CLIVIA

10

Growers: Brenda and Edsel Nuss — The Winner of the Akebono / Light of Buddha class at the KZN Show
Photograph courtesy of Clive Graham

Front cover: *Clivia miniata*, *'September Success'* The Photograph is the overall Winning picture in the Photographic Competition and Winner of the *C. miniata* section. Breeder, Grower and Photographer: Felicity Weedon

Back cover: The previous nine Year Book covers

Published by the Clivia Society
P O Box 53219, Kenilworth 7745. South Africa

ISBN 978-0-620-41724-2

Design: Claude Felbert

Printed by Mills Litho, Maitland, Cape Town

CLIVIA
10

An exceptional head of flowers tightly packed and with lots of peachy pink colours

Editors

Roger Dixon
Roger Fisher
John van der Linde
Claude Felbert

Contents

Editorial

Mick Dower, one of the original editor's of the CLIVIA YEARBOOK, published then as CLIVIA YEARBOOK 1998 reminisces:

I was overseas in 1997 and visited Mike Jeans in the UK and later Kees Sahin in Holland. Mike had remarked that the Newsletter was comprising too much that was of local South African interest only and that more photographs would be welcome. Kees passed a remark about the Newsletter being "mickey mouse" and gave me a copy of the Delphinium Yearbook published by the Delphinium Section of the RHS (his wife was a Council member) as an example of what should be aimed at. I showed it to John Winter when I got back and then raised the challenge with the powers that be in Pretoria at the time and landed in deep boiling water when I reported Kees' remark. However, the 1998 International Conference in Cape Town made the necessary articles easily available so I pulled John and Claude in, we found a graphic designer (first choice David Davidson, who did that sort of thing for Kirstenbosch, was not available because he was at Chelsea) and persuaded Pretoria to let us give it a go. Later I persuaded Chris [Vlok] to let us print the covers for the following year's newsletters as part of the Yearbook print order to improve quality at a lower cost and to provide more sources of comment in the Newsletters based on the photographs on the covers.

Claude continues on the Editorial team, John has attempted to retire as editor but has been co-opted to do duty, Roger Dixon is part of the team and Roger Fisher takes over as lead editor in this issue.

It seems fitting that in this, the tenth volume of the CLIVIA YEARBOOK we revisit some of the contributors to the very first issue. This has literally been done by members who have taken time and paid good money to visit breeders and growers in distant climes. Dries Olivier visits those growers of the Low Lands in Europe, and catches up with Pierre de Coster in Belgium while using the opportunity to make the acquaintance of Dirk Lootens of ID'flor Nursery, as well as paying a visit to another regular contributor, Aart van Voorst.

George Mann (South Africa) takes us on a visit to some Japanese growers and breeders and we revisit Yoshikazu Nakamura, who we first met in CLIVIA YEARBOOK 1998. Marilyn Paskert (USA) fills us in on some other Japanese growers, and Shigetaka Sasaki tells us of some recent developments in the breeding of Clivia in Japan, with the focus on leaf form and variegation there.

Through contributions by Paul Michael de Meglio (USA) and Helen Marriott (Australia) we visit the collections of older breeders, Roly Strachan in South Africa, and Laurens Rijke, of Dutch extraction, in Australia respectively.

John Craigie (Australia) tells of his experiences in breeding for polytepalous (multitepal) *Clivia* plants and Hannes Robbertse (South Africa) brings a botanists understanding of the morphology and genesis of the *Clivia* flower and the hormonal control of the formation of the different flower parts, but concludes that more research is needed to explain the polytepalous phenomenon.

We enter the annals of *Clivia* history where John van der Linde (South Africa) looks at some named cultivars from the 19th Century. Even the recent past becomes history and some of the founding members of what was then the Clivia Club, James and Connie Abel (South Africa), Keith Hammett (New Zealand, also a contributor to the first volume of the CLIVIA YEARBOOK) reminisce about the first Clivia Show held at the National Botanical Gardens in Pretoria in 1992.

Sean Chubb (South Africa) introduces pastel habitat forms of *Clivia miniata* in the Heritage Collection and Val Thurston (South Africa) adds a story of a particular rescued form, while Alick McLeman (New Zealand) tells of his breeding with some of these forms. Lisa Mannion (New Zealand) tells of her breeding for wide leaved forms of the yellow *Clivia*.

Roger Fisher (South Africa) reviews the second edition of Graham Duncan's 'Grow Clivia' and reflects on the dramatic additions that the last ten years have brought to the world of *Clivia*. With all this we believe we have met the challenges set by that very first issue of the CLIVIA YEARBOOK ten years ago in giving an international cover to our very localised genus, the *Clivia*.

This issue – CLIVIA 10 – has a number of contributions by collectors and growers of habitat plants. Over the years legislation has changed and we urge all those wishing to collect or grow this material to familiarise themselves and comply with the current legislation. It is also imperative that *Clivia* conservation be vigourously persued and herbarium specimens be officially prepared and lodged with one of the recognised National Herbaria.

We think that here is an appropriate place to publish the objectives of the Society so all may remind themselves of what we stand for.

THE OBJECTIVES OF THE CLIVIA SOCIETY

1. To coordinate the interests, activities and objectives of constituent Clivia Clubs and associate members;
2. To participate in activities for the protection and conservation of the genus *Clivia* in its natural habitat, thereby advance the protection and conservation of the natural habitats and naturally occurring populations of the genus *Clivia* in accordance with the laws and practices of conservation;
3. To promote the cultivation, conservation and improvement of the genus *Clivia* by
3.1 the exchange and mutual dissemination of information amongst Constituent Clivia Clubs and associate members;
3.2 where possible, the mutual exchange of plants, seed and pollen amongst Constituent Clivia Clubs and associate members; and
3.3 the mutual distribution of specialised knowledge and expertise amongst Constituent Clivia Clubs and associate members;
4. To promote the progress of and increase in knowledge of the genus *Clivia* and to advance it by enabling research to be done and by the accumulation of data and dissemination thereof amongst Constituent Clivia Clubs and associate members;
5. To promote interest in and knowledge of the genus *Clivia* amongst the general public; and
6. To do all such things as may be necessary and appropriate for the promotion of the abovementioned objectives.

The following contents will hopfully be enjoyed by you the reader and advance your knowledge of all things *Clivia*.

The Editors – July 2008

Has Anyone Seen Mrs. Laing?

John van der Linde, South Africa

According to the Journal of the Royal Horticultural Society, Volume 11 (1889) the RHS awarded a silver Banksian medal to a Mr John Laing of The Nurseries, in Forest Hill "for several named varieties of *Clivia;* 'Louise Cremer', 'Mrs Laing', 'Sulphurea', 'Madame van Houtte', and 'B.S. Williams', the latter excellent." John Laing was also awarded a first class certificate for a *Clivia miniata*, "a magnificent variety bearing a strong spike of brilliant orange-scarlet flowers of large and fine form".

What has happened to these plants, and many of the other magnificent *C. miniata* bred in Britain and on the continent of Europe in the final quarter of the 19th century?
We have only a few illustrations to go by. Harold Koopowitz, writing about some of these great clones in his book 'Clivias', says "the quality of the flowers was stunning, equal to some of the most modern standard hybrids".

One of the best known of these early clones, which created a sensation when it was first exhibited, is *Clivia miniata* 'Lindeni'. "The flowers were very large, approximately 100 mm in natural spread. The floral segments were slightly narrow by modern standards, but their size and arrangement on the umbel made for a spectacular display. The umbel itself was nearly 310 mm in diameter and reputedly carried up to 39 flowers" (Koopowitz). Lindeni was among the first *Clivia* plants with wide leaves and, judging by its painting, it would still rank among the best.

I mention 'Lindeni' particularly because it, and 'Mrs Laing', are two of the *C. miniata* mentioned in the plant catalogues for 1886 and 1889 of John Laing and Co., who describe themselves as "nurserymen, seedsmen and new plant merchants".

Clivia miniata 'Lindeni'

The asking price for 'Lindeni' in 1886 was one guinea, i.e. one pound one shilling (to those of us old enough to remember pounds, shillings and pence!). 'Mrs Laing', on the other hand, was on offer at "*from* two guineas", i.e., *at least double* the price of 'Lindeni'. Does this price difference imply that 'Mrs Laing' was an even more exceptional plant? To put these prices into perspective, the *weekly* wage of a gardener in those days was probably not much more than *half* a guinea!

C. miniata 'Marie Riemers' originally named *Himantophyllum miniatum* var. *Marie Riemers*

The catalogues do not state the number of plants on offer or whether the plants listed were of flowering size or were smaller, or whether these were seedlings or offsets of named clones. A possible clue is provided in the article "History of the Clivia in Belgium", in the 1998 CLIVIA YEARBOOK of the Clivia Club, the predecessor to the Clivia Society. The well-known Belgian *Clivia* breeder Pierre de Coster wrote "From 1879 onward, the seedlings of the *C. miniata* 'Lindeni' variety were very much in demand. Some of the seedlings reflected the type in its purest form, while other divergent specimens gave us numerous new varieties with large umbels, large flowers and/or broad leaves." This statement leads one to suspect that the plants that John Laing and Co. were offering for sale may well have been seedlings rather than offsets. Incidentally, those prices, expressed in 2008 terms, are around £94 and £188 respectively, significantly lower than the prices at which some special plants change hands these days, reinforcing the suspicion that the catalogue prices refer to seedlings.

At this stage we know nothing about the mysterious and desirable 'Mrs Laing', other than that customers were asked to pay at least twice the price of 'Lindeni' for one. Perhaps someone reading this article may be able to throw light on this highly rated *Clivia*. One thing that can be said with reasonable certainty is that the original 'Mrs Laing' would have been bred from outstanding parents. The early plant collectors who went into the wild would have collected the pick of the bunch. They would have chosen to take only the best. So the early *Clivia* breeders in Britain and on the continent of Europe would have had a top-class starting genetic base with which to work.

Harold Koopowitz, in his book 'Clivias', says about these early introductions "The unique feature ... was the enormous truss of bright orange flowers, often a foot or more in diameter, held in an almost globular umbel on an erect inflorescence. There was considerable colour variation between different clones, from the intensity of the orange colour to the shape of individual flowers to the extent of the contrasting yellow-cream throat."

Clivia miniata 'M^me^ Van Houtte' originally named *Himantophyllum* var. *M^me^ Van Houtte*

Did John Laing (1823-1900) breed this special plant and name it for his wife, or did someone else? It seems that his *Clivia* collection included plants bred in Europe ('Louise Crèmer' and 'Madame van Houtte') as well as 'Sulphurea', 'Robustum' and '*miniatum superbum* '. As a horticulturist he must have been highly regarded by his peers, as he was recognized with the top award of the RHS, the Victorian Medal of Honour.

His dear wife, on the other hand, not only had a *Clivia* named after her, but also a hybrid perpetual rose, 'Mrs John Laing'. Her *Clivia* may have slipped from view but her name has lived on, because the rose named for her in 1887 is one of the very few old roses that is still popular. It was introduced by one Henry Bennett, originally a cattle-breeder who applied his understanding of genetics to roses and became a notable rose breeder of the late 1800s. One wonders whether he also tried his hand at breeding *Clivia* plants?

Regarding the other people for whom plants mentioned in this article were named, I have found out the following:

Madame van Houtte was probably the wife of Louis van Houtte, the eminent Belgian nurseryman and publisher of the richly illustrated horticultural magazine, *Flore des Serres et Jardins de l'Europe*. She not only had a *Clivia* named for her, but also a rose and a clematis.

Mr B. S. (Benjamin Samuel) Williams of Victoria and Paradise Nurseries, Upper Holloway, London, was an orchid collector of note.

I have not been able to trace *Louise Cremer*, though Pierre de Coster has found a reference dating back to around 1883 to the plant named for her.

'Lindeni' may have been named for *Jean Linden* (1817-1898) who published lithographs of some of the selected clones in *L' Illustration Horticole*. According to Koopowitz, quoting Pierre de Coster, this plant was bred by Theodore Reimers, the chief gardener for a Mrs Donner, who lived in Ottenhausen near Hamburg, in Germany.

Clivia miniata var. M^me^ *Legrelle Dhanis*

Clivia miniata var.
M^me^ *Alice Rodigas*

All scans in this article are courtesy of the following: Paul Michael de Meglio, Ken Smith and Johan van Scheepen.

Fashions change, even in the naming of plants. I cannot think of many well-known modern *Clivia* plants named in this rather formal way, as was the custom amongst the Victorians of the late 19th century.

According to Michael Jeans, a UK Clivia breeder, many of the named clones in private hands in Britain would probably have been lost in the Second World War, as just about every able-bodied person was employed in the war effort. Additionally, fuel was rationed and glasshouses would have lost their heating, as well as most of their plants, through cold and neglect of plants, which could have been important for the re-establishment of a post war horticultural industry. Many important plants were exported to the USA. One of the biggest problems that caused the loss of important plants was bomb damage to glass, which was essentially irreplacable during the war. However, one can hope against hope that *at least some* of these special plants still exist somewhere in the world, even though their labels may have been lost and those special people for whom they were named may no longer be remembered. We know that some of the plants were used for breeding. Their genes almost certainly underlie many of the top-class modern *Clivia* plants.

A search of the internet has found that one of the plants for which John Laing was awarded a silver medal is listed in the International Plant Names Index as *Clivia sulphurea* Laing. This plant was exhibited at a flower show in the Belgian city of Ghent in 1888.This is the very first record of a yellow-flowered *C. miniata* (Dixon, 2005). Clearly, there were already good contacts between British and Continental *Clivia* breeders at that time. 'Sulphurea' may well still exist somewhere, and also others.

My hope is that the present article will stimulate readers to find the missing 'Mrs Laing', and other top plants like it, and to search out more pictures of stunning *Clivia* plants of the late 19th and early 20th centuries. I would like to thank all those who assisted me in my research. They include the staff of the Lindley Library at the RHS in London, who assisted me during my visit in 2007; Ian Coates, Michael Jeans, Lourens Malan of Kew Gardens and Gary Dunlop (all UK), Johan van Scheepen (Holand), Ken Smith (Australia), Pierre de Coster (Belgium),Alberto Grossi (Italy), and Keith Hammett (NZ).

References:

In addition to those directly mentioned above:

Dictionary of British and Irish Botanists and Horticulturists

De Coster, P., Personal communication

Dixon,R.,(2005). Have genes, will travel – on the trail of 'VicoYellow'. *CLIVIA 7*: 78-81.

A Botanical Watercolour of a *Clivia miniata* Polytepal Green Throat grown by the Author

Clivia Fun – 15 Years Ago

Connie and James Abel, South Africa

In September this year (2008) Pretoria will hold its fifteenth *Clivia* show. We thought that a few reminiscences about the first show in 1994 might be of interest. As far as we know, it was the first *Clivia* show and/or conference to be held in the English speaking world.

As most readers will be aware, the Clivia Society started in 1992 with the "Friends of the Clivia" newsletter, conceived and produced by Nick Primich, from Johannesburg. The first edition was mailed to his circle of *Clivia* and bulb friends around the world, many of whom contributed articles, and the membership swelled from there. It is fruitless but interesting to speculate on how, if at all, *Clivia* organisation would have developed if it had not been for that initiative of Nick's. The range of activities broadened, and 1993 saw the first meetings, garden visits and habitat tours.

It was all great fun, and as momentum increased in 1994 it was obvious that we should 'spread the message'. A 'wish' list soon developed. Since our hobby concerns a beautiful plant, we naturally decided that we had to have a show (with rosettes), so that prize specimens from many collections could be admired alongside each other and the owners could brag a bit. We also decided that we had to have a photographic exhibition so that our far-flung friends could show their special plants. And if a show, why not also a conference so that we could share knowledge? And sales so that collections could be started and expanded, and funds generated. A visit to see *Clivia* in habitat was a natural. Memorabilia – of course. And the Sunday could be devoted to several garden visits. The obvious venue was the Botanic Gardens, fortunately available to us, and *Clivia* shows were held there for several years subsequently. With the bravado (rashness?) of first-timers, the 'wish' list became a 'must do' list!

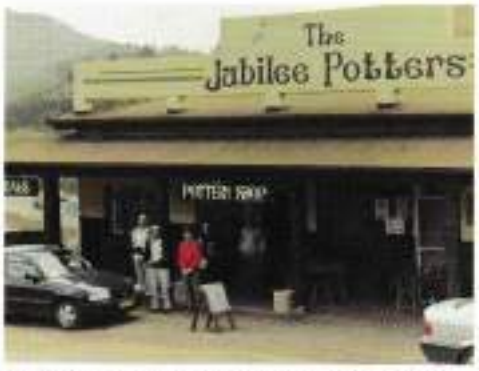
Every aspect was a new challenge, but they were tackled vigorously. With no track record, publicity was of prime importance, and we were able to arrange coverage from local and national press as well as several talks on radio. The illustrated poster was spread as widely as possible - were the entry fees really so low? At current rates, R2 = US$0.25! The reason for the 'one o'clock' restriction was that most of us "specialists" would be tied up in the conference until then. Of great importance

The Show Poster

was the fact that Nick was able to make it truly international with the attendance of Yoshikazu Nakamura from Japan, Keith Hammett from

New Zealand and Pen Henry from Australia. Of the South Africans, the best known and a helpful team member was Wessel Lotter, who has done so much for interspecific *Clivia* breeding.

Proceedings started with a trip to *C. caulescens* country. God's Window was covered in mist/drizzle, but when the South Africans apologised for the poor weather Keith assured them that it was a privilege to experience the range of conditions that are a regular part of the natural environment in which *Clivia* occur.



Keith Hammett (NZ), Yoshi Nakamura (Jp), Adri Haxton (SA), Pen Henry (Au) & Nick Primich (SA) in Pilgrims Rest.

Until that Saturday morning we remained uncertain as to the level of interest that would be shown. Our relief and delight on the day can be imagined when we were overwhelmed with the number of members of the public streaming in. A queue started forming early in the morning. The gates of the Botanic Gardens are perhaps ½ km from the venue, and when they opened at 09:30 there was a rush as the enthusiasts tried to be first to get to the plants. They came not only from Pretoria and Johannesburg, but also from KwaZulu Natal, the Cape and elsewhere.

The crowd and the show area

For the conference, besides contributions from our international delegates, we were able to arrange a good day's programme with presentations on fertilization, use of *Clivia* for traditional medicinal and spiritual purposes, other subjects, and even a paper mailed in from Australia on the potential for the use of neem oil as an insecticide (to a South African, what on earth was a 'neem'!). An interpreter had been arranged for Yoshi, and when it was time for his presentation,

Best on Show 'Ella van Zijl' - grower Toy Jennings

there was consternation since, due to language misunderstandings, we had left his slides behind at our home where he was a welcome guest. No problem – Keith was quickly press-ganged into taking over the chair, the next presentation was advanced, the slides were hurriedly fetched and Yoshi's talk was greatly appreciated. For most of us it was a wonder to start perceiving the esteem in which *Clivia* are held in the Orient.

The show was a great success, with many entries Best-on-show was awarded to Toy Jennings for her 'Ella van Zijl', as popular then as it is now. This was particularly poignant, since Ella was a close friend of Toy's who had placed the plant in Toy's care, from where it became widely admired – offsets have been distributed worldwide.

The photographic exhibition, with the inclusion of mouth-watering specimens from as far as Australia and the USA, was very successful. Later these photos were laminated and they were exhibited at a number of shows, impressing many thousands of show goers.

Sales were also very popular. Mistakes were made – the show and sales took place in the forecourt under indigenous trees which we soon realized were mainly deciduous and the shade was quite inadequate. For subsequent years we moved to the carports where there was adequate shade. Many sellers were apprehensive about committing themselves to a fixed rental for a stall, since we had no idea how strong the demand would be. To avoid having a fixed charge payable in advance and perhaps not recouped, we decided that we would charge a percentage of sales for club funds. The sales took place through a twin sales point, and were a real hassle to manage. In later years we relied on an honour system for the payment of commission on sales, and soon after that we again changed, this time to a fixed rental per stall, payable in advance.

On Show in the Forecourt

Support was received from several other provinces, and Jim Holmes's presence from the Cape with a bakkie (van) load of yellow *C. miniata* for sale was a highlight – at that stage they were still rarities. Our son Duncan, with a friend, took charge of the two cash registers for the sales. It was not long before the 'pressure of business' forced them to abandon the carefully planned ringing up of each sale (in those days tills were still mechanical) and simply start stuffing the proceeds into the open drawers while giving change as best they could! And that while baking in the hot sun under the bare trees!

Having the conference and the show/sales on the same day was a definite mistake, because the enthusiasts who had contributed so much to setting things up had to miss one or the other! Toy and Connie were so busy with the show and sales that they did not get to the conference hall at all! Although the subsequent conferences in Cape Town and then Pietermaritzburg also had their show and sales held on the same day, when it was again Pretoria's turn in 2006 it was decided to hold the conference on the Wednesday and Thursday, allowing the locals time on the Friday to set up for the holding of the show/sales on Saturday and Sunday, and so

they were able to participate in every activity. We are sure that this pattern will be adhered to for following conferences.

Sales at a *Clivia* show are essential for several reasons. There are often long queues of enthusiasts waiting at the gates for Saturday's opening, so that they can be among the first to see what is on offer and perhaps secure that special plant of their dreams. Part of the importance is fund raising. For those early years we had very little money, and the newsletter could be photocopied in black and white only – colour remained a dream. The entry and sales fees from that day were very welcome, but still not sufficient. It was only in 1998 that we had sufficient funds to produce the Clivia Review, a forerunner of the Yearbooks, for distribution to all members. It was a modest 8 pages, with 19 photos.


Clivia Club

The Clivia Review '98

The Clivia Review is published as a supplement to the Clivia Club newsletter. Its purpose is to illustrate named clones, winning exhibits and other interesting forms, many of which will have been described in the quarterly newsletter. Contributions from all Clivia enthusiasts are welcome. Photographs which best illustrate interesting forms of Clivia will be published, but all will be retained by the Club to form a reference library.

P O Box 74866, Lynnwood Ridge, 0040, South Africa. Tel/Fax 27-12-991-2663

Scan courtesy of James Abel

The First Colour Production

It was all a great few months and lots of fun, meeting so many other enthusiasts and facing so many challenges. The memorabilia included the proceedings of the conference, and T-shirts were essential, as can be seen! We were very fortunate in having Michael and Renee Stevenson on the committee – they held senior positions in a large retail group, and most of the credit for organizing that first great day is due to them.

The organisers, at the Nick Primich's home left to right: James Abel, Connie Abel, Nick Primich, Renee Stevenson, Michael Stevenson, Adri Haxton, Toy Jennings, & Wessel Lotter

With the benefit of hindsight, we regret that we did not make any special arrangements for a photographic record, which would have been invaluable in prompting further recollections. James Haxton, Adri Haxton, Toy Jennings, Keith Hammett and Lena van der Merwe kindly searched for and contributed the photos featured here.

A final reason for all of the activity was to expose more people to the wonders of the genus and to recruit them as members. The increase in momentum that was achieved on that day in 1994 has spilled forward into growth for the Society and the establishment of clubs, first in Pietermaritzburg, then Cape

Town and then elsewhere in South Africa and internationally. Many members of the public who attended that first show to see what the fuss was all about were successfully 'hooked' and became active members, making their own important contributions to *Clivia* organisationand enthusiasm.

A few recollections from Keith Hammett

First shows and conferences are often the most exciting, as they are a step into the unknown. It was a privilege for me to attend and I gained much from both the conference and associated tours.

En route to South Africa, I visited Joe Solomone in the USA and so was able to alert people outside of the USA to his work with the genus, at the conference. It was great to be able to spend time in South Africa with Yoshikazu Nakamura whom I had visited previously in Japan. I attribute much of the current heightened interest in Clivia to his extraordinary generosity with high quality seed and plants.

Before and after the conference I was able to travel with Nick Primich, Yoshikazu, Pen Henry and Adri and James Haxton to see various Clivia species growing in the wild where they had evolved over millions of years. For me this was a near religious experience, which fundamentally altered several of my paradigms.

Unless otherwise stated all photos in this article are courtesy of James Haxton.

Photo: Pen Henry

The clouds and mist rolling in at God's Window

Just one of the magnificent views that so many *Clivia* lovers have enjoyed on one of the many tours lead by James Abel (Eds.)

Clivia Research

Johan Spies, South Africa

The Department of Genetics at the University of the Free State is engaged in a number of research projects on *Clivia*. The projects can be subdivided into four different groups, i.e. *Clivia* diseases, genetic variation in *Clivia*, cultivar identification and flower colour formation.

Clivia diseases

We are currently studying two "new" diseases in *Clivia*. The first is a virus causing yellowing of the leaves. This disease was first observed in the *C. caulescens* population at God's Window during the 2006 Caulescens tour. A drastic increase in the number of affected plants was observed during the 2007 tour. Plants showing symptoms of this virus infection were also observed at Wonder View and Mariepskop. Leaves collected at the site indicated that this virus and the way in which it affects the currently being studied and a report will be published in CLIVIA 11.

The second disease is rotting of the flower stalk, the pedicels, the flower itself or the berries. This disease was observed by Chris Vlok in the second flower of a plant and in the young berries of some plants by Francois van Rooyen. Plants with these problems were grown in our green house and we have seen either the original problem in subsequent years or dying back of the flower stalk. It is not known yet whether this is the result of a "genetic weakness" of the plant or if an organism similar to crown rot is present. We are also studying environmental factors as possible causes for this phenomenon.

Unfortunately this type of study takes a long time to complete. Firstly, the plant must develop the disease and then one can look at the consequences. One also has to allow the plant to form off-shoots to study their behaviour in different environments to determine whether environmental differences cause the disease. As soon as the results are available, they will be published in either the Clivia Society quarterly Newsletter or in the Yearbook.

Genetic variation

At this stage the main focus of our research is on determining the genetic variation in different natural populations. For any species to survive in nature a lot of genetic variation is needed. With the decline in the number of different populations and the number of individuals in natural populations we urgently need to know the degree of variation. We also need to develop a strategy to conserve the existing variation. This variation is not always visible. Therefore it is necessary to begin a study of this nature with a conservation strategy.

The delimitation of species is also an important issue to *Clivia* lovers. This study should indicate the boundaries of the different species and whether each species really represent a different taxonomic status as a separate species. With an increasing number of reports on "new species" received constantly, we need to clarify the situation. I have received claims for at least five new species in the past two years. In my opinion none of them really represent "new species", but rather different ecotypes or in one instance it may be an interspecific hybrid.

Suzanne Stegmann is studying the genetic variation in *C. caulescens* and *C. x nimbicola*. We received a lot of material from different

localities but the extreme northern distribution area is poorly represented. We would appreciate it if somebody could help us with material from that area. We are still waiting for permission from the Nature Conservation authorities to collect leaves from Bearded Man. Our application was submitted approximately six months ago! Hopefully we will get permission and this study should be completed by the middle of 2009.

Carmari Breyl has made a start with *C. gardenii* and *C. robusta*. A lot of work must still be done. Material from the area west of Pietermaritzburg is still lacking in our collection. This study should be completed during 2010.

Hesmari van der Westhuizen is working on *C. mirabilis* and *C. nobilis*. We have a very complete collection record of these species and we appreciate the help received from many people in East London (especially John Roderick and Stella van Gass). On the *C. mirabilis* side we thank Hein Grebe and Gerhard Faber for their help. This study will include approximately 40 *C. mirabilis* specimens and the obvious morphological differences indicate that this species contains a lot variation. The study should also be completed by June 2009.

Cultivar identification

The longer I am involved with *Clivia* the more I become aware of the urgent need for cultivar identification. It really is a pity that so many *Clivia* growers seem to be either totally ignorant in connection with cultivar names, or else are unscrupulous dealers. I am convinced that the Clivia Society should play a bigger role in the naming and policing of already named *Clivia* cultivars. The whole *Clivia* fraternity will eventually suffer from the misrepresentation of named cultivars.

A first step is keeping records of all cultivars. In this respect we thank Ken Smith for his efforts and we encourage all *Clivia* breeders to register their cultivars. At the same time the Clivia Society will have to monitor the misuse of names. We have therefore embarked on a study to fingerprint different cultivars. The pilot project on some yellow flowering cultivars of *C. miniata* was published in CLIVIA 9. Now we have to build a database. This is a very time-consuming exercise. Think of our results as being represented by a barcode for each specimen. We cannot come to any conclusion by doing one additional specimen. However, by studying hundreds of barcodes we can start grouping them together. Eventually these groups may make sense. If an additional one is added at that stage, we will be able to fit it into the larger picture. So for all the people becoming frustrated by the present lack of feedback, please be patient. We simply cannot analyse each record. We need to build our database and analyse it to get the complete picture. Then we can slot further samples into this big picture. By adding only one piece of a jigsaw puzzle you still do not see the whole picture!

Paula Spies is steadily building the database and should complete her study by the end of 2010.

Flower colour formation

This very interesting aspect forms the last part of our research projects. Marius Snyman is currently studying the genes involved with the formation of anthocyanin in *Clivia*. He has already isolated the first two genes in this pathway and is now busy determining the variation in these genes and their expression in different *Clivia* cultivars. He should complete his study this year. Another student will then have to study the next set of genes.

Frank Maleka and Bernice Jackson have recently begun their studies on the carotenoid genes in *Clivia*. Their studies should be completed during 2011 and 2009 respectively.

A double seedling

Summary

A great deal of research on various aspects of *Clivia* is under way at the University of the Free State. The results from these studies will hopefully contribute to the *Clivia* fraternity. Sometimes these results will impact upon people such as unscrupulous sellers of misnamed cultivars, but most people should benefit. We wish to thank everyone again for their contributions to enable these different projects to go ahead.

We have previously published a picture of *Cryptostephanus vansonii*, *Cryptostephanus* being the closest species to *Clivia*. Here is a picture of *Cryptostephanus haemanthoides* courtesy of John Ingram

A Short Note on the Clivia Inflorescence

Hannes Robbertse, South Africa

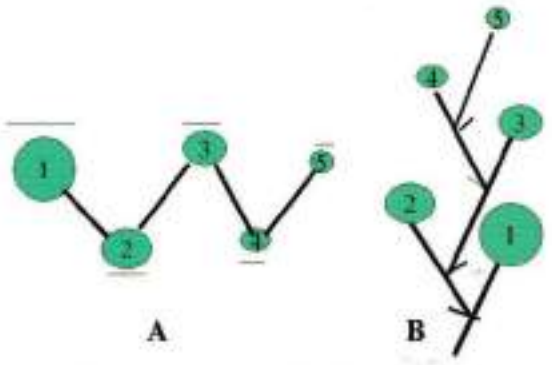
It is well known that that the type of inflorescence found in *Clivia* plants is an umbel. Weberling (1989) describes the umbel as follows: "The umbel (or sciadium) is distinguished from the raceme by the compression of the rachis which is compensated here by the fact that the pedicels of the flowers, which now radiate from one central point, are greatly elongated". It is also well known that the growth of the *Clivia* plant is sympodial (Robbertse (2003) in CLIVIA 5). Looking at the *Clivia* umbel, it would seem that inflorescence is determinate, meaning that the inflorescence axis ends in a terminal flower and that the number of flowers per inflorescence is pre-determined. However, we also know that the number of flowers can vary, depending on the age and vigour of the plant.The question is: what is the real structure of the inflorescence and what determines the number of flowers?

Photo: John Ingram

A tightly packed Inflorescence

The pictures on the next page were taken from a very young *Clivia* inflorescence that was dissected from a mature plant, and show separate cincinnae, that form the basic parts

Müller-Doblies (1978) worked on the inflorescences of *Amaryllidaceae* and found that the inflorescence of *Clivia* is actually a compound inflorescence made up of sympodial 'branches' or 'partial inflorescences'. The 'partial inflorescence' is classified as a 'flat cincinnus' as illustrated in Figure 1.



Cincinnus A - Plan, B - Side view

1 - 5 Succession of flower initiation

Fig. 1 Cincinnus, or synopodial branching system forming part of the Clivia inflorescence (umbel) with flower buds in axils of bracts, starting with the oldest flower (1) to the youngest flower (5)

Photo: Courtesy Hannes Robertse

Fig. 2. Back and front views of a very young, flattened *Clivia* inflorescence showing two cincinnae (1-5 and a–d) in A and B as well as a third cincinnus (x-y). The cincinnae are reduced, sympodial "branches" composing the umbel. Note the bracts subtending flower buds 4 and d

of the umbel. Buds always develop in axils of leaves of bracts (reduced leaves) as shown in figure 1. The young inflorescence depicted in Fig. 2 was enveloped by four bracts, suggesting four 'branches' in the umbel. In Figure 2 there are only three branches (cincinnae), but in other inflorescences four were seen.

The indeterminate nature of the cincinnae explains the fact that the number of flowers in the *Clivia* inflorescence can vary from a few to many and also that the flowers of the same inflorescence are not all of the same age and do not open simultaneously. The oldest and probably the strongest flower in the inflorescence (1 in Fig. 2A and B) is also the first flower of the 'basal' or first-formed cincinnus and is usually the first flower to open.

Hannes Robbertse is associated with the Department of Plant Production and Soil Science, University of Pretoria. (Eds.)

References:

Müller-Doblies D & U (1978). Studies on tribal systematics of Amaryllidaceae1. The systematic position of Lapiedra. Lag. Lagascalia 8: 13-23.

Robbertse H (2003). Leaf formation and its relation to flowering in *Clivia miniata*. CLIVIA 5:42-46.

Weberling F (1989). Morphology of flowers and inflorescences. Cambridge University Press.

The Phenomenon of Polytepalous (Multitepal) Clivia Flowers

Hannes Robertse, South Africa

Introduction

Before dealing with the topic itself, it is necessary to clarify a few terms.

In the heading above, I refer to *Clivia* **flowers** and not to *Clivia* **florets.** The term floret is used to refer to the small flowers composing the flower-like inflorescence, called a flower head or capitulum, found in some plant families such as the *Asteraceae* (sunflowers and daisies) and *Proteaceae*. These 'florets' are small and often do not contain all the structural parts of a full flower such as the perianth, stamens and pistil as is typical of a flower. In the case of *Clivia* the relatively large flowers are arranged in an inflorescence, called an umbel. They contain all the essential parts of a flower and should therefore be called flowers and not florets.

Multipetal, multitepal or polytepal?

The term 'perianth' (*peri* meaning around and *anthos* meaning flower) is a collective term referring to the two whorls of flower parts outside or surrounding the stamens and pistil. The stamens and pistil are regarded as the 'essential' parts of the flower responsible for sexual reproduction. In flowers of dicotyledonous plants the perianth consists of a distinct outer whorl of flower parts called the **calyx** and an inner whorl of flower parts called the **corolla.** The calyx is made up of a number of **sepals** (usually green), while the corolla is made up of a number of **petals** (often brightly coloured). In monocotyledonous flowers, as in the case of *Clivia*, the parts of the outer and inner whorls of the perianth look very similar and so as to distinguish them from sepals and petals they are called **tepals.** Flowers of monocotyledonous plants are trimerous (whorls consisting of three parts each). The perianth of a typical *Clivia*, therefore, consists of three **outer** and three **inner tepals**. Flowers having more than six tepals should therefore could be called **multitepalous.** However, in botanical terminology, when referring to many petals or sepals in the same flower, the prefix **poly-** is used instead of **multi-** and terms such as polypetalous and polyandrous are used. I am not sure who coined the term multitepal, but to be in line with botanical terminology, it would be more appropriate to use the term **polytepalous.**

The origin of flower parts

Except for roots, all plant parts such as leaves, stems and flowers are produced by the apical meristems or apical domes of buds. During the vegetative stage of the *Clivia* plant, the apical dome of the terminal bud produces leaf primordia, one at a time and in alternating positions on either side of the apical dome. The leaf arrangement (phylotaxis) of the *Clivia* is therefore alternate and distich (in two rows - see van der Merwe *et.al.* (2006) for more detail). After having produced a number of leaves, the apical dome switches to the reproductive phase and gives rise to an inflorescence bud. The latter then produces a number of bract (reduced leaves) primordia and in the axil of each bract it produces a flower bud primordium. Initially flower bud primordia are globular in shape, but soon become flattened at the top. Instead of producing one leaf primordium at a time as in the vegetative bud, primordia of flower parts are produced in whorls and in the case of *Clivia*, whorls of three at a time (Figure 1).

The first or outer whorl of three primordia will become the outer tepal whorl, followed by the inner tepal whorl, two whorls of stamens and one whorl of carpels. A typical *Clivia* flower therefore consists of six tepals, six stamens and a pistil consisting of three carpels.

The formation of the flower parts is controlled by genes, as stated by Ronse De Craene (2007): "The differentiation of the flower rests on the ABC-model, in which identity of organs in each whorl is determined by a combination of three classes of MADS-box organ identity genes: A genes are responsible for sepal formation, A + B function determines petal identity, B + C function specifies stamens, and C-function determines carpel development. The model has been subsequently extended to include D- and E-class genes that also play a role in floral organ development". Another citation from the Max Plank Institute reads "That means that petals and stamens require two genes for their development and that changes from the one flower circle (whorl) to the next is based on the successive turning on of the respective switch". Most of the research on genes that control flower development was done on dicots like *Arabidopsis* and *Antherrinum*, but presently researchers also look at monocots like maize, lilies and tulips. I am not a geneticist and do not want to dwell on the genetic details of flower development, but the above citations provide an idea of the complexity of flower development and also the lack of information regarding polytepals.

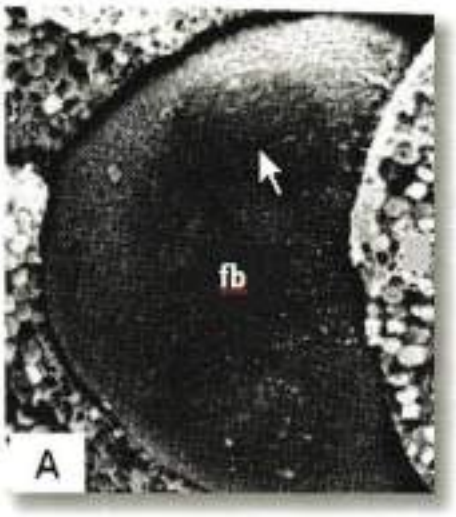


Figure 1 a

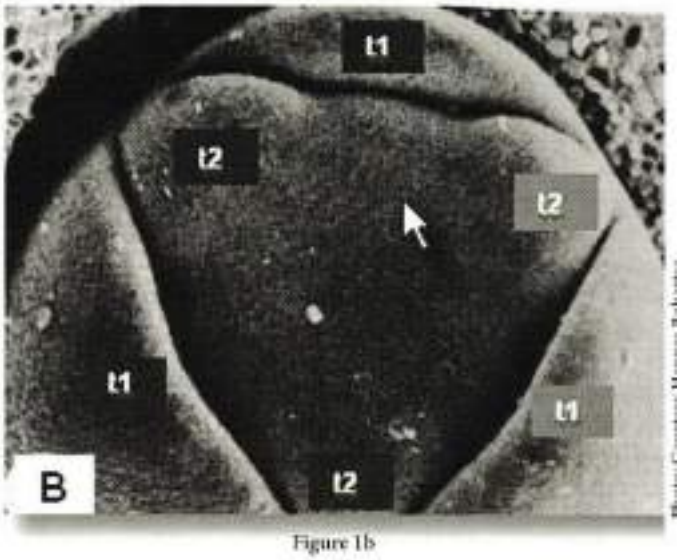


Figure 1b

The morphology of polytepal formation

Figure 1 shows the formation of the three members of the outer tepal whorl and the beginning of the second whorl in the young flower bud of a monocot plant. In the following whorls, the three tepals of the inner whorl

as well as the two whorls of stamens and one whorl of carpels, will position themselves in the 'vacant' positions between the members of the previous whorl. The reason being that the apex of each new primordium produces hormones that inhibit the formation of a new primordium in the direct vicinity of the previous one. The result is that members of the next whorl of primordia are formed a bit closer to the dome apex and in alternating positions exactly mid-way between two adjacent members of the preceding whorl. If more than two whorls of tepals or stamens are formed, they will follow the same sequence.

In his contribution on 'Breeding for Polytepalous *Clivia*' in this volume, John Craigie states that "polytepal plants can have flowers on the same scape with four, six, seven, eight, ten, twelve and even fourteen sepals". Since *Clivia* flowers are trimerous, and the flower parts are formed in successive whorls, multiplication of the flower parts like the tepals should also occur in multiples of three which means either six, nine, twelve or fifteen tepals per flower. Due to constricted space between tightly suppressed leaf bases where the *Clivia* inflorescence and flower buds develop, it is possible that one or more of the primordia may abort before developing into a tepal or stamen, resulting in the numbers observed by John Craigie. Figure 2 shows three *Clivia* flower buds on part of a flat inflorescence bud that was dissected close to the growing point of a mature plant. On the youngest buds on the left, the one outer tepal is more pronounced than the other two.

The question remains 'Why would the plant produce flowers with more than the normal number of tepals or stamens?' Considering the genetic control mechanisms mentioned above, it could be that the 'switch' from tepal formation to stamen formation is delayed for some reason such as the improper interaction between A and B genes or the interference of specific genes. Carpel formation is controlled by C-genes and this might explain why we still get three carpels in polytepal flowers. This is, however, merely speculation and we will have to wait for the results of proper research to supply the answers. In the mean time selection as proposed by John may be the best way forward.

Photo: Courtesy Hannes Robbertse

Figure 2

Hannes Robbertse is associated with the Department of Plant Production and Soil Science, University of Pretoria. (Eds.)

References:

Braun, G.K. & Gilmartin, A.G., (1987). *in* Leins P, Tucker SC & Endress PK, *Aspects of floral development*. J. Cramer, Stuttgart.

Craigie, J., (2008). Breeding for Polytepalous *Clivia*. CLIVIA 10: Pages 34 - 40.

Max Plank Institute. http:www.biologie.uni-hamburg.de/b-online/e28/28c.htm

Ronse De Craene, L.P., (2007). Are petals sterile stamens or bracts? The origin and evolution of petals in the core eudicots. *Annals of Botany* ,100:621 – 630.

Van der Merwe, L., de Kok, B. & Robbertse, H., (2005). Cultivation of *Clivias*. Clivia Society, Pretoria.

A Selection of Photographs from some Clubs and Interest Groups

Eastern Province Clivia Club:

Eastern Province Clivia Club Show Winner Grower: Charl Malan

Eastern Province Clivia Club Show First Runner-up
'Obama' Grower: Charl Coetzee

Eastern Province Clivia Club Show Best Novice
Grower: Gideon de Kock

Eastern Province Clivia Club Show - Second Runner-up Grower: Neil Ellis
All EPCC photographs by Charl Coetzee

Garden Route Clivia Club:

Garden Route Clivia Club Show Winners
See Opposite Page: The Garden Route Show venue is a school and the Learners drew pictures of Clivia for the display


C.J. Wepener Saal/Hall

Garden Route Clivia Club Winners

Garden Route Clivia Club Show Team

Left: A Close-up of a stamen by Piet Theron

Clivia miniata — Grower: Bets Rossouw and the Late Cor van Niekerk

Clivia miniata — Belgium Hybrid — Grower: Piet van der Merwe

Clivia miniata Apricot — Best in Class at Nylstroom Show — Grower: Piet van der Merwe

Clivia miniata — Belgium Hybrid — Grower: Bets Rossouw
All photographs in this section by Rina van der Merwe

Best on Show — KZN 2007 Sean Chubb

First Runner-Up — KZN 2007 Little Falls Farm

All photographs in the KZN section by Clive Graham

Second Runner-Up — KZN 2007 Liz and Glen Boyd

Best Apricot / Salmon Brenda and Edsel Nuss — KZN 2007

Clivia gardenii Any Other Colour — First in Class — Liz and Glen Boyd

C. gardenii Pink — First in Class — Gem Wild Flowers

Second *C. gardenii* Any Other Colour — Brian Tarr

C. gardenii Orange / Red — First — Gem Wild Flowers

First *C. robusta* orange — Val & Roy Thurston

The Winners from the Cape Show

An Apricot Clivia Grower Johan Botha

Clivia miniata Best Orange on Show Grower: Eric Heine

Clivia miniata 'Ghost' Grower: John Winter

Breeding for Polytepalous Clivia

John Craigie, Australia

Polytepal *Clivia* are both fascinating and challenging. They all vary because this trait exhibits the indicia of being recessive irregular inheritance. My first polytepal seed purchase was from the master breeder, Mr Yoshi Nakamura, and these plants have produced some of the best polytepal flowers.

Knowledge about polytepals appears to be limited. It is only through discussions with others and the limited number of years invested in breeding for polytepals that I am now starting to get a better understanding about them and about breeding with them. This article is not scientifically based and provides a general introduction into breeding polytepals. For further information on polytepal breeding see the article by Shigetaka Sasaki of Japan in CLIVIA 6.

The polytepal trait is recessive, variable and unstable

The science of plant breeding tells us that plants that have been self-pollinated and selected for type for many generations become homozygous at almost all gene loci and produce a uniform population of true breeding progeny. However, what happens if one crosses one homozygous plant with another? The scientists tell us that a cross between two different homozygous plants produces a uniform population of plants that may be heterozygous for many gene loci. However, a cross of two plants each heterozygous at a number of gene loci will produce a population of plants that differ genetically and will not be uniform. And so the cycle goes on!

Polytepal *Clivia* are not homozygous. From discussions with a number of enthusiasts, it would appear that the gene or genes responsible for the polytepal trait seem(s) to be very weak. The trait's variable expression and irregular inheritance suggests that it may take several generations to achieve higher levels of stability. However, for the reasons outlined above I doubt that homozygous polytepal *Clivia* plants may be achieved, at least within my lifetime.

The irregular inheritance suggests that the gene or combination of genes responsible for the polytepal trait is recessive to six tepal flowers. An added complication is that there appears to be a significant lack of uniformity in its expression (polytepal *Clivia* can have flowers on the same scape with four, six, seven, eight, ten, twelve and even fourteen tepals). It is highly probable that there may be multiple gene mutations in polytepal *Clivia* that exhibit a high lack of uniformity in tepal expression.

In the pursuit of creating a good red wine, there are good and bad grapes (genetics, climate, soil types, vinyard practices, etc. play a role), good and bad winemakers and some good old fashion luck. So it is with breeding polytepal *Clivia*. Firstly, one has to identify whether the *Clivia* plant in question actually has the polytepal trait. Climatic and other conditions under which a plant is grown may mask the expression of this trait. Secondly, it is important to have some understanding of the genetic history of the plants being used in a breeding program in order to have some feel about the extent to which the polytepal trait may be expressed in subsequent generations. Just because the plant is polytepal do not assume that it will produce many polytepal offspring. Thirdly, one needs to identify the objectives of a breeding program. Once this has been identified

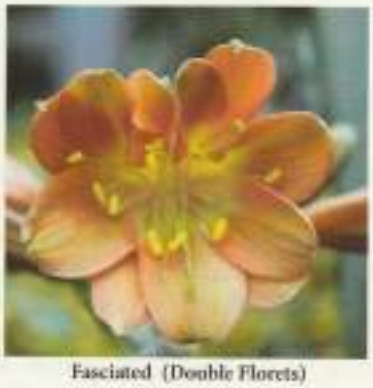
it is then possible to make plant selections and to develop a plan to breed offspring, for example, with higher levels of uniformity in expression. For that example objective, one would select polytepal *Clivia* with more uniform expression and a history of producing higher percentages of polytepal offspring in preference to those that exhibited extreme variability of expression or low percentages of polytepal inheritance. If the objective is to produce monster polytepal umbels then the selection process would include at least one monster polytepal *Clivia* irrespective of the level of variability in its trait expression.

Mistakes can occur each time plant cells divide and these mistakes are called mutations. These mutations may result in a change in the expression domains of the structural genes. We know that the polytepal trait is recessive and because of the significant lack of uniformity in its expression (polytepal plants can have flowers on the same scape with four, six, seven, eight, ten, twelve and even fourteen tepals), it is highly probably that it is the result of a mutation.

The gene or genes responsible for the trait seem to be very weak and its variable expression and irregular inheritance suggests that it may take several generations to achieve higher levels of stability. Knowing the genetic background of polytepal plants is a crucial first step to understanding the extent to which they may produce offspring with higher levels of uniformity in expression. Just because the plant is polytepal do not assume that it will produce many polytepal offspring

Identifying a polytepal

Clivia that have fasciated (double) flowers that are usually fused at the base of the pedicles are *not* polytepal. Sometimes polytepals just occur and these may be called "spontaneous" polytepals. In the first year of flowering there may be one or two polytepal flowers but in subsequent years the number of polytepal flowers may increase in some plants. In others, the number of polytepal flowers remains the same from year to year - one to two. An umbel that has only one or two polytepal flowers may not be genetically polytepal. Look at where they are positioned in the umbel. If these polytepal flowers appear in the centre of umbel and the other flowers only have 6 tepals then it is highly probable it is not a true polytepal. Further flowering may prove otherwise if more than two florets are polytepal.



Fasciated (Double Florets)

Non-Polytepal

If the *Clivia* plant is not a true polytepal then the polytepal flowers are not expected to have any different genetic information

True Polytepal

than the 6-tepal flowers so there is little point in using pollen from them in a breeding program. With a true polytepal each of the flowers including 6-tepal ones carry the same polytepal genetic information.

Polytepals only show their full potential when they are vigorous, mature plants. The trait expression is influenced by environmental conditions. For example, with plants grown under stress, there is a decline in the degree of the polytepal observance. Also, plants flowering for the first time may show no or limited polytepal expression, so do not discard them. Expression of the trait improves with successive flowering and maturity.

Often the polytepal trait is associated with strong green throats. Green throats are due to the presence of chlorophyll and this is present in the plastids within the cytoplasm of the plant cells. This would suggest that many of the early polytepals may have come from maternal parents with green throats. The gene or genes responsible for the polytepal trait does not appear to be linked to the genes that influence the other colours observed in flowers. There are a lot of true polytepals that do not have green throats. However, there may be a link between green throats and the ability to produce stable (normal) flowers.

It was thought that there was a link between yellow and peach polytepal material and narrow leaves but some breeders like Shigetaka Sasaki have short and broad leaf polytepal types.

Polytepal Hopeful

Green Centre

Non-Green Centre

It would be beneficial if polytepals have the same number of tepals and stamens in each flower. However, as the trait is unstable it is possible for flowers to contain additional layers of tepals although they retain their normal number of 6 stamens and a 3-lobed stigma. Other variations are also possible. Often polytepal flowers may have more than 3-lobed stigmas (for example, flowers with 8 tepals will often have 4 stigma lobes). Stigma lobes are a reflection of the general overall ratio of floral parts. They are fairly closely linked but their importance should not be overemphasized. Sometimes the style is spiral shape. Also a plant may exhibit a combination of polytepals and a modification of some of the stamens into petaloids.

Importantly, if the umbel has a majority of eight, ten, twelve, etc. tepals in the flowers then this would be a true polytepal and, as previously mentioned, any of the flowers (six, eight, ten, twelve, etc. tepals) could be used to breed for polytepals, either as the maternal or pollen parent.

Genetics of polytepal *Clivia*

I cannot emphasize enough the importance of knowing the genetic background of the polytepal *Clivia* to be used in a breeding program. Just because a *Clivia* plant has a polytepal umbel one should not expect it to produce 100% polytepal offspring. The expression of the trait is recessive and variable. Knowing the genetic history of polytepal *Clivia* may assist in predicting whether they may produce 30, 50 or some higher percentage of polytepal inheritance. A polytepal *Clivia* plant that has a genetic background of polytepal x polytepal may be preferred to one that has polytepal x non polytepal if one is, for example, seeking to produce higher levels of inheritance of the trait. Whilst further generational improvement may enhance the inheritance of the expression, this is not guaranteed. This has also been found to be the case with polytepal expression in some other ornamental plants.

Beyond polytepal *Clivia*, there have been many success stories in breeding doubled-flowers in other ornamental plants. Shigetaka Sasaki of Japan in CLIVIA 6 referred to results of breeding doubled-flower *Hippeastrum* cultivars by Nobuyuki Katsuyama. Other information on breeding doubled-flower *Hippeastrum* can be found on the internet, for example, "Trends in Modern *Hippeastrum* Hybridizing" by Charles Hardman. These and other articles suggest that crossing a doubled-flower with a single flower *Hippeastrum* would produce no or a very low percentage of doubled-flower F1 progeny, but crossing two doubled-flower *Hippeastrum* may produce up to 50% of the resultant seedlings that would have some doubled-flowers. Also crossing the F1 non doubled-flower progeny may produce higher levels of doubled-flower *Hippeastrum*.

Whilst one should be cautious about applying genetic results for one plant type to another, even though in this case they both belong to the *Amaryllidaceae* family, the work done with doubled-flower *Hippeastrum* provides some useful insights. From our own experiences, crossed or selfed polytepal *Clivia* grown from seed that we acquired produced less than 50% polytepal. No doubt the genetic background, if known, would have helped explain this outcome.

It would be beneficial if polytepals have the same number of tepals and stamens in each flower. However, as the trait is unstable it is possible for flowers to contain additional layers of tepals although they retain their normal number of 6 stamens and a 3-lobed stigma.

Other variations are also possible. Often polytepal flowers may have more than 3-lobed stigmas (for example, flowers with 8 tepals will often have 4 stigma points). Stigma points are a reflection of the general overall ratio of floral parts. They are fairly closely linked but their importance should not be overemphasized. Sometimes the style is spiral shape. Also a plant may exhibit a combination of polytepals and a modification of some of the stamens into petaloids.

Objectives of a Breeding Programme

The objective of a breeding program may be as simple as breeding for uniformity or as complex as breeding the hottest polytepal *Clivia* plant ever conceived. You know the one, it includes the following traits:

- Longitudinal and non longitudinal variegated foliage;
- Short but ultra broad leaves;
- Leaves that grow completely in a plane with the previous leaf to create a perfect fan shape with leaf tips that gradually arch to a rounded apex;
- A soccer ball umbel with 40 plus flowers;
- Flowers with layers upon layers of very broad "blue" particoloured tepals!

Unfortunately, the more desirable traits one includes in a breeding program, the lower is the probability of achieving the combined outcome.

To breed for uniformity, it is recommended to select polytepal parents that have the greatest percentage of uniform flowers and crossbreeding with them. Such breeding may lead to polytepals with greater stability and beauty, for example by crossing between the F1 generation, F2 generation, etc. or between the parents and subsequent generations. If only one polytepal *Clivia* plant meets your criteria then self pollination may be a better strategy than crossing it over another polytepal that is less than desirable.

In my opinion umbels which have a

Polytepal

mixture of eight, ten, twelve, etc. tepal flowers are less preferred than ones that have uniform polytepal expression. But which tepal version is preferred? Connie and James Abel have suggested that the aim should be to breed *Clivia* with well-rounded 8-tepal flowers. I agree that an umbel of uniform flowers of eight tepals, eight stamens and a 3-lobed stigma would provide an impressive display.

Polytepal *Clivia* now come with yellow, pastel and peach flowers. A lot of patience is required to breed new polytepal colours if using orange flowering polytepals as the foundation. Pollinating an orange flowering polytepal with pollen from a yellow flowering *Clivia* plant is expected to produce no or little progeny (F1) with the observed polytepal trait. If you want to create good quality polytepals from these F1 progeny use only the best F1 plants. Intercrossing these F1s may produce some

Pastel Polytepal

Count the tepals in the Polytepal Bud

A Cream Polytepal

percentage less than 25% with an observed polytepal trait. Crossing the best F2 progeny should improve the number of offspring that have the polytepal trait and with some good luck some of the polytepal progeny may have yellow flowers.

"Super" polytepal *Clivia* also exist. In these

Yellow Polytepal

plants the flower appears to be a combination of polytepals and a modification of some of the many stamens into petaloids creating some very

A Nakamura Polytepal

Photo: Courtesy Shigetaka Sasaki

full polytepal flowers. So then how does one go about breeding for a "super" polytepal type? Most of us may never get access to *Clivia* that exhibit a combination of polytepals and petaloids. Those that have them are probably well-advanced in

striving to produce more uniform and stable plants. In the absence of having one of these plants, what does one do to start the long journey for breeding a "super" polytepal type with limited resources of *Clivia* plants like polytepal, polytepal with keeled tepals, six tepal flowers but with keeled tepals or one with stamen petaloids? Once it was thought that plants with keeled tepals might hold a key to the development of petaloids but with limited history available it would appear that the two might be unrelated.

We have pondered on how to breed "super" polytepal *Clivia* plants and have embarked on a long journey of crossing a *Clivia* plant with stamen petaloids with a polytepal *Clivia* plant. A big assumption in our plan of action is that the stamen petaloid trait is recessive to the polytepal trait so the progeny of the initial cross would be backcrossed over the *Clivia* plant with stamen petaloids. From this new population we intend to discard plants that do not show polytepal and petaloid traits, to self the remainder and to continue a program involving backcrossing and selfing. Like all plans one must be prepared to modify it if it is not delivering on expectations. Different strategies would be adopted if it is found that the two traits are co-dominant or the polytepal trait is recessive to the petaloid trait.

And as for the finished product, that may well be many CLIVIA Yearbooks away! In the interim, enjoy your polytepals!

All Photographs are courtesy of John Craigie unless otherwize stated. **(Eds.)**

Photo: Claude Gilbert

A Nakamura Polytepal - Grower Ian Brown

Focus on Heritage *Clivia miniata* with Unusual Colourations

Sean Chubb, South Africa

The source of all genetic diversity in *Clivia* is to be found in our natural habitat populations of *Clivia*. The conservation of these natural habitats and the preservation of the diverse gene pool within them is paramount to the future of *Clivia* cultivation, for without preservation, the genetic diversity essential for the future cultivation of *Clivia* and the ability of *Clivia* to adapt to changing environmental conditions may be lost. Genetic diversity as represented in habitat heritage plants, must be conserved and protected if *Clivia* cultivation is to have a secure future.

The Heritage collection is an effort to conserve these precious genetic resources in a living collection in their original form in which they occur in the natural habitat. In this article I will focus on some of the more unusual colourations displayed in the Habitat Heritage collection of *Clivia miniata*. The outward expression of flower colour variation is only one of the phenotypic variations, which displays the genetic variation of *Clivia*.

The colours focused on in this article are Splash, Versicolour, Blushed Yellow and Pastel Pink.

Splash

An example of Splash colouration in the Habitat Heritage collection is Andrew Gibson. Andrew Gibson is a Heritage plant originally collected by Andrew Gibson in the Karkloof forests outside Howick. The original date of collection is unknown, but is estimated to be in the 1980s or early 1990s. This plant displays a very unusual splash colouration.

Clivia miniata 'Andrew Gibson'

A line breeding program has been running for some years using Andrew Gibson selfed seedlings and a similar plant called Candy Stripes. The F2 generation seedlings being produced have colouration remarkably like the parent Andrew Gibson. These plants are being marketed by Thurlow Flora as Chubb Splashes.

Andrew Gibson is still an extremely rare habitat clone with only a few offsets having been released to *Clivia* enthusiasts.

A clone of Andrew Gibson in flower was sold at the *Clivia* Society auction held in conjunction with the 2006 International conference for a price of R9500.00.

Versicolour: *(Contrasting inner and outer tepal colouration)*

Sikwebizi Versicolour was originally collected by Kobus Sreenkamp as a small-unselected seedling in the Sikwebizi river valley whilst on a botanic trip with Prof Nat Grobbelaar to view the Encephelartos natalensis form endemic to the Sikwebizi River

Clivia miniata 'Sikwebizi' Versicolour

system. The area is extremely inaccessible and as a result very little human activity occurs in this area leaving the *Clivia* populations in a pristine condition. Sikwebizi Bi-colour joined the Habitat Heritage collection in December 2004 by kind donation of Kobus Steenkamp and the help of Louis Lotter.

In 2004 the plant was already mature. This robust plant flowers with very large umbels held well above the foliage and is particularly striking due to its impressive flower colouration. The reproduction of this clone from seed has been only marginally successful with very poor seed set when selfed and on a subsequent flowering soft rot infection in the flower peduncle.

Soft Pink Pastel

There are two examples of this colouration in the Habitat Heritage collection namely Ndwedwe Ngidi Pink Champagne and Mpochocho Pink Pastel.

Ndwedwe Ngidi Pink Champagne was originally collected by Roy and Val Thurston in 1995 in the Ndwedwe area. Ndwedwe Ngidi Pink Champagne is predominantly Yellow but suffused with pink on both sides of the tepals. A full story of this plant is written by Val Thurston for this publication. (See Page for Article)

Mpochocho Pink Pastel was collected by myself in 2003 in the greater Port St Johns area of the Transkei Wild Coast. The plant was found at the base of the Mpochocho waterfall and was a large clump; an offset was removed for the Habitat Heritage collection. Mpochocho Pink Pastel is sensitive to both light and water stress in that if too much light is allowed the plant flowers considerably darker and the same occurs if it undergoes water stress at the time of flowering. This is an elite clone and an asset to the Heritage Collection.

Clivia miniata 'Mpochocho Pink Pastel'

Blushed Yellows

This mutation group seems to occur more regularly than the previously described colour forms. There are 6 separate clones of this colour form in the Habitat Heritage Collection. This colour variation also seems to be light sensitive with more blushing occurring with increased light intensity.

Ruby Stewart

This is a robust clone with fairly broad long pointed leaves. Ted and Ruby Stewart collected this clone on their farm in the Stanger area many years ago. The cloneflowers freely with impressive umbels held above the foliage. It is a deep yellow with pink flecking and spotting on the outside of the tepals with more concentrated colouration on the midrib of the tepals. This colouration is more pronounced with high light intensity, flowered indoors it appears yellow. The fruit ripens red.

C. miniata 'Ruby Stewart'

Three blushed yellows

Collected in the early 1940s, by Mr. Potterill on the farm Kingston-'The Precipice, Mattersons Hill, Raisethorpe, Pietermaritzburg. This clone has fairly small flowers with a distinct blushing on the back of the tepals, with more colour concentrated in the tepal midrib. This clone is also light sensitive. It offsets freely. At this stage no seedlings have been flowered from it and so the breeding potential is still unknown.

Clivia miniata 'Potterhill' Blushed Yellow

Clivia miniata 'Mrs. Male'

DNA has proved that Mrs. Male Blushed Yellow [Greendale /Peacevale] and Celtiskloof Squibby Yellow are very closely related to Potterill Blushed Yellow and the likelihood is that they all originated from the same habitat colony. Judging by the quantity of plants of both these clones that there are in collections they are very old habitat collections and probably collected much the same time as Potterill Blushed yellow. However there is at this stage no historic proof to confirm this.

Mrs. Male Blushed Yellow is very similar to Potterill Blushed Yellow but differs by having a green throat but has the same blushing on the back of the tepals. The flower of Celtiskloof Squibby Yellow is almost identical to both clones described above except the blushing is not displayed until the flowers are completely spent. All 3 of these clones produce red fruit.

Clivia miniata 'Celtisklooof Squibby Yellow'

Clivia miniata 'Msubo Nguni'

Msubo Wow and Msubo Nguni

Both these Blushed clones were collected by Roy and Val Thurston in the Ndwedwe area.

Msubo Nguni was the first of the 2 clones found in the Waterfall Area of Ndwedwe in August 2001. The flowers were badly sun damaged and the colouration was not easy to identify. When it flowered the following season the bloom was a good shade of yellow with dark orange speckles or splashes on the underside of the tepals.

The leaves are of average width and length and similar to most of the plants found in this pocket of indigenous forest. The plant offsets well. The blooms self and cross pollinate well. The berries are orange in colour when ripe.

In September 2002 the second clone was found close to the location of the first plant. This was named Msubo Wow. The colouration of the blooms is very similar to those of Nguni but there is a slight difference in the shape and size of the tepals. Both clones have small hooks at the end of each tepal. The leaves are narrower than those of Nguni and there is a white stripe down one leaf on every plant. The seeds ripen orange and the plant offsets freely.

There are many more Habitat clones with unusual colouration and an attempt to categorize them, confirm their histories and conserve them is an ongoing process by the KZN Clivia Club.

All Photos in this article are courtesy of Sean Chubb

Clivia miniata 'Msubo Wow'

A comparison of 'Msubo Wow' on the left and 'Msubo Nguni' on the right

The History of Ndwedwe 'Ngidi Pink Champagne'

Val Thurston, South Africa

This plant was found in the Upper Tongaat area of Ndwedwe in 1995 by a partially blind Africa man who lives in the Ndwedwe area who said it was a 'yellow' clivia and had it growing in his house in the sun. It was badly sun damaged and the umbel was bruised and crushed but one could see that it was in fact a yellow with pinky markings which I then thought was caused by sun and handling damage. No seed set that year. In 1996, it flowered in the base of the leaves and rotted off before the bloom could open. In 1998 it again flowered in the base of the leaves.

As most of my plants never flowered in Westbrook Beach at the coast, I decided to send the plant to Des Andersson in Pietermaritzburg for a 'temperature shock' in 1999. Success at last, the flower spike pushed up to beyond the leaves. When in bud the colour of the outer side of the tepals was yellow/orangey pink. As the bloom opened and matured it turned a pale-pinky yellow with a bush of darker pink on the upper and under side of the reflexed tepals. The bloom has a slight scent and produces a large amount of pollen.

The plant was selfed, crossed with Pat Quin's Nakamura Yellow, and Ndwedwe Beta – a wild yellow. All the seeds set and ripened orange. When we moved most of my plants were mixed up when settling them under the trees, labels were misplaced and so forth. So it was a matter of wait and see what flowers where, and then check the name on the bag! Fortunately all the Ngidi crosses were labelled on the bag but are scattered around the garden and mixed in with other crosses.

Disaster, in December 2001 the plant rotted at the base. When I discovered there was a problem, the rot had already travelled right up the centre core of the leaves so there was no chance of saving what was left. I scratched around in the soil and found a small pieces of root stock about the size of a 5 cent coin. I tried to grow some but failed. I decided to give the biggest piece to Sean Chubb and said "save it, if you can – you have more of a chance up in the cooler area of Eston than I do with the coastal humidity".

Months went by – I was too depressed and anxious to even ask how the rootstock was doing – I took a chance in a moment of mental strength, and was delighted to hear that Ngidi had started to send up the tiniest shoot. I did not hold my breath – and left things for another couple of months. Over many months, she grew and grew and eventually it looked like there was a good chance of saving the plant. Sean planted Ngidi in an earthenware pot that he had inherited from his grandfather – his lucky pot – as he called it. Over the next five years Ngidi flourished – still in the same pot – Sean was terrified of transplanting it in case it took another dive. Each time I visited him I went and had a look – it was a very exciting time as I just could not wait for her to flower once more.

Great excitement, the day had arrived - Sean phoned in September of 2006 to say that Ndigi was now in bud. Well, the rest is history – she flowered – was photographed and once again admired by Sean and myself in amazement at what was once a small piece of rootstock and 6 years was now a flowering size plant.

Clivia miniata 'Ngidi Pink Champagne'

In 2007 Sean informed me that Ngidi was bursting out of 'grandad's' pot, and had cracked it open. Sorry Sean. It was duly repotted into the heaviest earthenware pot Roy has ever tried to pick up and is now re-united with the rest of my plants. Needless to say, Ngidi has never produced a sucker so I am still living a life of fear in case the the rot returns.

All I can say is an enormous and extremely grateful 'THANK YOU' to Sean for saving this very beautiful and precious habitat plant of *Clivia miniata* for the gene pool.

We hope that the first sucker produced goes into the KZN Heritage Collection (Eds.)

A example that is not yet fully open of Alick Mc Leman's 'Gold Dusk' (See next Article for information and a further picture)

Ndwedwe 'Ngidi Pink Champagne' The New Zealand Connection

Alick Mc Leman, New Zealand

Prior to emigrating to New Zealand for family reasons in 2000, I had the privilege of associating with the KwaZulu-Natal Clivia Club and leading growers such as Sean Chubb, Brian Tarr and others who stimulated my interest in *Clivia*. I envy their advantage of living right in the heart of *Clivia miniata*, *C. gardenii* and *C. robusta* country where over the years they have had access to wild accessions and many natural mutations.

In particular, Val and Roy Thurston really aroused my interest. They have a great partnership. Val grows the plants and Roy follows his passion for 'bundu bashing' (exploring the countryside) in the wilds of KZN, finding interesting specimen habitat *Clivia* and bringing them home for Val to propagate. And so over the years Val has acquired plants like her 'Alpha and Beta Yellows', her 'Gamma 'Peach, the 'Ndwedwe Ngidi Pink Champagne' and others.

While I lived in South Africa I was always going — but never did get to see Val's collection. These fabled plants have always been a particular interest because very little has been done with them in the way of hybridisation. Thanks to the wonders of emails I have maintained my friendship with Val and over the years have acquired crosses of these rare plants. For instance by sibling crossing her 'Alpha Yellow' x 'Chubb Peach', I have been able to recover a lovely F2 yellow with very small flowers. Perhaps this is the recovery of the 'Alpha Yellow'? Similarly, from a F2 sibling cross of Val's 'Ngidi Pink Champagne' x 'Beta Yellow', I flowered last year something really special, that I have registered as 'Golden Dusk'. 'Golden Dusk' is a yellow with pink overtones. Initially the red anthocyanin pigments reflect themselves in the fringes of the tepals only but deepen in colour and distribution as the flowers age. Surely this is the recovery of the 'Ngidi Pink Champagne'?

Alick Mc Lemon's *Clivia miniata* 'Gold Dusk'

The resemblance to 'Ngidi Pink Champagne' is very obvious and it will be interesting to see whether future crosses and self crosses continue to produce similar flowers. Perhaps Alick will supply some material for DNA testing as compared to 'Ngidi Pink Champagne'

(Eds).

A Visit to Belgium and the Netherlands

Dries Olivier, South Africa

On 25th March, 2008, I left OR Tambo Airport in Johannesburg, on my way to exhibit at a steel wire and tube trade exhibition in Dusseldorf, Germany where no private individuals are allowed to attend. The exhibition is held biennially and South Africa has a national pavilion to market our product and we used to buy flower arrangements at exorbitant prices to use as decoration. In 2006 I started useing *Clivia* from Pierre de Coster to use as decoration. This was very well received - so much so that people from all over the world asked for plants when the exhibition was over and a number were even pinched during pack-up time. The exhibition this year was attended by 100 000 industrialists from 84 countries.

The S.A. stand with *Clivia* as decorations

After a connecting stop at Frankfort, my first destinationstop was Amsterdam. Aart van Voorst collected me at the airport and took me to the nursery where he works and keeps his *Clivia*. A number of his ploidy conversions (triploids and tetraploids) were in flower. What beautiful plants and flowers! I was amazed at the size of the flowers and leathery feel of the tepals. And the brightness of the colours!

The View of Aart's Collection of Plants

The following comments were made by Aart van der Voorst on the status of his work and his expectations of the road ahead.

Polyploidy is the presence of more than the usual two sets of chromosomes in an organism.

It can have a big impact on floricultural crops. In many crops all commercial hybrids are polyploids (mostly triploids and tetraploids). Examples are *Narcissus*, *Freesia*, *Alstroemeria* and Daylilies (see CLIVIA 5 p.33). Because of superior characteristics such as bigger flowers, stronger stems, polyploid hybrids replaced those of the diploid varieties in these cultivars.

Clivia is just at the beginning of its polyploid revolution. The first tetraploids are now being artificially bred. It will take some generations to restore fertility to that of the original diploid strain.

The large number of *Clivia* plants for sale commercially are produced by seed lines that flower early. These seed lines are selected

for flowering after two and three years from germination. Breeding within the tetraploid seed lines is difficult. It is an open question whether tetraploid seed lines will ever be commercially available. Most polyploid crops are therefore propagated vegetatively. This is not an option for *Clivia*. Propagation by offsets is very slow and is not possible to achieve the quantities of plants needed (hundreds of thousands) for a viable commercial venture. Tissue culture is not an option either. The multiplication rate of *Clivia* in *in vitro* culture is low, and after the hardening phase *ex vitro* growth is relatively slow. This means that the production costs of tissue-cultured material are relatively high and will not readily equal the costs of seed propagated material. Special techniques of tissue-culture such as somatic embryogenesis are successful in some crops, but the research costs are very high and probably not of interest for *Clivia* propagation. Hence tissue culture will only be profitable for special hybrids (regardless of their ploidy level).

Special hybrids may certainly arise from polyploid breeding. In polyploid material multiple genomes can be present and characteristics that benefit from the accumulation of alleles will be prominently visible (e.g. flower size and colour). So in the world of *Clivia* lovers polyploids will have a future.

To increase the number of polyploids it is important that more people get involved in the breeding of polyploid *Clivia*. Some enthusiasts may be able to convert material to tetraploids themselves (see CLIVIA 6 p.43). Exchanging material may be a good way to increase the gene pool of tetraploids. John Craigie from Pine Mountain Nursery may have some tetraploids that arose from the Belgian material he has obtained.

An unexplored part of polyploidy enhancement may be unreduced gametes. These gametes with the double number of chromosomes are sometimes formed in special breeding combinations - for example interspecific crosses - or under special environmental circumstances. In *Clivia*, interspecific crosses are easy to make and till now no hybrids with unreduced gametes have been identified. On the other hand,only a few types have been researched, so potentially unreduced gametes remain a possibility. Unreduced gametes can give rise to more variation than gametes from artificially made tetraploids. The fact that no tetraploids have been found in natural populations or in crosses with interspecifics indicates that a high level of 2n gametes in *Clivia* should not be anticipated. However the phenomenon is not well enough researched to pass final judgement. I have, in fact, one example of an unreduced gamete in my own breeding: I have a tetraploid interspecific that arose from a cross with *C. caulescens* as a mother with one of my tetraploids. One of the two resulting plants turned out to be a tetraploid; the other is expected to prove to be a triploid (they have not yet bloomed). The most reasonable explanation is that the *C. caulescens* produced an unreduced gamete. It would be an interesting research project for a student to examine the occurrence of unreduced gametes in the genus *Clivia* (wild and hybrid material) Perhaps Johan Spies may be interested, although I have not raised the matter with him.

Many types have been treated with colchicine , but in the near future some proven superior crosses (e.g. those carrying Vico genes) could be used for chromosome doubling. This is important because diploid breeding might otherwise be too far evolved in comparison with tetraploid breeding to really make use of the benefits of polyploidy.

Aart obtained the following details of *Clivia* sold on Dutch auctions over the past 6 years (courtesy of Vakblad voor de Bloemisterij)

I hired a car in Amsterdam and took a 3 hour drive to Ghent where I arrived at 18:00 on 26th March 2008. I was met by Dirk and Christine Lootens and we drove to Pierre de Coster's nursery. Unfortunately Pierre and Isabelle were away on holiday in Croatia, but his son was tasked beforehand to show us around the nursery and to hand over some plants I had arranged to collect. It was near the end of the flowering time but many plants still displayed their wonderful flowers. The most outstanding yellows, peaches, reds, bicolours, variegateds and many more were standing everywhere. I collected three nice yellows, some bicolours and a few offsets that Pierre left for me.

Aart in his Laboratary

News and Views from Pierre de Costa

In my nursery we have not changed much in the way of breeding of new lines. We instead have been breeding to improve our strain, or more specifically, parts of our strain to earlier flowering in the season (November, December), but not all of them, because, for instance, the prices this year were not so favourable in that period. Are there other growers that plan to have a significant quantity available in that period? Normally the prices are high for the first *Clivia* placed on the market. So you will see that it is important that we spread the period of production.

I continue to improve the yellows, breeding for short leaved plants and nice full flowers and as deep a yellow as possible. Yellow *Clivia* can have only commercial success when plants are bred to be more compact and have a nice flower head, but it will remain hard to make a profit with them. There are also efforts towards breeding for some peaches, but that will take a number of years.

I also need to plan my retirement. None of my sons will continue the nursery. They always can if they want but not at the same

location. What I will breed will in future will be as a hobbiest. For the moment I enjoy my collection and for me that is adequate.

In Holland you now have big players in the breeding of *Clivia* in the market, such as Dyna Plant. The market for *Clivia* in Europe was quite good this year. The prices were stable on a not too high level. In fact, to compensate for the higher energy price, labour, potting medium, plastic pots, transport trays (packaging) and the higher transport of *Clivia* plants prices must go up.

Today I received a phonecall from a Dutch *Clivia* amateur who calls me every year regarding something about *Clivia*. This time he told me about his visit to a Royal palace (I'm not sure where in the Nederlands) where a room was decorated with a big terracotta pot filled with a dozen flowering *Clivia*. It was a magnificent sight and he asked where they came from. The staff in attendance told him that these plants were descendants of plants given as a gift from the King of Belgium, Leopold II, who offered a basket of flowering *Clivia* as a present for the wedding of Queen Wilhelmina from the Netherlands in 1901. These plants remain in good hands until this day!

Pierre's Nursery, near to the Entrance

After only 1 hour in Pierre's mecca, we had a wonderful Flemish dinner at a restaurant. The next morning at 08:30 Dirk picked me up from the guest house and we visited ID'flor, the first of four venues where Dirk grew *Clivia* and also where he has his office. The number of plants were unbelievable. Colours ranged from yellow to red. White Lips, pastels, green throats in red, bronze and yellow, green flowers, new strains, interspecifics one could die for, and many more.

Dirk Lootens had the following comments on *Clivia* in Belgium:

- In Europe people are not really interested in special *Clivia* colours.
- When we bring them to the market in traditional fashion it is very difficult to get "high(er)" prices
- We sell *Clivia* to a Canadian grower. He sells his plants with our label in the USA.

Now, back to ID'Flor :

- Lines: it is too early to mention details. I really want to wait as long as possible before informing the market as to breeding trends.

However:

- We produce for the broader consumer market, orange *Clivia* in a pot of 130 mm. The most important issues for us are - fast growing, early flowering, high flowering percentage, with average broad up to wide leaves. Plants should be around 450mm up to a maximum of 550 mm high (including the pot and measured with leaves erect)
- We have bred the White Lips (see Clivia News Vol 15 No. 2 Cover + p. 7)
- White Lips is a sowing line that produces between 50 and 90% "White Lips" although not yet 100%.
- Of course we have yellows, let's say around 5% of total amount produced.

'White Lips' an outstanding clone from ID'Flor

A Belgium Akebono

- We have beautiful individual plants
- In the future plants will be bred to be more compact with slightly broader leaves
- We have bred Belgian Akebono's and 'Hot Lips' + green flowers.
- We have done work for the better marketing of *Clivia* - these are branded in our marketing as 'The Strength of Africa'. We have developed pot-covers, labels and sleeves, garden-cards following this branding.
- I believe that ID'flor has the most professional marketing material I have ever seen.

Concerning marketing special plants around the world

- The opportunity is to spread special plants around the world, to be in contact with *Clivia* enthusiasts, to spread the love for *Clivia* around the world.
- The problem is that this is very time consuming, therefore the need is to work with local enthusiasts who want to place group orders.
- A second problem is that transport/ export costs are huge! This also calls for the grouping of orders so as to cut costs.
- A threat is: we have to focus on our core business namely the production of large quantity of *Clivia* 'Florid Orange' of a high quality to be marketed at affordable prices for the broader consumer market. If we also try to meet the "market of the enthusiasts", we could loose our focus!

Our pride plants

- Q 08
- the interspecific with the yellow inner and the orange on the outside
- some of our Tricolors
- one of our 'Hot Lips'

Many people visit many growers in many countries in the world. My personal opinion is that Belgium and the Netherlands must have *Clivia* of the highest quality and quantity that is

at least on par or sometimes even superior to what anyone can offer. Furthermore, I was highly impressed by the friendliness and knowledge of the growers in these historic cities in the lands of our ancestors!

An outstanding Belgium Interspecific. Note the open flowers with rich yellow on the inside and the contrast of Orange on the outer Tepals

Endnotes

[1] Somatic embryos are formed from plant cells that are not normally involved in the development of embryos, i.e. ordinary plant tissue. No endosperm or seed coat is formed around a somatic embryo. Cells derived from competent source tissue are cultured to form an undifferentiated mass of cells called a callus Plant Growth Regulators in the tissue culture medium are manipulated to induce callus formation and subsequently changed to induce embryos to form from the callus.

All photos in this article are courtesy of Dries Olivier

Another of the special Belgium *Clivias*

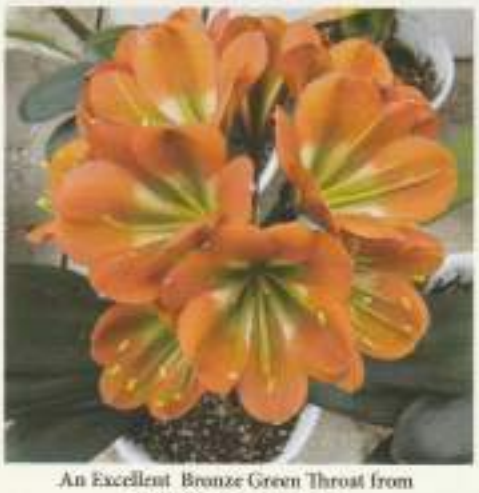
'Hot Lips'

A Visit to Japanese Clivia Breeders

George Mann, South Africa

I still remember as a small boy, about 10 years ago, admiring the beautiful photographs of Mr Yoshikazu Nakamura's *Clivia* plants in the first CLIVIA YEARBOOK. Never in my wildest dreams could I have imagined that I would one day have the wonderful opportunity to travel to Japan and have the privilege of meeting the legendary Mr Nakamura.

Wayne Haselau, Andy Forbes-Harding and I departed from Johannesburg's O.R. Thambo Airport on 18th March 2008, around midday. We then flew on via Hong Kong to Narita Airport where we were to meet up with David Brundell and Tony Barnes from New Zealand, to start our six-day Clivia Tour of Japan, organized by my good friend Shigetaka (Shige) Sasaki. Upon arrival at Narita Airport we were met by Shige, who immediately took us to the Centre Hotel Narita, where we tried to recover from severe jetlag. That night Shige took us to an amazing restaurant, where we were treated to some genuine Japanese sushi.



An Excellent Bronze Green Throat from Shige Sasaki's collection

Early the following morning we set out from the hotel to see Shige's green houses. There we found his plants to be in their prime, with magnificent blooms. I was especially impressed by the Vico hybrids, originally bred by Mr Nakamura, some with flower diameters of well over 100mm. I was also surprised by some of the best examples of bronze *Clivia* flowers that I have ever seen. In my opinion Shige has by far the greatest selection of plants in his three glass houses; his diverse collection includes plants from all over the world, ranging from Victorian Peaches and Solomone Broad Leaf Yellows from the US to some of the best examples of Pretty Pinks and Tipperary Peaches that I've seen from South Africa! He also had a very nice selection of TK Yellows. Later that afternoon we traveled to the Clivia Breeding Plantation, where we had the wonderful opportunity of meeting Mr Nakamura. Most of Mr Nakamura's plants were still in bud, but we marveled at the selection of variegated *Clivia* plants, which ranged from the newly-developed Tiger variegated plants to yellow Akebonos. He also has a great selection of some of the best Light of Buddha plants that I have ever seen. Mr Nakamura was very generous and gave each of us some *Clivia*-related books and other momentos. We were also very fortunate to each receive some seed as a gift. Because

A Vico Pastel Hybrid

of his severe arthritis Mr Nakamura is no longer able to do much pollination. (For more information on Mr Nakamura and his *Clivia* breeding refer to Helen Marriott's article in CLIVIA 8, "Nakamura's Contribution to Clivia Breeding".)

On Friday we traveled to Mr Matsumoto's cut flower production nursery, where we had the opportunity to see how they harvest and pack cut flowers for the flower market. Amongst the plants grown for cut flower production we saw *Leucocoryne, Ornithogalum* and *Helianthus* but what especially impressed me most was their *Zantedeschia* and *Sandersonia* production. He probably has more *Sandersonia* tubers in his one glass house than are left in the whole of South Africa, where they are being seriously depleted by the traditional medicine ('muti') trade. After viewing all Mr Matsumoto's green houses, we were kindly invited to have lunch at his home with his family. Mrs Matsumoto and Mrs Matsumoto Snr prepared a most delicious lunch for us. Mr Matsumoto has a magnificent traditional Japanese house and garden.

The following day we received a wake-up call from Shige at 04:00 in the morning, as we had to leave early to travel to Mr Koike's nursery in Gifu Prefecture, a full six-hour drive when there is little traffic. As luck would have it, there was an accident on the freeway that morning causing a two-hour delay. However we had a spectacular view of the ocean along the way and were also able to take some great shots of the famous volcanic Mount Fuji. We were met by Mr Koike and by my good friend Mr Masami Uno and his wife. Needless to say, Mr Koike is the breeder of the famous green-flowered 'Hirao' (CLIVIA 7). Mr Koike has also bred miniature yellow *Clivia* plants, as well as peach interspecifics, where he has used *C. gardenii* pollen on group 2 yellow plants. Mr Kioke is also breeding a new strain of picotee-like plants. Mr Uno brought some amazing Appleblossoms (grown from seedlings purchased from South Africa) along to show to us on that occasion. After admiring Mr Koike's magnificent *Clivia* plants and harvesting Mr Uno's Appleblossom pollen, we were taken to lunch, accompanied by Mr and Mrs Uno as well as Mr Koike. After lunch Mr Koike allowed us to begin cleaning our plants on his property. We departed around 18:00 and only arrived back at the hotel after midnight.

One of Mr Koike's Green Plants

Mr and Mrs Uno, Mr Koike and Shige Sasaki our Guide

A Picotee from Mr Koike's breeding

Mr Matsumoto arrived early the following morning and took us to his house, where we, with the help of his wife and mother, finished cleaning the plants that we had purchased. Later that morning Mr Matsumoto took us to the nursery of one of the most famous bulb breeders in Japan, Mr Komoriya. I could not believe my eyes. I absolutely love *Amaryllidaceae*. Mr Komoriya had the largest collection of species of South African *Amaryllidaceae* that I have ever encountered. He also had thousands upon thousands of *Lachenalia*, ranging from the original species to the most amazing hybrids that he himself has bred. We also saw a large selection of *Hippeastrum* species and hybrids. To me, seeing all these *Amaryllidaceae* was truly one of the highlights of the trip. Mr Komoriya has made some amazing breakthroughs in creating intergeneric hybrids by using South African *Amaryllidaceae* on other *Amaryllidaceae* genera from across the world. He is also a great fan of *Gloriosa*.

That evening we decided to pay one last visit to Shige's green house, just to see if anything new might have opened and we were surprised by a beautiful 'Andrew Gibson' in flower as well as a 'Four Marys'. Once again we only got to bed after midnight.

On Monday 24th we left early to visit Mr Nakamura. We traveled along the coast, and saw some beautiful forests. It was just a pity that we were too early in the season to see the cherry trees in full bloom. Mr Nakamura specializes in the breeding of polytepal *Clivia* plants. His plants were all in full bloom and we were able to admire some magnificent specimens, including some rose-like polytepals that were unfortunately not for sale. Mr Nakamura then accompanied us to the nursery of Mr Tsuruya. He was not available but MrsTsuruya was there to show us around. At this nursery we were able to obtain some amazingly good quality *Clivia* plants at very reasonable prices. These included some exceptional Negishi-fu, Daruma, and Akebono plants.

The last nursery we visited was the nursery of Mr Tsuruoka. He is the vice-president of the newly-formed Japanese Clivia Society and specializes in the breeding of Akebono Daruma *Clivia* plants, but also has some remarkable Daruma and miniature *C. nobilis* plants.

On our last morning we said farewell to Tony and David as we left to collect our plants at Mr Matsumoto's house. From there we traveled to the airport to obtain the necessary paperwork to take the plants we had bought back to South Africa. Helen Marriott met up with us at the airport and we had lunch together before our departure back to South Africa.

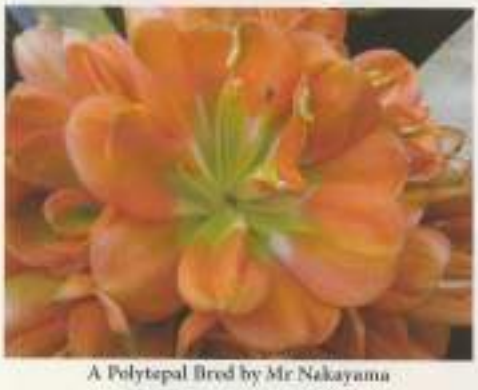
We wish to express our appreciation for the assistance and hospitality that we received from all concerned.

A Pastel from a Vico Hybrid that I managed to obtain while in Japan

Mr and Mrs Nakayama's Polytepals

Marilyn Paskert, USA

One of my favorite clivia destinations in 2007 and again this year was the farm of Mr and Mrs Nakayama. A large farm that has been in the family for many generations on the outskirts of Kamogawa City, the Nakayamas can only be reached by driving over a narrow twisting bridge of land between two rice paddies! It was as wide (or narrow) as the wheel base of the van, it was a relief that Shige is such a skilled driver! At the Nakayama farm one feels instantly transported to the rural past of Japan — only a few miles, but centuries away from the metropolis of Tokyo. Waterbirds were standing in the paddies and the fields were golden with daffodils.



A Polytepal Bred by Mr Nakayama

Mr and Mrs Nakayama invited us into their green houses. With Helen Marriott as translator, Mr Nakayamura welcomed us. He explained that he is now 72 years old and has been breeding clivias for over 50 years. Although in Japan much emphasis has been on leaf forms from the very beginning Mr Nakayama was occupied with creating new flower forms from his *miniatas*, as well as breeding a beautiful leaf structure. Now, 50 years later, the results speak for themselves;

Mr and Mrs Nakayama

the Nakayamas have created the most stunning polytepals including 'Hanyae', a rose-like bronze with green throat and 'Kiyou No Mai', a deep orange even more chimeric rose-like polytepal with large flowers on a compact wide-leaf plant. There were more surprises to come. Hidden behind a curtain in one of the greenhouses were the latest and greatest polytepals waiting a future release — well, I can hardly wait!

The Nakayamas could not have been more welcoming. They served us an assortment of beverages and Japanese sweets. Mrs Nakayama is heavily involved with the clivias and helped us knock our new acquisitions out of their pots for the journey overseas. After all debts were settled, the Nakayamas took us to a small traditional Japanese country restaurant where we sat on the floor in a private room. The great food and company distracted us from the discomfort of our stiff Western legs. Although I don't speak Japanese and they don't speak English, the warmth these two people exude make them excellent *Clivia* ambassadors for Japan. I'll always be grateful that they opened their farm to us.

An interesting selection of Mr Nakayama's Polytepals that cover open flowers with up to twelve tepals to *Chrysanthemum* lookalikes

Photos in this article courtesy of Marilyn Paskert

Recent Developments in Clivia Breeding in Japan

Shigetaka Sasaki, Japan

In previous articles I have introduced the work of some important Japanese breeders, namely Yoshikazu Nakamura (CLIVIA 3) and his interspecifics, and Toshio Koike (CLIVIA 7) with his green 'Hirao'. In this article I would like to report on the discovery of a new kind of variegation in Japan, together with its combination in mixed variegates. In addition, I will describe a dark bronze colour found in another breeder's *Clivia miniata*.

Tiger variegation

In CLIVIA 3 I outlined seven types of variegates in Japan. Recently, however, a new *Clivia miniata* variegate has appeared. Here I would like to introduce the breeder Hiroshi Mitsuhashi who is responsible for the new rare variegation called Tiger. Mitsuhashi owns a nursery in Chiba prefecture where he sells mainly *Clivia* and *Zygocactus truncatus*, both of which he commenced breeding and growing in 1977. He has enjoyed a good friendship with Professor Harold Koopowitz, James Comstock and Ilie Gaceu for quite a while. He has often visited California and obtained many *Clivia* plants from Joe Solomone and the late David Conway. More recently, he has visited China as well and now sells the Chinese Sparrow *Clivia*, Light of Buddha and some other rare Chinese *Clivia* to Japanese *Clivia* enthusiasts.

Hiroshi Mitsuhashi

Mitsuhashi came across the Tiger variegation among his seedlings in 1990. According to his records it emerged from a cross between Japanese daruma and a Belgium hybrid. Photo 2 shows his first Tiger variegate. Tora or tiger variegation, as seen in the example of 'Tahihou', already existed in Japan

Tiger variegation bred by Hiroshi Mitsuhashi

and at the time it was thought that the leaves had markings that resembled a tiger pattern. The variegation that is found in 'Taihou' is

thought to be viral but it does not spread by seed or plant sap. However the Tiger variety that Mitsuhashi produced from this 1990 cross is really close to a tiger patterning

Mitsuhashi's Tiger variegation looks like a scab or welt on the surface of the leaf but the pattern can also be seen on the underside of the leaf. In

The Base of a Tiger leaf

cases where there is a deep purplish pigmentation under the leaves, reddish horizontal stripes appear because of the influence of the Tiger variegation (*see photo below*). If in the future Tiger appears with leaves like *C. mirabilis* where the undersides

The Base of a Tiger leaf

of the leaves are all a deep purplish pigmentation and the leaves are vertical, beautiful red horizontal stripes will appear and it will be a new strain.

For the first 10 years after Mitsuhashi's first Tiger flowered, he was unable to collect much pollen so could not do any hybridization with it. But then in the next spring he found that the plant had produced enough pollen and so he pollinated the Akebono Nishiki plant that was flowering next to it.

The fact that the Tiger patterning carries some paternal (through the pollen) as well as maternal inheritance (through the seed parent) suggested to Mitsuhashi that it may not be another kind of variegation but belong to some other category. The extent to which Tiger is maternally inherited is still unclear at this stage. Some young seedlings (with two or three small leaves) that are currently being grown by Yoshikazu Nakamura show about 10-20% inheritance of the Tiger pattern through the pollen parent but he does not know if the pattern will increase as more leaves develop.

Akebono Nishiki variegation

Above, I mentioned the use of an Akebono Nishiki plant. Here, the term 'Nishiki' in Akebono Nishiki refers to vertical stripes, so the leaves of this type of *Clivia* are a mixture of Akebono and Shima (vertical striped) variegates. That is to say, through hybridization, it is possible for the leaves of one plant to have mixed Akebono and Shima variegation.

Akebono Nishiki

There are three pattens for the leaves of such a plant:

1. Leaves with only Akebono variegation;
2. Leaves with only Shima (vertical stripes) variegation and,
3. Leaves with both Akebono and Shima variegation.

I do not know whether we should categorise such plants as either Akebono or Shima variegates, but recently I have had the experience of using a mixed Akebono and Shima variegated plant as the mother parent in a crossing. The first leaves which appeared in the seedlings after the seeds germinated belonged to (1) and (2) mentioned above. The seedlings are still young at this stage so I do not know if the mixed variegation will appear on some leaves as these seedlings grow. When we use Akebono as the mother plant in hybridization, 100% of the seedlings that emerge are Akebono, but in the case of this mixed variegation plant, the seedlings which emerge are either Akebono or Shima variegation, so this may suggest that such plants belong in a different category.

Both Akebono and Shima variegates have existed in Japan for quite a long time and they were probably crossed together. However, such hybridization has been done only by a small number of breeders so there are still only very few of these plants to be found.

Akebono Tiger and Southern Cross

(Southern Cross being Tiger with striped variegation)

When Mitsuhashi used the pollen of his Tiger on the Akebono Nishiki, as described above, the seedlings shown in the photos at the top of the next column emerged. As seen in the photos, the Tiger variegation can

Akebono Tiger

Southern Cross

be transmitted through its pollen, in other words, it possesses paternal inheritance, as described. Akebono Nishiki is already a mix of two kinds of variegation – Akebono and Shima, so when it was pollinated with the Tiger pollen, the seedlings displayed the characteristics of paternal inheritance and the two new types of *Clivia* variegation, described above, appeared. Mitsuhashi has labelled the mixture of Akebono and Tiger as Akebono Tiger (See photo top of next page) and he gave the name of Southern Cross to the mixture of Shima variegation and Tiger (*See photo top of next page*). The leaf of Southern Cross with its vertical and horizontal stripes is much clearer than the cases of Akebono Nishiki hitherto and even looks like a checkered pattern resembling tartan. It is important to note that Tiger, Akebono Tiger and Southern Cross are all strains, not single cultivars.

Akebono Tiger

Southern Cross

Mitsuhashi's Akebono is different from the one produced by Nakamura. In the case of Nakamura's Akebono, even the old leaves retain their white stripes, whereas the Akebono characteristic is weakish in Mitsuhashi's plants where it appears most strongly in the new leaves. By combining together both Tiger variegation and weak Akebono variegation, Mitsuhashi has been able to bring out the best of both kinds of variegation. Perhaps in the future we can expect to find Fukurin Tiger and Negishi Tiger emerging from among the mixed variegates involving Tiger. Mitsuhashi is now working on producing a new variety combining multitepal yellow and Akebono Tiger, so in the future we can look forward to a new *Clivia* plant.

Dark bronze

Another exciting development that has taken place is Japan is due to the work of Kazumi Hattori who has produced an early maturing variety of *C. miniata* , similar to the early Twins produced by the Sahin company in the Netherlands.

Hattori operates a nursery in Aichi prefecture called Baijyuen Nursery where in addition to *Clivia* he also handles *Brunfelsia australis*. In 1983 Hattori obtained some

Kazumi Hattori

Belgian *Clivia* seed through a Japanese seed company and commenced production. From these Belgian hybrids he selected out some promising early maturing ones and produced his own original variety. Grown at a temperature of 15-17 degrees centigrade, his early maturing variety will flower in approximately two and a half years and he reports that they will even flower in mid-summer.

Around 1995 a bronze and a deep red-coloured flower, both with green centres, emerged from his crosses and when he crossed

these together he obtained a large number of deep or darkish bronze coloured flowers. Hattori has named this strain as UQ.

Hattori's plants with bronze-coloured flowers are small so the flowers are also smallish, but in terms of the quality of the colour, his

The deep Bronze UQ strain

bronze flowers are among the best that I have seen. Furthermore, from among his crossings using these bronze flowers are some beautiful flowers that are closest to burnt orange (on the Cape Clivia Club Colour Chart) but which age to a much darker colour.

I have had the experience of seeing plants producing red and bronze *C. miniata* flowers in places such as California, where the ultraviolet light is strong. Those same plants have blooms with quite a light red colour when flowered in Japan. As a result, I expect that Hattori's varieties of dark red and bronze flowers that flower in Japan will become a much stronger red colour when grown in overseas countries where the ultraviolet light is stronger.

In the summer of 1998 Hattori used the pollen from a *Crinum amabile* in flower and crossed it with a *C. miniata* that was flowering in his hot house, and the F1 and F2 hybrids that

Hattori's Pastel

he obtained from this cross reveal a dramatic change in colour (*See photos on this page*). When you hear this story you probably recall Gordon McNeil claiming to cross *Tulbaghia*,

Hattori's Bi-colour

Hattori's 'Sakiben'

Hippeastrum and other flowers from the Amaryllidaceae family with *C. miniata*. Nakamura also used the pollen from *Amaryllis belladonna* on *C. miniata* and obtained seeds but he reports that the flowers were those of the usual *C. miniata*. So it would seem that intergeneric hybrids between *Clivia* and others from the Amaryllidaceae family have not succeeded to date. Hattori's cross was probably not an intergeneric hybrid either. But perhaps the pollen from *Crinum amabile* had some sort of influence on the *C. miniata*. Perhaps the fact that the pollination time was summer had something to do with the outcome but it is a fact that he was able to produce extraordinary coloured flowers from this cross.

When we consider Hattori's work with *Clivia*, there are two other strange phenomena which are of interest, both of which may be due to inbreeding. One case involves plants where the growth point stops. I myself am growing one of these types of *C. miniata* from Hattori and the growth point stops once the plant has flowered, but then the offset itself produces a flower a year later. When that flower is finished, the growth point stops again, an offset emerges and it flowers the following year. In other words, the pattern is repeated three times (*see below*). I have often seen similar cases in the photos of growers overseas where the plants have been grown from seed and they flower within a very short time. I think it is probably due to the influence of inbreeding where an abnormality occurs in the meristem, and that meristem becomes a floral bud and is not able to produce the next growth point.

A strange outcome

In the second case, during the growth period, the leaves become curled or bent on one side and the plant ends up as a strange shape with curved leaves. The curved leaves develop more strongly on such plants from about the third year and when they become a mature size the leaves will be completely lop-sided. Such plants will generally produce a flower but the flower stem will not elongate very much.

Curved leaves

If we engage in the mixed breeding of Japanese *Clivia* such as Hattori's deep bronze *C. miniata*, Koike's green 'Hirao', Mitsuhashi's 'Tiger' and Nakamura's interspecifics, perhaps one day we will be able to announce some new results to *Clivia* enthusiasts around the world.

GO Green

Clivia miniata 'Hirao' Grower: Mick Dower
There are many photographs of this *Clivia* being sent in to this publication as well as being shown on the Enthusiasts Group but few are as green as this clone.

'Green Genes' Photograph by Hugh Bollinger

An Ian Coates Photographic Composition

Green in the Pink. Photograph courtesy of Rina van der Merwe

An Interspecific that has very unusual colours
Photograph by Susan Kay

An Ian Coates Photograph

Gnoenang study - a photograph by Charl Coetzee

St. Patty's Day Bouquet photograph by Susan Kay

Top of Page on the Right:
A green *Clivia gardenii*
photographed by Mick Dower

Above Right:
Green tips and a blush colour
with green seed.
Photograph by Slang de Lange

'Gnoenang' owned and photographed by Charl Coetzee

Roly Strachan's Special Clivia

Paul Michael de Meglio, USA

Roly Strachan is a *Clivia* grower with a unique collection of named plants and with their outstanding and interesting colouration they are a step apart from the many other South African cultivars. Yet many of these special plants might have languished in obscurity, hidden from or lost to the *Clivia* world, had it not been for the visits of a neighbouring *Clivia* lover and enthusiast, Val Thurston. This article presents a concise history of these most special plants.

Roly and Barbara in their forest of *Clivia*

Roly's collection began with a simple start. He collected a few *Clivia* from the wild in the Ncalu bush near the farm where he lives with his wife Barbara, in the area of Ixopo in KwaZulu Natal. (This is inland of the sea and south of Durban) Roly planted these habitat *Clivia* under trees on his property. This was in or around 1978 (approximately 30 years ago – maybe more). According to Roly, these original 4 to 6 plants were fairly average orange flowering *Clivia miniata*. Left to themselves, they self pollinated, or perhaps cross pollinated among themselves, and produced seed. These seeds self-sowed and more plants grew. Over the years, the original plants and the mature seedlings all produced offsets and grew into large clumps. Roly began to divide these and plant them into the bushy areas under the fir trees along the 500 metre driveway on his property. He also gathered their seed, germinated them and planted the seedlings among the other plants. By 1990 the *Clivia* were fully naturalised under many trees all over his large property, and probably numbered in the thousands.

After several years Roly noticed that some of the *Clivia* had special flowers: pastels and other interesting colours. These had appeared in his garden sporadically among perhaps 10 000 plants growing under the trees. Roly joined the local KZN Clivia Club in 1998, and other *Clivia* enthusiasts started visiting his collection. He continued to divide more and more clumps until he had utilised every bit of shade on the large farm property around his home.

Roly's 'Chiffon' named by Val Thurston

Among the early visitors who came to admire Roly's collection was Val Thurston, a 'neighbour' from 170 kilometres away. She first visited Roly in 1999, after meeting him at a KZN Clivia Club meeting the prior year. Together they went to look at his *Clivia*, and walked the many lines of plants. Among the more common orange-flowering forms, they took note of the ones with unusual colour flowers. The first of these was a lovely broad petalled white throated orange *Clivia* - which Val asked to buy a sucker of on the spot. Roly said she may take the whole plant, as long as she returned him an offset. This she did. Val named this first clone 'Roly's Chiffon'. Walking further down the lines, Val selected others for her garden, making sure to leave some suckers of each one for Roly. Val suggested that he replant these special clones closer to his house, where they could be more readily enjoyed, and label them. He did so.

Although 'Chiffon' was prime among Val's first selections from 1999, many of which she named after fabrics, in 1999 she also obtained 'Organza' a very attractive creamy/ orange pastel, 'Chartreuse', a dark orange with green centre, and 'Taffeta', a pastel orange with green centre. 'Chiffon' is considered the best among these clones; it has the broadest tepals of the group, and has won first place award at the Conference 2002 Show Any Other Colour 2 umbels. A plant selected by Sean Chubb, 'Roly's Delight', which is a lovely creamy pastel orange with cream stripes down the petals, won Runner-Up to Best on Show at the KZN Miniata September 2005 Show. 'Organza' was also placed Runner-Up in 1999 at the KZN Newcastle Miniata Clivia Show.

Over the coming years Val and Roly continued to walk the lines together, and select out special *Clivia*. In most cases Roly replanted a division of each new found clone into his special collection by the house. In 2000 Val selected 'Harlequin' a narrow petal Picotee, 'Kaleidoscope', a small bloomed pastel with mixture of dark and light oranges and cream, and 'Muslin', a pastel with cream stripes running up the petals, returning to fabric-based names. These were followed by 'Denim', 'Crinoline' and 'Brocade' - in 2001. In 2002, the collection was supplemented by Silk, another creamy pastel and in 2005, 'Crepe', a very attractive pastel with lots of cream and a dab of orange from the middle to tips of the petals.

Clivia miniata 'Organza'

Clivia miniata 'Taffeta'

Clivia miniata 'Kaleidoscope'

Clivia miniata 'Harlequin'

As for the clones with creamy orange flowers with white stripes down the petals, Val believes that these all came from the seed of one plant, from which Roly collected the seeds and planted out the seedlings some years prior. As in those early years Roly did not keep records. It is unclear, but it is certain that all the clones are closely related.

Clivia miniata 'Crepe'

Around the time that Val selected out the named clones, Roly's involvement with the broader Clivia Society through the KZN Club led him to acquire many other *Clivia*: yellow flowering *Clivia*, broad leafed *Clivia*, peaches, et cetera. These he planted out into his garden along with his other plants. Over the subsequent years their genes were undoubtedly mixed into the collection by the wind, the birds, the bees — but after the initial named clones were selected out. By this time Roly had also stopped growing out and replanting the seedlings, and as many visitors had selected and removed the majority of the *Clivia* with interesting flowers, now the majority of the remaining plants have the normal orange flowers of the original wild-collected plants. Roly and Val continue to walk the lines, and on the rare occasion that they do find a *Clivia* with interesting colours they mark it, and Roly puts it under the shade cloth with his special collection where he lets them inter-breed.

The work with those first selected named clones continues to yield wonderful results. In addition to Sean Chubb's award winner, Val's 'Chiffon' crosses and selfings have produced some really nice F1 generation seedlings which she is now crossing back onto 'Chiffon', and also crossing with

'Chiffon', in hope to further bring out the broad-petalled white-throated colouring.

There are a few green throats within the named Clones, including 'Taffeta', but not a lot of breeding has been done with them yet. These green throats have a habit of being good one season and not very green the next. Perhaps the best among them is 'Chartreuse', which was very green when found, but unfortunately suffered rot and has not flowered again. It had a very dark green throat and stood out in his mass of plants.

Among the 'Chiffon' F1s of note, are 'Reflection' and 'Poise', bred by Val Thurston, and the aforementioned plant of Sean Chubb. I am sure much promising work with these clones lies ahead.

Clivia miniata 'Chiffon' F1 'Reflection'

Val Thurston was first introduced to *Clivia* when she saw them flowering at the home of her husband Roy in 1971 at Renishaw. She was given plants by her mother-in-law but her real interest was 'sparked' when she saw a yellow plant growing in the garden of a friend in Howick. This plant was identified as the plant

Val Thurston

that Cynthia Giddy found, namely 'Natal Yellow'. She was 'bitten' and just had to have a yellow *Clivia* and waited about 13 years before obtaining an offset. She also purchased an offset, at the then huge sum of R35 from a gentleman who had a small collection of yellows and was prepared to part with this rare colour. She then swopped a plant of this clone, for a 'yellow' from Sean Chubb, the now well-known 'Chubb Peach' clone.

The race was on. She then joined the newly formed KZN Clivia Club in 1995 and as more and more different clones of yellows, peaches and pinks appeared at the various Clivia Shows and meetings, so the addiction of this amazing and interesting genus *Clivia* grew.

Clivia miniata 'Chiffon' F1 'Poise'

Roly and Barbara Strachan have lived and farmed in the Ixopo area of KZN for the past 40 years. Here is what Roly has to say about his adventure with *Clivia* plants, "I have been propagating *Clivia* plants since my interest in the genus *Clivia* started during 1980. Since Val has taken an interest and encouraged me in this venture I have started selecting and marking

plants with special flowering features, I am now in a position to sell plants and seed on a large scale. This venture gives me a great interest and keeps me healthy and young for my 88 years."

Comments on 'Roly`s Chiffon' as a breeding plant by Sean Chubb.

On my first visit to the garden of Roly and Barbara Strachan I recognized that here was a gene pool of plants, which produced a fair percentage of unusually coloured flowers with very full throats. It was not until the second or third visit that I saw Roly`s Chiffon, the BEST "other colour" *Clivia* I had ever seen. With the generosity of Roly Strachan and the help of Val Thurston I had some material to work with.

I initially crossed 'Roly`s Chiffon' with herself and a habitat plant with a partially full throat from Eshowe called 'Joy'. At that stage I considered 'Joy' to be superior, full throat plants were very rare. By today's standards 'Joy' is only a little better that ordinary. A few year later the seedlings of 'Joy' x 'Roly`s Chiffon' began to flower with spectacular colouration. Even crossed onto fairly ordinary plants the resulting seedlings produce flowers with interesting colour cominations.

A 'Chiffon' Daughter Flower

Clivia miniata 'Joy'

Since these first seedlings many more crosses have flowered and they seem to be getting better all the time.

I have recognized the uniqueness of these plants and have a line-bred family of them in my Nursery. These plants are called 'Chiffon Daughters', all have superior colouration and have 'Roly`s Chiffon' as either berry parent or pollen parent. I cross these 'Chiffon Daughters' back to 'Roly`s Chiffon' and as a result of the concentration of genes they produce some excellent results.

The colouration of 'Roly`s Chiffon' is highly heritable and for this reason I believe 'Roly`s Chiffon' to be a superior breeding plant.

Photos in this article are courtesy of :
Paul Michael de Meglio and Sean Chubb

A Red and White '*Chiffon*' First Time Flowerer

Laurens Rijke
A Passionate Collector of *Clivia*

Helen Marriott, Australia

A collector at heart, when Laurens Rijke saw an advertisement for the yellow *C. miniata* 'Aurea' in an Australian garden magazine around 1976 he recognised immediately that this was a rare plant and became determined to obtain one. Having emigrated from Holland some years earlier, Rijke was very familiar with orange-flowering *Clivia* plants that were

Laurens Rijke with a polytepal

common on Dutch window sills but he had not previously heard of a yellow flower. As a result of following up this advertisement, Rijke bought his first *Clivia*, *C. miniata* 'Aurea' as well as *C. miniata* 'Ailsa Dearing' (an apricot colour, supposedly a cross between 'Aurea' and an orange-coloured *C. miniata*) from Fred Pollard, who was selling offsets of plants that he had originally obtained from James Dearing, the head gardener at Rippon Lea, a large estate in Melbourne. (See Ken Smith's article in CLIVIA 2 for further details.) Pollard rationed out plants at the time, and Rijke was only able to purchase one or two on any one occasion. At $25 each in the 1970s, the offsets were very expensive indeed. But this small beginning constituted the start of his passion, and he now has a very large and splendid collection of *Clivia* plants.

Throughout the 1980s, it was virtually impossible for Rijke to obtain other "rare" *Clivia* in Australia. However, as time passed a small number of people provided others with access to important plants or seeds. For instance, Kevin and Coral Larsen, in Queensland, sold some plants bred or selected by Kevin Walters that they had raised from seed. Through another Australian source in the 1990s Rijke obtained his first orange-flowering akebono as well a fukurin variegate, which had been imported from Yoshikazu Nakamura.

A Fukurin Variegate

In more recent years, the role of the internet has revolutionised access to seed and to a lesser extent, plants, in particular from South Africa, and as the breeding of *Clivia* plants has jumped qualitatively, so too, in some cases, have the prices. Rijke has been one of the people to take advantage of access to a variety of material from the latter half of the 1990s.

As a Dutchman, Rijke patriotically grows many Dutch hybrids, which he says are different from Belgian hybrids and also different from the Sahin Twins strain. The Dutch hybrids that he grows vary in flower shape and colour - sometimes with green centres appearing.

Dutch Hybrids

Dutch Hybrids

Many of these plants flower twice a year (two stems simultaneously, or one after another, or during different seasons), and the leaves are taller and broader than are the contemporary Belgian hybrids. In recent years he has sold some of these hybrids and occasionally some of his other stock at weekend markets.

Rijke has imported seed and occasionally plants from South Africa, The Netherlands, Belgium, China and Japan, building up a collection characterised by much diversity. Not only has he accumulated Nakamura orange and yellow hybrids, peaches from South Africa, and broad-leafed Chinese and Japanese darumas, but he has a very special collection of many variegates, including akebono, fukurin, Light of Buddha and others. Nevertheless, it is the plants grown from Nakamura seed that form the centre of his large collection. In 2000-2001, which may have been the peak in Nakamura's breeding, Rijke was able to purchase 49 of the 50 crosses on offer.

From this 2000-2001 seed from Nakamura are a large number of beautiful polytepals as well as interspecifics involving *C. miniata* x *C. caulescens*, *C. miniata* x *C. gardenii*, and *C. miniata* x *C. nobilis* or other combinations. Some of these interspecifics are truly splendid specimens: 'Clementina', a cross of (*C. miniata* x *C. caulescens*) x self, and named by Rijke, is probably Nakamura's outstanding interspecific (see CLIVIA 8, p.14), rivalling the beauty of 'Day Dream' (see CLIVIA 8, p.50) but quite different from it.

Interspecific *Clivia* 'George'

Rijke's own crosses that he made in recent years are now starting to flower. Utilising material obtained in the earlier years, he has often used *C. miniata* 'Aurea' as the seed or

Interspecific *Clivia* 'M Rose'

A Polytepal Daruma

C. miniata x *C. gardenii*

pollen parent, crossing it with *C. miniata* 'Twins', *C. miniata* 'Mammoth' or other material. The best to emerge to date are crosses between *C. miniata* 'Aurea' and an interspecific *C. miniata* x *C. caulescens* of Nakamura origin. Out of one cross he obtained a range of flower types, including the broad-tepalled 'Pansy' (see inside cover of CLIVIA 8), 'Patsy' (CLIVIA 8, p.15), and 'Primrose' with broadish leaves.

When a small *Clivia* show was held in Melbourne in September 2001, the plants that Rijke displayed were the prime attraction – in terms of both variety and quality of blooms.

C. miniata Yellow x *C. miniata* 'Helen'

C. miniata 'Ghost'

Regrettably, despite several attempts since that time, no active group of *Clivia* enthusiasts has continued in Melbourne, though new attempts are being undertaken in 2008.

Rijke's plants thrive in a large glasshouse that is light and warm, where he and his wife Ester keep the plants well watered. He believes that the secrets of his success are his home-made potting mix plus fertilizers, though the warmth, light and air movement must also be important factors, along with copious watering, contributing to the growth of his *Clivia* plants. Like many of us, Rijke has found that a *Clivia* collection soon becomes a time-consuming hobby. He hopes that his large collection will be looked after in the distant future by his granddaughters who are still quite young at this stage.

It is exciting to be a part of the *Clivia* movement at present but it seems as if there is still a considerable way to go before the general public, at least in Australia, can become familiar with the diversity and potential available within the genus *Clivia*.

This photo of Laurens Rijke with his granddaughters affords one a good view of his glasshouse

All photographs in this article are courtesy of Helen Marriott

Photographic Competition Winners

Best Photograph

Best Photograph in Competition and First Placed *Clivia miniata* 'September Success'
Breeder, grower and photographer Felicity Weedon
The plant is from a Les Brown *Clivia* 'Links 2' as the parent and was selfed by Felicity

This Years Competition drew a record number of entries with some magnificent *Clivia* Blooms to be seen. This always makes the panel of Judges selections difficult as this is a Photographic Competition not a Beauty Contest. We have to pick those images that have Photographic merit as well as look at the flower form. Congratulations to all the winners and because of the outstanding entries we received we have decided to print a number of interesting and meritorious images as well. The Habitat section is disappointing with only one entry and I encourage all who live close to Habitat *Clivia* to get out and take photos. For those that do not manage to get into print please try again for next year.

Miniata Section: 254 entries — 28 entrants, Single Flower Section: 52 entries — 11 entrants,
Pendulous Section: 37 entries — 11 entrants, Interspecific Section: 35 entries — 14 entrants,
Habitat Section: 9 entries — 1 entrant.

Claude Felbert

Clivia miniata Section

Second Placed *Clivia miniata* 'Autumn Splendour'. Grower and photographer Mick Dower

Third Placed *Clivia miniata* 'Tipperery Peach' with a green-throat.
Breeder: Chris Welgemoed
Grower: Piet van der Merwe
Photographer:
Rina van der Merwe

Habitat Section:

Winning Photographs:
All nine entries in this section came from Gideon Scheepers and it is difficult to split them so we decided to print the best three.

Pendulous Section

Winners Penduloss Section:

Left Opposite:
Winner: *Clivia caulescens*
Photo by Helen Marriott

Below Left Opposite:
Second Placed: *Clivia nobilis*
Photo by Gideon Scheepers

Right:
Third Placed: *Clivia mirabilis*
Photo by Mick Dower

Interspecific Section

Winner: An Interspecific *Clivia* with strong colours and an attractive flower head. Photo by Gideon Scheepers

Second Placed:
Interspecific *Clivia*
Photo by Gideon Scheepers

The time and effort invested in this picture with the composition, background and sharpness as well as the frame with vignetting make it an excellent submission.
(Eds.)

Third Placed: Interspecific *Clivia* 'Icecream' photo by Susan Kay

Single Flower Section

Winner Single Flower:
Above:
Clivia miniata with green throat
Photo by Gideon Scheepers

Second Placed Single Flower:
Left:
Clivia miniata 'Georgette'
Photo by Tessa Nel

Third Placed Single Flower::
Clivia miniata 'Gigi'
Photo by Tessa Nel

Interesting and Meritorious Photographs

Clivia miniata green-throat photo by Helen Marriott

C. miniata 'Volcano'
Photo by Tessa Nel

C. miniata 'Frangelico'
Photo by Tessa Nel

C. miniata 'Bruce'
Photo by Tessa Nel

Below:
C. miniata Vico Clone x Lotter Peach
Photo by Felicity Weedon

Clivia miniata 'Lovely Pink' photo by Felicity Weedon

Clivia *miniata* 'Ella van Zijl' type
Photo by Terry de Vine

Clivia nobilis photo by John Craigie

A Nakamura Interspecific *Clivia* 'Golden Dawning'
Photo by Mick Dower

An Interspecific *Clivia* 'Suikerbekkie'
Photo by Susan Kay

We follow these photographs with the popular Single Flower Gallery that has been extended to include a wider range of pictures from the Photographic Competition.

Photo by Gideon Scheepers 'Palomino Princess'

Photo by Gideon Scheepers 'Contessa'

Photo by Rina van der Merwe

Photo by Teresa Scheepers

Photo by Rina van der Merwe

Photo by Gideon Scheepers - Having a bath?

Above left photo by Claude Felbert

Above right photo by Gideon Scheepers

Centre right photo by Claude Felbert

Bottom left photo by Teresa Scheepers

Bottom right photo by Tessa Nel

Photo by Rina van der Merwe

Photo by Gideon Scheepers

Photo by Claude Felbert

Photo by Gideon Scheepers

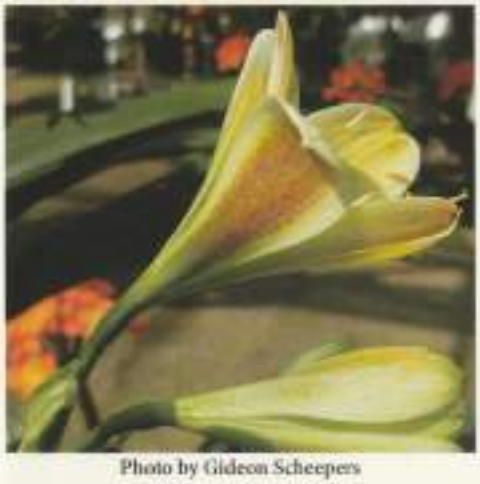


Photo by Gideon Scheepers

Photo by Claude Felbert

The Great Wide Yellow and other Clivia

Lisa Mannion, New Zealand

My first contact with *Clivia* was some twenty years ago when I was given a few seeds of a new hybrid by the late John Lesnie, then a prominent *Camellia* breeder. As I left his nursery he pressed a couple of seeds into my palm. I can't remember what became of those original plants, but I assume now that they must have been *Clivia* 'Hugh Redgrove'.

About 10 years ago I was living on a large bush block in the Waitakere ranges, west of Auckland. With a young family and needing an excuse to get out of the house I had established a small nursery, growing flowering perennials; however I was prompted to re-think my growing strategy when I quickly ran out of sunny clear space. The Waitakeres are a protected environment and it is illegal to cut down the large native trees that cover our property. Thinking shade, I remembered *Clivia* and went looking for seed. Now at this time I was unaware of the growing international interest in *Clivia* or the significant breeding advances, I was even unaware that a yellow strain existed.

I was directed to Keith Hammett by Jack Hobbs the curator of the Auckland Botanical Gardens. It was with some trepidation that I made the first phone call to Keith. His name has always figured in the horticultural worlds I have inhabited since specializing in nursery production at Massey University. Indeed, my first text on plant propagation was a Keith Hammett publication.

I didn't know what to expect when I rang him one evening out of the blue, but what I got was an invitation to help him pollinate his extensive collection. I can remember my baby son Tom, now 12 years old, sleeping in his pushchair under a tree at Keith Hammett's extensive property while I carefully pollinated flowers! I did this work over a number of weeks, and in return Keith gave me a solid introduction to *Clivia* breeding and a proportion of the high quality seed that resulted from our crosses. This was the beginning of my serious involvement with *Clivia*. At the same time I sourced seed from Australia; 'Walters Yellow' and 'Twins Orange' from Ken Smith and a large amount of Belgian and European hybrids from a commercial supplier. Although I have continued to buy small quantities of seed where it appeals, the above lines have formed the foundation of my nursery stock.

I have subsequently concentrated on line breeding to produce oranges that are deep enough to be called red, and yellows that have extra broad leaves. The original seeds from Keith were mostly of Solomone origin. As people know, these have a tendency in some cases to be wider-leaved than usual. I selected out the widest leaves from the original seedlings and have continued to cross these to develop a line of plants that I call 'The Great Wide Yellow' (GWY).

A 'Wide Leaf' Yellow

Of course it is important to not only have wide leaves but also have a good form; this has been a further selection criterion – wide leaves, short in length with a good flower. I will say that my experience when crossing two yellow plants with exceptionally wide leaves - say 100mm wide - is that the resulting seedlings will only have a proportion with distinctly wide leaves, while less than half will have leaves as wide as the parent plants.

I have my broad leaf yellows defined into GWY 'Silver' and GWY 'Gold', with only a couple warranting the title 'Platinum'. 'The Great Wide Yellow' was a name that came to me in the form of a letter written by a collector of *Clivia* and advertising man Garry Murphie of Sydney. About five years ago Garry wrote to me "in pursuit of The Great Wide Yellow". He had heard that broad leaf yellows were my specialty and wanted to buy seed. I loved the name and with his permission I have had labels and marketing material produced to promote my plants.

I now do all my growing in two 50m x 10m green houses that I lease in Whenuapai, still out west but not in the hills. I sell my plants primarily through two wholesale plant markets. I have established a strong client base of landscapers who say they like my plants especially because of their distinctive lush wide leaves. In New Zealand *Clivia* are recognized by the landscape trade as a high value plant suitable for difficult shade areas. They have had plenty of promotion over the past five years in gardening magazines and via the New Zealand Clivia Club Shows and regional exhibitions.

A broad-leaf yellow in bud

A broad but short-leaf form with a deep yellow bloom

Last year when I began to feel the nursery was getting too much for me to manage alone I had a friend offer to work with me two days a week during school hours. She is a former forensic scientist and has introduced a welcome sense of order and system to my establishment. We start the day with a strong coffee, have a large shared lunch under the pine trees and get an enormous amount of work done. Two certainly amounts to more than double the output of one.

Clivia have been an excellent plant to specialize in growing for me. The project began largely out of necessity, became a labour of love, and has now evolved into a business that still allows me time to continue studying and run around after family.

Lisa Mannion in one of her shadehouses showing off her broad-leafed yellow *Clivia* while still in pursuit of improving 'The Great Wide Yellow'

A Book Review of *Grow Clivias*

Roger Fisher, South Africa

Grow Clivias (Second Edition 2008)
Written by Graham Duncan for the Kirstenbosch Gardening Series and published by SANBI (ISBN 978-1-919684-51-2).

This is an extensive rewrite of the first edition and a 188 page tome (194 pages in total). Much as with the first volumes of the CLIVIA yearbook (Volumes 1-4), the first edition was a folded staple-bound booklet, while this is a bound, paperback book.

As the first issue of the CLIVIA Yearbook 1998 and the first edition of Grow Clivia (1999) are virtually contemporaneous it is worth quoting in full the observation expressed on page 19 of Graham's new Book:

Since the publication of Grow Clivias in 1999, our knowledge has grown exponentially. Two new species [*C. mirabilis* and *C. robusta*], *two new varieties* [*C. gardenii* var. *citrina* and *C. robusta* var *citrina*] *and one new natural hybrid* [*C. caulescens x C. miniata, C. x nimbicola*] *have been described. Numerous scientific studies ... have been undertaken, and numerous international conferences have taken place. The number of intraspecific and interspecific hybrids has increased markedly .... Pastel-coloured hybrids of C. miniata are slowly becoming more readily available to the public, and many new cultivars have been officially registered .... In addition, many highly successful Clivia shows continue to take place ...*

These developments fully justify the extensive revision of the original and Duncan is man to the task. The contents cover the full range of topics pertinent to the genus, from a historical overview, through general information of the plant and its habits to the taxonomy of the six described species, their cultivation, propagation and inevitably, that gory topic, 'Pests and diseases'!

The writing is clear, authoritative and accessible without pandering to current demands for populism or journalese. The book is extensively referenced, offering almost a current bibliography of the genus *Clivia*. It is pleasing to note that entries in the Clivia Society publications - the Clivia Yearbook, Newsletter and in-house publication Cultivation of Clivias are amongst those works cited. These works, along with the Harold Koopowitz book Clivias, make up the bulk of the published English Language knowledge of the *Clivia* genus and despite some overlapping they complement each other.

Illustrations are rich and varied and the illustration in coloured pencil of *C. mirabilis* by Sibonello Chiliza - South Africa's first black botanical artist - is premiered. There is the gremlin of digital images of too low a quality pixilating in print, but these are the exception.

The only question remains – who is the target readership? It is almost too weighty for the hobbiest and gardener, which the 'Grow' in the title suggests.

Perhaps it should be titled 'Know Clivias' for within it are nuggets even for the seasoned enthusiast. And since most of these are of the grey brigade, it is useful to be reminded of things once known but forgotten all contained in a single source, readily accessible through an extensive index. There is also a useful Glossary of terms appended to the text.

[*Grow Clivias* can be ordered from the SANBI bookstores or obtained at reduced price through various Clivia Clubs].

Front and Back Cover of Grow Clivias by Graham Duncan

'Henriettes Teaparty' Photo by Gideon Scheepers

The Clivia Society

www.cliviasociety.org

The Clivia Society caters for *Clivia* enthusiasts throughout the World. It is the umbrella body for a number of constituent Clivia Clubs and Interest Groups which meet regularly in South African and elsewhere around the world. In addition, the Society has individual members in many countries, some of which also have their own Clivia Clubs. An annual Yearbook and regular Newsletters are published by the Society. For information on becoming a member and / or for details for the following Clivia Clubs and Interest Groups contact the Clivia Society secretary or where appropriate, the International Contacts, at the addresses listed below.

MANAGEMENT COMMITTEE: 2008/9

***Chairman*:** Johan Spies, Tel: +27 51 4511886(h) e-mail: spiesjj.sci@ufs.ac.za

***Secretary*:** Lena van der Merwe, P O Box 74868, Lynnwood Ridge, 0040.
Tel & Fax +27 12 804 8892 e-mail: cliviasoc@mweb.co.za

***Vice-Chairman*:** Christo Topham, Mobile: +27 824975879 e-mail: christoto@absa.co.za

***Treasurer*:** Bossie de Kock,Tel: +27 12 807 2173 e-mail: bossiedekock@absamail.co.za

***Member*:** Ken Smith, Tel: +61 2 475 43287 e-mail: cliviasmith@idx.com.au

INTERNATIONAL REPRESENTATIVES:

Australia: Ken Smith, 593 Hawkesbury Rd., Winmalee, NSW 2777. Tel: +61 2 475 43287, e-mail: cliviasmith@hotmail.com

New Zealand: Tony Barnes (Representative)
Alick Mc Leman (Correspondence) e-mail: clivia@xtra.co.nz

UK: Jaco Nel 46 Atney Road, Putney, London UK SW15 2PS e-mail: clivia@yahoo.co.uk
Tel: +44 020 87892229

Europe: Aart van Voorst, Tel: +031 25 252 9679
e-mail: a.v.voorst@freeler.nl

USA & Canada: Jim Shields (Representitive) email: jshields@indy.net Tel:317 896 3925
William McClelland (Correspondence) Tel: 1 805 484 1484 1048 Bolin Ave., Camarillo. CA93010-4708, USA. e-mail: william_g_mcclelland@yahoo.com

OTHERS:

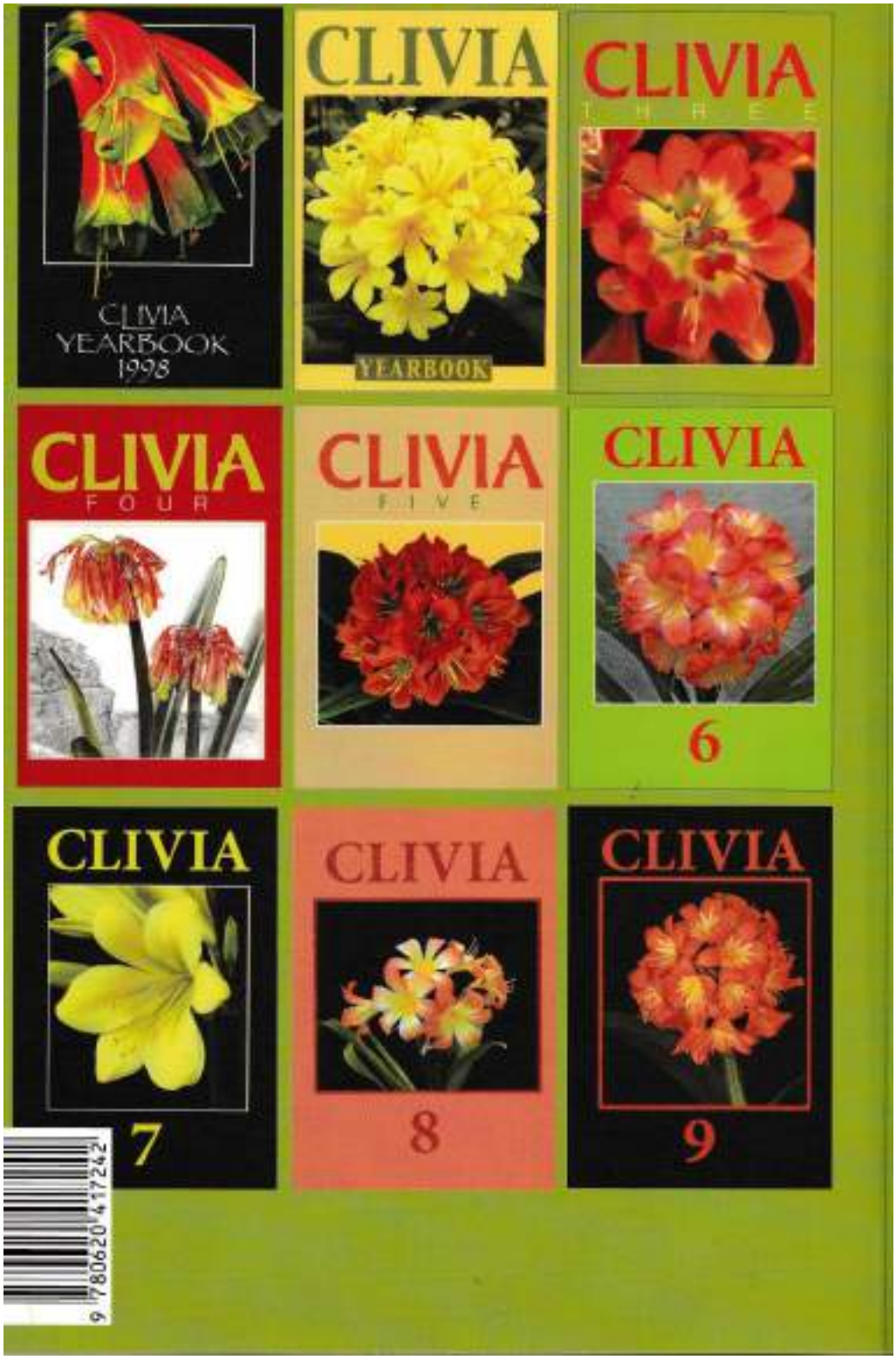
Newsletter & Yearbook Editor: Roger Fisher,
Mobile: +27 836027736
e-mail: clivianews@cliviasociety.org

Public Relations Officer: Sakkie Nel
Tel: +27 012 3616415 e-mail: corgas@absamail.co.za
Standards and Judging: Koos Geldenhuys
Mobile: +27 083 448 4487 e-mail: koos@cliviabreeders.co.za

Research: Prof. Johan Spies
e-mail: SpiesJJ.SCI@sci.uovs.ac.za

CLIVIA CLUBS: Cape, Eastern Province, Free State, Garden Route, Joburg, KwaZulu-Natal, New Zealand, Northern and Northern Free State.

INTEREST GROUPS: Lowveld, Northern KZN, Overberg, Waterberg, Zoutpansberg,


CLIVIA
YEARBOOK
1998
CLIVIA
YEARBOOK
CLIVIA
THREE
CLIVIA
FOUR
CLIVIA
FIVE
CLIVIA
6
CLIVIA
7
CLIVIA
8
CLIVIA
9