ended up with 15 plants from my first sowing of *N. corymbosa*, now 8 years old. The largest has exceeded 4 ft. in height and 3 ft. in width and is producing 50 inflorescences that should flower in Sept. Only 3 of the 15 plants have become competent to flower as yet so this species can have quite a long juvenile period.

Nivenia stokoei has the largest flowers of the genus up to 1.5 in. across, that vary from pale silvery blue to deep blue. It is not heterostylous. The foliage is quite waxy glaucous. It grows in a limited coastal area in and around the Kogelberg Biosphere Reserve. Out of 5 seedlings from 1995, all were competent to flower within 5 years and 3 flowered within 4 years, so this species appears to have a shorter and more uniform juvenile period. The largest plant has reached 2 ft. in height and 2.5 ft. in width in 8 years. When grown under artificial light the flowering time can be shifted. This species also appears easily propagated by cuttings treated as described above. Seed germination has been poor.

Nivenia binata blooms in the spring with flowers that range from pale blue to dark blue and up to a little over 3/4 in. across. The branching pattern of the inflorescence brings the flowers nearly into a single plane It is a heterostylous species. It grows in the Swartberg Mountains over a range of conditions. Out of 4 seedlings only one has become competent to flower in 8

years. The largest plant has reached 2.5 ft. in height by 2 ft. in width. Seed germination has been poor in several attempts.

I had the opportunity to see *N. argentea* and *N. stenosiphon* flowering in habitat last December. They were growing in a harsh environment in the Rooiberg Mountains which are in the middle of the Klein Karoo. Heading up out of succulent scrub there is an interesting transition to a fynbos community and near the top of the formation the woody irids appear. *N. argentea* is striking with silvery bracts around the large flowers of an extraordinary blue. It grew both in exposed areas and under dense shrubs. *N. stenosiphon* was generally growing directly in cracks in rocks and showed many charred branches from previous fires.

Witsenia maura is a plant of wetlands and fairly low elevation. It has large flowers (almost 2 in. long and over 3/8 in. wide) that remain closed with bright yellow, beak-like tips, a green zone which intensifies almost to black and then fades to yellow again at the base. The flowers are borne in conspicuous pairs that mature at the same time. The stigma protrudes from the tip like a snake's tongue. Out of 4 plants from a 1995 sowing, all have flowered in 8 years with the first flowering in 5, so this plant appears to have a relatively short and uniform juvenile period. Despite a nutrient poor soil mix, the plants I'm growing do not stand erect as I've seen them in the wild. They are growing in a way that I interpret as the result of too much nitrogen and must be staked. Germination is reported as good and I think I sowed under 10 seeds to get 4 plants. The tallest has reached 6 ft. in 8 years, but would be lying on the ground without its stake along with its numerous basal branches.

Klattia flava is not the star of the genus, but a few seeds have yielded 2 small plants at this time that appear to be doing quite well. It is reported that *Klattia* gradually regresses and dies in cultivation, but this may be based on plants dug from the wild rather than grown from seed. The most desirable plant in this genus would be *K. stokoei* because the leaves below the fringed head of flowers turn a bright scarlet and hold that color for a long time after flowering. It is a most beautiful plant that grows in the coastal region in and around the Kogelberg Biosphere Reserve. I know some South Africans are trying to grow it and hope they will be successful in its cultivation. ♣

Syringodea uniflora

We understand there is a movement afoot to detach *Syringodea uniflora* from its present genus to a mono-specific genus, provisionally named "*Crocusafricana*". Although we dislike mono-specific genera, we think this move is sensible, although we hope wiser council will prevail in respect of the name!

The Mysteries of Seed Germination

Rachel Saunders

I am sure that every member of IBSA, at some time or another, has sown seeds. In fact, many of us are fanatical seed sowers, even when we know that we have no space for the resultant plants! And every now and then we have all come across some seed which simply does not germinate, no matter what we try. Our first instinct is to blame the seed – it's old, it was harvested incorrectly or it was stored badly. Some species of plants produce large quantities of empty "seeds" – structures that have the normal size and appearance of seeds, but which are empty, and in those cases, we are justified in blaming the seeds. However, in most cases it is not the seed that is to blame – it is us. Either we are doing something wrong, or more commonly, we are not doing something right and we are not doing something that the seed requires.

Every species of plant has one or more mechanism for delaying germination, at least until the seed has been dispersed and until conditions are favourable. The challenge for us, as growers, is to overcome these delay mechanisms. This is often not an easy task as members of the same family or the same genus and even closely related species may have different mechanisms for delaying germination. In 95% of species, the delay mechanisms are chemicals which are typically destroyed by light, drying or varying temperature cycles. Often one species may have more than one chemical blocking system which must be removed in sequence. The remaining 5% of species use a physical system for delaying germination, and this is usually an impervious seed coat.

The first method of removing inhibitors that we will look at is drying. There is a common misconception that seeds will germinate if given moisture and warmth. Often one forgets that the seeds were collected 6 months ago and have been sitting on a shelf in a packet since then! This dry storage of the seeds, done by most of us without thinking, is essential to destroy germination inhibitors in many temperate plant species, particularly in the daisy family, grasses and mustards. A good example that will be familiar to all of us is the Namaqualand daisy, *Dimorphotheca*. If we sow freshly harvested seed, we will get zero germination. However, if we store the seed in a dry bag for 6 months, germination goes up to 100%. The length of time needed for drying depends on the species, the temperature and the humidity, and it varies from 3 weeks for barley to more than 5 years for a species of *Rumex*! All seeds are ultimately killed if stored dry for long enough. Some species cannot tolerate even a week of dry storage, eg willow seed, whereas others can survive for 100 years. Most species probably survive for a year or two. Death rates of seeds follow a rate curve and there is no one point where all the seeds suddenly die – they die over a period so that the germination rate decreases with time.

The next variable is temperature. In some seeds the inhibitor is destroyed at 20°C, in others at 4°C, and in many an oscillating temperature is required. Quite a few of our high altitude plant seeds, and many from the USA or Europe, require a cold treatment – sow the seeds, water them, wrap the pot in a plastic bag and put the whole thing into the fridge for 3 months. Then

bring it out into the warmth, and often the seeds will germinate. Most of our fynbos plants including almost all the SW Cape winter growing bulbs, require oscillating temperatures – warm days of just over 20°C and cold nights of less than 10°C. The simplest way of achieving this is to sow the seeds in autumn and leave the pots outside out of direct light, where they get warm during the day and cold at night. In many cases it is not only the temperature that is playing a role here, it is also the moisture.

Light is also important, and many seeds require light to break down an inhibitor. This is particularly important for plants that grow in swamps or woodland where availability of light is more of a problem than availability of water. However, many of our succulent species also require light, and some bulbous species may too. Several of us have found that if *Gladiolus* seeds are buried too deeply they germinate poorly, so perhaps they have a light requirement.

Gibberellins are chemicals produced by fungi that are found in soil, and they have been found to be important as natural stimulators of germination in up to 25% of species. Some of the smoke filters that we can buy to treat fynbos seeds contain GA3 for this reason.

Seeds imbedded in fleshy fruits often have an inhibitor in the flesh, and this must be removed by washing before the seeds will germinate. The pulp usually contains the inhibitor and this diffuses into the embryo. This can be illustrated by adding the juice of fruits such as apples, grapes or lemons to seeds of another species – their germination is inhibited. In nature a bird or animal eats the fruit and excretes the seed. The question has often been asked whether water washing is enough or do chemicals in the digestive tract of the animal play a role? For most seeds, the inhibitors are water soluble, so soaking in water seems to be sufficient, but in some cases, an aqueous detergent should be added to the water to remove oil soluble inhibitors.

For those 5% of species that have a physical system for delaying their germination, an impervious seed coat is the method commonly employed. Many legumes for example have extremely hard coats which prevent the penetration of water and/or oxygen into the seed. Grinding a hole in each seed works well, as does filing or abrasion of the coat. Another method involves soaking the seeds in hot or even boiling water. Heat causes expansion of the seed coat and this results in microfissures which allow water and oxygen in.

Most species have at least 2 delay mechanisms and it is often quite a challenge to work out what is required. Six months of dry storage followed by a light treatment, or followed by fluctuating temperatures. Or 3 months moist storage at 4°C followed by light and warmth. Or even soaking in hot water followed by fluctuating temperatures and light. And to make things even more complicated, some seeds have a 2 step germination process: in the first step the radicle emerges and a small bulb or corm is formed, and in the 2nd step a leaf forms. Sometimes each step occurs at a different temperature, or the plants require a cold treatment in between.

All of this is enough to put many people off sowing seeds for life! But if we are sensible about our seed sowing, we can get through all these hurdles without even trying very hard, and there

will be only a tiny number of species that require some special treatment. Some things are obvious:

- choose the right soil for the species (most SW Cape bulbous species require well drained sandy soil, whereas those from the rest of the country may require richer soil), and check the soil pH
- fill the pot with the soil and pour boiling water over the soil 3 times to kill any insects, or use Jeyes fluid at a concentration of 1 tablespoon per 5 liters of water
- allow the soil to cool and sow the seeds which have been cleaned of fleshy fruit and had their hard coats abraded if necessary
- sow the seeds at the right time of year for the species – in general, spring for the summer rainfall species and autumn for the winter rainfall species
- cover some of the seeds lightly with soil and leave some uncovered
- water the pot and enclose the pot in a thin polyethylene plastic bag and close loosely
- keep out of direct sunlight and put outside in light shade
- check the moisture every now and then and re-water if necessary
- don't throw the pots away for at least 2 years

If some seeds don't germinate, then is the time to try fiddling with cold treatments, gibberellic acid, smoke etc etc.

There is a small group of species that have seeds with no apparent dormancy mechanisms – this includes all the Amaryllids (except *Cyrtanthus*), and a number of trees such as *Podocarpus* (yellow woods), *Syzygium, Ochna* and several others. In these species, the seeds are what is termed "recalcitrant" (non-conforming) and they germinate immediately after ripening, whether conditions are favourable or not. They need to be sown immediately. If they have a fleshy covering, remove this, wash the seeds well, and sow them by pushing them gently into the soil with about half the seed exposed. Most of the Amaryllids require light to germinate. Short term storage can be achieved by mixing the seeds with damp vermiculite and keeping them in the fridge for a few weeks. But even at this temperature they will invariably start to sprout. Another method of germinating these seeds is to leave them on a piece of damp absorbent paper in the light until they have produced roots and a shoot, and then planting them in soil.

Much of the information for this article comes from a fascinating book called "Seed Germination Theory and Practice" by Norman Deno, a professor of Chemistry. During the 1990s he published a series of soft cover books based on experiments on seed germination of several thousand species of over 800 genera in more than 150 families. ♣

The Bulb Families: Storing Pollen

Taken, with permission, from Jim Shields' website

I collect the pollen as anthers, soon after anthesis (when the anther opens and displays the free pollen). Remove the anther with its pollen from the filament (stem) and place it in a suitable container. I use tweezers/forceps to grasp the stamen by the filament and break it off as they are easier to handle in this way. Fat finger tips tend to spread pollen everywhere, losing most of that which was initially on the anther.

The anther plus pollen must be dried before it is frozen. If your climate is such that your ambient relative humidity is low, you can dry them in air. Mine is not, and I have a drying chamber. Any large container that can be closed air-tight would work. Use a drying agent, such as silica gel (the "blue crystals"). I buy Drierite with blue indicator from Daigger scientific supply co. at: http://www.daigger.com/

Drierite™ Desiccant - Anhydrous calcium sulfate absorbs 14% its own weight in water, it regenerates with heat and can be reused again and again. (Spread in layer one granule deep and heat at 425°F (200°C)for 1 hour to dry it out). It is non-poisonous and non-corrosive. Indicating Drierite changes color from blue to pink when saturated and it then needs regeneration.

Containers: I store anthers in 1.5 ml polypropylene microcentrifuge tubes with caps. I dry the anther/pollen in the open tubes, then cap them. Tubes are grouped in zip-lock plastic bags for convenience and stored in the freezer.
Pollen Viability: A lot of this is hearsay and word of mouth. The numbers apply to thoroughly dried pollen in the freezer.

- Hippeastrum -- 6 to 12 months
- Hymenocallis -- 6 to 12 months
- Clivia -- 4 to 8 years
- Crinum -- 2 to 3 years
- Hemerocallis -- 2 to 4 years
- Nerine -- 1 to 3 years

Viability of stored pollen depends on dryness and temperature. The drier the pollen is before you freeze it, the longer it will stay viable in the freezer. The colder the storage temperature, the longer the viability is preserved. ie., the fridge is good for a week or two or three (at most); room temperature is good for a few days at most.

When using frozen pollen, allow the tube to warm to room temperature before opening it. Apply the pollen to the stigma using a fine camels-hair artists' brush. ♣

The *Zantedeschia jucunda* project on the Leolo Mountains in Sekhukhuneland

Charles Craib & Linda de Luca

Zantedeschia jucunda is one of South Africa's most beautiful plants and is confined to the summit of the Leolo Mountain range in Sekhukhuneland. The autecology of the plants has recently been studied in detail by one of us and details of this research have been published in Herbertia and Veld and Flora (Craib 2002 – 2003, Craib 2003, Craib 2004).

During the course of the research it became evident that bulbs were collected by the local people at certain times of the year and sold to the horticultural trade. The extent of the commercial collection of bulbs varies from one year to the next and assists in providing poor people with some income. It was found during the research that human settlement patterns on the mountain had a beneficial impact on numbers of plants. Grass cover is kept short by grazing animals and fires in winter clear the macro habitat of moribund vegetation. The open habitat with short cover promotes not only the flowering of the plants but also their pollination. The bright spathes are visible over large distances of short grassland readily attracting the beetle pollinators. Excavation of bulbs for sale took place only on a few sections of the mountain. It had a negligible impact on numbers of plants overall.

During November 2003, whilst photographing *Z. jucunda* on the southern end of the Leolo Mountains, a local resident struck up a conversation. He was involved with making and selling curios but commented that the income from this was very little. He asked us if we could suggest any other form of self-employment in which he could engage. One of us (Charles Craib) asked if he would be interested in propagating *Z. jucunda* and selling propagated material to the nursery trade. He expressed keen interest in the idea. A good deal of preparation had to be done to identify a suitable project that would benefit the man and his community. In addition, various people who would be involved with the project had to receive the necessary training.

One of the problems confronting us was the scale on which this very specialised development should occur. The Development Bank funds projects on a regional level and other funding is also supplied on a macro rather than a micro scale. It was decided, therefore, that both of us would supply the initial and on-going training required to start the project. The limited number of start up inputs such as large plastic pots required for propagation were donated by both of us. At a later stage it is expected that funding for the project will be self-sustaining, drawn from the selling of the first crop of corms produced in the nursery.

Linda de Luca has extensive experience in the management of an indigenous nursery and propagation of many species of indigenous plants. Charles Craib has wide experience with propagating indigenous bulbs and corms. He has also carried out a large amount of research concerning the autecology of *Z. jucunda* on the Leolo Mountains. Linda, in addition has an accountancy and financial background and Charles is a Social Anthropologist. He gained

experience as an applied Anthropologist whilst working for the Development Bank. These additional skills, over and above indigenous nursery management are necessary for the success of projects undertaken with local communities.

The people living on the Leolo Mountains are strongly patrilineal (tracing descent through the male line) and concerned with principles of descent (origin from a common ancestor). Residence patterns are often associated with agnatic groups (linking of extended families through males). Animal husbandry and crop production are integrally linked to the patrilineal kinship system. Social living is public with most homesteads in the vicinity visible and many of the economic activities attached to them, transparent. Access to land as a grazing resource, and also land in the valleys for the cultivation of crops, is controlled by chiefs. Chiefs are the custodians of land as the means of production.

It is evident that for enterprises like the *Zantedeschia jucunda* project to succeed, they must operate within the authority structure of chieftainship. The constraints and possibilities in projects will to a large extent be determined by the patrilineal kinship structure. The transparency of social living implies that developments ought to be as beneficial as possible to the widest number of people. For this reason, we have emphasised that project organisation should be equated with social organisation wherever possible. If projects of this nature are seen as public and benefits become evident, the foundations may be present for wider developments involving other flora. On the other hand perceptions of wealth amongst a few beneficiaries is likely to have negative results. The success of the project on the mountain will depend to a large extent on how individuals are able to work with the existing authority and kinship structures. In addition to this, those locally responsible for starting their own businesses, will have to have most of the characteristics of an entrepreneur. The successful individuals are likely to be those able to work tactically within existing kinship and authority structures, and who simultaneously make successful horticultural entrepreneurs.

Producing *Z. jucunda* sustainably from seed is an entirely different enterprise to gathering tubers, an activity possible for anyone living on the mountain.

Issues concerning formalities concerned for producing the plants are in the hands of the local community. The project co-ordinators are only responsible for technical inputs and the establishment of markets for seed produced plants.

A training programme was developed by both of us. It concerns on-going skills training in the propagation of indigenous plants from seed. In addition, skills training in the collecting, cleaning, sorting and storage of indigenous seeds is provided. On the job training is given with striking indigenous plant cuttings in various growing media. A specific mini-course was provided for the collection and germination of *Z. jucunda* seed, including the best methods for cultivation of the corms. The training takes place over periods lasting several weeks at Random Harvest Nursery near Johannesburg.

The greatest problem for horticultural entrepreneurs on the mountain is the very poor access roads. These are tracks in poor condition which take hours to navigate in utility vehicles.

During wet weather roads are unusable owing to the wet sticky norite clay, characteristic of the Leolo Mountains. For the moment no plants can be transported in nursery bags, owing to the fact that there is no access possible for light trucks. Plants will have to be transported manually in sacks and this will favour the production of species with small light bulbs such as *Z. jucunda.*

At present *Z. jucunda* seed is sown either in large plastic pots or directly in the open ground. Seed is sustainably collected initially on the mountain. It is planned that in future, seeds will be harvested from specific *Z. jucunda* orchards established in the vicinity of homesteads. These will be representative of the range of variation in plants found on the mountain.

Initial feedback from the project is that the first batch of seeds have germinated and the seedlings are growing. Saleable size tubers should be available 2 growing seasons after the seeds have germinated.

Projects such as this one are novel concepts and the successes and failures need to be analysed and the results published. This paper is the first of several which we intend to publish. It is likely that future papers will appear on social organisation and *Z. jucunda* production as well as the scope of projects in relatively isolated areas such as Sekhukhuneland.

The project co-ordinator is Linda de Luca at Random Harvest Nursery. Anyone interested in the project should contact Linda on Johannesburg 011 957-2758 or email her at info@rhn.co.za

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Colour Names

Written by Karl King for the International Bulb Society

In studying the matter of colour names, I have compared what the older authors actually wrote, to find which colour names they regarded as equivalent or comparable. It is also enlightening to see how they translated colour names from Latin to English, French, Dutch etc., as well as the reverse -- how English, Dutch, etc. writers used the Latin words. For instance, Paul Hermann (1689) described Amaryllis Belladonna L. as "puniceo flore". In 1740, Jan Burmann, also Dutch, translated this same "puniceo" as Dutch "purpure" in parallel text. English writers have translated "puniceo" as "scarlet", "red" and "orange".

I finally broke down and consulted a standard reference, the Hypertext Webster and a Latin dictionary, to find more connections. Dictionaries can be a surprising source of fun.

Biblical scarlet, as in “scarlet sins”, was a dye made from the *Coccus ilicis*, an insect which infests oaks. Scarlet sins were worse than sins of other colours because the scarlet dye was more colourfast, and therefore harder to wash away. The Arabic name for this dye is kermes, and here the fun begins. Kermes can be found in the names kermesina and Parkinson's chermisina. This is the origin of our word "crimson". It is also the origin of our "carmine". The colouring matter in kermes is carminic acid. Cochineal refers to the same dye. So, scarlet = crimson = carmine = coccinea. It gets better! The kermes insect was regarded as a worm (= verm). So, fabric dyed with it was vermiculatia, which became the French "vermeil" and English "vermilion". Because of the similarity of colour, vermilion became another name for the bright red pigment consisting of mercuric sulphide, obtained from cinnabar. Since the Romans received all their cinnabar from the Iberian penninsula, the Basque name for cinnabar -- armine[a] -- was adopted into Latin as "minium". This name was then transferred to red lead, which is similarly coloured. Thus, vermilion = cinnabarina = miniata, which is tied to the previous list of colour names through vermilion. Latin "cerula" (a small piece of wax) is miniata - meaning a critic's red pencil. This may explain the "blue" rimmed Narcissus I found mentioned in a 16th or 17th century work I viewed on microfiche. Apparently I misread "cerula" as "caerula", and thus transformed scarlet into blue.

Other colour names, such as cerise (cherry), rose, red, rubicunde, rubro, rubido, ruber, rudor, rufus, incarnato, sanguineo are imprecise at best, and mostly within the range of kermes. Rubicunde, for example, is literally "red of the complexion", which is roughly blood-red, though sometimes pale. In use it means "ruddy" - and the redder the better. Aldinus (1625) used "rubicunde" to describe the deep red of his Lilionarcissus rubeus indicus, which Barrelier regarded as “phoeniceus". Rochefort (17th century) described the healthy complexion as lively "vermeil", but used the same word to describe the flesh of a watermelon. So, his vermeil is someone else's incarnato or rubicunde or blush.

The precise colour of a dyed fabric depends on the quality of pigment used, the method of dying, the fabric being dyed, and the mordant used to fix the colour. Then, as now, pigments could be mixed to give desired shades and tints. When Ferrari described the American Amaryllis as "purpura in crocum languente", he may have been referring to a known combination of dyes -- purpura from the sea mollusk (Murex), and a little crocum (=saffron) -- together giving a red-orange colour. (Ferrari described the colour as "rancio", orange, in his Italian edition.) Parkinson (1629) sometimes mentioned a "more Orient red", which may be an allusion to the Phoenician purple, which was called "puniceo" or "phoeniceo", and regarded as an orangey sort of red.

There are fashions in colour, which vary with time and place. A kermes-coloured fabric will vary in colour according to who is making it, and for which market it is intended. Likewise, as Brent Dickerson has mentioned, colour names may be used differently for different plants. Before the 20th century, most European roses were some shade of "rose" or "purple", variously shaded with white. This did not stop Europeans from describing some varieties as "blue", "salmon" or even "orange". 'Paul's Scarlet' is not at all orangey compared with 'Tropicana' or

'Golden Slippers', but can appear vermilion when grown beside purpley or winey red varieties -- a trick of colour perception I have experienced and find rather discomforting.

I checked an etymological dictionary of the English language and found some more interesting bits about colour names. The Greek word phoinos meant "red with blood". It was this word that gave the Greek name for the Phoenicians -- Men of the Purple -- who traded in fabric dyed with the Murex mollusk. One sense of this "phoenician" colour can be seen in the flamingo - phoenicopterus, a Latin transliteration of the Greek name for the bird. Flamingos, by the way, derive their colour from the shrimp they eat, which makes it difficult to distinguish flamingo pink from shrimp pink. One of the supposed Indo-European roots pertaining to red is *reudh (the * indicates a speculative word that may or may not have existed at any time). This and similar words in a variety of related languages gave rise to red, rufus, ruby, rubric, russet, rust and others, as well as the personal names Read and Reid. A cognate Sanskrit word means red or bloody. Purpureus meant red of varying shades, or could pertain to flesh and blood. It was used to describe both roses and poppies = Papaver. My Latin dictionary runs out of steam, here, so I don't know whether to connect papaver with purpureus, or with papae – "Wonderful!", which would be a reasonable description of a field of poppies in full bloom.

Viola, from the Greek Fion (borrowed from a non-Indo-European language), referred to the violet and the stock. A violarius was a dyer of the violet colour. Chambers Etymological dictionary has the word as "wion", which became "ion". (The Greek "F", or digamma, was dropped early on.) We see this in the colour name ionantha, meaning violet coloured. Whether this name was associated with Ionia (west coast of Asia Minor) is another question.

Orange also has an interesting history. Chambers notes that this word, meaning reddish-yellow, was used in English before 1600. The spelling was either orange or orenge -- Parkinson (1629) used both. The name supposedly derives from the Arabic nranj, which would have been altered for easier pronunciation by Europeans. Apparently the "n" was absorbed by the French article (une), and the golden colour suggested a connection with "or" (gold): thus, une orange. This word was then fashioned into a self-consciously Latinate "aurantia", which makes the connection with gold (aurum) more explicit. A lake is a body of water, as everybody knows. A lake is also a deep red or purple-red dye made from the resinous deposits left on trees by certain insects. This usage is borrowed from the French "lac", which we see in "lacquer". By a series of connecting words in several languages, Chambers traces the word through Hindi to Sanskrit, where the cognate word refers to the salmon. Apparently it was the colour of the salmon, yellowish pink, which inspired the name for the dye. And so, by a series of adaptations and modifications, a single root word came to describe a body of water, a fish and a dye. And salmon pink again became tied to reddish-purple.

Overall, it seems that people were interested in colouring their fabrics like blood -- arterial (scarlet) or venous purplish), light or pale. ♣

Botanical Art

Andries de Villiers

A few years ago the members of IBSA, at an AGM, endorsed without discussion the recommendation of the committee to drop the word "growers" from the title of our association; a word which for some 30 years had had a specific and vital relevance to IBSA. I distrusted it at the time, but did not object, for I hoped it would widen the base of our membership to include artists, photographers, writers and conservationists who were aficionados of our indigenous bulbs, without the desire to grow and possess them. It did not, at the time, appear to have been successful, but I believe it is now having an effect for we have members who are content to attend our monthly meetings to view the strange and beautiful plants exhibited and to listen to the talks given. Perhaps the decision was a right one. It persuades me to promote a rather specialized interest: the collection of original botanical art. Quite apart from the investment value of such a collection, it has several advantages despite the undoubted disadvantage that it is likely to be expensive as are all worthwhile cultural pursuits. As I know to my cost, it requires a considerable amount of money to collect stamps, first editions, porcelain and other memorabilia. The advantages in a collection of botanical art are that a plant which you may grow and delight in for three or four flowering days each year remains a joy for 365 days each year. It enables you to juxtapose plants of different flowering periods and places, and of striking habit, never seen together in nature. Do not mistake me. I do not include flower paintings which are part of all traditional artistry and which ignore all aspects of the plant except its petals. Botanical art is a very different, and perhaps more difficult, discipline. In that magnificent book "South African Botanical Art - Peeling back the Petals", the editor committed the solecism of including a flower painting by Irma Stern that was botanically inaccurate and, in fact, not botanical at all. Perhaps it was felt that Irma Stern was too famous to ignore, but it was out of place in a book devoted to botanical art. Botanical art must be artistic to the eye but also, and pre-eminently, morphologically correct and complete. In the same book Auriol Batten's *Clivia nobilis* and Fay Anderson's *Moraea gigandra* are not only works of art but also botanically instructive. My own favourite painting is a garland of spring flowering indigenous bulbs by a lesser known artist Estelle Byrne, commissioned by IBSA. It hangs in a place of honour on my wall where I can see and enjoy it every day. I have recently acquired two magnificent paintings: *Romulea luteoflora* (Gwen Lewis) and *Lapeirousia corymbosa* (John Manning). I mention these because two of the artists are still alive and active (Byrne and Manning) while Lewis died as recently as 1967. I also have two from Curtis magazine (early 19th century), neither of which cost me a significant sum of money.

It never ceases to amaze me that the members of the SA Botanical Artists Association, a very active local body, do not join IBSA when, any month of the year, they could see rare and beautiful plants on exhibition, more interesting than many of those they do paint. They hold an exhibition and sale every two years (September 2004 in Cape Town). I have purposely ignored photographs, however beautiful, as unlike paintings, they are ephemeral, fading in time, less of an investment and less historically interesting. ♣

New Species

Bothalia (2004) 34,1: 17 – 22 *Romulea* species

Two new species of *Romulea* from the western Karoo and Northern Cape are described by John Manning and Peter Goldblatt. *Romulea collina*, from the summit of the Hantamsberg, is yet another yellow flowered species! The corm is subglobose and asymmetric, the 7 to 9 leaves are narrowly 4-grooved, and the deeply cup-shaped yellow flowers have dark marks in the throat and on the reverse. The bracts are papery. The seed capsules are pushed onto the soil surface by pedicels which bend strongly downwards – these later become erect, and the seeds are very large. The plants form clumps, and are found in one very localised colony on the top of the Hantamsberg. They grow in seasonally wet dolerite clay, the flowers open at midday for about 3 hours, and each flower only lasts two days.

Romulea eburnea, from the Komsberg near Sutherland, has pale creamy apricot flowers with a deep yellow cup. The corm is subglobose and asymmetric, the 2-4 leaves have sand adhering to the base, and the flower bracts have broad translucent margins and tips. The plants are known from one small colony in seasonally moist deep sandy soil.

Bothalia (2004) 34,2: 103 – 113 *Thereianthus* species

A new species *Thereianthus montanus* from the Riviersonderend area, is described by John Manning and Peter Goldblatt. The species is about 30cm high and has three linear thickly textured leaves. The flower spike is compact and densely packed with 7 to 10 violet flowers with white throats. Like most other *Thereianthus* species, this one flowers in mid-summer. It is only known from one locality in short grassy fynbos at an altitude of 1500m where it is exposed to frequent mist and cloud in summer. This article also includes a key to the 8 species of *Thereianthus*:

T. racemosus with a short perianth tube
T. minutus with a well developed tube and sword shaped to falcate leaves
T. juncifolius has a well developed tube, a lax flower spike with short bracts and terete leaves
T. longicollis with a dense spike of flowers with 18mm long bracts & corm tunics of coarse fibres
T. montanus similar to above but with bracts of about 6mm and corm tunics of fine fibres
T. ixioides has a compact subcapitate head of white flowers & narrow perianth tube
T. spicatus with wider perianth tube, violet flowers facing upwards with erect stamens and leaves with prominent veins
T. bracteolatus has leaves with no prominent veins & flowers facing sideways with horizontal stamens.

Bothalia (2004) 34,2: 87 – 96 *Babiana* species

The genus *Babiana* was last revised by GJ Lewis in 1959 and 60 species were described from southern Africa. Today the genus is thought to comprise about 80 species, and in this paper Peter Goldblatt and John Manning describe several new species and make various changes. The first change is to the species in the *B. flabellifolia* complex: the long-tubed *B. pubescens*, a relatively short-tubed species *B. truncata* and the long-tubed western Karoo species *B. flabellifolia* identified by GJ Lewis. There is confusion in the taxonomy of these species, and

in this paper, the western Karoo plant is renamed *B. praemorsa*, the short-tubed *B. truncata* is put into *B. flabellifolia*, and a new species in the complex, *B. cuneata*, is described.

B. flabellifolia - up to 8cm high, truncate leaves crowded at the base of the plant, flowers borne at ground level, zygomorphic, mauve to violet with pale markings and sweetly scented, flowers in June or July. It is found in Namqualand and the western Karoo.

B. cuneata - to 15cm, oblong leaves may be hairy or not, zygomorphic flowers borne at ground level, pale blue to violet with white marks, unscented or scented, flowers in August to September. This plant is found in arid fynbos and renosterveld of the Kouebokeveld and the Rogggeveld Escarpment.

B. praemorsa – to 15cm high, the cuneate leaves in a spreading fan and silky hairy. The flower spike is congested, the flowers are weakly zygomorphic, dark violet with white markings often edged with red or darker blue on lower tepals, usually unscented. This species is found in the dolerite outcrops of the Calvinia district,

The next group to be revised is the *Babiana hypogaea* group. The plants in this group have a partly underground spike and an underground ovary, and they were *B. falcata, flavida* and *hypogaea*. Examination of *B. hypogaea* reveals two species, one with slender leaves and pale flowers with a dark marking along the centre line, and one with longer leaves and blue to violet flowers with white markings on the lower tepals. The former species is *B. hypogaea*, and the latter has been named *B. bainesii*.

B. hypogaea – to 8cm high, leaves to 15cm and linear to falcate, flower spike arising below ground level, flowers zygomorphic, greenish-yellow with reddish streaks on lower tepals, strongly scented. Flowering time is mainly June to September. The plants grow on the red sand flats in southern Namibia and the Bushmanland area.

B. bainesii – to 25cm, leaves linear to sword-shaped, flower spike below ground level, zygomorphic flowers in shades of blue to violet, lower tepals with white markings, usually sweetly scented. This species flowers in summer from February to April, and is found in the summer rainfall areas from the Karoo northwards to Zimbabwe and southern Zambia.

The final changes are in the *Babiana stricta* complex. *B. stricta* had 5 varieties: *stricta, erectifolia, sulphurea, regia* and *grandiflora*. Here *B. stricta* var *stricta*, var *erectifolia* and var *sulphurea* are all lumped into *B. stricta*, and the other 2 varieties are raised to species level.

B. stricta – narrow stiff and roughly hairy leaves, zygomorphic flower of varying colour, with the three lower tepals having contrasting markings (white marks on blue flowers and yellow markings on buff flowers).

B. regia – radially symmetric flowers, deep blue with a dark red centre, leaves similar to above. The plants are only found in the Malmesbury Stellenbosch area at one locality near Paarl.

B. longiflora (old *B. stricta* var *grandiflora*) – to 20cm, erect stem, zygomorphic flowers, lilac to deep mauve with white markings on lower tepals, faint rose scent. Flowers in August to September, and is found at the foot of the Piketberg Porterville Mountains.

Botanical Journal of the Linnean Society (2004) 146: 369 – 374 *Clivia robusta*, a new species from Pondoland Murray, BG et al

In 1960 some specimens of an unidentified Clivia were sent to NBI in Pretoria, and these were later identified as *Clivia gardenii*. At the time, differences in morphology of these specimens were attributed to natural variation. However, chromosome and DNA sequence analysis have subsequently shown that it is in fact a different species with distinct morphology, but clearly related to *C. gardenii*. The plants grow to almost 2m in height, have a huge root system including buttress roots on the vertical rhizome, and the leaves are broad and strap-shaped. The pendulous flowers vary from dark orange red with red tips through pale orange to pink orange, and both the stigma and stamens are included within the corolla tube. The flowering time is early autumn to late winter. The plants prefer perennially wet swampy habitats in swamp forests, but are also found on river banks. *Clivia robusta* is a Pondoland endemic species.

The Pondoland centre of endemism extends along the Indian Ocean coast from Port St Johns (in the Eastern Cape) to Port Shepstone in southern Kwazulu Natal. The area was named after the Pondo people who settled here in the 16th century. The area consists of rugged plateaux with narrow river gorges, and varies between 100 and 500 meters above sea level. The climate is sub-tropical and the summer rainfall is over 1000mm. Fires are an important aspect of the ecology – fires maintain the grassland, and in areas which do not burn, forests develop. Most of the rock is sandstone, overlaid by shallow sandy acidic nutrient poor soils. Much of the area consists of grassland with patches of forest in the gorges where they are protected from fire. The area has a high number of endemic plants and is, for example, the centre of endemism for *Plectranthus*. Bulbous/cormous plants endemic to the area include *Cyrtanthus brachyscyphus, Aristea platycaulis, Kniphofia coddiana, Watsonia bachmannii, W. mtamvunae* and *W. pondoensis*. Other bulbs found in the area include *Crocosmia aurea, Clivia miniata, Scadoxus multiflorus* ssp *katherinae*, several *Dietes* species and *Gloriosa superba*.

Novon (2004) 14: 288 – 298 Peter Goldblatt and John Manning
This paper includes various taxonomic changes:
Ixia frederickii is included in *Ixia dubia.*
Gladiolus erectiflorus var *verdickii* is raised to species level as *G. verdickii.*
Tritonia marlothii ssp *delpierrei* is raised to specific status as *T. delpierrei*.

A new species of *Ixia* is described: *I. superba* – this species grows at the foot of the Langeberg in the Little Karoo. It is to 60cm in height, has 3 basal leaves usually about half as long as the stem, the flowers are salver-shaped, actinomorphic and pink with a black centre, and have a light sweet scent. The plants flower in September.

Moraea simplex, a new species from the clay flats at the eastern foot of the Piketberg, is described. The plant is to 40cm in height, the leaf is solitary and exceeds the stem in length. The flowers are uniformly pale creamy yellow and unscented. Flowering time is late September and October. ♣

Name changes

Probably the most radical change that we need to take note of is the revision of the southern hemisphere Hyacinthaceae. This was published by J. Manning, P Goldblatt and M Fay in the Edinburgh Journal of Botany (2004) 60: 533-568, and a summary of the paper follows:

Hyacinthaceae has 700 – 900 species, and one of the big problems in this group is a lack of good diagnostic characters for many genera. To distinguish between Albuca or Ornithogalum, and Drimia and Urginea is often very difficult. Traditionally many of the genera were based on floral characters alone, and this may be unreliable due to the selective pressure of pollination strategies. This can result either in a huge number of very small genera within the family, or in one large genus with many heterogeneous species "lumped" into it.
In this paper the authors have lumped together *Albuca, Dipcadi, Galtonia, Neopatersonia, Pseudogaltonia* and *Ornithogalum* into one single genus *Ornithogalum*. This group (the sub-family Ornithogaloideae) is characterised by flattened or angular seeds with tightly adhering testa.
The second sub-family Urgineoidea has two genera, *Bowiea* and *Drimia*, with *Tenicroa, Litanthus, Schizobasis* and *Rhadamanthus* included in *Drimia*. It is characterised by spurs on the lower bracts of the inflorescence and flattened or winged seeds with brittle loosely adhering testa.
The third and final sub-family, Hyacinthoideae contains Hyacintheae (all northern hemisphere plants), Massoniaea (*Veltheima, Ledebouria, Drimiopsis, Resnova, Massonia, Merwilla, Eucomis, Schizocarphus, Namophila, Lachenalia, Spataea* and *Daubenya*) and Pseudoprosperaceae with one species *Pseudoprospero firmifolium* (the old *Scilla firmifolium*).

This means that there are many name changes in the new genus. *Ornithogalum* now consists of about 200 species worldwide, including about 70 species in the western Cape.

Species previously in Albuca:

Old name	**New name**	**Old name**	**New name**
Albuca abyssinica	Ornithogalum abyssinicum	A. humilis	O. humile
A. longifolia	O. albanense	A. imbricata	O. imbricatum
A. acuminata	O. acutum	A. karasbergensis	O. karasmontanum
A. monophylla	O. angolense	A. villosa	O. lanatum
A. caudata	O. aristatum	A. leucantha	O. leucanthum
A. aurea	O. auratum	A. longipes	O. longipes
A. batteniana	O. battenianum	A. macowanii	O. macowanii
A. baurii	O. baurii	A. maxima	O. maximum
A. bifoliata	O. bifoliatum	A. collina	O. monticola
A. prolifera	O. bulbilliferum	A. rogersii	O. moylei
A. spiralis	O. circinatum	A. namaquensis	O. namaquense
A. clanwilliamae-gloria	O. clanwilliammae-gloria	A. dinteri	O. namibiense
A. cooperi	O. cooperi	A. nelsonii	O. nelsonii
A. cremnophila	O. cremnophilum	A. tenuifolia	O. nematophyllum
A. crinifolia	O. crinifolium	A. papyracea	O. papyraceum
A. crudenii	O. crudenii	A. nana	O. parvum
A. dalyae	O. dalyae	A. patersoniae	O. patersoniae

A. decipiens	O. decipiens
A. reflexa	O. desertorum
A. bifolia	O. diphyllum
A. paradoxa	O. dividens
A. rupestris	O. drakensbergense
A. echinosperma	O. echinospermum
A. engleriana	O. englerianum
A. etesiogaripensis	O. etesiogaripense
A. exuviata	O. exuviatum
A. fastigiata	O. fastigiatum
A. ciliaris	O. fimbrifolium
A. flaccida	O. flaccidum
A. fleckii	O. fleckii
A. foetida	O. foetidum
A. fragrans	O. fragrans
A. glandulosa	O. glanduliferum
A. glauca	O. glaucescens
A. goswinii	O. goswinii
A. hallii	O. hallii
A. hereroensis	O. hereroense
A. hesquaspoortensis	O. hesquaspoortense
A. pendula	O. pendulum
A. robertsoniana	O. robertsonianum
A. massonii	O. saxatilis
A. schlechteri	O. schlechteri
A. schoenlandii	O. schoenlandii
A. setosa	O. setosum
A. shawii	O. shawii
A. affinis	O. simile
A. tenuis	O. tenuis
A. polyphylla	O. teretifolium
A. thermarum	O. thermarum
A. tortuosa	O. tortile
A. trachyphylla	O. trachyphyllum
A. transvaalensis	O. transvaalense
A. viscosa	O. viscosum
A. weberlingiorum	O. weberlingiorum
A. corymbosa	O. wilsonii
A. xanthocodon	O. xanthocodon
A. amboensis	O. amboense
A. kirkii	O. kirkii

Species previously in Dipcadi:

D. bakerianum	O. bakerianum
D. concanense	O. concanense
D. cowanii	O. cowanii
D. crispum	O. crispum
D. durandianum	O. durandianum
D. erythraeum	O. erythraeum
D. heterocuspe	O. heterocuspe
D. hyacinthoides	O. hyacinthoides
D. longifolium	O. longifolium
D. magnum	O. magnum
D. maharashtrense	O. maharashtrense
D. minor	O. minor
D. papillatum	O. papillatum
D. platyphyllum	O. planifolium
D. readii	O. readii
D. reidii	O. reidii
D. rigidifolium	O. rigidifolium
D. saxorum	O. saxorum
D. serotinum	O. serotinum
D. montanum	O. turbinatum nom.nov.
D. montanum var madrasicum	O. turbinatum var madrasicum
D. ursulae	O. ursulae
D. vaginatum	O. vaginatum
D. viride	O. viride
D. gracillimum	O. dipcadioides
D. brevifolium	O. hyacinthiflorum

Species previously in Galtonia:

G. candicans	O. candicans
G. princeps	O. princeps
G. regalis	O. regale
G. viridiflora	O. viridiflorum

Species previously in Neopatersonia:

N. falcata	O. falcatum
N. namaquensis	O. filicaule
N. uitenhagensis	O. uitenhagense

Species previously in Pseudogaltonia:

P. clavata	O. clavatum ♣

Book Review

Crocosmia and Chasmanthe

RHS A Plant Collector Guide
By Peter Goldblatt, John Manning, Gary Dunlop with illustrations by Auriol Batten
Published by Timber Press in conjunction with the Royal Horticultural Society 2004
219pp Hardcover ISBN 0-88192-651-5

"Crocosmia and Chasmanthe" is a cheerful and eye-catching book that attracts attention on the bookshelf. It has a conventional case binding with stitched sections and is robust with no slackness in the spine. The brightly coloured dust jacket completes the binding.

The book is the sixth written by Peter Goldblatt and others on horticulturally significant genera of the Iridaceae. The previous publications have been strictly taxonomic works, albeit with strong popular appeal. This one is the first to include a section on the history of cultivar breeding and the horticultural development of the genera.

The first chapter deals with early exploration and discovery. *Chasmanthe* was the first of the two genera to be recorded in 1635 – it was illustrated by a woodcut and was named *Gladiolus aethiopicus flore coccineo*. This plant was formally named *Antholyza aethiopica* (now *Chasmanthe aethiopica*) by Linnaeus in 1759. The discovery and description of the Chasmanthe species makes extremely interesting reading. The first *Crocosmia* species to be discovered was *Crocosmia fucata*, a rare species from Namaqualand, possibly found by James Niven in 1798. The much more common *C. aurea* was first collected by Johan Franz Drege in 1832, and discovery of the other species followed this.

Following this chapter is one entitled "Plant Form and Structure", illustrated with line drawings by John Manning. Leaf anatomy, flower structure and seed development are all illustrated and discussed in detail.

The third chapter is on ecology, and the section on pollination makes fascinating reading. I had never really thought about the pollination of Crocosmia, and had accepted that they were probably mostly bird pollinated. In reality however, they are mostly very specific in their pollinator requirements and birds are only involved in a few species.

Following ecology is the chapter on Evolution and Classification, and as can be expected from authors of such note, the descriptions are lucid and are more extensive than in a purely "botanical" book. The chapter is 57 pages long and describes all the species of both genera. The text is illustrated by Auriol Batten's charming pencil sketches of plants in habitat, and water colour paintings of each species. My only criticism of the book is that the colour plates are not opposite the text, but are all lumped together in the centre of the chapter on classification. The paintings of the cultivars are also included here, and are only described in

the chapter at the end of the book. I am told that publishers do this in the interests of economy. I have strong views on this and feel that it is not economical, but is cheap and nasty!

The second last chapter deals with cultivation and the final extensive chapter with cultivars of *Crocosmia*. Surprisingly, apart from the species *Crocosmia aurea* and *paniculata*, the genus and its many cultivars (420 listed in this book) are not frequently encountered in South African gardens. There are a remarkable number of cultivars when one considers that there are only 7 species of *Crocosmia*, and they are all basically shades of orange to red. I grow "Lucifer" in my garden – it is a fine plant and this book has whet my appetite to find and try some of the others.

Finally the book has an excellent glossary for those who are confused by technical terms, a comprehensive bibliography for those who wish to know more about the subject, and finally an excellent list of suppliers of bulbs, unfortunately none in South Africa.

My one criticism aside, this book is a must for everyone interested in these fine garden plants.

Rod Saunders ♣

Book Review

Southern African Wild Flowers Jewels of the veld

By John Manning and photography by Colin Paterson-Jones
Published by Struik Publishers 2004
176pp Hardcover with dust jacket ISBN 1770070176

A number of authors have dealt with various regions and aspects of the Southern African flora, but few authors have tackled the task of capturing the entire Southern African flora in all its glory. This book does just that, and does it exceedingly well.

The book roughly follows the regions of endemism as laid out in the book "Regions of Floristic Endemism" by van Wyk and Smith. However, the similarity ends there. "Regions of Floristic Endemism" is learned and academic, whilst "Jewels of the veld" is artistic and passionate.

The Introduction briefly discusses the geography, climate, vegetation and origin of the flora of SA. The rest of the book is divided into 3 main sections:
"Land of Plenty" which deals with the entire eastern part of the country
"Fynbos Country" which covers the SW Cape, and
"The Thirstlands" which describes the western half of Southern Africa.

Each section has various sub-sections, such as “Gateway to Namaqualand”, “The Bulb Capital”, and “Garden of the Gods” which break the country down into smaller more manageable areas. The text is extremely informative, with details of the local geology, the history, pollinators, rare and endangered species from the area, habitat destruction, and much more. It is packed full of facts but is written in such as way that one is lead on from page to page and from area to area.

Colin Paterson-Jones’ photography is superb. He has captured the plant’s sense of place in the landscape, be it bleak, arid and windswept, or sheltered and protected beside rocks or beneath surrounding vegetation. Even the best photography can be reduced to lifelessness by poor reproduction and printing. The reproduction in “Jewels of the veld” is some of the best I have seen. The semi-matt paper used in the main text is very easy on the eyes and it is a pleasure not having the reflective interference of gloss paper.

Whilst many readers who buy only strict reference works may be discouraged from buying this, I saw several illustrations in “Jewels of the veld” that I have never before seen in any other book. How many of you have seen *Babiana carminea, B. tanquana, Ixia acaulis* or *Hexacyrtis dickiana* illustrated previously?

All in all, it is a superb book with superb text, magnificent photographs, and excellent reproduction. Congratulations to all concerned.

For Cape readers, I heartily recommend you buy this book as it will shake you out of your complacency! Apart from the 8 500 species in the Cape Floral Kingdom, there are still 13 000 species in the remainder of the sub-continent, and this book illustrates many of them. For readers elsewhere in South Africa, it will serve to remind you just how precious the landscape around you is. And for overseas readers, this is the definitive flower guide book to South Africa. Read the epilogue and visit South Africa now before it is too late!

Rod Saunders ♣