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Haworthia magnifica v. *atrofusca* x *Haworthia magnifica* v. *splendens* [Ham 1978]

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Haworthia 'Mori-no-Sono'

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In Alsterworthia International 1(1)4-5 details, supported by a photograph, of *Haworthia* 'Moori Nosono' were given with a request for information which would reveal the source of the plant and the whereabouts of its original description. In Alsterworthia International 3(1)4 *Haworthia* 'Moori Nusono' and *Haworthia* 'Midori Nosono' were illustrated and compared and it was suggested that both were the same cultivar with *Haworthia* 'Moori Nusono' being a corruption of *Haworthia* 'Midori Nosono'. Following these two articles Harry Mak kindly sought guidance from Mrs Hikako, editor of the Japan Succulent Society journal. In her very helpful reply Mrs Hikako wrote, "*Haworthia* 'Moori Nosono' is not correct. It should be 'Mori no Sono'. 'Mori' means wood and 'no' is the Japanese preposition meaning "of or in". 'Sono' means garden, paradise or oasis. So I think that 'Mori no Sono' means 'Oasis in the wood'. Most probably it is of Japanese origin. Clearly it is a Japanese name and is mis-spelled." Later Mrs Hikako said that she had been unable to trace any publication concerning *H*. 'Mori no Sono'.

Harry Mak stressed that the name *H.* 'Moori Nosono' had been established under the ICNCP, because a description and photograph was attached to that name in a dated journal (Alsterworthia International 1(1)4-5). Eggli has listed it in RPS Vol. 52(2001):7.

The purpose behind the article *Haworthia* 'Moori Nosono' in Alsterworthia International 1(1)4-5 was to draw attention to the cultivar and locate where the name had already been published. However, in the absence of the prior establishment of a name for that cultivar, the provisions of the ICNCP do result in the establishment of a cultivar name if that name appears in a dated journal with a description. Mrs. Hikako has confirmed that the plants in the photographs in Alsterworthia International 3(1)4 and the plants she knows in Japan are the same cultivar. As Art. 29.2 of the ICNCP states that "An unintentional etymological error in a cultivar ….is to be corrected." (Moori to Mori) and Art. 28.6 that "…the particle 'no', derived from the transliterated Japanese cultivar epithets, is to be hyphenated before and after that particle." the name is amended to *Haworthia* 'Mori-no-Sono'

Summary:
Haworthia 'Mori-no-Sono'
Corrected from *Haworthia* 'Moori Nosono' Alsterworthia International 1(1)4-5. ICNCP Art. 28.6 and 29.2
Haworthia 'Moori Nusono' misspelling of *Haworthia* 'Moori Nosono'
Haworthia 'Midori Nosono' corruption of 'Moori Nosono'.

Acknowledgements:
Jos Verhoeven for drawing my attention to *H*. 'Midori Nosono'
Harry Mak for initiating investigations in Japan.
Mrs. Hikako for valuable information supplied.

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Gasteria carinata var. *verrucosa*

A comparison of various populations & cultivars

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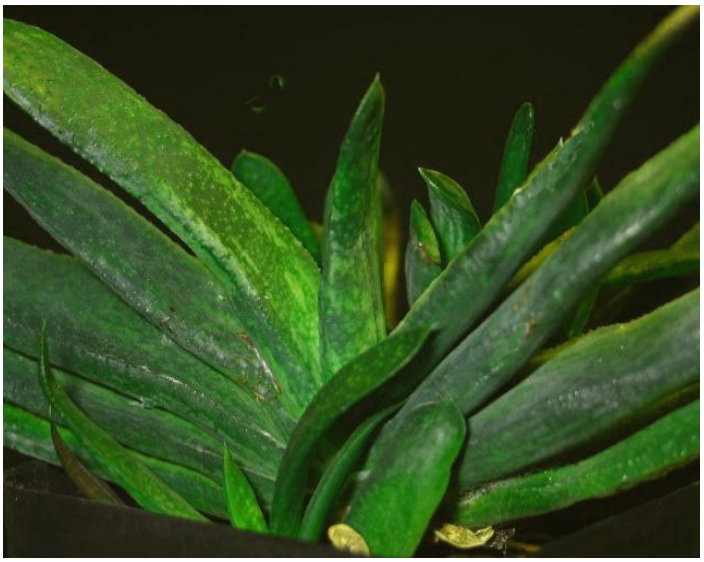

***Gasteria carinata* var. *verrucosa* (Witsand (?)) Fig. 1.**
KG 729/71 Karoo Garden's collection north of the Breede River Estuary.

In contrast to the other *verrucosa* collected from around the Infanta area, which have long leaves and nice white tubercles typical of the variety, this plant is a relative miniature with green tubercles against its green body making it rather nondescript. Fortunately, being a relative miniature, it is easy to maintain in a small pot and is worthwhile keeping due its being different from the typical *verrucosa* collections. Leaves are distichous, about 7-8cm long and 1.5cm wide at the base. They are dark green tending towards blackish, but paler towards the centre growing point with pale streaks, which can extend upwards along the leaves from the growing point. Tubercles are the same colour as the leaves and only slightly raised giving the leaf a rough texture. Flowering is in spring. Offsets facilitate propagation.

***Gasteria carinata* var. *verrucosa* (Infanta) Fig. 2.**
KG 730/71 Karoo Garden's collection south of the Breede River Estuary.

Leaves are distichous, about 12-15cm long, 2cm wide at the base and less than 0.5cm thick. They have densely packed white tubercles, most of which join up with their neighbours in the same fashion as *G. batesiana* leaves. With age, the tubercles tend to dull and/or turn green. This leads to a mature plant with whitish looking centres and greener leaf tips. In contrast juvenile plants with predominately white tubercles have a very attractive whitish appearance. Flowering is in spring. Offsets facilitate propagation. This is not the 'Infanta' plant described by van Jaarsveld (in Gasterias of South Africa) who describes a much larger plant with leaves up to 28cm long. However, the characteristics of densely packed tubercles suggest a relationship.

***Gasteria carinata* var. *verrucosa* (De Hoop) Fig. 3.**
De Hoop Nature Reserve east of Bredasdorp (ex Sheilam Nursery RSA)

I inherited my first *Gasteria* from my grandmother (who passed away about 40 years ago). This was a nice little *G. carinata* var. *verrucosa* that would have been in 'my family' for over 70 years. This is the plant which I associated as being typical of this variety. Little did I know when ordering the De Hoop plant about 5 years

Fig. 1 (top left) *Gasteria carinata* var. *verrucosa* (Witsand (?))
Fig. 2 (centre left) *Gasteria carinata* var. *verrucosa* (Infanta) KG730/71
Fig. 3 (bottom left) *Gasteria carinata* var. *verrucosa* (De Hoop)

ago from Sheilam Nursery that I would be turning full circle and finding a possible location for the original plant.

This is a very distinctive and easily identifiable plant. The leaves are very dark green and upper and lower surfaces are covered with pearl white 1mm diameter raised tubercles, which against the dark background makes them stand out. Leaves are distichous, about 1.5cm wide and 7-10cm long when grown in good light and low moisture conditions. Under lower light, leaves can grow to 20-25+cm long. Flowering is in spring. Offsets facilitate propagation. It seems identical with a collection from Bredasdorp.

***Gasteria carinata* var. *verrucosa* 'Pink Delight' Fig. 5.**
David Cummings imported this cultivar into Australia from the USA. Its form is similar to the collection from De Hoop/Bredasdorp. It has yellow variegation and I have not observed any 'pink' after which the plant was named. Pale yellow (or light green) streaks of varying shades run down the length of upper and lower leaf surfaces in an assortment of patterns. The leaves are distichous and have a background colour of very dark green. Upper and lower surfaces are covered with pearl white 1mm diameter raised tubercles, which against the dark background makes them stand out while making the paler background appear even more paler. Degrees of variation vary with different offsets with some having no or almost negligible amounts. Leaf length varies depending on the intensity of ambient light but average around 1.5cm wide and 15cm long. Flowering is in spring. Offsets form from short stolons rather than from between leaves and facilitate propagation. The plant is slower growing than the non-variegated form and is sensitive to over watering, with root loss being common.

***Gasteria carinata* var. *verrucosa* (Infanta) Fig. 7**
EVJ 8906 collection by van Jaarsveld & Retief (NBG) from Infanta.

Leaves are reported to grow to 28cm long and 3.5cm wide. On my plant, acquired from Burke's Nursery over eight years ago, the leaves have only grown to 15cm long and 2cm wide so there is still some growing to do! Leaves are distichous. The leaf colour is a mid light green which means the tubercles do not show off as well as they do against the darker leaved verrucosas. This 8+ year old plant is slow growing (averaging one leaf per year) and has not offset (but may do so when it matures). It has densely packed white tubercles, but not to the extent of KG 730/71 (also from Infanta), but, like KG 730/71, with age the tubercles tend to turn green resulting in a plant with whitish looking centres and greener leaf tips. A juvenile/younger form is more attractive. Flowering is in spring.

***Gasteria carinata* var. *verrucosa* (Golden Pond - Dreyer) Fig. 9.**
DMC 4224 Collected by David Cummings 18-20km NW of Infanta.

This is one of a number of all green forms of *verrucosa.* Its all green colouration is a result of the tubercles being almost the same colour as the plant body. Tubercles are only minutely raised giving the leaf surface a rough feel. Leaves are distichous, a light lime green, often bordered with dark green edges. Some slightly darker streaks can sometimes be seen running down the centre of the leaf. Stress and higher light intensities turn some of these leaves reddish. In the midst of a group of standard patterned green and white *Gasteria* these pale, lime green ones stand out. Leaves are around 2cm wide and 12-15cm long when grown in good light and low moisture conditions. Flowering is in spring with single racemes around 70cm long. Plants are slow growing, reluctant to offset, but easy to propagate from leaves.

***Gasteria carinata* var. *verrucosa* (Solitare) Fig. 4.**
ARM 353 Anthony Mitchell collection 2km east of Solitare. Leaves are distichous, 15-18cm long and about 2cm wide at the base. They are medium green with leaf tips and edges developing an attractive reddish colouration during summer. Summer also appears to bring the lighter colouration out in the tubercles making them appear paler. In winter this is a dull almost uniform green plant. Very small tubercles (reminiscent of those on *G. batesiana*) densely cover the leaf surface giving it a rough texture and because they are the same colour as the leaf, or slightly lighter, results in a plant with an all green appearance. Leaves can become deeply channelled under water stress which then causes the leaf edges to turn. Flowering is in spring. This plant offsets profusely. Offsets facilitate propagation.

***Gasteria carinata* var. *verrucosa* (Cooper Siding) Fig. 6.**
KG 790/62 Karoo Garden's collection from Cooper Siding.

This plant is distinctly different from the typical *G. carinata* var. *verrucosa* and could probably be described as a permanently juvenile (i.e. distichous) form of *G. carinata* var. *glabra.* Like the var. *glabra*, it has similar colouration and smooth leaves with relatively sparsely scattered, white spots forming indistinct bands. Tubercles are almost non-existent, but can be felt rather than seen on the leaf surface. Plants are very slow growing. Leaves are around 13-20cm long, 4cm wide and 1.5cm thick. This is really a plant for outdoor cultivation as the leaves are so thick and broad and lie flat, which means the potting mix has to be at the level of the top of the pot and even so the plant tends to lift itself out of the pot. Plants remain solitary so propagation is by leaf cuttings.

***Gasteria carinata* var. *verrucosa* (Klein Brak River Mouth) Fig. 8, page 5.**
DMC 3989 David Cumming collection from Klein Brak River Mouth.

This plant is distinctly different from the typical *G. carinata* var. *verrucosa* and could perhaps be a transitionary species. In many respects it has a greater affinity to *G. carinata* var. *glabra.* Like the var. *glabra*, it has a very smooth leaf with relatively sparsely scattered, white spots and forms rosettes (albeit very loose) when

Fig. 4 *Gasteria carinata* var. *verrucosa* (Solitare)

Fig. 5 *Gasteria carinata* var. *verrucosa* 'Pink Delight'

Fig. 6 *Gasteria carinata* var. *verrucosa* (Cooper Siding)

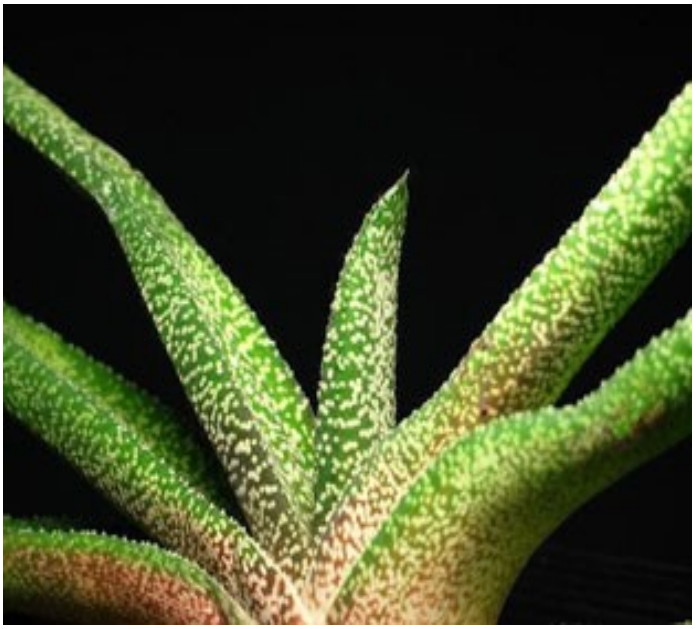

Fig. 7 *Gasteria carinata* var. *verrucosa* (Infanta) EVJ 8906

Fig. 8 *Gasteria carinata* var. *verrucosa*
(Klein Brak River Mouth)

Fig. 9 *Gasteria carinata* var. *verrucosa*
(Golden Pond - Dreyer)

Fig. 10. *Gasteria carinata* var. *verrucosa* (*subverrucosa* – hort.)

Fig. 11. *Gasteria carinata* var. *verrucosa* (*asperimma* – hort.)

mature. Leaves are grey/green, almost asperous, and can grow to around 16-18cm long, 2cm wide. They are almost rounded rather than flattened as in most of the var. *verrucosa.* Tubercles are present but sensitive fingers are needed to detect them. White spots form distinct bands on the underside of the leaf and are less distinct on the upper surface.

***Gasteria carinata* var. *verrucosa* (*subverrucosa* – hort.) Fig. 10.**

This is an old invalid name reduced to synonymy with the var. verrucosa. The original description indicates an origin from Algoa Bay, with leaves 20-25cm long, 3cm wide, convex, tuberculate with a rounded tip and white dots towards the apex in distinct transverse lines. Unfortunately, this description does not appear to match any of the current known habitat collections of *verrucosa* of which I am aware. However, it still remains a common plant in cultivation and worthy of acquiring. I have acquired *subverrucosa* (hort.) from a couple of different sources and the plants appear uniform in their characteristics. Leaves are distichous, 15-18cm long, 2 cm wide, concave and tapering to a point. Leaves are a somewhat dark green and covered with a combination of white spots and slightly white tubercles. Tubercles predominately appear on the leaf edges/sides and the underside of the leaf commonly has a greater proliferation of spots/tubercles than the upper side.

***Gasteria carinata* var. *verrucosa* (*asperimma* – hort.) Fig. 11.** This is an old invalid name reduced to synonymy with the var. *verrucosa.*

This is a very attractive plant and reasonably common in cultivation. Its attractiveness lies in its broad flat leaves densely covered in white tubercles, which join along the leaf margins to form white edgings. Leaves are distichous, about 15cm long and 3cm broad for most of their length. Tubercles are white and larger than normal (i.e. about 2mm in diameter), which gives the appearance of a greater number of tubercles per leaf. While very densely packed on the upper leaf surface,

Fig. 12. *Gasteria carinata* var. *verrucosa* 'Pikta'

Fig. 13. *Gasteria carinata* var. *verrucosa* (Mudlark)

they are even more numerous along the underside of the leaf, there being typically more "white" than '"green" showing on leaf undersides. The plant offsets sufficiently to facilitate propagation and flowers in spring.

***Gasteria carinata* var. *verrucosa* 'Pikta' Fig. 12**
Syn '**Picta**' Aust. Hort. Hybridist unknown.

A plant by the name of 'Picta' has been in circulation in Australia for a number of years. It is likely that it originated with David Cummings, but it is unlikely that David named it as it appears on none of David's lists. It is also unlikely that there is any *verrucosa* represented in the plant. I number of years ago I created an almost identical plant by crossing *G. carinata* var. *thunbergii* x *G.* 'Little Warty' (*G. batesiana* x 'Old Man Silver') so I conjecture that these are the parent plants. It is acknowledged that picta is an invalid name for *G. bicolor* var. *bicolor* and I am grateful for Paul Forster pointing out to me that picta is a latinisation from the Latin pictus for painted. As picta is an invalid name for a cultivar it is renamed here as 'Pikta' in keeping with the name series of another cultivar of similar parentage ('Pikandi').

Leaves dark almost blackish green, about 15-18cm long and up to 2cm wide. On maturity the plant forms a loose rosette with flattened triangular leaves. However, it is the white tubercles against the dark background that make this plant attractive. The tubercles are typically 1 to 1.5mm wide but 3mm to 5mm long and can join up to form very distinct bands across the leaf surface. Tubercles also join along the leaf edges to form a single white tubercle sized band running the entire length of the leaf. The plant offsets sufficiently to facilitate propagation and flowers in spring.

***Gasteria carinata* var. *verrucosa* (Mudlark) Fig. 13.**
DMC 4234 Collected by David Cummings 8-10km from Infanta
This is quite similar to the EVJ 8906 collection by van Jaarsveld & Retief from Infanta. It grows into a fan formation typical of the distichous carinatas with lower leaves lying flat against the soil. My plant is nearly 10 years old and grown from a leaf that produced only one plant, which in itself is quite unusual. However, it is at a size at which it is commencing to produce offsets (x2) albeit small.

Leaves are distichous around 20cm long and 3cm wide. The leaf colour is a mid/light green. The plant is densely tubercled. Tubercles on the upper leaf surface can vary from white and barely raised (almost spots) towards the growing centre to a somewhat faded pale green towards the leaf tip. However, the greener tubercles towards the leaf tip are raised giving the tips of the leaves a rough feel. On the older leaves the tubercles invariably fade to pale green, so new growth and leaves predominately have whiter and more attractive patterns. However, it is the undersides of the leaves that are most attractive with a density of white tubercles almost hiding the green of the leaf.

Special Issue - Cultivars & Hybrids

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Following discussions with a number of interested people earlier this year, one or more special issue(s) of Alsterworthia International is/are planned for "Cultivars and Hybrids".

It would be unrealistic to expect complete coverage. The ICNCP allows the publication of cultivars in any dated publication available to the public and in any language. Locating, obtaining and translating all relevant journals, catalogues, lists etc is probably an impossibility. If it is not, then it will probably take the (lifetime) efforts of many people to achieve it. All previous attempts by a number of people have been discontinued because of the inordinate amount of time involved for the production of limited results..
Our realistic objective is confined to illustrating as many cultivars as possible, in whatever time span is necessary, for the genera and nothogenera of the Asphodelaceae, so that a reference is provided for the hobbyist No doubt this will take more than one special issue. For obvious reasons, we do not have any precise publication dates scheduled, but we have reasonable expectations of publishing the first in the first half of 2004. Others will then be published at intervals as sufficient additional material is received.

All the cultivars listed will be illustrated in colour with supporting details, which will include the plant name, source of publication, parentage, appropriate propagation method(s) and comments. Not all this information may be available or necessary for every cultivar illustrated. There will normally

be four colour photographs to an A4 page. In the first issue there will be articles on propagation methods, with illustrations, and cultivation. Haworthias will probably form a substantial part of an issue with significant contributions from *Gasteria* and *Aloe* plus their nothogenera. Other genera are NOT excluded.

A significant number of photographs have already been received and more have been promised, consequently publication of the first "Cultivars & Hybrids" is assured. This permits this announcement and an appeal for further assistance.

An invitation is extended to both members and non-members to submit photographs, with whatever relevant information is available, for inclusion in the special issues. Please do not be deterred from sending in photographs because you have little information available or because you think they may already have been sent in. They may not have been and, if they have, your photos may be more suitable for a variety of reasons. Good quality photographs may be sent as prints, slides, on floppy discs or CDs or by files attached to e-mail. People whose photographs are included will receive a free copy of the special issue.

Again, for obvious reasons, it is not possible to indicate firm prices for these special issues, but they will be produced in the same way and on the same high quality gloss paper as is used for this journal. Thus the cost can be kept to a minimum notwithstanding the large amount of colour content. These special issues will be available to members at about total cost price, which will be some pounds less than the price to the public.

If you are able to help with material for this project, even if it is only one photograph, do please let me know. Every contribution will be appreciated and acknowledged.

Alsterworthia International Special Issue No. 4

Bruce Bayer has contributed three papers for S.I. No. 4.

Alooideae - Asphodelaceae and the genera thereof. In this paper Bruce discusses the paper "Phylogenetic relationships in Asphodelaceae (Alooideae) inferred from chloroplast DNA sequences (rbcl, matK) and from genomic finger-printing (ISSR)" published in Taxon 52:193.(2003) by Treutlein, J., Smith, G.F.S., van Wyk, B.E. & Wink, W. Bruce included in his discussion details and four illustrations (roots, "bulb", leaf and flowers) of a plant which could be a new genus because of its unique combination of characters. This plant came to light as a number of photographs taken by a botanist who was looking out for *Haworthia limifolia* for Bruce. He brought back a plant which turned out to be *Chortolirion angolense* and photographs of another plant which Bruce considers could be a new genus

What should we learn from history. Controversy was paramount in papers published by G.G. Smith, A. J. A. Uitewaal and Flavio Resende in the period 1949-50. These are republished, examined and commented upon by Bruce Bayer. Controversy is not only historical it is current and Bruce believes it is the result of an ill-defined species concept. He gives his species definition and details seven points in support of the credibility of his classification

Haworthia limifolia var. arcana Smith & Crouch. Bruce Bayer draws on his field experience to comment on varieties of *Haworthia limifolia* and uses eight photographs of collected plants to outline difficulties in classification. He concludes "I have no conclusion to draw other than to say that the problem of genera in the *Alooideae* is a reflection of the problem in the lower ranks."

Alsterworthia International Special Issue No. 4. has 44 A4 pages. The price is £6 + p & p. ***Alsterworthia International members' price £4.50 including p & p when ordered with renewal of membership for 2004.***

Haworthia Study

Biannual journal of the Haworthia Society of Japan.
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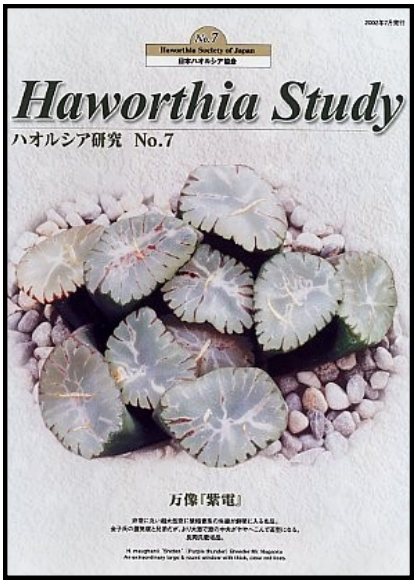
Articles are in Japanese with brief, occasionally longer, summaries in English.
A large proportion of each journal is devoted to cultivars with many colour photographs.

The last issue for 2003, December, will be distributed with the March 2004 issue of Alsterworthia International to all members who have subscribed to *Haworthia Study* for 2003. The subscription for *Haworthia Study* for 2004 will then become payable. At the time of writing this note (September) the subscription to *Haworthia Study* is not known but, subject to currency fluctuations, the price will probably be the same as for 2003. If you wish, you can contact Harry Mays in November for up-to-date information.



Infrageneric classification of Haworthia (Aloaceae): perspectives from nectar sugar analysis

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Abstract.
Species and genus concepts and infrafamilial delimitations in the Aloaceae (subfamily Alooideae of the Asphodelaceae) have often been controversial. Arguments are mostly based on evidence obtained from vegetative and floral morphology, but data from other fields have also been used for speculating on taxonomic affinities within the Aloaceae. For the present study, nectar sugar composition (glucose, fructose, sucrose) was determined for representatives of *Astroloba*, *Chortolirion*, the three subgenera of *Haworthia* and for interspecific haworthioid hybrids and miscellaneous taxa. Two nectar types were distinguished in *Haworthia* and the two related genera: a *Haworthia* type (subg. *Haworthia* only, usually less than 50% sucrose) and a *Hexangulares* type (subg. *Hexangulares*, subg. *Robustipedunculares*, *Chortolirion* and *Astroloba*, usually more than 60% sucrose). Results support Uitewaal's subdivision of *Haworthia* in two main groups, but reveal little substantiation for infra-subgeneric groupings.

Key words.
Aloaceae, *Astroloba*, *Chortolirion*, *Haworthia*, nectar sugars, chemotaxonomy.

Résumé. Classification infragénérique chez *Haworthia* (Aloaceae): perspectives à partir de l'analyse du sucre nectarifère. Les concepts spécifiques et génériques ainsi que les délimitations infrafamiliales chez les Aloaceae (sous-famille Alooideae des Asphodelaceae) ont souvent fait l'objet de controverses. L'argumentation se base principalement sur des données de morphologie végétative et florale mais des travaux dans d'autres domaines ont également conduit à spéculer sur des affinités taxonomiques au sein des Aloaceae. Dans la présente étude, la composition du sucre nectarifère (glucose, fructose, sucrose) a été déterminée chez des représentants de *Astroloba*, *Chortolirion*, des trois sous-genres de *Haworthia*, chez des hybrides interspécifiques haworthioïdes ainsi que chez divers taxons. Deux types de nectar ont été distingués chez *Haworthia* et chez les deux genres affins: un type Haworthia (subg. *Haworthia* seulement, généralement moins de 50% de sucrose) et un type Hexangulares (subg. *Hexangulares*, subg. *Robustipedunculares*, *Chortolirion* et *Astroloba*, généralement plus de 60% de sucrose). Les résultats corroborent la subdivision de Uitewaal du genre *Haworthia* en deux groupes principaux mais révèlent le peu de bien-fondé de groupements infra-subgénériques. Traduit par le journal.

Introduction

The Aloaceae, often regarded as subfamily Alooideae of the Asphodelaceae (Dahlgren & al. 1985; Smith & Van Wyk 1991, 1998), is a medium-sized family comprising five to seven genera and about 510 species (Smith & Van Wyk 1998) of succulent-leaved, petaloid monocotyledons. Most researchers recognise the family as a taxonomically difficult unit and species and genus concepts have often been controversial. The basic integrity of the three principal genera, *Aloe* L., *Gasteria* Duval and *Haworthia* Duval is usually accepted, but infrageneric classification in *Haworthia* and the legitimacy and intergeneric relationships of the remaining genera (*Astroloba* Uitewaal, *Chortolirion* A. Berger, *Lomatophyllum* Willd. and Poellnitzia Uitewaal) have frequently been debated (Uitewaal 1947; Rowley 1967, 1996; Parr 1971; Bayer 1972; Obermeyer 1973; Manning & Smith 2000). Arguments are mostly based on evidence obtained from vegetative and floral morphology, but data from other fields, e.g. in vitro callus growth (Hayashi 1987), cytogenetics (Rollins 1953; Brandham 1971; Riley & Majumbar 1979) and phytochemistry (Reynolds 1985; Viljoen & Van Wyk 1996), have also been used for speculating on taxonomic affinities within the Aloaceae.

The haworthioid genera of the Aloaceae

Three of the genera of the Aloaceae are included in the so-called haworthioid group. These are, chronologically and in descending order in terms of number of species, *Haworthia*, *Astroloba* and *Chortolirion*. On morphological grounds these genera are united by their small stature and dull-whitish, more or less or distinctly two-lipped or at least obsolescently zygomorphic flowers (Bayer & al. 1997). Geographically *Haworthia* is near-endemic to South Africa, with only one species, *H. venosa* (Lam.) Haw. entering Namibia in the west, and another, *H. limifolia* Marloth, extending into Mozambique in the east. Astroloba is restricted to the southern parts of South Africa while *Chortolirion* has a very wide distribution in the southern African grasslands, extending from Angola in the west, through Namibia, Botswana and Zimbabwe to the northern, central and eastern provinces of South Africa.

Data from nectar sugar analysis of Aloaceae

In a cladistic study of *Aloe* and related genera, Smith & Van Wyk (1991) used nectar sugars (glucose, fructose and sucrose) as one of an array of phylogenetically informative characters to investigate generic relationships in the Aloaceae. The data on which the character polarities were based were presented in a later paper (Van Wyk & al. 1993). During the latter study, high performance liquid chromatography (HPLC) analyses of nectar samples had shown distinct generic and suprageneric discontinuities in the family and three distinct nectar types could be distinguished. These comprised (a) an alooid type (*Aloe*, *Kniphofia*, *Lomatophyllum* and *Poellnitzia*) with less than 5% sucrose and more or less equal proportions of fructose and glucose; (b) a gasterioid type (*Gasteria* only) with sucrose dominant and about equal proportions of fructose and glucose; (c) a haworthioid type (*Astroloba*, *Chortolirion* and *Haworthia*) with sucrose dominant, but with much more glucose than fructose.

According to Smith & Van Wyk (1991) and Van Wyk & al. (1993), nectar sugar composition is remarkably consistent within each of genera of the Aloaceae. However, subsequent scrutiny of results obtained during the 1993 study showed that the nectar of a few haworthias did not conform to the haworthioid type: the dominant sugar in the nectar of *Haworthia arachnoidea* (L.) Duval, *H. comptoniana* G.G.Sm. and *H. herbacea* (Mill.) Stearn was not sucrose, but glucose; the sucrose content for these species was in fact unusually low at 36%, 42% and 35 %, respectively (tab.1 in Van Wyk & al. 1993). Since all three aberrant species belong to *H.* subg. *Haworthia,* it seemed possible that nectar sugar analyses

might reveal infrageneric groups in this genus and help to elucidate intergeneric relationships in the family. To test this hypothesis, a rigorous comparison of nectar sugars was made for species of all three subgenera of *Haworthia* as well as for representatives of *Chortolirion* and *Astroloba*. The results of our investigation are reported in the present communication.

Material and methods

Nectar was sampled from newly opened flowers on cultivated plants in private collections and various botanical gardens (see tab.1). Collecting voucher specimens was therefore not only unpractical, but also unnecessary (most of the co-authors of this paper are taxonomic experts on the various genera of the family). A total of 65 samples, representing 49 taxa as listed in tab. 1, were analysed. Nectar samples were applied as spots to Whatman no.1 filter paper with a micropipette, air-dried and stored at –18 ºC. For analysis, the sugars were recovered from the filter paper by repeated rinsing with distilled water, followed by centrifugation (usually 3× with 25 to 50 ml, depending on the size of the spot). Analyses were done with a refractive index detector coupled to a isocratic HPLC system operating at 2.5 ml per minute, with a "Waters Sugarpack" column and acetonitrile-water (87:13) as eluent. The percentages of the sugars were calculated on a weight basis from peak area, using 2, 4, 6, and 8 mg per ml of fructose, glucose and sucrose as external standards.

Results and discussion

Table 1. Nectar sugar composition in *Haworthia* (sensu Bayer 1982) *Astroloba* (sensu Groen 1987) and *Chortolirion* (sensu Smith 1991)

No.	Genera and species	Locality*	Nectar composition* (%) fru	(%) glu	(%) su
I. Subgenus Haworthia					
1	H. angustifolia Haw.	WNBG	4	48	48
2	- fa. baylissii (C.L.Scott) M.B.Bayer	GFS	10	25	65
3	H. arachnoidea (L.) Duval sample 1	NBG	13	51	36
4	- sample 2	JDV	5	50	45
5	H. blackburniae W.F.Barker	WNBG	24	43	33
6	H. bolusii Baker	PNBG	6	39	55
7	H. comptoniana G.G.Sm.	POTCH	4	54	42
8	H. cooperi Baker	KNBG	5	39	56
9	H. cymbiformis (Haw.) Duval var. cymbiformis	GFS	14	55	31
10	H. decipiens Poelln. sample 1	WNBG	7	51	42
11	- sample 2	WNBG	9	61	30
12	H. divergens M.B.Bayer	WNBG	16	52	32
13	H. emelyae Poelln. sample 1	PNBG	8	54	38
14	- sample 2	GFS	12	59	29
15	H. habdomadis Poelln. var. morrisiae (Poelln.) M.B.Bayer	JDV	2	48	50
16	H. herbacea (Mill.) Stearn	POTCH	19	46	35
17	H. maculata (Poelln.) M.B.Bayer sample 1	WNBG	17	49	34
18	- sample 2	WNBG	16	58	26
19	H. magnifica Poelln. var. maraisii (Poelln.) M.B.Bayer	JDV	1	50	49
20	H. magnifica Poelln. var. maraisii Uitewaal	WNBG	16	54	30
21	H. maughanii Poelln.	JDV	7	58	35
22	H. nortierii G.G.Sm. var. nortierii	WNBG	20	60	20
23	H. pubescens M.B.Bayer	WNBG	11	46	43
24	H. retusa (L.) Duval	JDV	4	44	52
25	- var. dekenahii (G.G.Sm.) Bayer	JDV	10	39	51
26	H. rycroftiana M.B.Bayer	JDV	6	57	37
27	H. semiviva (Poelln.) M.B.Bayer	WNBG	16	52	32
28	H. truncata Schönland	JDV	7	47	46
29	H. unicolor Poelln.	WNBG	5	45	50
30	H. xiphiophylla Baker	JDV	25	48	27
31	H. glauca Baker	KNBG	1	19	80
II. Subgenus Hexangulares					
32	H. koelmaniorum Oberm. & D.S.Hardy - sample 1	PNBG	5	23	72
33	- sample 2	GFS	8	28	64
34	H. limifolia Marloth var. limifolia sample 1	KNBG	4	41	55
35	- sample 2	PNBG	3	24	73
36	- sample 3	GFS	11	29	60
37	- var. gigantea Bayer	WNBG	4	34	62
38	H. longiana Poelln. sample 1	KNBG	3	20	77
39	- sample 2	WNBG	7	19	74
40	H. nigra (Haw.) Baker	WNBG	–	25	75
41	H. venosa (Lam.) Haw. subsp. granulata (Marloth) M.B.Bayer - sample 1	PNBG	5	25	70
42	- sample 2	PNBG	4	24	72
43	- sample 3	WNBG	8	30	62
44	subsp. tessellata (Salm-Dyck) Baker - sample 1	KNBG	1	29	70
45	- sample 2	PNBG	2	24	74
46	H. viscosa (L.) Haw. - sample 1	PNBG	2	32	66
47	- sample 2	GFS	4	33	63
48	H. woolleyi Poelln.	WNBG	1	22	77
III. Subgenus Robustipedunculares					
49	H. minima (Aiton) Haw.	PNBG	7	24	69
50	H. pumila (L.) Duval - sample 1	WNBG	1	14	85
51	- sample 2	PNBG	3	17	80
52	- sample 3	PNBG	7	19	74
Interspecific hybrids and miscellaneous taxa					
53	H. woolleyi × H. sordida	WNBG	4	29	67
54	H. viscosa × H. longiana	WNBG	8	27	65
55	H. subg. Haworthia sp. nov.	WNBG	6	55	39
56	H. tortuosa Haw.	GFS	11	31	58
57	H. mcmurtryi C.L.Scott	PNBG	7	26	67
Astroloba					
58	A. bullulata (Jacq.) Uitewaal	GFS	20	46	34
59	A. spiralis (L.) Uitewaal subsp. spiralis	KNBG	2	13	85
60	- subsp. foliolosa (Haw.) Groen - sample 1	POTCH	4	16	80
61	- sample 2	PNBG	7	29	64
62	- sample 3	KNBG	9	32	64
Chortolirion					
63	C. angolense (Baker) A.Berger - sample 1	POTCH	8	21	71
64	- sample 2	POTCH	8	19	73
65	- sample 3	POTCH	7	20	73

* Definitions
GFS, Personal collection G.F.Smith;
JDV, Personal collection J.D.Venter;
KNBG, Kirstenbosch National Botanical Garden;
PNBG, Pretoria National Botanical Garden;
POTCH, Potchefstroom University for Christian Higher Education Botanical Garden;
WNBG, Karoo National Botanical Garden, Worcester.
fru, fructose
glu, glucose
su, sucrose

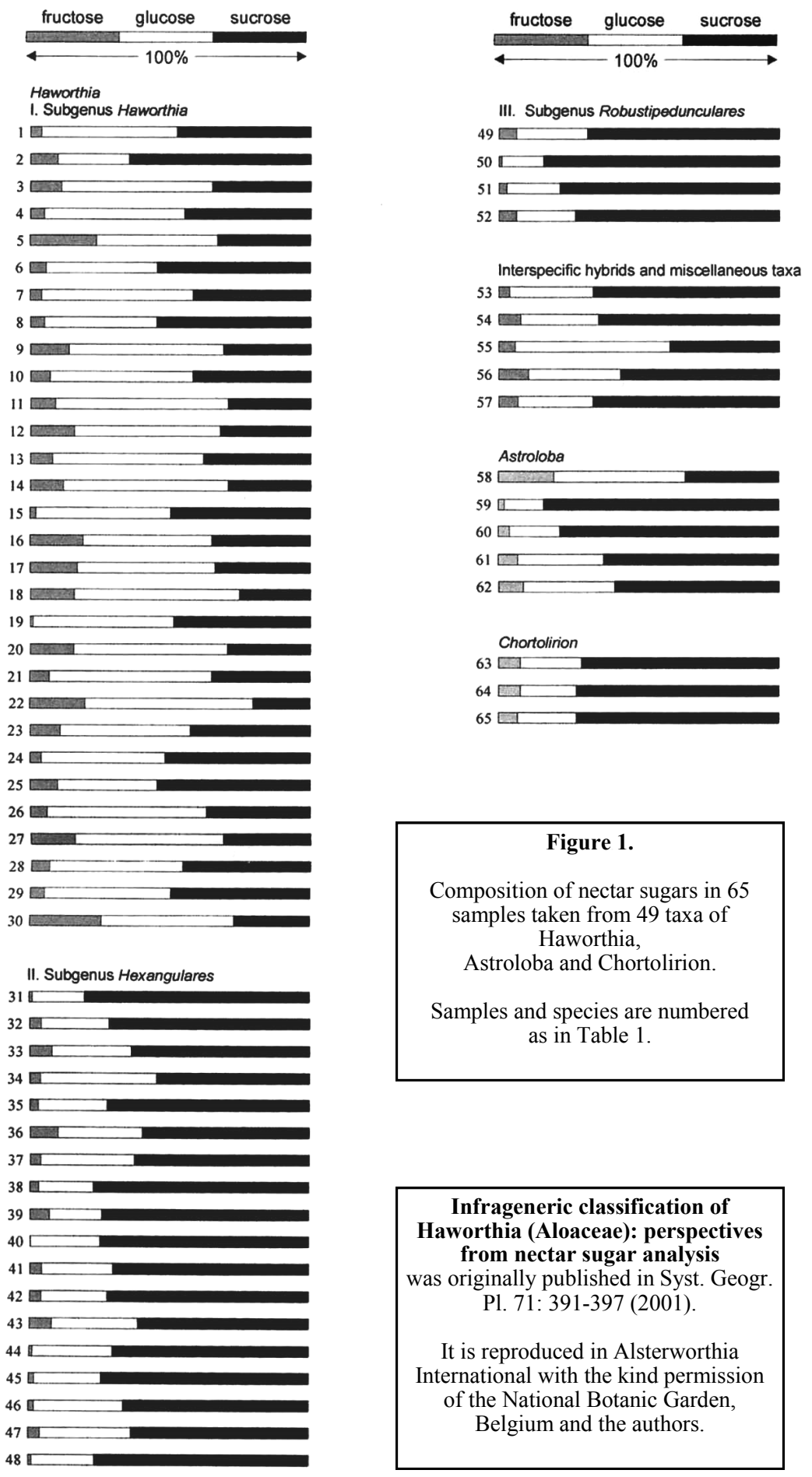

Figure 1.

Composition of nectar sugars in 65 samples taken from 49 taxa of Haworthia, Astroloba and Chortolirion.

Samples and species are numbered as in Table 1.

Infrageneric classification of Haworthia (Aloaceae): perspectives from nectar sugar analysis was originally published in Syst. Geogr. Pl. 71: 391-397 (2001).

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In the list of taxa studied (tab. 1), the composition of nectar sugars present in the samples are given. The results of the analysis are also depicted graphically (fig. 1) to ease comparison of species. The outcome of the study clearly shows that the composition of nectar sugars varies considerably among species of *Haworthia* and *Astroloba* and, especially, among those representing *H.* subg. *Haworthia*. Moreover, samples taken from plants belonging to the same species but from different localities, i.e. botanical gardens or private collections, vary in their ratio of sucrose to hexose, i.e. glucose plus fructose (compare Nos. 3 & 4; 10 & 11; 13 & 14; 34, 35 & 36). In samples of *Chortolirion* taken from plants of the same locality, the variation is negligible (compare Nos. 63, 64 & 65). Hence, results on *Haworthia* and *Astroloba* do not support the findings of Van Wyk & al. (1993) that "…the sugar composition of the nectar is remarkably invariable within each of the genera (of Aloaceae)".

The various nectar samples were selected so as to cover most of the sections and subsections or series within the subgenera of *Haworthia* as recognised by Pilbeam (1983) and by Breuer (1998), who both based their infrageneric subdivisions on leaf and rosette characters. Where our study provided data on the nectar of more than one representative of a subsection or series, it shows that some species, grouped together on account of morphological similarities such as *H. bolusii* Baker, *H. cooperi* Baker and *H. habdomadis* Poelln. var. *morrisiae* (Poelln.) M.B.Bayer, are remarkably uniform in sugar composition (compare Nos. 6, 8 & 15). Nevertheless, other species belonging to the same series (*Limpidae*), namely *H. decipiens* Poelln. and *H. semiviva* (Poelln.)

M.B.Bayer (Nos.10 & 27), differ notably.

According to Van Wyk & al. (1993) the fructose/glucose ratio in intergeneric hybrids of Aloaceae is inherited from the pod parent. Our results on interspecific hybrids and *H. tortuosa*, a possible hybrid of *H. viscosa* (Pilbeam 1983), are inconclusive (compare Nos. 53, 54 & 56 with Nos. 46–48). The nectar composition of a new, undescribed species (No. 55) supports its placement under *H.* subg. *Haworthia.* Nectar *of H. mcmurtryi* (No. 57), regarded by Scott (1985) as allied to *H. koelmaniorum* (No. 32), is very similar to that of the latter species.

Despite the variation in nectar composition within the subgenera of *Haworthia* and in *Astroloba*, for example the deviation shown by *Astroloba bullulata* (No. 58), our results show a general trend. On the basis of the ratio of sucrose to hexose (fructose plus glucose) the 49 investigated taxa can be divided into two groups, namely those with sucrose-rich nectar (usually more than 60% sucrose) and those with nectar that is low in sucrose (usually less than 50% sucrose). Both nectar types have a relative higher proportion of glucose than fructose. The results of the present investigation suggest that sucrose-low nectar is generally characteristic of representatives of the largest subgenus within *Haworthia*, namely *H.* subg. *Haworthia.* This subgenus includes 93 of the 132 taxa recognised by Breuer (1998). Consequently, the characteristic nectar type is here referred to as the *Haworthia* type. On account of its lower proportion of sucrose, the *Haworthia* type is quite unlike the 'haworthioid' type of Van Wyk & al. (1993).

Sucrose-rich nectar, comparable to the 'haworthioid' type of Van Wyk & al. (1993) is produced by a second, smaller group of taxa within *Haworthia.* This nectar type is here referred to as the *Hexangulares* type, since it characterises the nectar of representatives within the second largest subgenus, namely *H.* subg. *Hexangulares*. The investigated species of *H.* subg. *Robustipedunculares*, *Chortolirion* and *Astroloba* also belong to this group. The correlation of nectar in *Astroloba* and members of *H.* subg. *Robustipedunculares* with the sucrose-rich *Hexangulares* type is surprising. Because of floral and other morphological features it was expected that the sugar composition of species belonging to these two units would be nearer to the sucrose-low *Aloe* type nectar of Van Wyk & al. (1993).

Conclusions

Two nectar types occur in *Haworthia*, namely a sucrose-low *Haworthia* type (generally less than 50% sucrose and more glucose than fructose) and a *Hexangulares* type (generally more than 60% sucrose and more glucose than fructose).

Haworthia type nectar characterises taxa within *H.* subg. *Haworthia*, while *Hexangulares* type nectar occurs in *H.* subg. *Hexangulares*, *H.* subg. *Robustipedunculares*, *Astroloba* and *Chortolirion*.

Evidence from nectar sugar analyses knits *Haworthia* to *Astroloba* and *Chortolirion*, and also suggests that *Chortolirion* and *Astroloba* may not be closely linked to species within *H.* subg. *Haworthia.*

Our findings support Uitewaal's (1947) subdivision of *Haworthia* in two main groups, but reveal little substantiation for infra-subgeneric groupings.

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E-mail addresses

We will e-mail any important notifications such as special issues, seed lists, new books etc to you, in advance of publication in Alsterworthia International, if you provide your e-mail address on your membership application/renewal form. Please print clearly.

Seed List - 2004

The seed list for 2004 will be distributed with the March issue of Alsterworthia International. It will be similar, but not necessarily identical, to that for last year. If you have supplied an e-mail address, the seed list will be e-mailed as soon as it is available to all who have paid the 2004 subscription .

A correction to the 2003 offering of the International Succulent Introductions

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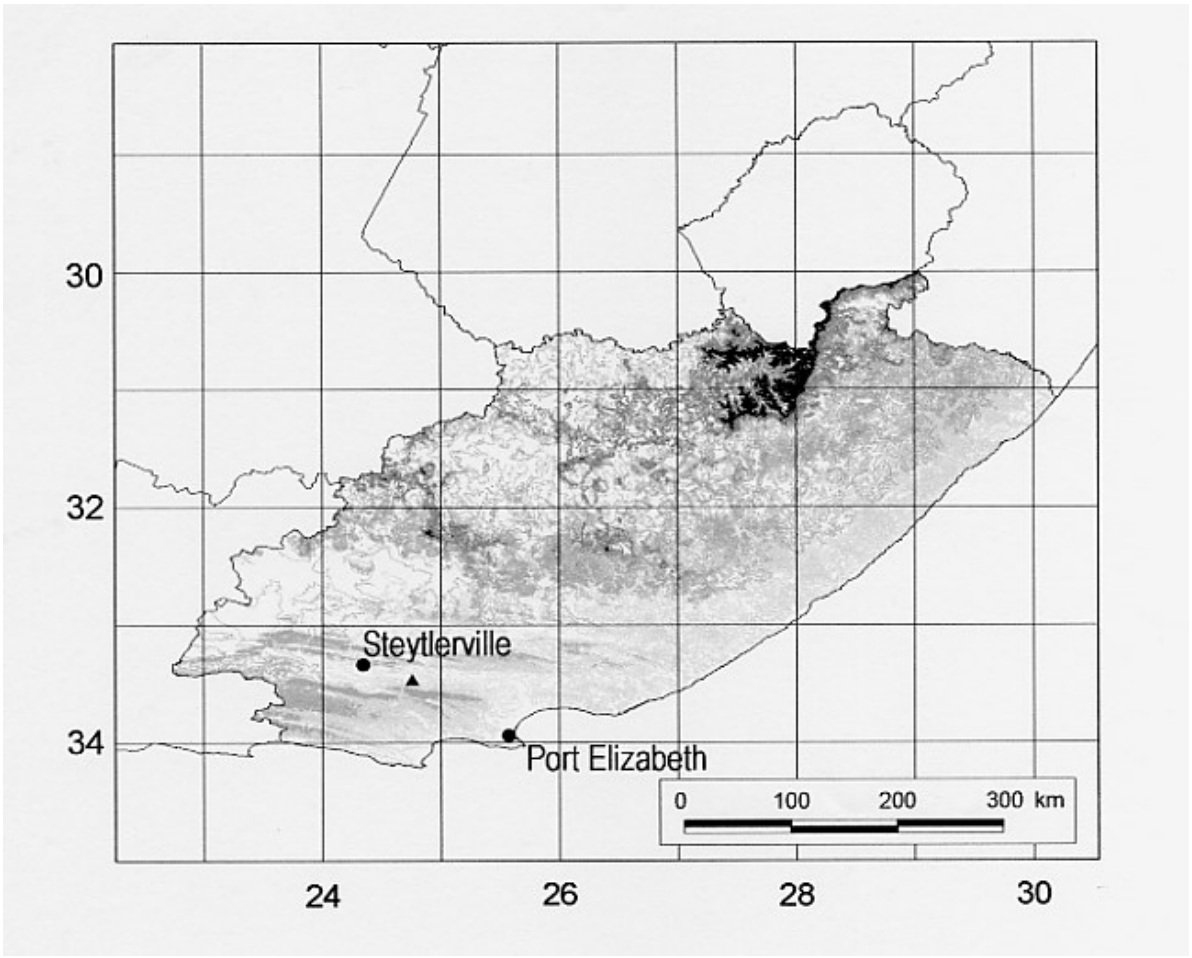
Introduction

The International Succulent Introductions (ISI) is operated from the Huntington Botanical Gardens as its plant introductions programme. Admirably, the aims of the ISI are to "…propagate and distribute new or rare succulents…to further research and appreciation of these remarkable plants." (Trager 2003). Every year the ISI offerings are presented in the March–April issue of the *Cactus and Succulent Journal (U.S).* This annual event is undoubtedly eagerly awaited by succulent plant enthusiasts from all over the world, as the enticing accompanying texts compiled by John Trager do more than descriptive justice only for these "new" plants.

One offering of 2003 (Trager 2003) requires a small correction to the text. We do this with some reluctance as we do not want to distract in any way from John's sumptuous descriptions that accompany the colour photos of the new offerings. However, since the same ambiguous data was repeated in *Alsterworthia International* (Mays 2003), some clarification of the issue has become necessary.

The correction

ISI 2003-30, *Haworthia springbokvlakensis* C.L. Scott, described as "…one of the choicest of the retuse-leaved haworthias…", is listed as having been "…collected by E. Heunis (#311) ca. 60 km. ESE of Steytlerville, E. Cape, S. Africa." However, in the preceding text this location is given as being "…in the dry interior [of the] W Cape around Oudtshoorn where rain is scant but can occur in winter or summer." The same information was given by Harry in *Alsterworthia International.* As John, and Harry, are likely to be questioned about this contradiction on the same locality being in both the Eastern and Western Cape Provinces of South Africa, the following brief explanation should clarify matters.



Map 1. Eastern Cape Province, showing the location of the Springbokvlakte at ▲ near Steytlerville.

As Trager (2003: 77) remarks, there are numerous localities called "Springbokvlakte" in South Africa. Leistner & Morris (1976) list at least seven of these in their useful publication on southern African place names, and this listing is likely not comprehensive. This large number of places called "Springbokvlakte" testifies to just how abundant springboks (note orthography: NOT springbucks) were in southern Africa some centuries ago (Cornwallis Harris 1840). Today, it seems, impala has overtaken springboks in terms of abundance in at least some parts of the subcontinent. Indeed, impala are sometimes fondly(?!) referred to as bush cockroaches as a result of the large number of

individuals that can be encountered in parts of the bushveld or savanna.

The Springbokvlakte in question is not near Oudtshoorn, but rather in the vicinity of Steytlerville, where Mr Emile Heunis, proprietor of Grey Heron Nursery in Kraaifontein, Cape Town, collected plants about 60 km (about 37.3 miles) east-southeast of this small village. The seed from which the plants offered as ISI 2003-30 were produced were obtained from plants collected at this locality. Oudtshoorn is in the Western Cape Province, but Steytlerville, and its associated Springbokvlakte, is in the Eastern Cape Province (Figure 1). Note also that the seed used to grow ISI 2003 -29, *Haworthia sordida* Haw. var. *sordida*, was collected at this exact same locality.

The Springbokvlakte near Steytlerville lies in the rain shadow of two majestic mountain ranges, the Baviaanskloof Mountains and the Great Winterhoek Mountains, consequently the rainfall received at Steytlerville is indeed scant, averaging only 240 mm, measured over a 110 year period. Precipitation is distributed throughout the year with peaks in early summer (November) and early autumn (March).

Acknowledgement
We thank Ms Hester Steyn for assistance with the map.

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In search of Aloe perryi Baker.

This Aloe was described in 1881, but it is rare in, or absent from, collections, some say it is not in cultivation, but hybrids of it may be. It is understood that exports of this *Aloe* from Socotra are prohibited and have been so for a number of year. However, prior to this prohibition, at least some plants legally found their way into a few (botanical) collections.

At the present moment we have one botanist member who would like to obtain *Aloe perryi* for study purposes and one, a proprietor of a tissue culture laboratory, who would like to obtain at least one for tissue culture purposes.

If you are able to supply a (small) plant or seed please contact the editor so that the sale/purchase can be arranged. It would be helpful if you could supply source (collection) details.

No documentation is required for plant movements within the European Union, but documentation is required for movement into the E. U.

Editor: Harry Mays,
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E-mail: hmays@freenetname.co.uk.

***Haworthia cymbiformis* var. *obtusa* 'Chik-Chun Mak'**

Harry Mak
20 Walsingham Ave., Evesham Gardens, Middleton, Manchester, M24 1SR, UK

Recently I needed to consult the ICNCP and accidentally discovered that I had made a mistake in one of my new cultivar names in Alsterworthia International Vol. 2, Issue 2, p.3.

According to article 29.8, the initial letters of second and subsequent elements of a hyphenated word in a cultivar or cultivar-group epithet (except conjunctions and prepositions) are to be capitalised when derived from hyphenated personal names or when taken from hyphenated place names.

***Haworthia cymbiformis* var. *obtusa* 'Chik-chun Mak' is, therefore, corrected to**
***Haworthia cymbiformis* var. *obtusa* 'Chik-Chun Mak'**

Variations on *Aloe variegata*, the partridge-breast Aloe

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Introduction, Taxonomic History and Synonymy

Aloe variegata L. was one of the first species of the genus *Aloe* to be known to western science having been discovered on the expedition of Simon van der Stel to Namaqualand in 1685 (Reynolds 1950, 1954). An illustration of this material was prepared but not published until 1932 (Gunn & Codd 1981). The earliest pre-Linnean citation to the species is from 1690 (Reynolds 1950) and the first, rather crude illustration in 1689 (Reynolds 1950; Gunn & Codd 1981). The first introduction to European horticulture of *A. variegata* is considered to be by Caspar Commelin in 1700 who received seeds from collectors in southern Africa (Wijnands 1982). As with many species named by Linnaeus in 1753 in the *Species Plantarum*, there is not a clearly cited type for *A. variegata*, but rather citation of several elements. Wijnands (1982) in his comprehensive account of the plants described and illustrated in the various works of the Commelins, chose Fig. 47 in the book *Plantae Rariores et Exoticae* of 1706 as lectotype for the name *A. variegata* L. This figure is incorrectly cited as 'iconotype' for the name *A. variegata* by Glen & Hardy (2000). Newton (2001a) incorrectly states that the name *A. variegata* is "not typified".

Two other names at specific rank and one name at varietal rank are included in the synonymy of *A. variegata*. The name *Aloe punctata* Haw. is based on an illustration in Plukenet's *Phytographia* of 1691 (Glen & Hardy 2000) that was considered by Reynolds (1950) to be typical of *A. variegata.*

A. variegata var. *haworthii* A. Berger was named in 1908 based on a type from Sheldon in the Eastern Cape (Berger 1908), but the taxon has never been recognised by subsequent authors.

Perhaps the most distinctive of the taxa subsumed under *A. variegata* is *A. ausana* Dinter. This name is based on two syntypes collected by Dinter in Namibia, one from Aus (*Dinter 3149)* and the other from Klein Karas (*Dinter 4762)* (Dinter (1931). Both of these syntypes were presumably deposited in the Berlin Herbarium (B) (Gunn & Codd 1981), although one syntype is listed as being present in PRE (Glen & Hardy 2000, with a putative and unseen B collection incorrectly cited as a holotype). Little mention has been made of *A. ausana* since Reynolds (1950) sunk the name without comment under *A. variegata.* Plants distributed as *A. ausana* have been considered as superior over typical *A. variegata* from a horticultural point of view (Poindexter 1935). Some selective breeding of the 'ausana' variant was undertaken by Hummel's Exotic Gardens in the 1930's (Hummel 1954), but it is not certain whether these forms are still in cultivation.

A number of common names have been given for *A. variegata*. The best known of these is "Partridge-Breast Aloe" that alludes to the distinctive white banded leaves of most plants. Just when this common name originated is uncertain but Miller (1768) referred to it as being "commonly called Partridge-Breast Aloe" and Sims (1801) also used the name some 33 years later. Other English common names are "Tiger Aloe" and "Pheasant's Wings" (Bailey & Bailey 1976; Griffiths 1994). Africaans names are "Kanniedood" (cannot die) and "Bontaalwyn" (Eliovson 1955; Jankowitz 1975; Bond & Goldblatt 1984; Glen & Hardy 2000).

History of Introduction to Cultivation

Aloe variegata was recorded from a number of documented European collections of succulent plants from the 18th and 19th centuries (e.g. Rowley 1987; Edmondson & Rowley 1998). The merits of the species were eloquently described by Sims (1801) "So many desirable points unite in this Aloe, that we are not to wonder at its being held in such very high esteem by all that have the least taste for plants, especially those of the succulent kind; we frequently see it nursed up with great care by those who have only the convenience of a parlour window, and succeed better with such than in the greenhouses of many; it grows readily and [flowers] freely but irregularly, during most of the summer months; its foliage is beautiful both in its form and markings, and its flowers are no less handsome". A stunning photograph of a large clump of *A. variegata* in full flower near Graaff Reinet in the Eastern Cape Province amply demonstrates these sentiments (Brink 1985).

By the 20th century the species was a well-known and popular inclusion in many collections or general gardens. Noble (1976) considered it "perhaps the best known Aloe in Britain", however the species was curiously not included at all by Cullen (1986). Many contemporary books and articles on succulent plants have featured short notes and illustrations of *A. variegata* (e.g. Poindexter 1935; Hummel 1954; Reynolds 1954; Jeppe 1969; Barkhuizen 1978; Gie 1984; Brink 1985; Sajeva & Costanzo 1994; Frandsen 1997; Cowling & Pierce 1999; Court 2000; Sajeva & Costanzo 2000; van Jaarsveld *et al.* 2000; Newton 2001a). Detailed or concise descriptions of the species have been provided by Pole-Evans (1923), Reynolds (1950), van Wyk & Smith (1996), Glen & Hardy (2000) and Newton (2001a), although there has been no in depth discussion of variation within the species. Nor is there much detailed information on habitat preferences and current conservation status in the wild. It has been stated (without supporting data) that *A. variegata* was "more common in cultivation than in the wild…the

reason for its decline in its native South Africa is over collecting to meet the demand for quick sales" (Rowley 1978). The species was considered as not threatened by van Wyk & Smith (1996) and Hilton-Taylor (1997), common by Frandsen (1997) and may be commonly encountered during casual exploration of parts of the known range (pers. obs. 2001).

Affinities
Aloe variegata was included by Reynolds (1950) in *Aloe* series *Serrulatae* Salm Dyck together with *A. dinteri* Berger and *A. sladeniana* Pole Evans. The three species form a small coherent group of taxa with a number of shared character states mainly pertaining to the leaf arrangement and form. Differences between the three species are outlined by Reynolds (1936, 1950, 1952), Jankowitz (1975) and Glen & Hardy (2000).

Distribution and Habitat
The 'Partridge Breast Aloe' is widely distributed in southern Africa in southern Namibia and South Africa in the Karoo and Namaqualand regions within the political provinces of Western Cape, Eastern Cape, the Free State and Northern Cape (van Wyk & Smith 1996; Glen & Hardy 2000). A distribution map based purely on herbarium records is presented by these latter authors.

With such a wide distribution, the species is encountered in a range of habitats, but is mainly found in karroid shrubland in often exposed areas on soils derived from clays and granites (Glen & Hardy 2000) (Fig. 1). Rainfall is in summer or winter and between 125 and 500 mm with temperatures from near freezing to over 38 degrees C in the summer (Jeppe 1969).

Variation
The most notable variations within *A. variegata* are with respect to leaf arrangement, spotting and flower colour. Dealing firstly with the latter character of flower colour, the usual state is a pinkish corolla, however a pale yellow form also exists and is well represented in the plantings in the Succulent house at Kirstenbosch although it appears to be rare in cultivation elsewhere in the world. Populations from Namibia also tend to have a red-pink corolla, as illustrated by Eggli (1994).

Populations named as *A. ausana* tend to differ from *A. variegata* in the more upright, chunkier, darker leaves (versus spreading, thinner, lighter), the white mottles on the leaf not being defined in strong bands (versus strongly defined in bands) and the individual blotches extending up to 10 mm in length (versus up to 5 mm). The corolla of *A ausana* also is about 3 mm longer than typical *A. variegata.*

Hybrids with other Aloes
There are relatively few known, artificial hybrids of *A. variegata* with other species of *Aloe*; however wild hybrids with *A. microstigma* and *A. hereroensis* have been recorded (Reynolds 1950). Hybrids with *A. variegata* as a parent, tend to inherit the broad lanceolate leaves and some degree of spotting. Named hybrids are listed below.

A. 'Lysa' D.M.Cumming (*A. variegata* x *A. bakeri*; Forster & Cumming 1998).

A. 'Versad' D.M.Cumming (parentage unknown, but includes *A. variegata*; Forster & Cumming 1998).

A predominantly green clone was raised by Atilla Kapitany in Melbourne, Australia from seed purportedly received from habitat. This has been distributed in Australia as *A. variegata* 'Splash' by Rudolf Schulz of 'Tarrington Exotics'. This clone may revert to typical *A. variegata* via the production of normal offsets.

Hybrids with Gasterias
Aloe variegata has been used as a parent in hybrids with a number of *Gasteria* species, although generally these are unnamed (cf. Newton 1998) and often of unknown *Gasteria* parentage. Just how many of the named X *Gasteraloe* hybrids reviewed by Rowley (1982) are still in cultivation is debateable. Other more recent hybrids by David Cumming have been given cultivar names (Scott 1997). These cultivar names are listed below for completeness. Further additions to this listing would be welcomed.

X *Gasteraloe* 'Agate Chips' E. Aslander (*A. variegata* x *G. bicolor* var. *bicolor*).

X *Gasteraloe* 'Green Ghost' D.M.Cumming (*A. variegata* x *G.* 'Old Man Silver'; Scott 1997). An occasional mutation of this cultivar has been distributed as X *G.* 'Green Ice' by the Australian based nurseryman Rudolf Schulz, but as the mutation is unstable and often reverts, use of this latter name is to be discouraged (Holmes 2000).

X *Gasteraloe* 'Orella' D.M.Cumming (*A. variegata* x *G. batesiana*; Scott 1997).

X *Gasteraloe mortolensis* Guill. (*A. variegata* x *G. acinacifolia*; Rowley 1982; Newton 2001b).

X *Gasteraloe pethamensis* (Bak.) Rowl. (*A. variegata* x *G. carinata* var. *verrucosa*; Rowley 1982; Newton 2001b).

X *Gasteraloe pfrimmeri* Guill. (*A. variegata* x *G.* sp.; Rowley 1982; Newton 2001b).

X *Gasteraloe radlii* (either *A. variegata* or *A. serrulata* crossed with an unrecorded species of *Gasteria*) (Newton 1997, 2001b).

X *Gasteraloe rebutii* Guill. (*A. variegata* x *G.* sp.; Rowley 1982; Newton 2001b).

X *Gasteraloe sculptilis* (Poind.) Rowl. (*A. variegata* x *G. x cheilophylla*; Rowley 1982; Newton 2001b).

X *Gasteraloe smaragdina* Guill. (*A. variegata* x *G. ? candicans*; Rowley 1982; Newton 2001b).

Fig. 14 (above). *Aloe variegata* in fully exposed situation. North of Springbock, South Africa.

Fig. 15 (left). *Aloe variegata* with rosettes shaded. NE of Grahamstown, South Africa.

Fig. 16. (below). *Aloe variegate.* Group in fully exposed situation. North of Ross Pinah, Namibia.

All photographs - H. Mays

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Captions for photographs in clockwise order starting top left.

Fig. 17. *Aloe variegata.* Close up of flowers in Fig. 14, page 17 taken from the opposite side.

Fig.18. *Aloe variegata* Sandkraal, South Africa.

Fig. 19. *Aloe variegata* Springbockvlakte, South Africa.

Fig. 20. *Aloe variegata* NE of Grahamstown, South Africa.

Fig. 21. *Aloe variegata* in cultivation in England. Origin unknown.

Fig. 22 *Aloe variegata* N of Ross Pinah, Namibia.






Exploiting the potential of roots

Harry Mays

Roots perform vital functions, notably to secure the plant in the ground and convey water and nutrients into the plant for the preservation of life and the promotion of growth and reproduction, but these matters are not the subjects of this article. This article deals with using roots as the starting material for vegetative propagation

As plants develop from seed their different parts normally become committed; roots function only as roots and do not themselves produce leaves and flowers, these are produced by other parts of the plant. Nevertheless, the roots of some plants have the potential to produce new plants if they are stimulated by detachment from the parent plant. No other stimulant is necessary. (In tissue culture different committed parts of a plants may be stimulated to produce new plants by the application of hormones.)

Detached roots of some plants, but certainly not all, can be used for vegetative propagation. No reports are known of *Aloe* roots being used successfully for vegetative propagation but roots of some *Haworthia* species/cultivars have been so used. Fig. 23 shows a *Haworthia truncata* root producing one new plant.

Detached roots may accidentally become available when repotting or as a result of rot at the base of the plant. The broken/rotted end should be cut back to sound tissue. "Surplus" roots may also be cut from a plant when repotting to provide propagation material. To prevent setback by drying, it is best to pot up root cuttings immediately in a damp, gritty compost with the root cut surface projecting about 1 cm above the surface (Fig. 24.). This helps to prevent rot by avoiding contact with the compost. Place them in a warm position, but not in full sun, and ensure the compost does not dry out. Aim to keep it just moist. If, perhaps because of accidents, you are using roots for propagation in winter, put them in a propagator at 60°+F, or better still bring them into the house and place them in the brightest possible place. Avoid low and high temperatures and dry and wet compost as these conditions prevent growth and encourage desiccation/rot.

Patience is required. Depending on growing conditions and the species involved, some root cuttings may produce new plants in six months, others may take up to a year longer.

There is no list of plants which will produce plants from root cuttings. Long, thick roots are likely to give the best results but shorter, less thick roots may also give results. Success is unlikely with thin roots as they die because they have few reserves compared with thick roots. Furthermore, in some genera roots of any species seem incapable of generating new growth whatever their size and in genera such as *Haworthia,* in which the thicker roots of many species can be used to generate new plants, the roots of many species which have only fibrous roots cannot be so used. Nevertheless, it is worth potting up any "surplus" roots you have to see what can be achieved and worth reporting the results in Alsterworthia International.

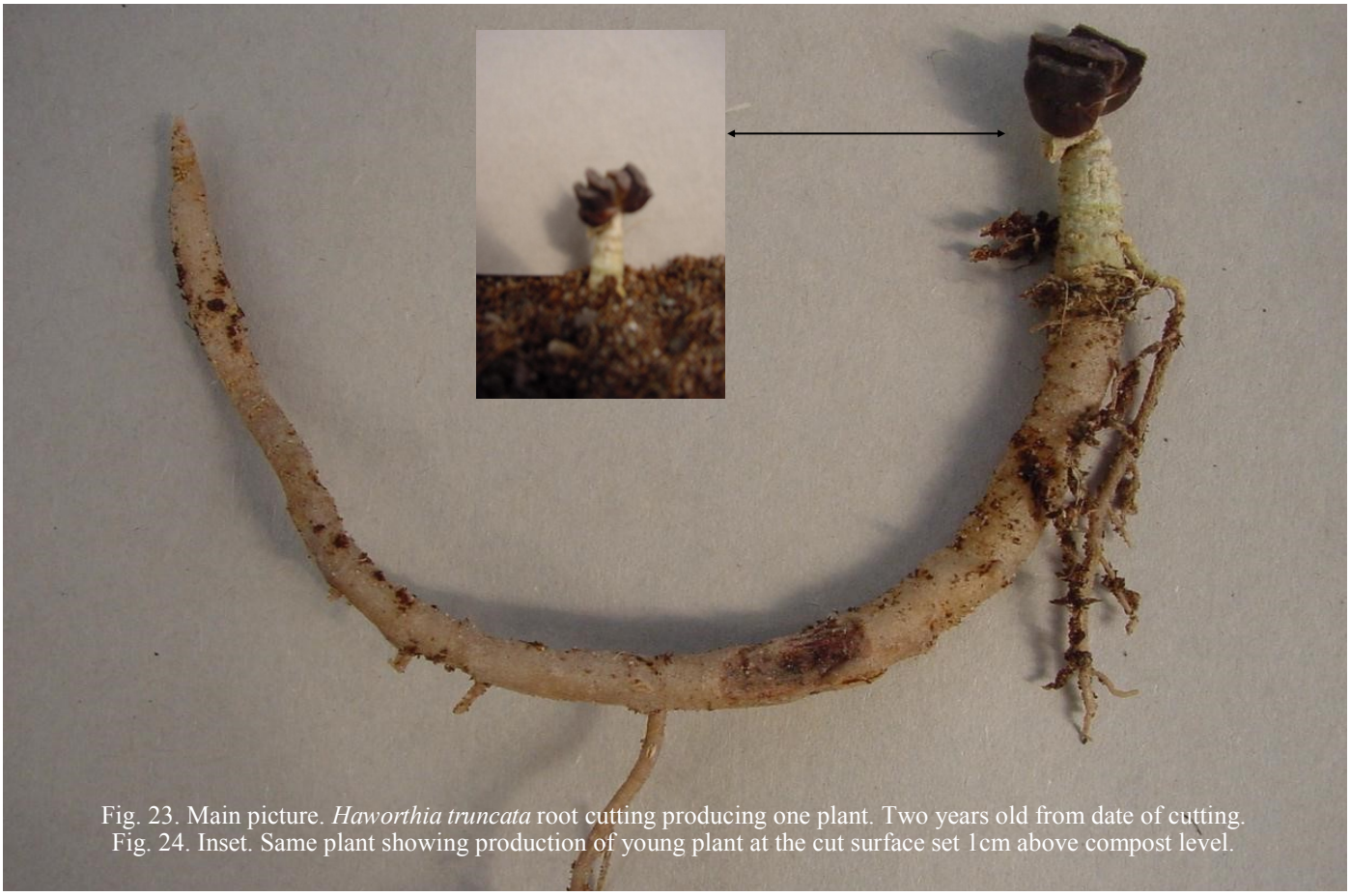

Fig. 23. Main picture. *Haworthia truncata* root cutting producing one plant. Two years old from date of cutting.
Fig. 24. Inset. Same plant showing production of young plant at the cut surface set 1cm above compost level.

THE ARMY NEEDS YOU!

A matter of recruitment in *Gasteria excelsa* Baker

David Cumming

Gasteria excelsa occurs for the most part near rivers or in close proximity to them such as within river valleys. It can be found from near Alexandria, some fifty kilometres south of Port Alfred to southern areas of Transkei, with a population as far inland as Cala.

Along the banks of the Lushington River near Bathurst there is a large population of *Gasteria excelsa*, it was noted while collecting some seed that there appeared to be a very large amount of seed produced with little resultant recruitment. Towards Langholme there is a small population isolated from the main body, this was chosen to study in more detail the above observation.

This locality presents two different habitats in one small area; one, a small ridge approximately one metre in height with a NE slope and a corresponding SW slope, two, a steep almost perpendicular 25 metre high river bank, facing SW. First let me say that though the Lushington is called a river it is little more than a metre across at this point and for that matter at its confluence with the Kowie River it hardly reaches two metres in width. That said however it always appears to contain water at the point in question.

The first habitat has gasterias only on the NE facing slope with two single, two groups of two, one of four and a large group of fourteen mature plants. These are all growing among low spreading bushes of 300 mm in height. These plants ranged in size from 370 mm to 790 mm in diameter with leaves 80 mm to 130 mm wide and 230 mm to 410 mm in length. Only three juvenile plants were found, one estimated to be two to three years old, the other two to be three to four years old. Other succulents present are *Crassula*, *muscosa* v. *polpodacea* and *Cynanchum gerrardii.*

The second habitat contained twenty-seven mature plants, for the most part the plants here were smaller even though there were fewer harsh conditions to contend with. Dimensions were in the range of 370 mm to 450 mm in diameter with leaves 70 mm to 80 mm in width and 200 mm to 300 mm in length. Here however the low bushes were replaced by scattered tall bushes and short trees to three to four metres. Juveniles were more plentiful with three up to one year old, three, one to two years, four, two to three years old and three, three to four years old. Other succulents present here were *Euphorbia pentagona*, *grandidens*, *Crassula lactea*, *muscosa* v *polpodacea*, *Kalanchoe rotundifolia*, *Othonna dentata*, *Sansevieria hyacinthoides* and an occasional *Haemanthus albifos.*

An estimation was made of the number of seeds produced by these plants in anyone year. 116 racemes were counted for the total of 51 flowering size plants. This gives 2.28 racemes per plant. 150 to 260 seed capsules per raceme containing 10 to 85 seeds per capsule were noted, that is an average of 205 seed capsules containing an average of 47.5 seeds. We therefore have 2.28 x 205 x 47.5 x 51 = 1,132,275 seeds. An average of four juveniles produced in any one-year results in the recruitment of one plant for approximately every 300, 000 seed produced.

The seed were tested for viability. A hundred seed were placed on damp filter paper with one corner immersed in water to act as a wick to maintain moisture. Only two seeds failed to germinate. These were furthest away from the water, therefore, in all likelihood, the seed was 100% viable. Seed of *Aloaceae* are often parasitized by the larva of a small beetle, but this only decreases the overall number of seed by a small amount as observed in this population.

The time of ripening normally coincides with a 'wet' period thus increasing conditions conducive to germination. Why such low recruitment when in cultivation *gasterias* grow so readily? Is this the normal state of affairs with other *gasterias* and perhaps *haworthias* also?

ALSTERWORTHIA INTERNATINAL NEEDS YOU!

A matter of renewal of membership for 2004.

This issue of Alsterworthia International completes volume three, 2003. A renewal form for 2004 is enclosed. We hope you will be able to send in your renewals right away, to the editor if you are paying in British pounds or to your local agent if you are paying in one of the currencies of the 10 countries where we have agents. At the same time you may also subscribe to Haworthia Study, the Japanese Haworthia Society journal (please see page 8), and order books and special issues. Members discounts are now being offered on more books. Please see the renewal form for details.

The journal now regularly contains more than the forecast normal minimum of 16 pages and 3 special issues have been published. The editor welcomes assistance - suggestions, notes, articles, photographs etc - to bring about further improvements. If English is not your normal language of communication please do not let this deter you. Photos and brief notes are adequate for the preparation of an article and you may include a LITTLE French, Spanish, German or Italian for translation at this end!

Fig. 26. *H. emelyae* v. *major* Hybrid x *H. emelyae* v. *major*

Fig. 28. *H. cooperi* v. *venusta* x *H. retusa*

Fig. 25. *H.* “Yumedono” x *H.* ‘Ruby Star’ [Crest]

Fig. 27. *H.* ‘Ruby Star’ x *H.* “Yumedono”

The Joy and Art of Hybridization in Haworthias – an introduction.

Harry Mak .

In nature, plants are subjected to variation by hybridization and mutation, but it may take a very long time before a horticulturaly desirable feature is fixed. It is through selective hybridization, induced mutation or careful selection that we artificially obtain so many wonderful cultivars with peculiar morphological excitement in our horticultural world. With artificial methods, the birth of nice cultivars can be accelerated. As an enthusiast on haworthias, I dream of creating attractive new haworthias by hybridization. I began to hybridize haworthias in Hong Kong more than 12 years ago. After moving to UK in 1995, I expanded my hybridization programme. In the first two years, I did it rather randomly, but afterwards more systematically. My aim is to create plants with distinct special features - hairy, spiny, colourful, rough surface; colour contrast; windowed; large-growing; obese; small or some combinations of these. I see hybridization as an art through which we paint our dream plants with distinct features and our chosen colours! By repeated hybridization, we can improve or refine the features we choose. This article attempts to share some of my young creations. As those plants are quite small, their features are not fully expressed. When they are mature enough, I shall report on their new looks.

1) *Haworthia* "Yumedono" (Ham 1249) x *Haworthia* 'Ruby Star' (Ham 1474) [Crest, Ham 3316] Fig. 25.
This is another wonder in *Haworthia* cultivars. It is a cristate form! Up to now I have come across only eight crests in succulent monocotyledons. In addition to the six mentioned in my early article (Haworthiad 14:1,8-11), two more crests are recognised - this crest and *Haworthia mirabilis* v. *badia* (in the Journal of Japan Succulent Society). The excitement comes from the fact that this crest is produced from my own seed! The seeds was sown in March 1999. It took over three years for it to reach a size of 3.5cm across - very slow-growing. It turns reddish brown when in bright light. It is much smaller than its normal form, an unusual characteristic for crests. Though it is small, conspicuous windows with papilla can be seen on the leaf ends.

2) *Haworthia magnifica* v. *atrofusca* (Ham 1142) x *H. magnifica* v. *splendens* (Ham 524) [Ham 1978] Front cover.
This is an early hybrid I created in April 1997. It inherits the fantastic merits from its parents - dark leaves and reddish tinge. Its mother is a dwarf form of *atrofusca.* It is therefore expected not to be a large plant. The overall colour of the plant is very rich. Of course, the leaf windows are also attractive. It is slow-growing. It has taken five years to achieve a diameter of 6cm and without any signs of offsetting. A proper cultivar name will be given to it later after fuller evaluation.

3) *Haworthia emelyae* v. *major* Hybrid (Ham 1154) x *H. emelyae* v. *major* (Ham 994) [Ham 2584] Fig. 26.
This remarkable beauty is from the marriage of a green form of 'Hairy Crab' and *major.* The upper leaf surface is outstandingly rough. It may be one of the dream forms of a *major* hybrid. The seed was sown in May 1999. Growth is slow. The plants is now just 5 cm across. When admired from the side, the white dots on the lower surface of the leaves are particularly attractive.

4) *Haworthia* 'Ruby Star' (Ham 1474) x *Haworthia* "Yumedono" (Ham 1249) [Ham 2188] Fig. 27.
This is the cross between two Japanese cultivars sown in December 1998. The first cultivar is itself a cross between a large form of *retusa* and *badia.* The second is a cross between *major* and *bayeri*. An exceptional rough form of "Yumedono" is used here. The offspring is expected to show wide morphological variations especially in leaf roughness. In some seedlings, the network of lines on the windows is very attractive

5) *Haworthia cooperi* v. *venusta* (Ham 1530) x *Haworthia retusa* (Ham 1137) [Ham 2224] Fig. 28.
This cross attempts to produce bigger, hairy windows by combining features of *venusta* with the large solitary form of *retusa.* It seems the result is not bad. Moreover, selection is needed to choose those offspring with better hairy windows. This plant illustrated here was germinated in September 1999.

6 Haworthia (*springbokvlakensis* x *pygmaea*) (Ham 1486) x *H. truncata* hybrid (Ham 700).[Ham 2256] Fig. 29.
This is a selected form from the seedlings. This cross is a rather complicated and the morphological variation is very great among the seedlings. This form shows a sophisticated window pattern. This kind of bubble-like window is seldom seen in natural species. This is probably one of the example of the beauty of artificial hybridization. However, time is needed to appreciate its full beauty!

7) *Haworthia bolusii* (Ham 1479) x *Haworthia emelyae* (Ham 1156). [Ham 2215]. Fig. 30.
Sown in March 1999, this gem inherited the hairy feature from its mother. Almost the whole leaf is covered with short hairs. On the other hand, the leaves are broader and more rigid than *bolusii*. Windows are obvious on leaf ends. It is still too early to evaluate the full potential of this cross. The plant is only 4.5cm in diameter.

8) *Haworthia emelyae* v. *major* (Ham1594) x *H. arachnoidea* v. *scabrispina* (Ham 1159). [Ham 2587] Fig. 31.
This should be a promising cross between *major* and *scabrispina*. It combines the desirable features of *major* (surface texture) and *scabrispina* (rigid hairs). Even when young, these features already stand out. It is hoped that they will be enhanced as the plant achieves full size.

Fig. 29 Above. *H.* (*springbokvlakensis* x *pygmaea*) x *H. truncata* hybrid

Fig. 30 Above right. *H. bolusii* x *H. emelyae*

Fig. 31. Right. *H. emelyae* v. *major* x *H. arachnoidea* v. *scabrispina*