Editorial

Our personal botanical book collection is housed on shelves in our dining room. Not only is it extremely decorative along one long wall in the room, but it is also a good conversation piece while eating dinner! The collection, which is far from complete, consists mainly of books on Southern African indigenous plants, and the "South African" books occupy 12 shelves, each 1 meter in length. And that is only the books – it does not include the journals such as "Flowering Plants of Africa", Bothalia and the SA journal of Botany which occupy another 7 meters of shelves. I haven't ever taken the time to count the books, but 12 meters is a lot of publications, and it is astounding to realise that they are all concerned with one subject, our flora.

The wealth of our country's flora has fascinated travellers and botanists since their first visits to South Africa. Many plants were taken home to Europe and these were described and illustrated as early as 1605. Initially in the history of mankind, plants were of importance as medicines and in folklore, and were not really scientifically described. This changed in the 16th and 17th centuries when scientific knowledge of plants was first recorded, and the study of plants was split into medical and scientific. It is interesting to note that many botanists were also originally medical physicians.

The indigenous peoples of South Africa certainly used our plants – they ate them, used them for medicinal and magical purposes, and sheltered under them, but they did not record their knowledge in any formal manner. The first plant to be illustrated in a book was Protea neriifolia which was included in a 3 volume work on exotic plants published in 1605 by Charles de L'Ecluse of the University of Leiden. The origins of the plant were obviously obscure as it was described as a thistle from Madagascar! In the same year an illustration of some Haemanthus bulbs appeared in a Belgian publication – these were described as "Narcissus Aphricanus bifolius".

In 1624 Justus Heurnius described and illustrated 10 plants that he found on the lower slopes of Table Mountain, and these were ultimately included in a book published in 1644. All the illustrations up to this time were woodcuts, not a medium well suited to the illustration of delicate flowers. Copperplate engraving and etching took over from woodcuts from 1600 onwards, and these were eminently more suitable for flower drawings.

The first botanist to visit the Cape was Paul Hermann who came to Table Bay in 1672. He formed a herbarium collection that made a major contribution to botanical knowledge. Once a permanent settlement was established in 1652, many early settlers collected plants and sent them back to Europe. From this time onwards, more and more of our plants appeared in gardens, often medicinal gardens, and in books. Many plants were illustrated by people such as Johannes Commelin and Heinrich Claudius, both druggists involved with medicinal plants. The importance of the gardens established by Van Riebeeck was two fold – firstly to supply fresh vegetables to passing ships, and secondly to grow horticulturally interesting plants. In 1693 a master gardener was appointed and one of his jobs was to search for and to grow medicinal plants. This resulted in many new plants being collected, described, grown and

painted. The first systematic explorations to study the South African flora were made by Carl Peter Thunberg, a Swede, in the 1770s. He collected over 3000 species, of which 1000 or so were new, and he is known as the "father of South African botany". He was followed by people such as Sparrman, Masson and Burchell, all of whose names are well known to us today. They all travelled extensively in the interior of the country, and made large collections of plants as they went.

Modern botanical science began with William Henry Harvey, an Irishman, who visited South Africa between 1835 and 1841. He produced "The genera of South African Plants" in 1838, the first botanical book to be published in South Africa. All the illustrations in Harvey's book were done by lithography (a process of obtaining prints from a stone or metal surface that is treated so that what is to be printed can be inked but the remaining area rejects the ink). He was followed by Harry Bolus, John Medley Wood, Rudolf Marloth and TR Sim, all of whom published important botanical works. Until the end of the 19th century, most publications were very learned and scientific or medical, and were not really meant for the lay person. It was only in the 20th century that more "popular" books were produced in South Africa – two books by Louisa Bolus (Harry Bolus's niece) and in 1950, the first of the Botanical Society Field Guides. Since then the number of popular and scientific books on the South African flora has escalated, resulting in our 12 meters of books today. This includes many detailed monographs on genera such as the Stapeliae, the Watsonias, Pelargoniums, Ferns, Aloes, Lithops, Gladioli and many others. It also includes regional flower guides such as Cythna Letty's "Wildflowers of the Transvaal", the Botanical Society Field Guides, many tree books of various areas and "The Color Encyclopedia of Cape Bulbs". The books are all well illustrated, either by photographs or by botanical art. It is debatable which is more effective, but possibly the essential quality of a flower is captured more adequately by an artist with paints and a brush, than by film. We are lucky in that we have a large number of extremely talented botanical artists in South Africa whose work can be seen in many modern publications as well as at various art exhibitions.

The subject that has attracted the largest number of publications is probably succulents. With 5 or 6 books on Aloes, eight or more on the Mesembs, several on Gasterias, Haworthias, Stapelias and Euphorbias, not to mention the more general books such as those on "Succulents of the Transvaal" and "Succulent Flora". Of our 12 shelves, succulents take up almost 2 meters.
Then come tree books, closely followed by books on bulbous plants. As bulb lovers we are lucky with 1 meter of publications on Kniphofias, Eriospermums, the ever popular Gladioli and Moraeas, Romuleas, Lachenalias, Babianas, Geissorhizas, Tritonias, Agapanthus, Haemanthus, as well as general books such as "The Spring and Winter Flowering Bulbs of the Cape" beautifully illustrated by Barbara Jeppe, "Bulbous Plants of Southern Africa" by Neil du Plessis, Graham Duncan and Elise Bodley, and the latest lavish publication "The Color Encyclopedia of Cape Bulbs" by John Manning, Peter Goldblatt and Dee Snijman.

We have a glut of botanical books, beautifully presented, lavishly illustrated and affordable to all of us. No longer are books the preserve of the rich and influential – we all have access to them, and we should honour and thank our botanists and botanical artists! ♣

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

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

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

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

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

Massonia grandiflora differs from *Massonia depressa* only in the size of the flowers and

leaves, which are slightly larger in *M. grandiflora*. *Massonia grandiflora* has, however, often been considered deserving of its species rank by previous authors. DNA data shows the genetic sequence of *M. grandiflora* to be identical to that of *M. depressa*, thus indicating that it should be reduced to the synonymy of *M. depressa.*

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

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

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

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

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

perianth tube that is equal in length to the perianth segments.

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

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

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

anatomical, palynological and molecular information. In this thesis phylogenetic characters were used to bring clarity to the morphological characters and the morphological characters were used to test the phylogenetic tree.

Key to the species of *Daubenya*

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

- Flowers slightly zygomorphic; white to lilac-tinged.....*D. alba*
- Flowers actinomorphic; yellow to orange
  - Tepals prominent, 11-15mm long, spreading from base of staminal tube; disc present on top of staminal tube; styles non-persistent on capsules.....*D. capensis*
  - Tepals reduced, up to 2mm long, minute at top of perianth tube; staminal disc absent; styles persistent on capsules.....*D. stylosa*

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

- Lower flowers of inflorescence strongly zygomorphic with three large tepals and three smaller ones, differing greatly from upper flowers; coma of bracts absent.....*D aurea*
- Lower flowers of inflorescence slightly zygomorphic or actinomorphic; lower and upper flowers subsimilar or the same; coma of bracts present
  - Perianth tube of lower flowers 25-45 mm long; tepals recurved; filaments all free.....*D. comata*
  - Perianth tube of lower flowers 10-25 mm long; tepals suberect or spreading; filaments all or partially united into a tube
    - Flowers bilabiate, tepals equally fused, linear; flowers scented.....*D. namaquensis*
    - Flowers not bilabiate, tepals not equally fused, ovate to lanceolate; flowers unscented, inflorescence conical, protruding well above leaves; tepals yellow to orange, somewhat fleshy; stamens yellow to red; conspicuous coma of orange or yellow bracts.....*D. marginata*
      - Inflorescence capitate, hardly protruding above leaves; tepals white, papery; stamens red with purple base; inconspicuous coma of small green bracts.....*D. zeyheri*

Geographical Distribution and Ecology

Daubenya alba occurs in scattered colonies along the edge of the Roggeveld escarpment, between Calvinia and Middelpos. The species grows in heavy doleritic clay, as do most of the

other *Daubenya* species. Plants appear to be restricted to the lower-lying drainage areas. The flowers are strongly scented during the day and night, and flowering time is from May to June.

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

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

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

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

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

Daubenya stylosa is a highly local endemic and like *D. capensis* occurs only around Nieuwoudtville. It is known from a few populations in the immediate vicinity of the town, the

Wildflower Reserve and the Farm Glenlyon. Plants are abundant in these populations and grow in the red doleritic clays so typical of this genus. Flowering time is May.

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

Key to the species of *Polyxena*

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

- Inflorescence distinctly corymbose.....*P. corymbosa*
- Inflorescence subcorymbose or racemose
  - Perianth tube very short, ¼ of the length of the perianth segments, inflorescence distinctly racemose, flowers campanulate .....*P. brevifolia*
  - Perianth tube equal in length to perianth segments or longer, inflorescence subcorymbose, flowers funnel-shaped
    - Perianth tube equal in length to perianth segments, stamens included in perianth tube, leaves always 2 .....*P. paucifolia*
    - Perianth tube at least double the length of the perianth segments, stamens exserted above recurved perianth segments, leaves 2 or 3 .....*P. longituba*

Leaves lanceolate or ovate, obtuse, 2 per plant

- Perianth tube 3x the length of the perianth segments, perianth segments strongly recurved.....*P. pygmaea*
- Perianth tube up to double the length of the perianth segments, perianth segments erect to spreading
  - Stamens included in throat of the perianth tube .....*P. ensifolia var. maughanii*
  - Stamens exserted beyond the throat of the tube .....*P. ensifolia var. ensifolia*

Geographical Distribution and Ecology

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

P. corymbosa is restricted to the Cape Peninsula and was originally collected on Lion's

Head. The species occurs in isolated patches around Greenpoint, Bantry Bay and Camps Bay. Plants grow in sandy soil or sometimes in gravely soils and rock crevices. Flowering time is from April to June and flowers are pleasantly scented.

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

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

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

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

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

Key to the Species of *Massonia*

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

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

Outermost bracts hairy, coma of green bracts present in centre of inflorescence.....*M. hirsuta*

Outermost bracts glabrous, coma of green bracts absent from centre of inflorescence

Stamens biseriate, of 2 lengths; leaves glabrous or pustulate but then with long hairs .....*M. pygmaea*

Stamens uniseriate, all of equal length, leaves glabrous, echinate or pustulate, but seldom hairy

Filaments long, 17-24mm; style long, 10-30mm; leaves pustulate ..*M. pustulata*

Filaments short, 2-8mm; style short 5-10mm; leaves glabrous, echinate or minutely pustulate

Perianth tube twice the length of the perianth segments, perianth segments sometimes lacking sigmoid curve; filaments 2-4.5mm; restricted to the Eastern and Northern Cape Provinces and Lesotho .....*M. jasminiflora*
Perianth tube equal in length to perianth segments or slightly longer; perianth segments with sigmoid curve; filaments 5-8mm; widespread in the Western Cape Province .....*M. echinata*

Geographical distribution and ecology

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

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

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

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

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

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

crevices. Flowering time is from April to May.

Geographical Distribution and Notes on *Whiteheadia*

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

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

Table of Species Currently Recognized Together with their Synonyms

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

	Neobakeria haemanthoides (Baker) Schltr.
	Massonia angustifolia auct. non M. angustifolia (=M. echinata L.)
D. namaquensis (Schltr.) A.M. vd Merwe	*Neobakeria namaquensis* Schltr.
D. stylosa (Barker) A.M. vd Merwe & J.C. Manning	*Amphisiphon stylosum* [‘*stylosa*’] Barker
D. zeyheri (Kunth) J.C. Manning & A.M. vd Merwe	*Massonia zeyheri* Kunth
	Polyxena zeyheri (Kunth) Dur. & Schinz
	Massonia pedunculata Baker
	Massonia burchellii Baker
	Neobakeria burchellii (Baker) Schltr.
	Massonia angustifolia auct. non *M. angustifolia* (=*M. echinata* L.)

Genus *Massonia*

M. depressa Houtt.	*Massonia latifolia* L.f.
	Massonia sanguinea Jacq.
	Massonia obovata Jacq.
	Massonia grandiflora Lindl.
	Massonia brachypus Baker
	Massonia triflora Compton
M. echinata L.f.	*Massonia scabra* Thunb.
	Massonia muricata Ker-Gawl.
	M. longifolia Jacq. var *candida* Burch. ex Ker-Gawl
	Massonia huttonii Baker
	Massonia setulosa Baker
	Massonia tenella Soland. ex Baker
	Massonia versicolor Baker
	Massonia calvata Baker
	Massonia latebrosa Masson ex Baker
	Massonia amygdalina Baker
	Massonia parvifolia Baker
	Massonia dregei Baker
	Massonia cocinna Baker
	Massonia candida Burch. ex Baker
	Massonia modesta Fourc.
	Neobakeria visserae Barnes
	Massonia angustifolia L.f.
	Polyxena angustifolia (L.f.) Baker

	Neobakeria angustifolia (L.f.) Schltr.
M. hirsuta Link & Otto	*Massonia orientalis* Baker *Massonia bolusiae* Barker *Massonia inexpectata* Poelln. *Massonia sessiliflora* (Dinter) U. & D. M-D.
M. jasminiflora Burch. ex Baker	*Massonia bowkeri* Baker *Massonia greenii* Baker
M. pustulata Jacq.	*Massonia schlechtendalii* Baker *Massonia longipes* Baker
M. pygmaea Schlechtendal ex Kunth	*Polyxena bakeri* Dur. & Schinz *Neobakeria heterandra* Isaac *Massonia heterandra* (Isaac) Jessop

Genus *Polyxena*

P. brevifolia (Ker-Gawl.) A.M. vd Merwe	*Scilla brevifolia* Ker-Gawl. *Dipcadi brevifolium* (Thunb.) Fourc. *Scilla brachyphylla* Roem. et Schultes *Periboea gawleri* Kunth *Hyacinthus gawleri* (Kunth) Baker
P. corymbosa (L.) Jessop	*Hyacinthus corymbosus* L. *Massonia corymbosa* (L.) Ker-Gawl. *Scilla corymbosa* (L.) Ker-Gawl. *Periboea corymbosa* (L.) Kunth
P. ensifolia (Thunb) Schönl. var. *ensifolia*	*Polyxena ensifolia* (Thunb) Schönl. *Mauhlia ensifolia* Thunb. *Agapanthus ensifolius* (Thunb.) Willd. *Massonia ensifolia* (Thunb.) Ker-Gawl. *Massonia odorata* Hook.f. *Polyxena odorata* (Hook.f.) Baker *Massonia uniflora* Sol. ex Baker *Polyxena uniflora* (Sol. ex Baker) Dur. & Schinz *Polyxena calcioli* U. & d. M-D.
P. ensifolia var. *maughanii* (Barker) A.M. vd Merwe	*Polyxena maughanii* Barker
P. longituba A.M. vd Merwe	-
P. paucifolia (Barker) A.M. vd Merwe & J.C. Manning	*Hyacinthus paucifolius* Barker *Periboea paucifolia* (Barker) U. & D. M-D.

	Periboea oliveri U. & D. M-D.
P. pygmaea (Jacq.) Kunth	*Polyanthes pygmaea* Jacq. *Hyacinthus bifolius* Boutelou ex Cav. *Massonia violacea* Andr.

Genus *Whiteheadia*

W. bifolia (Jacq.) Baker	*Eucomis bifolia* Jacq. *Basilea bifolia* (Jacq.) Poir. *Melanthium massoniaefolium* Andr. *Whiteheadia latifolia* Harv.

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Plant labels

We have all experienced the frustration of fading plant labels. We sow seeds, label the pot clearly with so-called "permanent non-water soluble" pens, and two years later when the plants flower, the label has faded, is illegible and we no longer have any idea what the plant is. Several suggestions from around the world:
"The ultimate in labelling for UV proof, heat proof, waterproof, long-lasting label is the Brother TZ tape labels. I have the Brother P-Touch 2600/2610. You can either type directly into the label maker or create files in Excel, Word, Word Perfect (for non MS users). Then stick them on anything like plastic or wood popsicle sticks."

"I've used a method for two years now that is great for both maintaining a record of accessions and also printing highly legible labels which are permament and contain a lot of information. I enter my accessions into a column of an Excel sheet then use mail merge within Word to create labels. Save your Excel data, open Word and select mail merge. Choose your label template sheet - I use Avery transparent return address labels, 80 per sheet, for standard 5" or 8" plastic labels. For larger aluminum labels I use a bigger Avery label. Select the data you want to merge then complete the merge and format the labels as you need to get them to fit all the information. Generally Arial at 8, 9 or 10 point works best. Print them on a laser printer - essential because it is the carbon toner that bonds with the label that is responsible for the lack of fading (same as the Brother method). You don't have to do a full sheet each time - the sheets happily go through the printer at least 3 times. Stick the printed labels on your label of choice and put them in the ground/pots. Before doing a lot I microwaved, dishwashed, froze and thawed the labels a number of times and the adhesive never deteriorated. After a couple of years in the garden not a single label has peeled or faded."

Nerine falcata in the North West Province

Charles Craib

Nerine falcata was described and illustrated by Miss W.F. Barker in Flowering Plants of Africa (Vol. 13 Plate 511, 1933). It was later placed in the synonomy of *Nerine laticoma* in the Botanical Research Institute's first check list of South African flowering plants (Gibbs Russell et al, 1958 : 11).

N. falcata will be treated as taxonomically distinct in the Conspectus of Amaryllidaceae of Southern Africa currently in preparation by Dr. Piet Vorster of Stellenbosch University. The affinities of this plant may lie with *Nerine krigei* rather than *N. laticoma* and these and other taxonomic matters will be discussed fully in the Conspectus and possibly elsewhere.

N. falcata occurs mostly in hilly or mountainous areas in the North West Province. It is found in the hills at Kalkheuwel near Broederstroom and in the Elandsberg between Brits and Thabazimbi. It also occurs on flatter ground such as that near Assen west of the Barakalolo Nature Reserve.

The bulbs are usually associated with dolomite, growing in seasonally moist seepage areas or in water retentive pockets of deep soil amongst boulders or on sheets of exposed rock. The bulbs are mostly dormant during droughts which regularly occur in much of their distribution range along the border between the Limpopo and North West Provinces. They flower in large numbers during years of good regularly spaced rainfall occurring from November to February.

Studies at the Elandsberg and near Assen

The western and north western slopes of the Elandsberg lie in Limpopo Province whilst the southern slopes of the mountain as well as the south western portion fall within the North West Province. The mountain range is lightly wooded with Combretums and *Kirkia wilmsii* and the ground is covered in various perennial and annual grass species. The lower western slopes of the mountain contain the largest number of seepage areas and moist depressions associated with large sheets of exposed and sub-surface dolomite. This habitat is very moist during rainy weather but completely dry during the rainless winter and spring from May to October.

The *N. falcata* bulbs are crowded together in suitable habitats and often establish themselves in very shallow soil owing to the rocky nature of the terrain. The majority of the populations scattered on the lower slopes of the Elandsberg consist of large well-established mature bulbs, but younger plants in distinctive age grades are also present. These Nerines were largely produced from seeds that germinated after mass flowering during flowering seasons of above average rainfall. The bulbs grow actively during November or in December after summer rains have thoroughly soaked the soil. The peak of the flowering season is the first two weeks in February and most of the plants are in seed during the period mid-March to late April. During years when dry weather follows the flowering season most of the seeds wither before having the chance to germinate.

Newly germinated seedlings grow actively from March to late May or even early June. The last rains are usually over by mid-April but the ground is sufficiently moist to allow the young bulbs to grow until the beginning of the winter. Additional moisture during the dry late autumn and early winter is provided by heavy dew which condenses on the lower slopes of the Elandsberg lying adjacent to the Crocodile River.

Cattle frequently graze the lower slopes of the Elandsberg. They have a negative impact on some of the larger groups of Nerine bulbs, particularly in the winter months. The soil in which many of the bulbs occur is shallow and very loose and friable. Bulbs are kicked out by livestock or else their necks are trampled by the hooves of the grazing cattle.

A beautiful painting by Leigh Voigt of the Elandsberg *N. falcata* has been painted for the Conspectus of Amaryllidaceae.

The *N. falcata* growing near Assen grow in deep soil adjacent to flat sheets of exposed dolomite. These situations with poor drainage ensure that some *N. falcata* manage to grow and flower even after occasional rainstorms during droughts. The plants here flower much more frequently than the Elandsberg Nerines where the hill slopes have steep drainage and where more rainfall is required to replenish seepage areas during the summer rains.

The *N. falcata* population near Assen consists of several thousand plants growing in a small area. This results in good cross-pollination during years of abundant rainfall when many of the bulbs flower. A huge percentage of the seeds go to waste however, as the habitat is fully exposed to strong direct sunlight during hot late summer and autumn weather. About once a decade the weather is rainy and cloudy for several weeks on end at the seeding time. It is at these times that most young bulbs are produced. The habitat is too far away from the Crocodile River for the condensation of the heavy dew that characterises the Elandsberg habitat. The young bulbs near Assen have to establish themselves before the last of the autumn rains in the first half of April.

The nearest known populations of *N. laticoma* to the Elandsberg plants occur around Lephalele more than 150 kilometres to the north east.

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Notes on Brunsvigia, with particular reference to *Brunsvigia pulchra* – the spectacular Namaqualand tulip

Graham Duncan

Containing some of the most magnificent of all of southern Africa's geophyte treasure trove, the genus *Brunsvigia* is endemic to the region where it is represented in all nine provinces of South Africa, and encompasses some twenty species. The year in which the published history of *Brunsvigia* began - 1753 -was an auspicious one. It was the year in which Linnaeus introduced his binomial naming system for plants and animals that changed the system of natural history classification forever. Linnaeus afforded the name *Amaryllis orientalis* to the species we know today as *Brunsvigia orientalis,* but it was Heister who established the genus *Brunsvigia* in 1755, honouring the German General and patron of the arts and sciences, Karl Wilhelm Ferdinand, Duke of Brunswick-Luneburg, when he described the same species from a bulb sent to Germany from the Cape in 1748 by Ryk Tulbagh, the Governor of the time. In 1797, the plant's true beauty was brought to the fore in Vienna, contained in the first volume of N.J. Jacquin's magnificent work, the *Icones Plantarum Rariorum.*

In addition to the enormous, flamboyant flower heads produced by many members of the genus, the group has many fascinating attributes including the exceptional range in overall plant size, flower colour and leaf shape of the various species. The diminutive *Brunsvigia radula* grows to just a few centimetres high, whereas the gigantic *B. josephinae* reaches up to 2 m when in full bloom. Flower colour varies from pure white in a mutant form of *B. radulosa* from the Free State, to blooms of the palest pink in *B. comptonii* from the Tanqua Karoo, and from bright pink for the widespread *B. natalensis,* to the glittering scarlet blooms of *B. marginata* from the south-western Cape mountains. The foliage too is enormously varied and interesting - prostrate, broad leathery leaves in *B. orientalis*, erect, greenish-grey leaves with wavy margins in *B. grandiflora*, and small oval-shaped leaves in *B. radula*, its upper leaf surface covered with attractive slanting yellow bristles.

Brunsvigia pulchra

Whereas *Brunsvigia orientalis* is one of the most widespread members of the genus, occurring along a vast stretch of Atlantic Ocean coastline as well as further inland, *Brunsvigia pulchra* is one of the rarer species, restricted mainly to the arid, semi-desert region of Namaqualand. The very apt specific epithet *pulchra* (meaning beautiful) describes the deep rose-pink flowers, and certainly the colour contrast created by the pink flowers, the cream-coloured ripe anthers and the deep maroon unripe anthers, is very eye-catching. The flowers of all other Brunsvigias open fully once the flower stalks have radiated outwards to form the more or less spherical flower head, but those of *B. pulchra* are most unusual in that they all face straight upwards during the flowering period, and at a distance resemble a leafless tulip! Its flower stalks only lengthen and radiate after the flowers have faded.

Flowering in the wild at a time of blistering autumn heat, the highly ephemeral blooms last no more than seven to ten days, small wonder then that few people have ever had the pleasure of seeing them in their natural habitat. The four to six oval-shaped, overlapping leaves appear after the first good winter rains, but during frequent periods of winter drought experienced in Namaqualand, they simply remain dormant for one or more growth cycles. The leaves lie flat on the ground and closely resemble those of another pink-flowered species, *B. bosmaniae*, a very common, widespread plant famous for its mass autumn displays in the Vanrhynsdorp and Nieuwoudtville areas of the Northern Cape.

All members of the genus are strictly deciduous, being either winter- or summer-growing, with a pronounced corresponding dry summer or winter dormant period. The species from the winter rainfall region in the western part of the country are 'hysteranthous' (meaning they produce their flowers before the leaves appear in late autumn or early winter) whereas those from the summer rainfall regions are 'synanthous' (producing their flowers together with the leaves during the active growing season). Certain members of the genus like *B. radulosa,* widespread in summer rainfall parts, and *B. josephinae* from the western and southern Cape, produce some of the largest and oldest true bulbs known in the plant world, easily capable of reaching a hundred years or more.

Brunsvigias, like several other amaryllid genera in southern Africa, have evolved a remarkable strategy of distributing their seeds over as wide an area as possible once they are ready to be released from the mature flower heads. The base of the flower stem breaks off at ground level, thus allowing the flower head to be carried away by the wind, during which process it tumbles across the ground and into surrounding vegetation, releasing its fleshy pea-shaped seeds in the process. This occurrence takes place just before, or during the current rainy season, allowing the seeds to germinate and rapidly send down a radicle, produce one or two leaves, and establish a small bulb by the time the next dry dormant period arrives.

Cultivation

Brunsvigias are either winter- or summer-growing and their successful cultivation begins with a sound knowledge of which seasonal growth cycle the species in question falls into. During the corresponding summer- or winter-dormant period, the bulbs must be kept as dry as possible, but it is important to note that they all have perennial fleshy roots which must always be kept covered by the growing medium to prevent them from drying out. All members of the genus strongly resent any disturbance to their bulbs and roots and will delay or terminate the development of their flower buds and leaves.

It must be remembered that most Brunsvigias, including *B. pulchra,* are somewhat erratic in their flowering behaviour both in the wild and under cultivation. In the wild, the genus occurs in a very wide range of soil types from dry, deep coastal sands to heavy clays in swampy grassland, but under cultivation a very well drained, sandy medium has proved to be the most satisfactory one for all the species.

All Brunsvigias can be cultivated successfully in containers that can conveniently be moved to a dry place for the dormant period. Garden cultivation is more of a problem as in most instances, very few species are able to cope with regular garden irrigation during their dormant period. Well-drained rockeries are the most suitable places in which to grow Brunsvigias in gardens, and to this end the winter-growing *B. bosmaniae, B. orientalis* and *B. josephinae,* and

the summer-growing *B. natalensis* and *B. radulosa* are highly recommended. A suggested growing medium for container-grown plants is two parts coarse river-sand or industrial sand (swimming-pool filter sand), one part medium-sized crushed stone chips and a 5-10 cm layer of finely sifted compost placed at the base of the container (see also propagation notes below). The bulbs of most species should be planted with the top of the neck just below soil level, but three species, *B. herrei, B. josephinae* and *B. litoralis,* require the neck fully exposed above ground.

Brunsvigias need as much sun as they can get and seldom flower when grown in areas which are shaded for more than half the day. All the species are frost tender, requiring the protection of the cool greenhouse when grown in cold climate countries. Regarding watering procedure for container-grown plants, it is advisable to allow the soil medium to dry out almost completely in between watering. A heavy drench is suggested roughly every two or three weeks. Supplementary liquid feeding is not recommended for any of the species but bone meal can be mixed into the upper soil layer every second year.

Propagation

The most frequently used method of propagation for Brunsvigias is by seed. The bulbs of almost all the species never form offsets and their formation on those which do is so erratic that it is an unreliable means of propagation. The only other method of propagation suitable for the home gardener is bulb cuttage, using the 'scoring' or 'scooping' methods, but this entails destroying the terminal growing point of the bulb in order for young bulblets to develop, and this method is not always successful.

Brunsvigia seeds, like those of most other southern African amaryllids, are fleshy and do not undergo a dormant period after ripening, but begin to germinate immediately often while still inside the capsule and attached to the capsule wall. Although propagation from seed to flowering stage requires exceptional levels of patience from the grower for most of the species, under ideal conditions Brunsvigias grow and mature remarkably rapidly from seed.

A suggested sowing medium is two parts coarse river-sand or industrial sand (swimming-pool filter sand), one part finely crushed stone chips, and a layer of finely sifted compost or finely milled bark placed at the base of the container. For the larger species, the depth of containers used for sowing is most important as the deeper they are the more vigorously the young fleshy roots will grow, and consequently the more rapidly the young bulb can develop and reach flowering stage. Seeds of dwarf species like *B. radula* and *B. comptonii* can be sown in deep seed trays and allowed to ‘grow on’ for one year, or they can be sown directly into their permanent containers, ensuring that the seeds are sown individually, and spaced about 3 cm apart, in shallow or deep pots with a diameter of 20 cm. They often reach flowering stage in three or four years. For larger species, sow the seeds thinly in deep 25 cm diam. plastic pots and allow them to ‘grow on’ for two years. At the beginning of their third growing season, lift the bulbs, taking the utmost care not to damage the brittle fleshy roots, and plant them individually into their permanent deep containers. For medium-sized species like *B. pulchra, B. litoralis* and *B. gregaria*, one to three bulbs can be successfully grown permanently planted into a 30 cm diam. pot. The latter two species readily flower within six years from seed but *B. pulchra* probably takes a year or two longer. For large and very large species like *B. orientalis*

and *B. josephinae*, pots with a diameter of at least 35 cm diam. are required for a single bulb to develop in and grow to maturity, and species like these can take nine or ten years to flower.

Pests and diseases

In southern Africa, the greatest enemy of Brunsvigias is the hated lily borer, also known as the amaryllis caterpillar. The night-flying female moth lays her eggs on the surface of developing flower buds, flower stems and leaves, and the voracious caterpillars rapidly bore into the tissue and proceed towards the leaf bases and into the heart of the bulb. Their activities seldom result in the death of the larger species but the bulbs of dwarf Brunsvigias like *B. radula* can be completely destroyed by them in a short period. This pest is particularly prevalent during the hot summer months and infestations are particularly severe in the summer rainfall parts of the country. The culprits can be picked off by hand but invariably one misses a few, and by the time the infestation is noticed, considerable damage may have resulted. Badly infested leaves are best cut off and if the (by then) large caterpillars have entered the bulbs, they can usually be hooked out with a strong narrow piece of wire. Alternatively, preventative spraying with a carbaryl- or cypermethrin-based insecticide such as Karbaspray or Garden Ripcord respectively, once per month, can be done during the summer months.

Brunsvigias are particularly susceptible to virus infections. Slugs and snails are especially partial to Brunsvigia leaves, particularly those of the larger species and, together with mealy bugs, are the main culprits responsible for the transfer of virus-infected sap on their mouthparts from one plant to another. Mealy bugs hide and breed in between and underneath the overlapping leaf bases, and can be controlled by thoroughly drenching the soil with a solution of chlorpyrifos. Infected bulbs should immediately be isolated and destroyed to prevent infection to healthy bulbs. They can be recognized by deformed leaves and discolouration patterns in the form of mosaics, mottling or light-coloured streaks.

Fungal rotting of bulbs is almost always the result of a poorly drained growing medium. The leaves of affected plants turn yellow prematurely and the bulbs should be lifted immediately, cleaned, and have the infected parts cut away. Dust the wounds with captab and allow to dry for a few days, after which plant the bulb in pure river-sand and keep in a shaded place until the bulb has recovered and new roots have formed.

Sources of supply

A limited number of bulbs of *B. pulchra* have been made available from Kirstenbosch, and further material will become available from time to time. Being fleshy and short-lived, seeds of Brunsvigias are very difficult to obtain as they cannot be stored for long periods, but may occasionally be obtained from specialist bulb and seed suppliers such as those that advertise in *Veld & Flora,* the journal of the Botanical Society of South Africa.

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Daubenya comata in the Free State and North West Province

Charles Craib

The Genus Daubenya was revised by John Manning and Allison van der Merwe in 2002 (Manning and van der Merwe (2002)). This revision is not only insightful and significant from a botanical point of view but also represents some interesting developments in the knowledge construction process in South African botany. A study of this field comprises the domain of the Sociology of Botanical Knowledge which has been referred to in earlier IBSA bulletins (Craib (2002); Craib (2004)).
The revision of Daubenya entails many of the elements of a paradigm change in that it re-orientates the manner in which the genus is conceptualised. The authenticity and legitimacy of abstract models such as this revision, is usually judged by the internal logic of the constituent elements. In this sense the model makes significant advances in the way in which knowledge is presented.

The Distribution of *D comata*

D. comata is one of the most widely distributed species occupying a large area of the South African interior from Beaufort West in the Western Cape to the northern part of the eastern Great Karroo, through the Free State to the Klerksdorp district of the North West Province and then northwards to Barberspan in the Delareyville district. The species has also been recorded from the Northern Cape around Warrenton.
The herbarium records indicate that the plants may be rare or frequent where they occur. Research in the Free State and North West Province in May and June at the peak of the flowering season indicated however that the bulbs have apparently disappeared from areas where they were once commonly recorded. The species was never plentiful at Barberspan and may now have died out owing to the presence of large numbers of ostriches in the reserve. Ostriches graze huge numbers of surface rooting plants including bulbs. Many places along the Modder River east of Bloemfontein have been severely degraded by grazing livestock. The heavy black clay in which the Daubenyas grow is trampled forming large holes and tracts of uneven surfaced ground quite unsuitable for the bulbs. No Daubenyas were found in the areas searched along the Modder River and many places were overgrown with annual and perennial weeds as well as various alien grass species.

The Vaal River and its tributaries, at the places where they flow into the Vaal, appear to be the most significant areas where *D. comata* survives under modern conditions. The plants are, however, unaccountably absent from a lot of suitable habitat which appears to be ideally suited to their requirements. The main habitat along the Vaal River consists of sticky black clay which retains moisture for weeks on end in the summer and until July in the winter, after the autumn rains in February and March. Clay collected at one habitat was saturated with water

and allowed to dry out in full mid-winter sunlight. The plastic basin in which the clay was placed was 23 cm long, 15 cm wide and 8.5 cm deep. The saturated sticky mud was 4 cm deep when put out to dry on 18 June. Two weeks later the clay had cracked at the surface but was still moist just above the base of the container.

Studies in the Klerksdorp District

The Vaal River between Parys and Orkney has several holiday resorts and developments. These have had the effect of excluding grazing domestic stock, particularly cattle, which severely degrade *D. comata* habitat in a short space of time. Housing developments are usually well away from the Vaal River and its tributaries, the area usually occupied by the Daubenyas.

The study area consists of a strip of clayey ground with numerous water retentive depressions, adjacent to the Vaal River, with a housing development situated a few hundred metres away from the plants. Parts of the habitat are heavily smothered in annual weeds during the summer, particularly the exotic cud weed *Pseudographalium luteo-album*. Kikuyu grass *Pennisetum clandestinum* which has transformed much of the habitat nearby, has not yet invaded the area frequented by the Daubenyas.
The habitat has many thousands of Daubenyas ranging in size from large mature bulbs down to seedlings. The plants grow in the late summer and flower in the autumn from April until the end of the first week in June. The peak of the flowering season is usually mid-April to early May. The grass cover is often very dense with flowering performance at its best in the season after a winter grass fire has thoroughly burnt the habitat.
The Daubenyas flower even when there is heavy grass cover, but not nearly as well as they do when conditions are more open. Pollination is relatively poor during the inter-fire years and most plants that do succeed in attracting pollinators are those in open places with scant grass cover.

The seeds develop during the winter months from June to August. They develop at or just below ground level and thereby escape burning during winter grass fires. In late August and early September the peduncle bearing the inflorescence withers and the seeds are scattered around the habitat in the wind. August and early September are dry windy months in the area and seeds are distributed far and wide.

The adjacent farmland has been ploughed up for maize production in some places and left intact in others. In the areas where livestock, mainly cattle, graze, the Daubenyas are mostly confined to places not favoured for grazing – areas below steep banks and the short grassland amongst stands of *Acacia karoo*.

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An Autumn and Winter Growing, early Spring Flowering Ornithogalum from the Delareyville District of the North West Province

Charles Craib

Two apparently undescribed Ornithogalums have been found in the North West Province. One occurs in the Lichtenburg district in crevices on sheets of exposed dolomite. It grows in shallow soil or soil-filled crevices on sheets of exposed rock - this species has been discussed previously in some detail (Craib 2001, Craib 2001). It grows in the autumn and winter and flowers from late June until mid-July.

Another Ornithogalum species has recently been found in the Delareyville district of the North West Province. It is also autumn and winter growing and flowers in the first half of September. This species frequents pebbly calcrete ground with thin grass cover, a habitat associated with the extensive system of fresh water pans for which the Delareyville district is well known.

Both the Delareyville and Lichtenburg species are unifoliate. The Lichtenburg plants have numerous short coarse bristles on their leaves whilst those from the Delareyville district lack the bristles but have rough leaf surfaces to which sand particles adhere. The leaves of both species are cryptic when covered in dust and soil particles and by virtue of their dark green colour which blends in well with blackish and purplish black dolomite and grey spotted calcrete pebbles.

These two plants are currently under study at SANBI. Readers of this article who find populations of these or any other winter growing Ornithogalums in the summer rainfall area are encouraged to report their discoveries to the herbarium at SANBI. At present the two Ornithogalums are only known from a mere handful of records in a restricted area. The correct taxonomic placement of these plants will certainly be enhanced by additional records.

The Ornithogalum in the Delareyville district comes into leaf in late April and May, and the leaf has developed fully by the end of May. The leaf tip withers in late June but the rest of it remains green until mid-August when it shrivels completely. At this time the flower buds start to develop. The plants come into flower in the first two weeks of September and they too are cryptic amongst the white calcrete pebbles. The Ornithogalums are in seed during late September and early October at a time when the first rains of the summer can be expected.

The most abundant habitat for the Ornithogalum is in the Barberspan Nature Reserve which has numerous areas of exposed calcrete pebbles. A search of the southern area around Barberspan in late May 2005 did not reveal any Ornithogalums. This seems to be as a result of the

introduction of ostriches to the reserve which graze most small shallow rooted bulbs and caudiciforms that they can find. Apart from the Barberspan Reserve, the area is either used for maize production or stock farming. The leaves and flowers of the dwarf Ornithogalum are easily trampled and for this reason the majority of them are found growing amongst calcrete pebbles where they are least susceptible to damage from grazing livestock.

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Granite as a source of micronutrients

From Jean Brian of the Pacific Bulb Society

Last year I wrote two papers for my soils and plant propagation class on rock dust, after coming across information on it and being intrigued with its possibility. I will try to give you a succinct impression of what I learned. The first thing one must remember is that the soil we have was created by rocks in the first place, particularly in the Ice Ages, when the movement of rocks enhanced soil formation throughout the world. Rock dust is a 20th century byproduct of the quarry industry, and is generally considered to be a waste product. In terms of its benefits, they are the following: it improves soil hydrology, buffers acid soils, and can provide potassium to plants on demand. According to the studies I located, it can restore lost and trace elements to the soil, increase the nutritional value of food crops, increase product yield, increase plant resistance to insects and disease, enhance microbial activity, aid soil moisture retention, aid the development of better root systems, reduce plant mortality rate during transplant, reduce the plant's need for soluble chemical fertilizers...there's a lot more, but you get the idea. It is very stable, dissolves very slowly and remains active in soils for many years, making it very cost-effective. It can be obtained for next to nothing at any local quarry. It is not a fertilizer in the usual sense of the word; it contains no nitrogen, very little phosphorus and a tiny amount of potassium. The most recent study I'm aware of is in Scotland, where the government has invested $100,000 in a three-year study combining compost and rock dust. Studies have also been done in Australia by an organization called Men of the Trees, who did a fascinating and successful trial using tree seedlings: in it, every tree species grown was twice as tall as the control plant, growth rates were up to five times faster than without rock dust, tree seedlings with rock dust appeared to resist insect predation, and there was a noted absence of fungal attack in the early stages of seedling growth. They now use 5 grams of rock dust for each tree seedling they grow. The amount to add per plant seemed to vary a great deal depending on what I was reading, and I found this somewhat confusing. It seemed to vary from 14 to 50 lbs per hundred square feet if you are broadcasting it. In pots perhaps 5 grams per plant/bulb?

The micronutrients of granite: 3-5% potassium, 67% silica and 19 trace minerals. There is a slow release over a long time period and ground granite will build up reserves in the soil. Broadcast the rock dust over the soil and rake it in.

Notes on a Couple of Gladiolus Species

G R Delpierre

The riches of the South African flora are legendary, and few genera typify this as well as Gladiolus. The diversity of habitat, plant habit, colour and shapes of flowers and so on can be readily appreciated by looking at the literature on this genus (Goldblatt and Manning, Lewis and Obermeyer, Delpierre and Du Plessis,).

My fascination with these wonderful plants has remained unabated over nearly 40 years of collecting and cultivation. Two species currently in my collection are worth a note.

Gladiolus cruentus: This species is apparently little known in cultivation. I have never seen it in its natural habitat, and came to grow it as a result of my French connections, Dr Maurice Boussard and Jacques Piquet. Maurice obtained a couple of corms in 1985, while on a visit to Harrismith Botanical Gardens. He managed to acclimatise it successfully in Verdun, and passed on some corms to Jacques, who sent me one in the late 1990's. I was delighted to see how well it acclimatised, after crossing the Equator for the second time and it flowered the summer after I received it. As can be seen from the photograph, it is a magnificent plant, its "gardenworthiness" being enhanced by its ease of cultivation and its readiness to form offsets and to divide its corms. Having a typical summer-growing cycle, its begins to grow (in Fish Hoek) in early November, flowers readily in February-March, and dies back in April-May. Alas, it is self-sterile, as most members of this genus are, and if any IBSA members grow it and would like to swap a corm or two, I will be happy to be in contact with them. In this way we may be able to supply seeds to collectors.

Gladiolus taubertianus: This is a rare species endemic to the Cederberg mountains of the Western Cape. In 1989, while climbing the Skerpioenberg in high summer, I came across a single dormant gladiolus with a dry capsule containing a few seeds. I sowed it the next winter, and had to wait 11 years before two plants bloomed, in 2001! It has not bloomed since - clearly a species that will only attract the most dedicated enthusiast! In August 2005, I came across a couple of flowering plants on the farm Kromrivier, growing in a rock crack about 20 metres away from the cottage where I was staying. These are the only plants I saw, in spite of hiking more than 20 km in that area during my stay. The flowers are reminiscent of *G. inflatus* and *G. carinatus,* and are sweetly scented.

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♣

Ammocharis coranica

Rob and Janet Wood

Edition no. 44 of "Bulb Chat" asked what triggers flowering of *Ammocharis coranica*. A subsequent IBSA newsletter raised the question again and mentioned its winter-growing cousin *Cybistetes longifolia*. The former grows over an extensive area with summer rainfall, and the latter in the winter rainfall Western Cape. As a grower in the summer rainfall Highveld (Benoni, Gauteng), some notes on my experiences may help to answer the question of the flowering trigger or triggers. The final paragraph gives some historical references before the recent transfer of Cybistetes back to Ammocharis.

Ammocharis coranica is just one of many summer rainfall members of the Amaryllidaceae that I grow. All my *Ammocharis coranica* bulbs have been grown from seed from the original two bulbs I acquired in 1960, which are still alive and growing. All the bulbs are in a north or north-westerly aspect. The bulbs are kept completely dormant in winter, the leaves dying back completely, and showing their first growth of the new season after the first good rains of summer. The plants may die down again in summer if there is insufficient rain, particularly in the hottest months of January and February. Well-established bulbs usually flower every spring, and occasionally again in March responding to late rains if there had been a dry spell in midsummer and they died back, or if they missed the flowering in spring.

Soil in my garden is red loam. New plantings have lots of compost and river sand (to ensure sharp drainage) dug in with them and are then left to grow naturally.

Trying to keep the bulbs in growth all year is unlikely to suit their growth pattern. They appear to need winter dormancy to ensure spring flowering. The bulbs are exceptionally large and need to be set in large containers with a good root run for substantial root growth in summer. I suggest that in the winter rainfall area the containers are moved in winter to a rain-free area such as under the eaves of the house, ensuring that they are well ventilated and are subjected to winter's cold nights. The bulbs must be kept quite dry in winter to ensure full dormancy.

October is probably a good month to start watering the bulbs in the Western Cape. Once day, night and ground temperatures have increased, then these bulbs should start growing. Watering should be deep and periodical, with some light fertilizing in summer. Watering needs to be reduced from about March, and cease entirely at the end of April.

Ammocharis coranica grows in sandy soils in its extensive natural distribution range in the summer rainfall areas of southern Angola, Namibia, Zambia, Botswana, Zimbabwe and South Africa. William Burchell in 1812 collected a specimen in the "Corana country.....several days journey beyond the Orange River". This specimen was named by John Bellenden Ker Gawler as *Amaryllis coranica* in 1816. Burchell managed to bring a bulb into flower in his garden in Fulham, London in 1821. William Herbert created the genus Ammocharis in 1837,

the generic name Ammocharis chosen because the Greek ammos means "sand", and charis is "delight".

Cybistetes longifolia has reverted to *Ammocharis longifolia* according to the latest "Plants of southern Africa (Strelitzia 14)", a name chosen by Max Joseph Roemer in his monograph Familiarum naturalium regni vegetabilis of 1847. It was in 1939 that Edgar Milne-Redhead and Herold Georg Schweickerdt investigated the genus thoroughly and proposed the name *Cybistetes longifolia* in "A new conception of the genus Ammocharis Herb" in The Linnaean Society Journal – Botany, volume 52. Ammocharis has long been known and figured in Europe, creating a taxonomic nightmare. In 1698 Paul Hermann illustrated a specimen of *Ammocharis longifolia* in Paradisus Batavus. This illustration was used by Carl Linnaeus to name it *Amaryllis longifolia* in his Species plantarum of 1753. Later Carl Pehr Thunberg collected two specimens which he recognised as the *Amaryllis longifolia* of Linnaeus, yet he named them *Crinum longifolium* in his Prodomus plantarum capensium, a name widely used in Europe where the bulb was widely cultivated in the 18th and 19th centuries. Later Thunberg compounded the confusion by mis-identifying them as *Haemanthus falcatus*. Other generic names over the years include Brunsvigia. Boophone, Crinum, Palinetes and Stenolirion. Pre-Linnaean references (ie. pre-1753) include the names *Narcissus pumilus, Lilio-Narcissus indicus, Lilium africanum, Lilio-Narcissus africanus* and *Amaryllis spatha*. The name Cybistetes was derived from the Greek kybisteter meaning "an acrobatic tumbler", from kybistan "to somersault", alluding to the fruiting inflorescence being blown about by the wind, and was a fitting name for the bulb. ♣

Reading through old IBSA Journals and Bulb Chats, we see numerous articles on botanical name changes, together with many complaints about this often painful practice. However, we must be grateful for one thing, and that is the Linnaean system of nomenclature. Before Linnaeus, plants were described by incredibly complicated names, which changed just as frequently as they do now! A good example found in "Botanical Exploration of Southern Africa" by Mary Gunn and L Codd (1981) is that of the Silver Tree, now known as *Leucadendron argenteum*. The first botanical reference to this plant appears to be in 1692, where it was named "Leucadendros africana, arbor tota argentea, sericea" by Plukenet. The meaning of this was "African Witteboom, the tree entirely silver-grey." A year later Hans Sloane described and illustrated the plant which he called Silver Pine-tree "Conifer Salicis facie" – a "conifer resembling a willow". In 1701 Caspar Commelin wrote about the plant as "Argyrodendros africana foliis sericeis et argenteis" (African silvertree with leaves grey and silvery). The name situation deteriorated further in 1720 when Boerhaave called the species "Conocarpodendron foliis argenteis sericeis latissimis" – the cone-fruited tree with silvery-grey broad leaves. Boerhaave also quoted a further name used, but not published by Hermann, namely "Scolymocephalos Africana, foliis sericeis, argenteis, longis, acutis", meaning "the African thistle-head with long, acute, silver-grey leaves". In 1753, Linnaeus simplified the procedure in "Species Plantarum", and he called the Silver tree *Protea argentea*. In 1810 Robert Brown finally changed the name to the one we know today *Leucadendron argenteum*.

The Purposes of Scent in Plants

Andries T de Villiers

You may remember that, some months ago, we discussed the different scents which various flowers emit. This present paper is intended to define why they emit those particular scents. Furthermore to explain why plants emit scent not only from the scent cells in the tepals, but from leaves, stems and roots as well. The scent consists of tiny droplets of oils which disperse in the air, and normally they will be most concentrated around the point of emission. These are three principal reasons for emitting scent: *Firstly* to attract pollinators, *secondly* to repel predators and *thirdly* to convey information. In some cases a plant may emit two scents, one to attract and one to repel. It is important to remember this ability of a plant to carry out more than a single purpose with its scent production.

Attraction

Since pollination occurs in the flower, attractive scents are principally located in the tepals so that the pollinator, in tracking down the scent, is led to the strongest concentration at or near the point of pollination. Scent is not part of the nectar reward system. It is a guide to where that reward may be received, including rewards that are not in the form of nectar though that is the case with most of our bulbous and cormous plants. Per contra some plants emit a scent which suggests the presence of a female and the reward offered is mating. The Bee Orchid (*Orphys sarpolax*) not only uses this method but the flowers actually mimic the female form. Among the species we collect there are several which use this form of attraction notably *Romulea uniflora* and probably *R. komsbergensis*. We recognize this method when we remark that the flowers offer what appears to be a nuptial bed, and such flowers are usually actinomorphic. Zygomorphic flowers impose on the pollinator a specific approach route which will lead the insect to the nectar. So zygomorphic flowers are unlikely to be using a sexual scent. They usually reinforce the scent attraction with nectar guide patterns on the lower tepals. Some plants emit a scent to attract a predator but not one which predates the flower but rather the insect predators which are attacking the flower. Thus the tobacco plant emits a scent which attracts Draconid wasps. These visit the plant and eat the tobacco Hornworm (*Marduca sexta*) which is predating the plant. Ladybirds, Lacewings and Hover Flies feed on aphids and are attracted to the aphids by the signal in the plant scent. This principle has been used successfully to protect tomato crops by attracting the Chalcid wasps. These are wasps which are attracted to plants being predated by caterpillars. They may not kill the caterpillar but lay their eggs on it or in it by injection. When the eggs hatch the larvae eat out the caterpillar. This does not protect the plant very effectively, but it does tend to protect the colony by reducing the numbers of the next generation of caterpillars. It has been suggested that this is an early form of evolutionary experiment causing single mutations to develop viable colonies.

Repulsion

The simplest form of repulsion is the emission of a scent which deters the plant predator from approaching the plant or of destroying the microbes which the plant predator is carrying.

Almost all the spices used in our kitchens belong to this category. Before the invention of the refrigerator, spices were used to prevent food from being spoilt in storage. Many spices are in fact lethal to humans but the ratio between the amount of volatile oil in the spices to the body mass of the human is such that the danger is unlikely ever to arise. Among our plants instances of repulsion are to be found in *Ferraria crispa* and some of the *Moraeas* (for example *M. lurida*). In both attraction and repulsion some plants differentiate between daytime and night according to whether the targeted insect is diurnal or nocturnal. For instance there is much less pollination of *Gladiolus tristis* by day than there is in the evening and early night. We talk of pheromones emitted to attract moths. These are essentially part of the scent methodology. Some plants emit a scent to attract predators and then engulf them. A wounded pine tree attracts a predator & then smothers it in a mixture of volatile oils and resins (terpenes). If you have been rich enough to buy your wife a brooch set with a fly in amber, you will have seen the effect.

Conveying information

From time to time we have discussed the way in which one plant warns a whole colony of the presence of a predator. The most obvious examples are the giraffe and the gerenuk which browse on the leaves of trees. The broken leaves emit a scent which is perceived by the other trees of the same species in the vicinity and then all of them secrete acrid, poisonous or unpalatable chemicals in their leaves and the giraffe or gerenuk, retires in disgust. Acacia trees use this protection. But protection by leaf breakage is not the only form of information sharing. The tiny rootlets of plants also emit scent which is picked up by the rootlets of adjacent plants. A Canadian experiment proved that a defective seedling, short of nutrients, was saved by the other trees by the copse feeding nutrient material by root. The same principle applies in pot culture when seeds are thickly sown, particularly in several species of *Romulea* and *Lachenalia.*

Evolutionary Effects

Two species of the same genus and very closely allied taxonomically may differ in their scent production. The production of the scent is controlled through an organ called the CAAT box. In one species the CAAT box is interrupted (as we explained in our talk on DNA) by additional adenines and so becomes CAAAAT. This prevents the CAAT box from working correctly and the pollen from this species fails to promote the scent enzyme so that the second species, when pollinated from the first species, cannot have the same (or any) scent. This is a genetic change which you may have found in different specimens of the same species of *Gladiolus carinatus* for example, albeit all growing together. IBSA member Cameron Taswell-Yates reported this in colonies of *Lachenalia contaminata*. Herein is not a difference between species, but between specimens of the same species. In Tritoniopsis the effect is found in different species. Because the scent droplets may contain different scent enzymes the second species may receive only one of a pair of scent enzymes and so have a discernibly different scent. Dr Manning established disparate scents in a survey, some three years ago, of Tritoniopsis in the Overberg. Because of the facility of the CAAT box to promote several enzymes in the scent droplets this phenomenon has been and is used to develop scents in ornamental flowers in commercial horticulture. It has also been used in agricultural research to develop strains with enhanced pollination practice: better scent more pollination. While it is unlikely that our members have the laboratory

facilities to analyse and interrupt CAAT boxes, some may use these principles to vary scent in some of their plants. ♣

New Section Hoarea Pelargoniums in the Cape Provinces

Charles Craib

A number of new Section Hoarea Pelargoniums have come to light in the last few years. Most of them have been found in the Northern Cape and the Western Cape, particularly the south western Cape interior. Most of the species have been found by the author and Rod and Rachel Saunders. Many of these plants are currently being studied by Dr. Bettie Marais, the expert on Section Hoarea taxonomy, at Stellenbosch University. There are likely to be many undescribed Section Hoarea Pelargoniums. Some of them are narrow endemics or occur in remote and rather inaccessible places on mountain summits. The plants have extremely variable leaves, some of them not even conveying the impression that they belong to a pelargonium. Others flower in the hot dry summer months when few botanists are active in the field.

IBSA members can play a valuable role in bringing undescribed Section Hoarea Pelargoniums to the attention of Dr. Bettie Marais at Stellenbosch University. Please notify Dr. Marais of any findings you think might be interesting. It does not make any difference if the species turn out to be described ones since new records of existing species are always valuable, extending the knowledge base about the plants concerned.

Dr. Marais can be emailed at emm@sun.ac.za or at Stellenbosch University tel. 021 808 3068. Her address is Dr. E.M. Marais, Department of Botany and Zoology, Private Bag X1, Matieland 7602 Western Cape. ♣

Don Mahoney, San Francisco Botanical Garden
Several fire ecologists at California State University at Los Angelos have been working extensively on identifying the chemicals in smoke that promote germination. In a research paper in the journal ecology (Ecology 79(7)1998 pp 2330-2336.), they found nitrogen dioxide as the main component of smoke which was involved in germination. Nitrates and nitrites had no effect. The chaparral species (annuals and shrubs) that they tested had complicated requirements. Some germinated with smoke alone, some required smoke plus stratification, and a few required abrasion of the seed coat also. They were able to exactly duplicate results of smoke by substituting nitrogen dioxide in their trials. At the botanical garden here we use Kirstenbosch smoke papers for much of the South African seed we germinate and find them important for the germination of ericas, proteas and the grass-like members of the Restinonaceae. Restios for us will not germinate without smoke, and protea germination is greatly enhanced. Bulbs on the other hand are a little more forgiving and we have had reasonable germination, especially of our own freshly collected bulb seed, without smoke . We still use smoke on stored bulb seed just in case it really does help. I've never had enough seed to do a true controlled test on bulb seed.

Growing South African Amaryllids at 43 Degrees South

Rob Hamilton

I garden in Southern Tasmania at approximately 43 degrees south which is eight and a half degrees of latitude south of Cape Agulhas. It might be thought that this is too cold for South African amaryllids but there are a handful of species which are well established as garden plants. These include *Amaryllis belladonna*, *Brunsvigia josephinae, Nerine bowdenii, N. flexuosa alba* (now *N. undulata*) and *N. sarniensis*. *Haemanthus albiflos* and *coccineus* are also found outside specialist collections.

Tasmania's climate is moderated by its island topography and is classified as temperate marine. We live about 5km from the coast at an elevation of about 200 metres. Based on a minimum overnight winter temperature of -2°C our garden is classified as USDA zone 9 but this is only part of the story. I believe that mean daytime maximum temperature has more influence on difficulties I have encountered growing amaryllids from seed. Annual rainfall in our area is 675 mm or 27 inches, with rainfall occurring fairly evenly throughout the year.

I first obtained an internet connection late in 1999 and soon discovered that it had become very easy to access seeds of fleshy amaryllids. Having successfully grown the species mentioned above I made my first seed purchases in autumn of 2000. The species which started what has now become an obsession, were *Brunsvigia marginata*, *Boophone haemanthoides*, *Crossyne flava* and *Cybistetes longifolia*. Naturally they all germinated and have continued to grow slowly each year. All 4 are still growing either in raised beds or pots with *Brunsvigia marginata* showing the greatest vigour of the 4 species. Now in their 6th season the largest of my 3 *B. marginata* seedlings has 4 leaves now 7cm across so is perhaps approaching flowering size. This early seed raising experience occurred in a previous garden, about 5km from our present home, at sea level in Margate where temperatures were a degree or two warmer.

Moving to rented accommodation during 2001 while our new home was being built, kept the acquisitions to a minimum as did all the work of establishing a new garden during 2002. There are few survivors from 2001 and not many more from 2002 when I started to acquire more species and perhaps started to learn from my mistakes. It was also from 2002 sowings that I started to notice a difference between the behaviour of summer rainfall species and winter rainfall species under my growing conditions.

In 2002 I sowed 5 Brunsvigia , 5 Haemanthus and 3 Gethyllis species. These sowings included summer rainfall species *Brunsvigia grandiflora* and *Haemanthus carneus* which both returned in late summer 2003. The other species of Brunsvigia and Haemanthus didn't return in 2003. On examining the pots in the summer of 2003-4, I discovered a reasonable number of seedling bulbs. They were re-potted but didn't ever grow, a lesson learned - don't handle seedling bulbs until they are several years old.

Now my method of determining whether there are sulking bulbs is to gently remove the surface layer of compost during summer, until the tops of the small bulbs are exposed (or absent). I then replace this with new compost having disturbed the small bulbs as little as possible. This

procedure has the added advantage of removing mosses and lichens which tend to grow on potting surfaces after a year or two. With Gethyllis I had more success with 2 species returning in 2003. I didn't touch their pots and was delighted to have the 3rd species return in 2004 having sulked through 2003.

Further experience has shown that the summer rainfall species which start into leaf growth in late summer generally return with reliability in their second season. In contrast, the winter rainfall species, with a few exceptions, often sulk through what should be their second season.

Our 2004 was a very cold year. Winter effectively started at the beginning of April and lasted a full 5 months. Subsequently there were very few winter rainfall species tempted into their second year of growth. *Brunsvigia orientalis* and *Strumaria discifera* were exceptions with a few seedlings reappearing.

In contrast in 2005 we have had a very warm autumn with the highest mean maximum temperature on record in April, with warmer temperatures continuing through May and early June. Quite a few winter rainfall species sown in 2003 which sulked through 2004 have returned in good numbers during 2005. Additionally species sown in 2004 have returned with more reliability in 2005.

2003 sown sulking species which returned in 2005 include *Boophone haemanthoides*, *Brunsvigia striata*, *Gethyllis setosa* and a species collected from Matsikammaberg, *Hessea breviflora* and *H. pilosula* and *Strumaria watermeyerii*. Other species show 'partial-sulking" behaviour. Both *Haemanthus coccineus* and *Nerine humilis* returned one or two seedlings per pot in 2004 with many more returning in 2005.

2004 sown species which have returned in 2005 include an *Apodolirion* species, *Brunsvigia orientalis, Haemanthus amarylloides* sp *amarylloides, coccineus, lancefolius* and *sanguineus, Hessea stellata, Nerine humilis, Strumaria hardyana* and *gemmata*. Some of these have previously sulked partially or totally.

In contrast, summer rainfall species in most genera I have tried, either continue in growth for their first 18 months or return with reliability after a short summer dormancy. Genera I am growing include *Ammocharis, Brunsvigia, Crinum, Haemanthus, Scadoxus* and *Strumaria (tenella* var *orientalis*).

I don't keep temperature records for my garden, but observations of my daily temperatures compared to Hobart city seen daily on television news, suggest that we are mostly about 2° C colder than Hobart. Hobart's recorded average maximum temperatures are April 17.3°C , May 14.4°C, June 11.9°C, July 11.6°C and August 13.0°C. In 2004 the mean maximums were below these readings whereas in 2005 they have been as much as 4 - 5°C above the mean maximums.

While these figures support my theory that it is lower daytime temperatures which are the cause of my winter rainfall amaryllid seedlings missing a whole season of growth before returning in the following year, it does not explain why they do return in that year. Because they always appear to have active roots, perhaps there is some accumulation of nutrient and subsequent bulb growth while dormant during that year of sulking and this gives the tiny bulbs the strength

to produce leaves again the following year.

There are exceptions including *Amaryllis belladonna* which returns reliably in its second year of growth, no doubt explaining its widespread garden distribution in Tasmania. *Cybistetes longifolia* is almost evergreen with even my single seedling from 2000 sowing rarely being without leaf, except after re-potting. Similarly my most recent sowings from 2004 which are still in leaf, were collected from Strand which I suspect provides a much more cosy climate than I have. *Strumaria tenella* var *tenella* has also remained evergreen since sowing as does the summer rainfall *S. tenella* var *orientalis* having provided me with its first flowers 21 months after sowing .

As my experience in growing these plants increases, my results are improving, but some species remain a problem for me. *Haemanthus pubescens* in the various subspecies just won't return. I have resorted to growing them in my glasshouse this year in the hope of improving my success. Already I can see much stronger growth from germinating seedlings and have a single seedling of *H. pubescens* var *pubescens* returned from a 2004 sowing. *Haemanthus barkerae* also remains a problem with not a single seedling returning after 1st year despite multiple attempts. I managed to obtain a mature bulb of this species last summer and it is growing quite happily.

I am also now buying seeds in larger quantities when available in the hope that some of those seeds will produce seedlings which are better adapted to my growing conditions. This is already paying off as an occasional seedling is appearing with much more robust growth than its siblings. Larger quantities of seed also allow experimentation in culture. This year I have sown some species directly into the garden, in pots under my normal growing conditions, under shadecloth and in the glasshouse. Hopefully in years to come I will have some answers to my problem of sulking seedlings. I expect that I will find that some species are only marginally hardy in my climate and providing some extra warmth will solve my problem. Of course solving one problem often creates another - let's hope it is not the need for a larger glasshouse!

♣

Mealybugs

In 1998 there was a discussion on this subject by members of the International Bulb Society. One member suggested the use of a product available in the USA called “Knox-out”. It is a time release form of Diazonon which is micro-encapsulated with a UV protectant. The reason that this special formulation of Diazonon is used is that the normal material once sprayed, will break down very rapidly when exposed to sun light. Using this time release formulation will make it effective for long periods of time. The writer said that he used “Knox-out” as a drench at 2 times the recommended concentration, and he mixed it with a good spreader/surfactant. Two applications of this compound totally eliminated all mealy bugs.

Caledon Wonderland

Rhoda & Cameron McMaster

In the third week of September 2005 on a sunny day we visited an area in the Overberg off the Caledon-Greyton road, covering several hectares of Renosterveld that has not been grazed by domestic livestock for many decades, and has never been cultivated except for the intensive activity of runner moles that churn up soil and stones as they move over the whole veld. It was interesting to note that no damage to vegetation from the mole activity could be found (they must play an important role in aerating the soil and burying seed). The slope faces south to south-east. What a delight!

Renosterveld is a vegetation type on clay soils that gets its name from the dominant shrub known as Renosterbos, *Elytropappus rhinocerotis (Asteraceae)*. In overgrazed areas this dark grey-green shrub is particularly evident. Another feature of the vegetation is the absence of many typical Fynbos plants such as members of the *Proteaceae* and *Ericaceae*. In the Caledon district the Renosterveld is very suitable for crop cultivation, except where the slopes are too steep or the ground too rocky. The uncultivated patches are usually tiny and most of them are degraded, so we jumped at the opportunity to explore the pristine 'Caledon Wonderland'.

There were bright flowers of bulbs and shrubs all around us, and the leaves of many other bulb species were recognisable. As amateurs, we find "The Color Encyclopedia of Cape Bulbs" (Manning, Goldblatt & Snijman) most useful to find out which species are likely to be found in a specific area, and the flowering time. In this way the list of possibilities is narrowed down considerably, and then for the difficult-to-identify species, the user-friendly key is consulted.

Among the Iridaceae the following were in abundance: tall stems of yellow *Moraea lewisiae* (previously *Hexaglottis*); deep orange *Watsonia aletroides* with some dainty pink *Watsonia laccata* nearby, but no hybrids to be seen. (At the Caledon Wild Flower Show each year there has been an unnamed pink form of *W. aletroides* with a long tube and tepals flared in a cup shape – a natural hybrid with *W. laccata* perhaps? We have seen it growing along the roadside south of Caledon, together with the orange *W. aletroides*, but without *W. laccata* in sight.)

Unusually pale green-pink *Gladiolus liliaceus* were dotted around, and blue *Moraea tripetala.* The white form of *Hesperantha falcata* was just opening, showing the brownish undersides of the flowers. Other recognisable species in leaf : *Freesia caryophyllacea* with leaves flat on the ground; *Gladiolus gracilis* in seed with leaves that appear cylindrical but are H-shaped in cross-section; and *Ixia flexuosa* in seed, luckily with a few of the last pink flowers with the typical veining to confirm identification.

The *Hyacinthaceae* were represented by masses of *Lachenalia rosea* with colours ranging in a combination of blue, deep rose and paler colours, and all with maroon markings on the stems and leaves. There was one pure white form, the stem pale green without any markings. Many *Albuca cooperi* were in bud, with only a few nodding greeny-yellow flowers out already. *Eucomis regia* was abundant with the tallest 'pineapple' flowers we have yet seen for this

species – a whole 12 cm, with the creamy flowers hidden under a large umbrella of many terminal bracts. They are easily found because of the large broad leaves flat on the ground. There were many *Ornithogalum thyrsoides* species in bud, and the leaves of *Ledebouria sp*, possibly *L. ovatifolia*. Large tufts of broad, dull green leaves were everywhere, evidence of the tall *Drimia capensis* which flowers later in summer.

Only leaves were visible to represent the *Amaryllidaceae* (autumn flowering) which obviously thrive here: a few patches of *Nerine humilis* leaves; enormous leaves of *Brunsvigia orientalis* (one had nine leaves) about 18 cm wide and 42 cm long; and the hairy-edged *Crossyne guttata* leaves about 14 cm wide and 30 cm long. There were still some dried inflorescences of the *C. guttata* stuck in the vegetation, with uncountably many pedicels! *Haemanthus sanguineus* with roundish tough leaves over 25 cm wide and 20 cm long, and *H. coccineus* with longer softer leaves, striped below, were not to be outdone, and huge leaves were common. Now to plan a visit in early autumn for all these flowers!

Other bulbous groups in flower included: yellow *Wachendorfia paniculata* and *Cyanella lutea;* the ground orchids *Pterygodium hallii* with creamy flowers and brown markings and pale yellow *Pterygodium catholicum;* the large brilliant pink flower with a yellow eye, of *Oxalis purpurea*; and the small *Bulbinella barkerae* with white flowers and grasslike-leaves, endemic to the greater Caledon district. We did not have time to explore the bottom of the slope, a wetter drainage kloof, but from a distance we could see many flowers there of *Zantedeschia aethiopica.*

Trachyandra divaricata was just starting to show its white flowers - the buds are used to make a delicious bredie, and *Bulbine lagopus* had long stems of yellow flowers – the juice of its fleshy leaves are a good field first-aid for rashes, insect bites and stinging thorns or leaves.

Apart from these bulbous riches, there were other typical Renosterbos plants in flower. The dominant species was not the usual *Elytropappus rhinocerotis*, used in earlier times as fuel and as treatment for influenza, but *Eriocephalus paniculatus*, the wild rosemary bush often seen in gardens, and a good cooking herb (the birds collect the woolly seeds for their nests). The showiest shrub was a *Selago* species, with masses of little mauve flowers clustered together – the bees loved this one. Many pale yellow-flowered bushes of *Hermannia hyssopifolia* and the large mauve-flowered *Senecio elegans* added to the colour feast. Some of the little ones included the bright yellow *Sebaea exacoides*, the red flowers of a twining *Microloma* species, and several pink or yellow species belonging to the legume family, as well as the striking brick-coloured *Indigofera nitida*.

There were grasses too, which have long disappeared from grazed areas. If there was any space left over, it was covered by the prickly large-leafed *Arctopus echinatus* – should we include this in our bulb collections (!!) – it apparently has a 'substantial underground tuber' according to the Botanical Society's Field Guide No.8: Southern Overberg. It bears male and female flowers on separate plants.
As a bonus on the way home, just after we left 'Caledon Wonderland', we found a good flower patch along the tarred road of dark pink *Babiana purpurea* with blackish anthers, and scented pink *Ixia longituba* – also an albino pure white form of the latter.

And the above flowers represent only some of the plants out of the year's cycle - an ever-changing charming tapestry of flower colours on these few hectares in the Caledon district.

List of Bulb species seen

Amaryllidaceae
Brunsvigia orientalis
Crossyne guttata
Haemanthus coccineus
Haemanthus sanguineus
Nerine humilis

Araceae
Zantedeschia aethiopica

Asphodelaceae
Bulbine lagopus
Bulbinella barkerae
Trachyandra divaricata

Haemodoraceae
Wachendorfia paniculata

Hyacinthaceae
Albuca cooperi
Drimia capensis
Eucomis regia
Lachenalia rosea
Ledebouria ovatifolia
Ornithogalum thyrsoides

Iridaceae
Babiana purpurea
Freesia caryophyllacea
Gladiolus gracilis
Gladiolus liliaceus
Hesperantha falcata
Ixia flexuosa
Ixia longituba
Moraea lewisiae
Moraea tripetala
Watsonia aletroides
Watsonia laccata

Orchidaceae
Pterygodium hallii
Pterygodium catholicum

Oxalidaceae
Oxalis purpurea

Tecophilaceae
Cyanella lutea

♣

A few years ago several IBSA members discussed whether or not plants could absorb nutrients through their leaves. Several of us feed our plants by foliar spraying of fish emulsion, and other members were sceptical whether we were achieving anything or not. I put the question to the International Bulb Society – "can plants absorb nutrients through their leaves?", and the replies I got were:
"Yes, they certainly can. However the uptake of nutrients is slow, if at all, when the leaf matures. It seems that uptake occurs during the growing stage of the leaf".
"I know that here in the USA more and more orchard managers are at least supplementing, if not shifting completely, to foliar fertilisation of tree crops. Foliar fertilisation with organic (seaweed & fish) and inorganic fertilisers has been standard practice among orchid growers for many years. My understanding about orchids is that they have fixed stomata in the open position which facilitates absorption of fertilisers through the leaves. But other plants are different."
So it seems as though the general opinion is that plants can absorb nutrients through their leaves, but no one seemed to know how this occurred.

Some of the Moraeas of Ceres

Margaret Fox

Open areas on the outskirts of the Ceres residential area provide the possibility of discovery of whatever is in flower and on show. For me it provides an opportunity of documenting the plants that I happen to find there. From mid-winter onwards it is a field of discovery. I am finding that the low growing plant life is varied and numerous. It also differs from patch to patch. This could either be that the plants have preferences or that they just hang on where they can, defying the odds against their continued survival.

There is an area which last year was still bare of houses, but in 2005 there is already a newly built house and two more houses imminent. The area is flat and sandy and normally quite wet in winter (2004 however, was not very wet). There I found *Spiloxene capensis*: yellow, cream, two-tone of near-white with dark brown, best of all white with peacock blue. Last year (2004), in mid September, I spotted a Moraea new to me. Yellow, not more than 10-15cm high, protected by a large spathe, a pale gray-green chunky plant. Consulting the books, it proved easily identifiable - *Moraea macronyx*. The style-crest a paler yellow - its specific name therefore very descriptive of the plant. It was satisfying to know that there was no confusion about its identification and everything fitted in nicely – it was within its range, flowering time, it fitted the description and even matched the illustration! This year (21.8.2005), I found the same plants in flower. A week later in the afternoon I came across another couple of flowers, then more, and finally little clumps. This new locality is an area lying between the river-bank and the housing area - a common. Every now and again it gets trimmed, otherwise gets left to its own devices and hopefully this situation should be ongoing. It is too dry in summer for any grass really to dominate. A few pine trees are scattered about and a salmon Oxalis species carpets the ground under the pines. The next day in late morning I went back to the site but could not find one flower. Had the moles, or the cutters, or wayward car wheels destroyed them? All was well however; I returned later that day to find that the plants had replaced the previous day's blooms with new ones. The plant was playing hide and seek!

Further towards the Ceres mountain, there is a flat municipal area which is relatively undisturbed - there is an access road to the nearby dam, but otherwise the area is left alone. It is flat with wet sand, and it is crossed with runnels carrying clear water. Nearby were patches of Drosera species, with red leaves in rosettes. Here at the end of September 2005 I came upon a little blue Moraea, less than 15cm off the ground. The flowers were smaller than 2cm across and delicate with clear jewel-like quality, and feathery style crests. Perhaps it was not yet known to science? There was one other specimen a few metres away. I returned late the next morning with my camera to get another look, but it had done a vanishing act. I spotted the plant, flowers either old, wilted or new ones about to open. I ought to have known better by this time and should have taken the time of day and weather conditions into account! So that afternoon I returned and found a flower open. This turned out to be *Moraea lugubris*, once again unmistakable in all aspects and according to the books quite widespread! As I widen my knowledge of our flora I also learn about their behaviour. ♣

A Bit of Froth on the Bird's Milk

(A short talk at IBSA's 2004 year-end meeting)

John van der Linde

The genus *Ornithogalum* consists of over 200 species of bulbous plants found mainly in Mediterranean regions, such as Southern and Eastern Europe, Turkey, Syria, Lebanon, the Caucasus, Northern Iran and South Africa, where there are about 120 species. 43 of these species are found in the Cape Region covered by Manning, Goldblatt and Snyman in their recent book "The Color Encyclopedia of Cape Bulbs".

In Europe *O. umbellatum* ("Star of Bethlehem") is one of the best known, whilst we in South Africa are most familiar with the "chincherinchee", *O. thyrsoides*. The S. Australians know it too, for it is a declared noxious weed in that State!

You may remember that at our October meeting Rod & Rachel tabled a magnificent pot of *O. dubium*, with rich butter-yellow flowers. This species, from the eastern, western & southern Cape, can have flowers in shades of yellow, orange and orange-red. The common name is "geeltjienkerientjee". I also have a pot of them, now coming to the end of their flowering season.

I wanted to know more about them and was intrigued by the derivation of the genus name – from "ornis", meaning bird, and "gala" meaning milk, both in Greek. Ornithogalum means "Birds' milk". How peculiar. So I began investigating, with help from Rhoda McMaster. There are several theories, but no-one knows for sure, as they have been in cultivation for centuries.

Firstly, it is said that pigeons produce a secretion in the crop for feeding their young, and our pigeon fancier Quentin Jansen confirms this. Maybe this somewhat resembles the gooey sap that exudes from the cut stems. Well, I went and massacred a stem and squeezed it to get some sap, very little and only slightly gooey, but certainly not milky in colour. Maybe I have the wrong species?

Another explanation is that the flower of *O. umbellatum* is milk-white and that it rises from a single stalk like a bird. I don't think so!

A third explanation is that the ancients described something infinitely rare and precious as "birds' milk". Nearly as rare as hen's teeth, maybe! Another one is that it was simply taken from "Ornithogale", an old Latin and Greek name for a bulbous plant with white flowers.

O. umbellatum, the "Star of Bethlehem", is native to the Near East, including Israel. It was probably introduced to Western Europe, well before 1450, by Crusaders returning from the Holy Land – more of them later. The genus was eventually established by Linnaeus in 1753. Thunberg first used the term "Tinkerintees" in 1772.

O. dubium (meaning "doubtful" and used for plants whose structures or affinities are uncertain) was described by Maarten Houttuyn, a Dutch physician, important botanist and

collector, who lived from 1720 to 1798. Remember, in those days medical training included a lot of botany, as then known, for doctors often made up their own medicines from herbs and other plants. Many South African *Ornithogalum* species contain colchicines, used to treat gout in humans and to induce polyploidy in plants, and are in fact extremely toxic.

Would you like to make your enemy's cow miscarry, or a cow's milk to dry up? Just use *O. ecklonii* as a charm, as the Sotho people in Lesotho are said to do!
Fancy an asparagus starter for dinner? Try the young infloresences of *O. pyrenaicum*, commonly known as "Bath asparagus" in Britain. Or how about a wholesome and nutritious veggie for your guests - cooked bulbs of *O. umbellatum*? When they have finished eating you can tell them that the dish was the supposed "Dove's dung", referred to in the bible – 2 Kings chapter 6, verse 25.

The Crusades, which attracted Christians from all over Europe, continued for almost 350 years. During that time of movement of large numbers of people over vast distances to and from the Holy Land, many plants from further east were introduced to the rest of Europe, and also ideas and inventions that we take for granted today. For example, the windmill used for grinding corn or raising water; and how could we gardeners manage today without a contraption that reached Britain back in 1170 – variously known as "The Wooden Ox" or "The Gliding Horse". Any ideas as to what that is?

That's right – the wheelbarrow! ♣

Kelp

Written by Mary Sue Ittner to the Pacific Bulb Society

Many years ago someone suggested a kelp soak to help germinate Cyclamen seed. I tried it, but couldn't find it or any of the other methods suggested made much difference. Fresh seed germinated the most quickly and other seed whenever they were moved to do so (sometimes after being thrown out!). I still had the kelp however, and noticed on the bottle it suggested soaking bulbs as well as seed to improve success. So this year I soaked four different things I hadn't been able to get to come up in the last one or two years, for a day in a kelp solution: *Brunsvigia minor, Lachenalia arbuthnotiae, Moraea neopavonia* – dormant for years, and mystery corms that looked like a Moraea given to me by a friend, that had been dormant for 2 years.

They all came up. To be really scientific I should have planted some without soaking to see what would happen, and I didn't. But it was easy enough to do and I think it is worth trying. I have some Oxalis I'd like to try next year as in my experience they also can sit out the year. Two of my four *Ornithogalum dubium* that didn't come up last year have come up and 5 or 6 of my 50 little seedling bulbs, so I wish I had soaked them too!

I soaked some *Veltheimia capensis* seeds in kelp water, some in smoke water and planted some without treatment all the same day. They all three germinated about the same percentage-wise, but the ones soaked in kelp started germinating a week sooner.

From the Archives

From the IBSA Bulletin number 42 of 1994 comes the following article:

"A Rare Lily has been added to our collection" by M Terblanche and M de Bruyn of the ARC

We saw a Cyrtanthus species during our collecting trip that had long been lost to the Botanic community. We had actually gone hunting for *C. huttonii* and *C. thorncroftii*. One day we set aside to explore the area where the great plant fundi, Reverend Junod, had resided. We had a rather remote hope of sighting *C. junodii*. One wonders if a plant still exists after it had last been seen in 1906.

With a surfeit of vague indications, we set forth to our destination. It really is a tough trudge up that mountain. We saw lots of *Clivia caulescens* in full flower in the ravines. A few *Cyrtanthus stenanthus* plants on the grassy slopes were apparently the only members of the genus that occur in this beautiful locality. We returned to our host to inform him what we had seen. It was only at that stage that Mr Thompson disclosed his great love for and knowledge of plants. "No man, I am not talking about clivias, let's go back" said he, and off we sped again up the mountain.

Fifty meters beyond where we had turned back, a host of lovely lilies hung from the perpendicular krantz. The waxy red, yellow tipped flowers hung on their 35cm long stems over the gaping chasm. Far across, on the horizon, lay the summer residence of Junod. On closer inspection we realised that this could only be *C. junodii*. Mr Thompson, who knows this part of the world intimately, was not at all as excited as we were. He had been observing them flowering there for the past 60 years.

Said he – "We used to call it Junod's but then this other learned oke said it was *tuckii*". He proceeded with his dog, Peanuts, to show us a small aloe named after his mother. He pointed out a *Brachystelma codii*. In passing it he held forth about the Myrhh species which also grows in Arabia. He recounted about Mc Neil, Codd and Junod; he described what grows in the Kaokoveld, the Blouberg forest and on Mariepskop. Even now we remain amazed at the man's knowledge of and enthusiasm for the vegetation.

On our return to Pretoria, the NBI confirmed the identity of the Cyrtanthus. There are now four *C. junodii* plants in our conservatory at Roodeplaat where we are investigating its cultivation requirements and horticultural potential. A rare lily has been added to our collection.

Editor's note: Since this article appeared, has anyone heard any more about this Cyrtanthus? I wonder if the ARC still has the plants and whether anything has been done with them. In the article another unusual species was mentioned - *C. thorncroftii*. Does anyone know anything about this species? Does anyone grow it? ♣

Synonymy in Agapanthus

In Bothalia Volume 35 (1) (2005), page 87), Graham Duncan describes changes within the genus Agapanthus. The last revision of the genus was published in 1965 by Leighton where 10 species were recognised. It is a difficult genus due to extreme morphological variation and the paucity of reliable characters. A new study based on DNA and on pollen colour and vitality, reduces the number of species to 6 – *A. africanus, campanulatus, caulescens, coddii, inapertus* and *praecox*.

Group with lilac pollen and a DNA content of 22.3 – 24 pg
Agapanthus campanulatus
caulescens
coddii

Group with yellowish-brown pollen and a DNA content of 25.2 – 31.6 pg
Agapanthus africanus
inapertus
praecox

Agapanthus walshii is now *A. africanus ssp walshii*
A. comptonii is now *A. praecox ssp minimus*
A. nutans is now *A. caulescens ssp gracilis*
A. dyeri is now *A. inapertus ssp intermedius*

A. praecox ssp minimus
Evergreen very variable species found from Knysna to Port Shepstone. Small plant size and small clumps, fewer flowers and slender short peduncle.

A. praecox ssp orientalis
Dense clumps, broad arching foliage, sturdy peduncles greater than 600mm, large dense inflorescene.

A. caulescens ssp gracilis
Deciduous summer growing species from Kwazulu Natal, Mpumalanga and Swaziland. There are now 3 subspecies – *caulescens, angustifolius* and *gracilis*.
The subspecies *gracilis* has more slender laxer growth form, smaller flowers with perianth segments recurving markedly towards the apices. It has caulescent shoots and linear leaves with hyaline margins.

A. inapertus ssp intermedius
Deciduous summer growing species from Mpumalanga, Limpopo Province, Gauteng and Swaziland. There are 5 subspecies – *inapertus, hollandii, intermedius, parviflorus* and *pendulus*. The subspecies *intermedius* has flowers 25 – 45mm long. ♣

New Species

Bothalia (2005) 35 (1), 1 – 6. P Goldblatt, A Dold and J Manning

Three spring flowering Aristeas from the eastern half of the winter rainfall area

Aristea nana from the Willowmore Baviaanskloof area.
It is 8 – 15cm high, sometimes in small tufts, stem flattened and 2 winged, sword-shaped to linear leaves, solitary flower clusters on the ends of stems, pedicels 1 – 2cm, dark blue fl with green on outside of outer tepals, flowering time July to September.
This species is similar to *A. pusilla* – the leaves of *A. nana* have a glaucous bloom and the flower stem is almost always unbranched.

Aristea elliptica found on rocky sandstone slopes in the Grahamstown area.
Plants are about 35cm tall, have an unbranched oval stem which is prominently 2 winged, linear to narrowly sword-shaped glaucous leaves clustered at the base. The pale blue flowers are in clusters and have a broad green stripe on the reverse of the outer tepals, flower from August to October. The seeds are unique – ellipsoidal in shape.
This species is also similar to *A. pusilla* – the seed shape differs as does the plant size (*A. pusilla* is usually about 8 – 15cm).

Aristea cistiflora from the Langeberg Mountains, flowering after fire.
30 – 50cm, oval stem, linear leaves 3mm wide loosely twisted. 4 – 6 flower clusters, mostly sessile, each 2 – 4 flowered. Flowers held at 45° to the horizontal, large pale pink to pale lilac or cream flowers with bases of tepals darker lilac violet or brown. The species flowers in August and September.

Bothalia (2005) 35 (1), 21 – 27. D Snijman

Three new species of Strumaria and a new synonym.

Strumaria prolifera from the Springbok area.
12 – 20cm in flower. Clumped bulbs make bulblets, leaves emerging with the inflorescence, 2 – 3 pale green leaves suberect to recurved, then spreading flat when mature, 2 – 4 flowers 15 – 30cm across, drooping funnel shaped delicate shell pink flowers faintly scented, stamens enclosed, in May.

Strumaria speciosa from Southern Namibia
About 30cm in flower. Clumped bulbs, neck extended above ground, broad leaves emerge at flowering, 4 – 6 erect to falcate leaves arranged in an erect fan in 1 plane, 11 – 14 flowered inflorescence, actinomorphic campanulate flowers, nodding, pure white, honey scented, in May. Stamens are well exserted and the tepals are strongly recurved in the distal half.

Strumaria luteoloba from the Richtersveld and Southern Namibia
25cm high in flower. Solitary bulb, leaves emerge just after the flowers, 2 – 3 erect dark green leaves arranged in fan in 1 plane, 4 – 7 flowers per inflorescence, actinomorphic nodding flowers, rose pink in the lower half, recurved and pale lemon to cream above, well exserted stamens, in May.

Strumaria gigantea, a new species described by the two Muller-Doblies in 1994, has been placed into synonymy under *Strumaria phonolithica*. The two species were separated by width of leaves, size of inflorescence and flowers, and locality. However, an intermediate in size and locality has been found, and the two species are now considered to be the same.

Bothalia (2005) 35 (1), 67 - 68. Z. Swanevelder, A van Wyk, J Truter

A New Variety in the genus Clivia

A distinct yellow-flowered form of *Clivia gardenii* is described as *C gardenii* var. *citrina*. In Ngome Forest a strong population of lemon or pale yellow-flowered plants was found.

Bothalia (2005) 35 (1), 71 – 74. P Goldblatt & J Manning

Taxonomic Notes on Babiana and Ferraria

In the revision by M. de Vos in 1979, *Ferraria divaricata* was treated as a single widespread species with 4 subspecies, ssp *arenosa, aurea, divaricata* and *australis*. She noted that there were differences between them, for example ssp *arenosa* and *aurea* had seeds that were completely different to those of all the other Ferraria species, but she left them all in the species *F. divaricata*. After collecting all 4 subspecies in the field, the above authors decided that the 2 subspecies *aurea* and *arenosa* should be lumped together in the species *Ferraria divaricata*, and that the 2 subspecies *australis* and *divaricata* should be lumped into a new species called *Ferraria variabilis*. This species extends from Southern Namibia to Oudtshoorn, excluding the western coastal area of the Western Cape.
The plants are up to 20cm tall, often branched, sword-shaped leaves, flowers yellow to brown or dull grey-blue, limbs dark brown, claws uniformly pale or with dark streaks, slightly putrid smelling, flowers in August to November, seeds rounded with wrinkled coat.

Bothalia (2005) 35 (1), 82 – 84. E van Jaarsveld & A van Wyk

Ornithogalum juncifolium* var. *emsii, a new cliff-dwelling Ornithogalum from Eastern Cape.

Bulbs above ground and forming clusters up to 10cm diameter, basal part of bulb continuously proliferating, 2 or 3 evergreen leaves, linear, half-terete, dark green, raceme to 20cm long, white tepals with green median stripe, flowering December to January, black angled seeds are wind dispersed. This variety is known only from the shale cliffs overlooking the Great Fish River. The plant is often mat-forming and the clusters may fill a whole crevice.

Bothalia (2005) 35 (2), 153-156. D Snijman

A new species of Namaquanula (Amaryllidaceae: Amaryllideae) from Namibia with notes on the genus

Namaquanula was described as a monotypic genus in 1985 – *N. bruce-bayeri*. This species is found in southern Namibia and the Richtersveld. In this paper, Dee Snijman describes a second member of the genus, *N. bruynsii*, also from southern Namibia. 15cm in height, bulb has brittle bulb tunics, 3 to 4 leaves appear shortly after flowering, leaves are flat, about 4mm wide, and

glabrous, inflorescence has about 15 flowers, each star-shaped and pale pink with a darker pink or greenish median stripe on each tepal, unscented, filaments free to the base, flowers in January, and leaves emerge a few weeks later. The plants grow in flat patches of granite and quartz gravel in association with various other winter growing succulents.

Novon (2004) 14 (3) P Goldblatt & J Manning

New species of Ixia and Moraea

Ixia superba from the Montagu area.
20 – 60cm in height, 3 basal lanceolate leaves about half the length of the stem, simple or 1 – 3 branched stem, large scented actinomorphic pale to deep pink flowers with purple to blackish base of each tepal, flowers in August to September.

Moraea simplex from the moist clay flats at the base of Piketberg.
To 40cm, solitary channelled leaf exceeding the stem length, erect sticky stem with sheathing bract-like leaf at each upper node, branched flower stem, pale creamy yellow flowers, outer tepals with pale yellow mark at the base of limb, unscented, late September or October.

South African Journal of Botany (2004) 70 (4), 631 – 634. A Dold & Brink

Drimia chalumnensis from the coastal grassland in the Peddie area.

This is a dwarf plant of 10 – 15cm, found in colonies. Each plant has 2 – 8 leaves, present or absent at flowering, rosulate and prostrate, 2cm linear-lanceolate, dark grey-green with dull whitish bloom, margin light brown and thickened. Single inflorescence, sub-globose capitate, dark glossy purple-red peduncle, star-like white flowers flushed pale golden brown above, October to November. The plant goes dormant from January to March.

Book Review

The Clivia Year Book no. 7

Editors R Dixon, C Felbert and J van der Linde
Published by the Clivia Society, South Africa 2005
96pp Softcover ISBN 0-620-34797-X

It has always been a source of amazement to me that 6 species of plants in one genus can produce so much diversity and so much enthusiasm amongst people. The Clivia Year Book, from its conception, has contributed in no small way to feeding this enthusiasm for all things Clivia. The quality is always high, both in appearance and in content. The latest issue, no 7, is no exception, from its striking glossy front cover to its contents, it is lavishly illustrated throughout.

A variety of subjects regarding Clivias are dealt with, in fact, so thoroughly that one wonders where the subject matter is going to come from for Clivia 8! The genetic variation of Clivia is dealt with competently by Johan Spies, and this article sheds light on why the genus is a plant breeder's delight. Understandably there are a number of articles on the breeding of Clivias, including a practical piece by Sean Chubb on colour selection in *Clivia miniata*. Shigetaka Sasaki describes new developments on Clivia breeding in Japan – one's mind boggles at the colour variations. Roger Dixon has written an historical account of the various yellow clones of *Clivia miniata* that are so beloved by growers.
Wild species are not neglected and there are articles on the 2 newly described species – *Clivia mirabilis* and *Clivia robusta*, by Hein Grebe and Keith Hammet respectively.
In a more practical vein there is a well illustrated article on fungal diseases of Clivias, by Wijnand Swart. A serious threat facing Clivias in the wild is focused on by Vivian Williams, who writes about the collection of Clivias for the muti trade. This is probably the single biggest threat facing the plants, and unfortunately the authorities seem loathe to tackle the problem head on.

Clivia 7 is truly an international publication with authors drawn from all over the world – UK, New Zealand, Japan and South Africa. Over the years it will become an historical record of the breeding of Clivias, and will serve as an important record.
Well done Clivia Society – I look forward to Clivia no. 8.

Rod Saunders ♣

South African Wild Flower Guide no 5
Stellenbosch to Hermanus
(Second revised edition)

A. Bean and A. Jones
Published by the Botanical Society of South Africa 2005
338pp Bound in a durable plasticised field type binding ISBN 1-874999-58-9

The first edition of this very popular field guide has accompanied us on many trips into the mountains, and has always been useful. It had 219 pages and was published in 1985. This second edition has 338 pages, covers more species, is more informative, and is very user friendly with excellent introductory chapters.
The first chapter deals with the areas of interest covered by the guide, and if you read it, you will get some idea of just how diverse the vegetation of the area is. For the more active reader, there is a list of recommended walks within the area to see wild flowers. Following on from this is a section on Climate and Geology, and then one on Ecology and Origins of the Cape Floral Kingdom, including information on soils, pollinators and seeds, fire survival and conservation.

Before commencing with the main illustrated descriptive part of the book, there is a section on the classification of plants and family descriptions. So often Field Guides assume that the person using the book has some botanical knowledge, while mostly this is not the case. This chapter serves as a good introduction to the naming of plants and the differences between various families.

For the bulb "freaks" buying this book, there are a total of about 70 pages devoted to bulbous and cormous plants, and most of the commonly encountered species are described and illustrated. Lachenalias are poorly covered with only 4 of the 14 species occurring in the area illustrated. On the other hand, Iridaceae, as befits a major family in the fynbos, is lavishly illustrated.
Grasses, reeds and restios are well represented in the guide. These are a major part of the vegetation in the Cape Floral Kingdom and are often neglected in other field guides – I suspect because they are not "ooh-aah" plants, and because they are not always easy to identify.

For each genus that is covered, information is given in footnotes detailing the total number of species in the genus and the number occurring in the area covered by the guide. Often reference is made in the species descriptions to related species not illustrated, but with which the species may be confused. All this information is extremely useful as it aids in the positive identification of a plant.
In the left hand margin, Wendy Hitchcock has illustrated diagnostic features and technical details by means of simple line drawings.
Throughout the guide, the text is always opposite the illustration, so there is no necessity for frantic paging to and fro. For those confused by botanical terms, there is an excellent glossary at the end of the book, again with many line drawings. Another useful feature at the end of the book are 3 pages illustrating the involucral bracts of the major genera of Asteraceae, a notoriously difficult family to identify.

Finally, I was delighted to find one combined index of all the names used in the book, whether common names or botanical ones. I hate separate indexes, as invariably one turns to the wrong one and has to page backwards and forwards to find either a common name or a Latin one.

For anyone living in the Western Cape who is interested in plants, this book is invaluable and must have a place on your shelf. The authors and illustrators are to be commended on a job well done.

Rod Saunders ♣