CLIVIA

TWENTY-ONE

The Clivia Society www.cliviasociety.org

NPO no. 139-860

SARS PBO Tax Exemption no. 930036393

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 Africa 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 quarterly Newsletters are published by the Society. For information on becoming a member and / or for details of Clivia Clubs and Interest Groups contact the Clivia Society secretary or where appropriate, the International Contacts, at the addresses listed in the inside back cover.

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 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.

Published by the Clivia Society, P O Box 74868, Lynnwood Ridge, 0040 RSA

ISSN 1819-1460

Design and Layout by Fréda Prinsloo
Printed by Ppduction, 153 Hornbill Crescent, Montana, Pretoria.

CLIVIA

TWENTY-ONE

Editor
Glynn Middlewick

EDITORIAL

By Glynn Middlewick

This is my second Yearbook publication. The task of the Editor is often oversimplified. My task is summed up for me by my fellow members, indicating that as an Editor, all I need to do is to decide on the order of the articles submitted!

Working on this latest edition of the Yearbook leads me to admire previous Editors and the many challenges that they have faced over the years. Negative criticism is a destructive tool which is used by many members, mostly back seat drivers, to find fault in a publication that targets the hobbyist. The number of articles, the complicated subjects, the absence of any substance in an article, the absence of or the lack of a winning position for their photographs submitted, the late date of publication, too few or too many pages in a Yearbook, are some of the unpleasantries the Editor is subjected too. If you did not have a thick skin before, you soon develop one!

I appreciate the hard work spent by the authors, in writing articles for the Yearbook or Clivia News, the submission of beautiful photographs for the competition, all of which are essential for the publication of an edition of the Yearbook or the Clivia News. Regular contributors are worth their weight in gold. So many aspects of *Clivia* have been written about previously, making it difficult to come with an original article or with a modification of a subject previously covered.

The articles in this publication have managed to do just that. An interesting read will be found for all members. A regular surprise for me is how often recent articles in the publications are not remembered. I am tempted to republish some of the articles of previous publications and see if anyone notices.

Digital media has changed our lifestyle. We expect instant gratification and this is achieved by publishing an image of a flower or plant on a platform such as Facebook or WhatsApp. The response is immediate from anyone logged into that service. The communication between participants doesn't extend beyond the image. Any written material is not really desirable or if it is brief then it may be acceptable.

The Yearbook 21 includes an article on the breeding of better picotee pattern flowers by George Mann. George has teamed up with Michael Holt and Pieter Saayman and sifted through groups of colour mutation breeding. This is an ongoing project and will updated with time. Felix Middleton covers the adaptation of *C. mirabilis* to arid conditions. Carrie Kruger shows how she has managed to develop some striking 'ghost' flowers. Paul and Sue Kloeck detail the breeding lines that they have decided to concentrate on. Dawie Strydom details his success in developing multitepal bronzes and provides some sound advice. Dirk Lootens of Belgium has submitted an article which compares the good and the bad of Clivias growing, when compared with Phalaenopsis and issues a challenge for the development of a series of hybrids to compete with the likes of Phalaenopsis.

Thank you to all the photographers that entered images for the competition and congratulations to the winning photographs. The photographs were assessed for their photographic merit and not on anything else. Thank you to the judges that had the task of judging each photograph. These include Ian Coates, Claude Felbert and Peter Lambert.

I wish all members an enjoyable read of this Yearbook and encourage everyone to consider the submission of an article for a future publication.

Regards,

Glynn Middlewick

COVER: Highest points of all entries. Anzette Snyders.
TITLE PAGE: Art Category. 7th Place. Mike and Angie Riska
BACK COVER: 2nd Highest Overall Score. Carrie Kruger.

CONTENTS

REPORT FROM THE CHAIR 4
Report – *Glynn Middlewick* 4

HONORARY LIFE MEMBERSHIP 5
Jean-Luc Bestel 5

ARTICLES 4
Ghosts: Are they real? – *Carrie Kruger* 6
'Colour pattern breeding' to improve the *Clivia miniata* picotee flowers – *George Mann* 14
Clivia mirabilis: Adaptation to an arid habitat – *Felix Middleton* 22
Development of multitepal bronze flowers using 'Bronze Green Boy' – *Dawie Strydom* 26
An opportunity for the Clivia World: In search of a new series of hybrid Clivias – *Dirk Lootens* 30
Review of *Clivia* Groups and Mutations – *George Mann, Michael Holt & Pieter Saayman* 39
Clivia Kingdom's Vision of the Future – Paul and Sue Kloeck 45

PHOTOGRAPHIC COMPETITION 51
Introduction – *Glynn Middlewick* 51

PHOTOGRAPHIC ENTRIES 52
Art category 52
Interspecific Category 57
Miniata Category 62
Pendulous Category 68
Single Flower Category 71

CORRECTION FOR PAGE 54, OF THE YEARBOOK 20 OF 2019

Dear Glynn,

On behalf of our President Kerry Robinson, we request that a correction be made of an error on Page 54 of the Clivia Society Yearbook 20.

In particular, the last sentence should read ' this year with his *Clivia* named Grace Miller, hybridized by Kevin Walters and owned by L & J Marten.' The initial error was made on a Display card on this *Clivia* whilst on display at the 2018 Clivia Show and the error was only picked up by Mr. Lionel Marten when reading the Yearbook itself.

We seriously value honesty and authenticity with breeding details of any *Clivia* and request that a correction be published in a way you see fit to do so. Thank you.

Yours sincerely,

Gary Conquest
Secretary, Toowoomba Clivia Society Inc
info@toowoombacliviasociety.com.au

REPORT FROM THE CHAIR

G Middlewick

The host for 2020 Annual General Meeting was meant to be the KwaZulu Natal Clivia Club, but fate intervened and as a result of the Covid-19 virus pandemic, the executive committee decided to cancel the physical meeting, replacing it with a teleconference.

The pandemic has led to a lockdown in many countries, which is disastrous for businesses and employment in most sectors. Learning from the lockdown, many have managed to work from home in this digital age. Is there a place for future Annual General Meetings of the Society to be held by teleconferences? The digital age has changed a lot of the behaviour of the Society members. The norm now is to use media such as WhatsApp or Facebook to share photographs mainly, with everybody. This is an easy and inexpensive way to communicate. Do younger members wish to meet up at a venue for club meetings? With the busy lifestyle, family responsibilities and little free time, a digital platform is becoming ideal. The membership fees to affiliate with the Society may be considered by some to be expensive. The option of meeting fellow members at a club venue seems not to be as pleasant or desirable as it was previously. Networking at a neutral venue, with like-minded people was considered an event to look forward to. This has changed and now we mix with fewer people, not even telephone calls are held but instead sms's or WhatsApp messages. Learning from clubs around the country, evidence is that the membership numbers have decreased and that there is a shortage of members who are willing to participate in club affairs.

What is the solution or is there a solution? Some groups on Facebook have a large number of members, but from a recent poll on one of my groups, I learned that the number of active members on the group are few. Some members feel that there is always more to be learned about a hobby and for this reason, meeting up with more experienced members is a good way forward to gain knowledge. The Society, together with the clubs, has been in existence for over twenty years. At the start of the formation of the Society the growth of membership was rapid and then the membership numbers stabilised. Have these members, from that era, got less interested, too old or frail, downsized or are unable to travel to meetings? Whatever the reason, the interest, in general has decreased.

What surprises me most of all, is the lack of interest of members in club matters. Some claim to be unhappy with the activities of a club, but are not prepared to do anything about expressing their feelings to change the routine of the club. If the number of active members attending meetings is not too large, a solution would be to meet at a member's garden to see the cultivation methods employed by them and to interact on a personal level with fellow members.

A positive outlook is perhaps the best way forward for our enjoyable hobby. As long as the *Clivia* growing and hybridising provides challenges, the appeal in the *Clivia* hobby will not decrease.

HONORARY LIFE MEMBERSHIP

Jean-Luc Bestel

PROPOSAL FOR THE AWARD OF HONORARY LIFE MEMBERSHIP OF THE CLIVIA SOCIETY

Proposed by – A. Everson – Chairman of the KwaZulu-Natal Clivia Club

Seconded by – G.Middlewick – Chairman of the Joburg Clivia Club.

Jean-Luc Bestel was born and educated in Pietermaritzburg and joined the KZN Clivia Club in 1996 as a young man studying accountancy. He qualified as a Chartered Accountant and served on the committee several times, usually as treasurer.

Jean-Luc was fortunate to befriend Sean Chubb who willingly guided him in his long and interesting journey with clivias. He has been interested in plants for most of his life. The bulbous species are of particular interest to him. All indigenous plants attract his attention and he developed a major interest in clivias after attending the Annual General Meeting of the Clivia Society in 1995.

In 2000, Jean-Luc assisted the Newcastle Interest Group with their first show, helping with the setting-up, assisting the judges and taking photographs of the show winning plants. He continues to be the club photographer and plays an active role at the shows, meetings and club outings.

Jean-Luc also played a big part in the establishment of the KZN Seed Bank. The seed bank initially offered bulbs and rare plants in addition to the clivia seeds.

As a member, he has been actively involved in the promoting of all aspects of clivia cultivation, not only giving talks at club meetings in Pietermaritzburg, but also travelling to Newcastle and other Northern Natal towns. On his tours he has often supplied pots, potting media and clivia plants to satisfy the need of his enthusiastic learners.

Jean-Luc Bestel

At no stage has he ever expected to be compensated for any of his efforts and duties and feels that the enthusiasm of the members provided him with adequate compensation.

He is aware of the importance of conserving the natural habitats of clivia and other endangered plant species. Living near to many indigenous populations of clivia, he has seen the threat to these areas and to the many changes that have resulted from the destruction of habitat over the years. The challenge to preserve the few remaining habitat areas for future generations, remains a major problem. Unfortunately, the under-resourced Department of Nature Conservation will not be able to preserve some of the habitat areas.

We of the KZN Clivia Club, are very proud of our fellow member, who has developed into a knowledgeable, willing helper, likeable and respected clivia enthusiast. Jean-Luc's commitment to the KZN Clivia Club has been continuous for the past 23 years.

Owing to his commitment and dedication to the KZN Clivia Club, we as a club, would like to nominate Jean-Luc Bestel for the award of Honorary Life Membership of Clivia Society.

Alfred Everson III

ARTICLES

Ghosts: Are they real?

Carrie Kruger: Utopia Clivias, SA

'Ghost flowers' – This description includes flowers with distinct dilution or loss of colour on the inner surfaces of the tepals. (Fig. 1)

'Ghost' or 'watercolours' have earned their rightful place at local shows with a category specifically for 'watercolours', 'ghosts' and 'particolours'. 'Florid White Lips' would also fall into this category. (Fig.2)

As the standards of the 'ghost' and 'watercolour' type of flowers have improved over the years, their colouring has made them very popular with collectors.

Breeding aims:

- One of the fundamentals of plant breeding is to have a passion for what you are doing. Following on from this it is necessary to decide which flower colour or plant form you prefer. You cannot successfully breed all colours and plant types.
- Use only the pollen of the best plants, in this case the 'ghost' plants. The pollen is used for both line breeding and out crossing.
- Our 'ghost' breeding programme has produced some beautiful new colour variations. These include 'pale pink ghosts' and 'picotee ghosts'. Two examples of our 'picotee ghosts' are 'Lipstick Ghost' (Fig.3, 4) and 'Spirit Ghost'. (Fig.5)
- Most of our 'ghost' colouring successes

Fig.1 'Ghost 1 x 2'

Fig.2 'White Lips Blonde'

Fig.3 'Lipstick Ghost'

have resulted from the breeding with our plant 'Ghost 2'. (Fig.6)

History of 'Ghost 2': (information from Charl Malan)

During a visit to Yoshi Nakamura in 1994, Charl Malan received a few 'ghost' seeds. These were planted and when they flowered in 2000, Charl selected the best two 'ghosts' and named them 'Ghost 1' and 'Ghost 2'. These two plants were then cross pollinated and the offspring produced top quality 'ghosts', pinks and yellows.

Fig.4 Ghost with a picotee edge.

Fig.5 'Spirit Ghost'

Breeding results with 'Ghost 2'

- Crossing 'Ghost 2' with 'Florid White Lips' resulted in superior 'ghost' flowers with a lot of white on the tepals. One of the first of these crosses to flower was 'Spectre', which was named the 'Judge's Choice' at the Eastern Province Clivia Club Show in 2016. (Fig. 7)
- When using the pollen of 'Ghost '2, a large percentage of the offspring have the 'ghost' colour pattern. From the cross of ('Pastel' x

Fig.6 'Ghost 2'

Fig.7 'Spectre Ghost'

Fig.8 'Vision Ghost'

Fig.9 'Ghost Phantasm'

'Chiba Orange') x 'Ghost 2' a stunning pink 'ghost' was produced which we have named 'Vision' (Fig.8)

- Another example of our 'ghost' breeding line, using the pollen of 'Ghost 2', is 'Kelly's Globe', bred by the late Mark Lewis. 'Kelly`s Globe' (Large yellow) x 'Ghost 2' resulted in a superior quality 'ghost' flower named 'Phantasm'. 'Phantasm' has been used extensively in our breeding programme over the last three years. (Fig.9)
- 'Ghost 2' does not self well and there is usually only a poor seed set. It is a large robust plant, but does not make many offsets.

Fig.10 'Jon Snow'

Fig.11 'Daenerys'

- The unpigmented stems of the 'Chiba orange' x 'Ghost 2' cross have resulted in some amazing large, near white and some pink flowers. This demonstrates that 'Ghost 2' is split for group 1 yellow. 'Greater White', 'Jon Snow' and 'Daenerys' are typical examples of this cross. (Fig.10, 11).

Collaborative breeding: info - John Craigie Australia

Collaborative efforts between growers have proved to produce some beautiful new 'particolours' as shown by John Craigie of Australia and Hugh Bollinger of the USA.

"Hugh Bollinger provided me with seed of a number of crosses with Dave Conway's 'particolored' clivias. These included crosses with 'Cynthia Ann', 'Louisa' and others. In the years that followed, I provided pollen to Hugh from my 'Aussie Dawn' and 'Aussie Sunset' clivia which were picotee and bicolour types for crossing with some of Dave Conway's clivia. Each year we shared the seeds of our crossing

Fig.12 'Particolour' photo courtesy John Craigie.

Fig.13 'Particolour' John Craigie

Fig.14 Multitepal 'Ghost' photo courtesy of Kevin Akins.

efforts to improve the particolored breeding efforts of Dave Conway. These two clivia are related to a beautiful earlier particolored clivia I bred with internal pencil edging in the throat of the flowers." (Fig.12 and 13)

Conclusion

New developments now also include multitepal 'ghosts'. (Fig.14).

'Ghost'/'particolour' breeding is still in its infancy and going by the results we have achieved this far, we look forward to further amazing colour combinations and the increase in the number of multitepals.

'Colour pattern breeding' to improve the *Clivia miniata* picotee flowers

George Mann

From time immemorial mankind has been manipulating anything and everything around them, from elements to the natural organisms themselves. Hybridisation of organisms can be defined as the purposeful manipulation of organisms in order to produce the traits we like. All living organisms have certain traits that are unique to that organism. By playing matchmaker, a breeder can select the parents to produce offspring with the desired traits.

There are 6 species of Clivias endemic to South Africa and Swaziland namely, *Clivia caulescens, C. gardenii, C. miniata, C. nobilis, C. mirabilis* and *C. robusta*. The term 'hybrid' refers to a cross between any two plants.

Clivia miniata has been a subject of great fascination to gardeners, plants collectors and hybridisers, as one of the most striking member of the family Amaryllidaceae. In South Africa, the genus *Clivia* is unique in that they are shade loving plants.

'Colour pattern breeding' is an inexact method of breeding *Clivia* and leads to varying degrees of success. This method of breeding must not be confused with compatibility breeding that occurs when working with colour mutations of various Groups.

'Colour pattern breeding' can be defined as breeding plants with similar colour patterns with each other to increase the number of plants or to improve the desired colour pattern.

This article will focus on the 'colour pattern breeding' method to improve the quality of the

Fig.1

Fig. 2

miniata picotee flowers.

The picotee flowering plants are basically 'orange' plants genetically with an atypical large throat colour. A true picotee flower is defined as a flower with a colour strip along the outer edge of the tepal, the width of which is not broader than ten percent of the tepal length. This pattern of colour is rare in *Clivia*.

In my own breeding programme, I have used the following four plants to improve the picotee pattern in *Clivia miniata* flowers.

'Klein Erda'

This is a *Clivia miniata* plant that I obtained from Bertie Guillaume. This is a tall plant with the umbel held well above the leaves. The flowers are a pale orange colour with a prominent white throat. Tepals are broad and recurved in a full umbel. This plant is split for Group 1 yellow. (Figure 1)

'Pico Starlett'.

This *Clivia miniata* plant is a medium sized plant with narrow leaves. The umbel flowers are loosely spaced and small. The flowers are light yellow to cream in colour with an edge of pink on the tepals. It is a true picotee and produces flowers with a similar pattern when self-pollinated. I used a self-pollnated seedling of this plant in my 'pattern breeding'. (Figure 2)

I pollinated my seedling flower with 'Andrew Gibson', another *Clivia miniata* plant.)

'Andrew Gibson'.

This *Clivia miniata* is a medium sized, narrow leaf plant, that offsets well but is prone to flowering out of season. When flowering in season the plant produces an umbel well above the leaves. The flowers are a 'Splash' versicolour with the colour on the back of the tepals bleeding through on to the front of the tepals with age. (Figure 3)

Fig. 3

Fig.4

Fig. 5

Fig. 6

throats and prominent orange tips. (Figure 4).

I used the 'USA Orange' plant as the berry plant and pollinated it with 'Klein Erda'. My theory was to breed plants with a similar large throat pattern. The 'USA Orange had a large throat pattern, but the flower was not that impressive. 'Klein Erda' has large well shaped recurved tepals with a big throat size.

All the seedlings from this cross had large throats with one plant that was exceptional. This plant I named 'USA Orange x Klein Erda No 2'. (Figure 5). Two other siblings had larger flowers, with the throat not as large as the first

'USA Orange'

This plant was also obtained from Bertie Guillaume. Bertie had received seeds from Joe Solomone in the USA. A range of flowers emerged which all had a picotee pattern. All the plants were named as 'USA Orange Strain'. The plant I received was one of a group of similarly looking plants. It is a large, tidy, broad leaved plant. The umbel flowers on a tall peduncle, well above the leaves. The flowers are of a medium size with large white

Fig. 7

Fig. 8

Fig. 9

one. (Figure 6) and (Figure 7). A comparison of the seedlings in flower may be seen in Figure 8. The flowers were similar, with Figure 5 being different and exceptional. (Figure 5). The 'colour pattern breeding' method is imprecise. By crossing two plants with similar patterns together, the appearance of the plants in Figure 8 demonstrate that the expected outcome was achieved. The seedlings mentioned above have been crossed with each other and as yet the seedlings have not flowered.

The second line of plants that I worked with

Fig. 10

in order to try and breed an improved picotee pattern, was the crossing of a self-pollinated seedling of 'Pico Starlet' with 'Andrew Gibson'. The seedling flowered for me in 2011. (Figure 9), This flower had a very large throat with some colour present only on the tips of the tepals.

Take a closer look at 'Andrew Gibson' and then look only at the pattern on the tepals. The colour pattern on 'Andrew Gibson' can at best be described as a versicolour that bleeds into the front of the tepals, thus it does have a picotee type colouration. By crossing 'Andrew Gibson' with a plant having a large throat, 'Pico Starlet', we obtained pigmented seedlings with a pico-

Fig. 11

tee type pattern. This results illustrates that 'colour pattern breeding' played a large role, with the pattern clearly having carried over into the progeny. Similar good results have been achieved by other breeders using 'Andrew Gibson' on plants like 'Chiffon' and obtaining superior picotee pattern plants.

I had to make a decision with regards to further breeding with the flower in Figure 9. ('Pico Starlet'

Fig. 12

X 'Andrew Gibson'). My decision was to pollinate the flower with a similar pattern plant. The best choice I had available, was 'Klein Erda'.

Four plants from this cross have flowered so far with a large variety of flowers. All the flowers had large white throats with picotee patterns. The first plant that flowered had a double umbel, was dark orange in colour with a large throat. The tepals had a large percentage of colour on their tips. (Figure 10). The second plant to flower was a superior plant with light orange tips and a light green throat. The tepals were broad and recurved. (Figure 11). The third flower was just as good but with slightly smaller flowers. The colour pattern is a true picotee. (Figure12). The fourth seedling to flowers had small flowers but retained the picotee pattern on the tepals. (Figure 13).

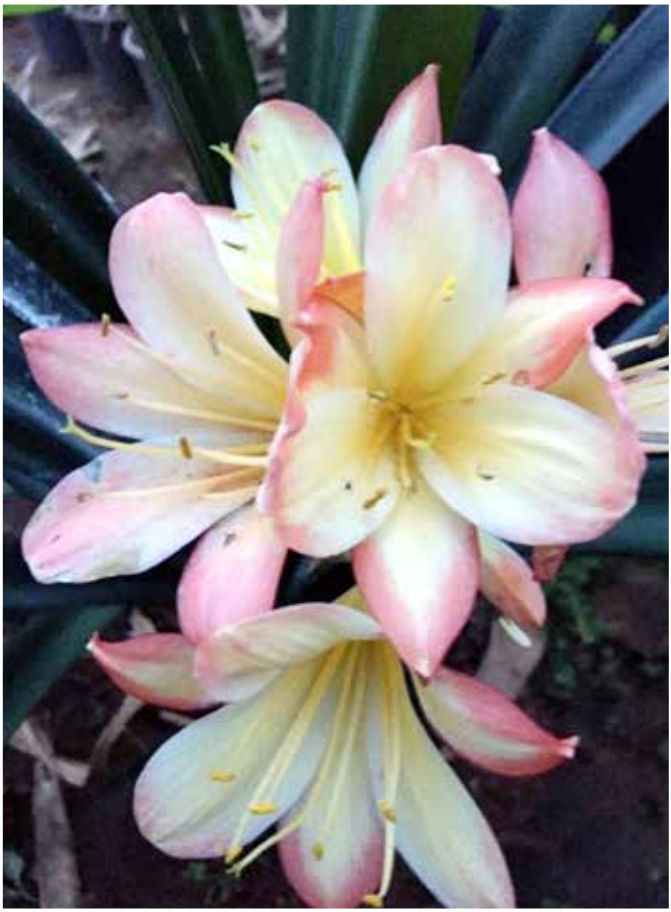


Fig. 13

The value of 'colour pattern breeding' is often disregarded owing to the unpredictability of the results. Using 'colour pattern breeding' in the correct way, opens new doors with endless possibilities with 'colour pattern breeding'. This method has been used in breeding a whole range of interesting flowering plants, for example 'ghosts' and 'watercolours'. The possibility of including various colour patterns in a variety of plant colours is an interesting challenge.

When you look back and realise what has been achieved in general plant breeding, it is difficult to believe that many further changes are still possible. With *Clivia* breeding I believe that we are still in the infancy of the eventual potential of this fascinating plant. Flower colours and patterns are two aspects of *Clivia* breeding. Other fields for further development include the flower shape and size, the plant size, the leaf width, length and colouring, making the possibilities almost endless.

Clivia mirabilis: Adaptation to an arid habitat

Felix Middleton

It is well known that *C. mirabilis* survives in an environment where other plants of the genus would not survive. This species is believed to inhabit specific ravines in Oorlogskloof, a location which is dominated by semi-arid vegetation. The rainfall in the upper reaches of the Oorlogskloof valley is slightly higher than that of the environment above the escarpment to the East and much higher than that of the flats to the West below the escarpment. Nevertheless, the annual rainfall is less than half of that found in other habitats of *Clivia* species. I contacted the South African weather Bureau in 2018 in an attempt to obtain the average rainfall in six areas around South Africa. The objective was to compare the precipitation patterns of all the locations where the different *Clivia* species grow. Unfortunately, this was not readily available unless I supplied a formal application to describe the project, the possible outcome of the project, and my collaboration with academic institutions on this project. I motivated with all the relevant information and to date have received no reply. Fortunately, one of the landowners in Oorlogskloof has been keeping daily rainfall readings for more than a decade. He kindly supplied me with the raw data.

The objective of this writing is to show the variation in rainfall between the growing sites. Do not expect to find a definitive answer to the question of how *C. mirabilis* survives in this arid setting.

C. mirabilis in shade.

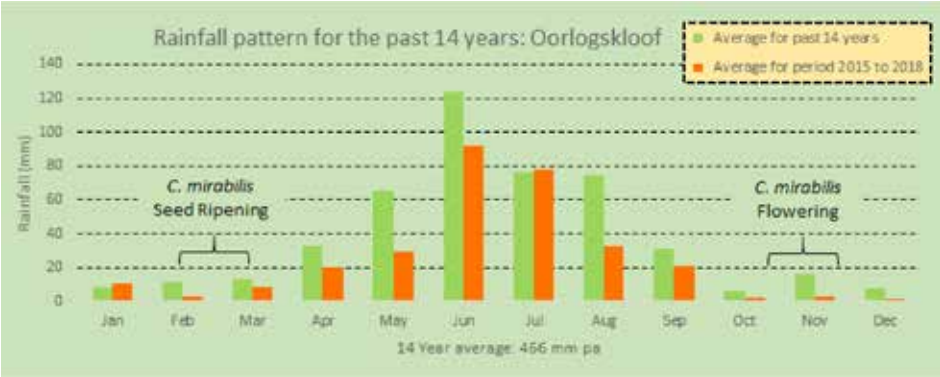
C. mirabilis in full sun.

What we know and can deduce from observations in Oorlogskloof

C. mirabilis plants generally grow at an altitude between 600m to 800m above sea-level. Mist accumulates on the West side of the escarpment, outside the actual Oorlogskloof valley and seldom drifts over the escarpment into the valley itself. I have only seen mist in the valley on one of my visits and the mist was well above the zone where plants grow. My personal observations were collaborated by local landowners. The mist is thus, I believe, not the main source of moisture for these plants.

Several people believe that the plants receive significantly water runoff from the sandstone capping of the mountaintop above them. This may however not be the main source of moisture for the plants. Plants are found in

Systematic die back of leaves.



Rainfall patterns for Oorlogskloof over the past 14 years.

sparsely forested ravines but do not populate all wooded ravines. The plants that I observed are only found in the ravines that are directed towards the East or South-East. Humidity in these ravines is noticeably higher than in the surrounding area. Moss is abundant on the underside of branches and on the South facing side of the rocks in these ravines. This indicates that moisture is moving in from the river up into these ravines from the South. A more definitive way to understand the survival of these plants in this harsh environment, would be to set temperature and humidity data-loggers in sites which contain plants and in similar sites in the area that do not contain clivia plants. These data-loggers would be able to show the differences in microclimate that promote the survival of these plants. Unfortunately, the cost of such a project may not justify the usefulness of the results.

Imprinting of leaves clearly demonstrated.

C. mirabilis plants generally grow among rocks, boulders and in rocky screes. Seed dispersal by birds and rodents may partly explain the high incidence of plants among the rocks. Birds perch on rocks while removing the edible seed coating and rodents prefer to eat in the safety of the rocky surround. Another reason for the plants surviving amongst the rocks, is that would receive more moisture in that position. Roots easily grow down the side of the rocks and extend deep among the subterranean rocks where they gain from the runoff. Moisture also evaporates rapidly from the topsoil where temperatures can be very high. On the other hand, soil temperatures are generally more stable and cooler among the rocks which can result in higher condensation and runoff down into the subterranean spaces among the rocks. This fact is well illustrated by observing the lush growth of weeds and grasses alongside a tarred road. This growth is a lot different from the grassland further from the road.

Seedling survival rate of *C. mirabilis*

C. mirabilis seedlings are for the most part not easy to grow to adulthood. I assume that not many have the genetic potential to reach adulthood. We are currently experimenting with different potting mixes to determine which will best benefit the cultivation of this challenging species. This experiment has been running for the better part of five years but

Natural selection of the strongest.

we still need to find a significant difference in medium preference. This is owing to the genetic diversity and apparent genetic disposition of many seedlings. Very few are quick growers, some are still the same size as when they were first planted and several are unhealthy. Only about 5% are maturing at the same rate as seedlings from the other *Clivia* species. In nature we estimate that on average less than 1% survive to year 6. I have visited the sites for the past 5 years and am surprised at the large number of seedlings among the few mature plants. In contrast there are very few sub-adults of between 3 and 5 years of age. There seems to be groups of similar aged plants in some populations, illustrating a possibility that in some years no seedlings survived and in other years a larger number survived.

The dry spell over the past 5 years has been described as the worst drought in a century for Oorlogskloof. Graph 1 is a representation of the average rainfall over the past 4 years as compared to the average long-term rainfall. The average annual rainfall for the site is just over 450mm. In 2017 the area received only 150mm for the whole year! Most seedlings survive to the two-leaf stage then die. However, immature plants in the area are possibly the result of the normal rainfall which was experienced in the period prior to the drought. For instance, 2007 and 2008 are noted as years with above average rainfall. Seedlings germinating in this period would have had a better than average chance of survival. The large number of sub-adult plants attests to this.

Seed dispersal amongst rocks.

Development of multitepal bronze flowers using 'Bronze Green Boy'

Dawie Strydom

1. Introduction

Multitepal development of clivia flowers is an interesting challenge for breeders. Most of the existing multitepal flowers are orange or shades of orange. Some yellow multitepal yellow flowers are available, but many of them are not yet up to the standard of the orange multitepal flowers. Most of the multitepal genetic material in South Africa has been obtained from Mr. Nakamura in Japan.

The breeding results included below are derived from the crossing of two green throated multitepal plants grown from seed obtained from Mr. Nakamura.

'Bronze Green Boy' does not readily form seeds with pollination. The green throated multitepal plants from Mr. Nakamura were used as the pod parents and 'Bronze Green Boy' as the pollen parent. The description that follows is the method by which I used the pollen of 'Bronze Green Boy' to develop a multitepal plant with the characteristic flower shape and colour of 'Bronze Green Boy'. Two generations of breeding were required to optimise the multitepal shape and colour.

Figure 1. 'Bronze Green Boy'. Note the petaloid development in some of the flowers.

Figure 2. 'Orange green throat multitepal A' with 7-9 tepals grown from seed of Mr. Nakamura.

Figure 3. First generation result. F1 'Orange with Green Throat Multitepal A' pollinated by 'Bronze Green Boy'.

Figure 4. 'Orange green-throat mutitepal B' used in the 2nd generation as the pod parent. Recurving tepals with symmetrical spacing illustrated.

2. First Generation

'Bronze Green Boy' flowers have a broad tepal which is slightly recurved with a bronze to brick colour. (Figure 1). The 'Bronze Green Boy' in my collection was purchased as an offset from Louis Swanepoel about fifteen years ago.

The 'Green throated orange multitepal A'. (Figure 2) This plant was used as the pod parent because of the green throat.

The first generation of the pollination of the flowers in (Figure 2) by 'Bronze Green Boy', produced green throated multitepal flowers with some petaloid flowers present. (Figure 3).

3. Second generation

The pollen of the F1 flower in Figure 3 was used to pollinate another plant of Mr. Nakamura. This second plant has a multitepal green throated flower with recurving tepals which are symmetrically spaced. (Figure 4).

4. Results of the multitepal breeding programme using 'Bronze Green Boy'

There is a great deal of variation in both the bronze colouring and the flower shape in the F2 generation. A selection of the best bronze multitepal flowers, with more than 8 tepals per flower and with open recurved flowers are illustrated in figures 5-8. The flowers have inherited the strong bronze characteristics as well as the broad tepals and recurving tepals. These features are prominent in both 'Bronze Green Boy' and the 'Orange green throat multitepal B' of figure 4. The green throats are more prominent F2 generation than in 'Bronze Green Boy', adding an additional colour characteristic to the flower. Some of the plants of the second generation will be culled. These include flowers with narrow tepals and tulip shaped flowers.

Figure 5. Plant 1 – 'Bronze Green Boy' F2 multitepal.

5. Conclusions

The 'Bronze Green Boy' flower was a successful choice from which bronze multitepal flowers can be developed. Some of the offspring had broad recurving tepals, evenly spaced with prominent green throats. (Figures 5, 7 and 8).

The key to the successful development of the multitepal offspring is, I believe, the presence of the petaloids (Figure 1) present in the 'Bronze Green Boy' flower. Adding to this is the use of the

Figure 6. Plant 2 – 'Bronze Green Boy' F2 multitepal

Figure 7. Plant 3 – 'Bronze Green Boy' F2 multitepal.

tepaloid pollen in the first generation hybrid. The second generation crossing with a superior green throated open flower, (Figure 4), made a positive contribution to the open, recurving flowers in Figure 5.

Future development to enhance the bronze colour and flower shape are the challenges that lie ahead. This I will attempt by sibling crosses and by using the tepaloid pollen of 'Bronze Green Boy' on the offspring.

Figure 8. Plant 4 – 'Bronze Green Boy' F2 multitepal.

AN OPPORTUNITY FOR THE *CLIVIA* WORLD
In search of a new series of hybrid Clivias

Dirk Lootens

1. Introduction.

In Western Europe the role of a *Clivia* is as an indoor pot plant. The plant is often placed on a windowsill in close proximity to a radiator. When the plant grows too big for the pot, the plant is transferred to a hallway, a dark corner or on the veranda. The growing conditions vary a lot and may be in too dark a position or receiving natural light, temperatures varying from frost conditions to a fixed 20 degrees centigrade throughout the year. Watering of a clivia plant is often on a weekly basis. As with all indoor plants the clivia is often given excess water. The growing condition are often not ideal for reblooming of the clivia flower or often the flower peduncle is too short.

The insulation standards of homes in Europe are being improved every year, providing a constant temperature throughout the year. The ideal living standards for the residents do not allow for the ideal conditions for clivia cultivation.

2.Phalaenopsis, the most popular of all pot plants.

Over the last 35 years, Phalaenopsis has become the most popular of all house plants. Analysing the reasons for the popularity of the Phalaenopsis plants, allows us to understand the strengths and weaknesses of the *Clivia* as a pot plant.

The reasons for the popularity of the Phalaenopsis:

- The first Phalaenopsis pot plants were produced in the early 1980s. At that time there were more than 350 000 Clivias produced in Europe (own estimation). In 2018 the total turnover of house plants at Royal Flora Holland, the most important of the auction sales in the Netherlands, was 1676 million Euros. The turnover of Phalaenopsis was 470 million Euros, about 28 percent of the market. (Annual Report Royal Flora Holland 2018). *Clivia* turnover was probably between 1.4 and 1.8 million Euros. (own estimation). As can be seen the Clivia production is small compared with the Phalaenopsis.
- The annual production of Phalaenopsis is between 150 and 200 million units (own estimation). Given that (before Brexit) there are 512.4 million inhabitants in the EU, this means that every European is buying a new Phalaenopsis every three years. If a family unit has three people on average, then each family buys a new Phalaenopsis every year. For *Clivia* the figures are: based on an annual production of +650 000 pieces, only 1 out of every 262 families has purchased a *Clivia* in a single year. In other words, the time lapse before a new (three member) family would buy a new *Clivia* is almost 9 generations.

Why has the popularity of the Phalaenopsis grown so much? Why is the *Clivia* not so popular anymore? The main reasons, I believe, are listed below:

Phalaenopsis	Clivia
Orchids still have an exclusive reputation. Everybody wants an orchid and they pride themselves if they are able to rebloom an orchid. They often have a small collection of different colours.	*Clivia* plants are considered as old-fashioned, especially in Belgium. This is less true for the rest of Europe.

Phalaenopsis	Clivia
A Phalaenopsis scape or spike often has flowers in bloom for 3 to 6 months at a time. By cutting off the stem once the flowers are spent, about 1 cm above the second or third dormant bud, it is possible to get the same flower stem to flower a second time. In this way, a plant can flower 6 to 12 months a year.	If a consumer manages to get a *Clivia* to flower again, this will usually be limited to a maximum of one flower peduncle per year. The flowering time is usually limited to 1 month. A positive feature of a second flowering stem is the pride of success of the owner. By pollinating the flowers and producing seed, the feeling of achievement is a positive outcome for the owner.
Cloning Phalaenopsis has decreased the production costs of the flower. The loss rate has been reduced from 20% for Phalaenopsis seedlings, to less than 1%.	Depending on how you define loss percentages (not flowering / broken stems) of clivia, you can expect a loss of between 10% and 20%. This high percentage loss has a strong negative impact on the production cost
The production of phalaenopsis is predictable, owing to the success with cloning and thanks to the knowledge gathered over the last few years This makes it possible for a grower to plan (e.g. >100,000 Phalaenopsis in the requested colour mix and the right blooming time for sale at a specific week number).	The *Clivia* production is much less predictable. For example, in order to be able to deliver 100,000 plants in a given week, at least 3 times as many plants need to be prepared from which the sales batch can be chosen.
Phalaenopsis are now produced throughout the year and production can be arranged for such a demand.	*Clivia* is a seasonal product. Large orders in the perfect flowering stage can only be arranged for the peak season.
New techniques have made it possible to produce Phalaenopsis with three to four flowering stems/scapes. Each new leaf can produce a flower peduncle. Creativity in the breeding of the Phalaenopsis has developed a multitude of different forms, such as the waterfall form, the coloured ones, 'singolo', which have become designer objects. (photo 1A & 1B).	With *Clivia* there is not yet sufficient knowledge on how to get the *Clivia* to flower at a specific time of the year. *Clivia* plants have already been developed to have double umbels. The growth model at present is still one bloom spike for every 3 leaves. There are examples of creative applications with Clivia (see photo 2).
The colours vary from perfect white, yellow, purple, pink, salmon...	The colour mix goes from bronze, red, orange, pink to yellow & green with a lot of new colour variations.
The current clones can also be re-flowered perfectly in the living room by the owner. This enhances the consumer's experience. New buds only develop during Spring, the natural flowering period.	Clivias have 2 natural flowering periods: the first and main one is in Spring. There is a 2nd flowering period about 4-5 months later. Re-flowering of *Clivia* is perfectly possible, but unfortunately the buds are aborted or the peduncle length is short and flowers develop at the base of the plants.
The plant leaves are not always special, the leaves are often even half shrivelled 'hanging ears'.	*Clivia* plants may have exceptionally attractive foliage throughout the year. This leaf characteristic of green and variegated colouring may have great appeal throughout the year for the owners.

Photo 1A. Phaleanopsis in a 'Green Bottle'.

Photo 1B. Multibranched plant.

Photo 3. *Clivia* in a glass receptacle. roduced by VDE plants. Exclusive varieties sold under the 'Intenz Home Brand'.

3. In search of a *Clivia* that will compete with the appeal of the Phalaenopsis

Martin Luther King was quoted as saying "I have a dream……"
Well, let's define the 'dream' with regards to *Clivia*:

Flower volume > 35

The flower volume is determined by a formula that is a function of time and variables such as the number of peduncles, the number of flowers, the length and width of the tepals, the diameter and fullness of the flower head ...
The basic principle is: 'Measuring is knowing'.

- Flowers:
  - Flower peduncles must extend above the leaves, at a temperatures of 21°C.
  - a long blooming period: > 6 weeks at 21 °C.
  - Full flower heads: e.g. 17 cm across, >15 flowers on one peduncle, pedicel between 2 and 3 cm; petals > 25 mm wide and > 60mm long.
  - Flowers that are already displaying some colour before they open. This is important for the shelf life in the shops.
- The flowering frequency:
  - Each plant must be able to produce 3 flower peduncles per year with at least 2 different flowering times. This aim is to ensure that the peduncles are seen growing twice a year and the flowering period per year is extended.
  - In total we obtain a flowering experience, from the bud to the end of the flowering stage, of at least 20 weeks per year.
  - If pollination is successful, the ripening of the berries and the harvesting and germinating, will lead to an added benefit for the owners.

Production lines

We need at least 10 production lines in which phenotypic variation within the population does not diverge by more than 10%.

- This means that all plants within the lines conform to the flower, leaf length and width and the same number of flowers allowing for no more than 10% variation.
- The production lines are distinguished by features such as colour or by plant size. The above production lines will find their way to the end consumer mainly in the retail market. In addition to the above production lines, provision must be made for the purchaser

to 'grow their own unique plant'. This group would purchase a plant that is grown by Clivia breeders with the aim of flowering something unusual and this the central objective of this group of purchasers.

Other characteristics which will add value:

- A well-shaped plant:
- characteristic 'fan-shaped' like the Chinese Clivias.
- dark green leaves, without any leaf damage.
- leaves with a length to width ratio of > 5,5 (e.g. leaves 32 cm long should be at least 6cm wide). For the standard *Clivia* line (= pot size 12/13 cm) the longest leaf length at first flowering should be 32 cm long.
- Fragrance
  - there are many lightly scented *Clivia*. If we could intensify the fragrance with inbreeding, this would greatly improve the appeal of the plant.
- Fisease susceptibility
  - the plants must carry a very high level of resistance to disease so that bio-production is possible. By breeding the resistance must be developed against fungi, viruses, mealy bugs and aphids.
- Air-purifying
  - if it can be scientifically proven that *Clivia* improves the air quality in an indoor room, this would be a strong selling point.
- Climate improver
  - if we could incorporate *Clivia* into a system that improves the indoor climate of an insulated room, this would prove to be an added benefit of having *Clivia* plants indoors.
- Extending the vase life of *Clivia* as a cut flower.

4. What material is available to develop the *Clivia* as an ideal pot plant?

4.1.1. Belgian hybrids fast, faster, fastest"

Throughout the past decades in Europe/ Belgium breeding by selection has produced Clivias that flower earlier in the season and flower after two years from germination. The De Coster family were the first to achieve a major breakthrough in this regard.

Through intensive selection and breeding work, the following has currently been realised:

- All Clivias produce their first flower bud after 12/13 leaves.
- about 70 % can be sold with a good bud within 25 months after germination and 85% within 30 months. Optimal climatic conditions are necessary to achieve this result.
- A growth module standard of 4 or 5 leaves, for the next flower peduncle to develop.
- The average growth rate (defined as the number of leaves produced per time unit) is faster compared to the average of the *Clivia* plants from e.g. South Africa. My estimation is that, depending on the climatic conditions, Belgian hybrids can produce up to 5-6 leaves in one year while South African hybrids produce +-3 leaves in the same period of time.
- There are plants that develop 7 to 8 leaves per year, using 'frost-free conditions'. This refers to a condition where the plants are stored dry and frost-free for at least three months of the year. During the other nine months the plants are kept in the house.
- 'Vinkske', a plant of mine, produces 11 up to 12 leaves a year when kept under standard room conditions all year round.

4.1.2. Early flowering/out of season

- The objective of breeding selection has been to produce early flowering plants as these plants would sell at a higher price.
- Another achievement of this breeding selection is the production of out of season blooming. If the plants are grown under ideal conditions the plants can flower during two different time periods.

4.1.3. Plants with multiple peduncles

(Below I use a few new terms to define previously undefined plant characteristics for *Clivia*.)

- Dub=
  - This is the plant characteristic whereby a 2-year-old *Clivia* plant has two peduncles at the same time. The flower peduncles are formed in different leaf axils.

- In an average batch of 2-year-old Belgian hybrids plants, +- 5% will flower dub=. Of course, this depends a lot on the realized growth over those 2 years. In the past, there have be records of a batch with a flowering rate of >85% dub=.

• Oks2
  - This is the plant characteristic whereby a *Clivia* plant gives 2 flower peduncles in the same leaf-axil. The flower peduncles may grow separately at +- the same time and can bloom together or one directly after the other (photo 3). It is possible that the 2 peduncles are grown similar to Siamese twins (photo 4).
  - This "Oks2" feature is quite rare in 2-year old batches: +- 1/15 000 plants.

Photo 3. Example of 'Oks2'.

Photo 4. Example of a fused 'Oks 2'.

• Tris
  - These plants have 3 visible flowering peduncles at the same time.
  - These are plants that are a combination of the 2 previous plant characteristics: oks2 & dub=
  - This feature is rare in 2-year old batches: +- 1/60 000 plants.

• Quattro
  - these plants have 4 visible flowering peduncles at the same time.
  - 'Il Quattro' (photo 5). This is the name of the only plant we were able to select from the breeding with 4 flower stems at the same time.
  - This plant came from a cross carried out in March 2009, was sown January 2010 and was selected February 2012 with 4 flower stems.
  - There were flower peduncles developed after 3 consecutive closed modules and one of these had an oks2 developed (although the stems of these last 2 were fused together).
  - This feature has only been found once to date.

Photo 5. 'Quattro' – Sown in January 2010. Photograph February 2012. Peduncle with open flowers on the left. On the right is a fused 'Oks 2'.

4.1.4. More frequently flowering plants.

• Rebloomers (photo 6)
  - If a plant develops a new flower stem in the same leaf-axil months after the first flower peduncle, then this plant can be called a rebloomer.
  - In spite of the fact that this trait may be

Photo 6. The timeline of a first flower, specifically bred for its reblooming characteristic.

more common than we now think, this has been confirmed to my knowledge by two plants only.
- In the meantime, it has been confirmed to be genetically inheritable.

- Blooming twice a year.
  - Plants which flower at least twice a year at different times.
  - A characteristic of these plants is that they often have a different growth model. The number of leaves per growth model is varied to realise the second flower peduncle should there not be sufficient growth that year. I have no knowledge of plants that have made a module of only 2 leaves (mod2). Modules with 3 leaves (mod3) do occur on a regular basis on these plants. (Photo 7)
  - 'Il quattro' is showing this characteristic. This one does this under frost-free conditions. Another plant belonging to this category is 'Tris'.
- 'Vinkske' (photo 8)
  - This is a yellow flowering plant, a species cross.

Photo 7. 'Quattro'. Three consecutive peduncles can be seen. There are only three leaves between the latest flowering buds.

Photo 8. 'Vinkske' timeline.

- This plant bloomed twice in the Summer of 2013, from January 2014 to September 2016 a total of 9 flower peduncles were produced, the number of flowers formed was 184 (or an average of >20/flowers per peduncle). The plant bloomed again February 2017 (28 fllowers), May 2017 (23 flowers) and July 2017 (21 flowers).
- During this period the plant was in a living room, at room temperature. The flower peduncle has always reached a sufficient height.
- In 2018, something must have changed as the flowering schedule has become completely irregular. To date there is no obvious reason why this resulted in the change in flowering.

The South African colours

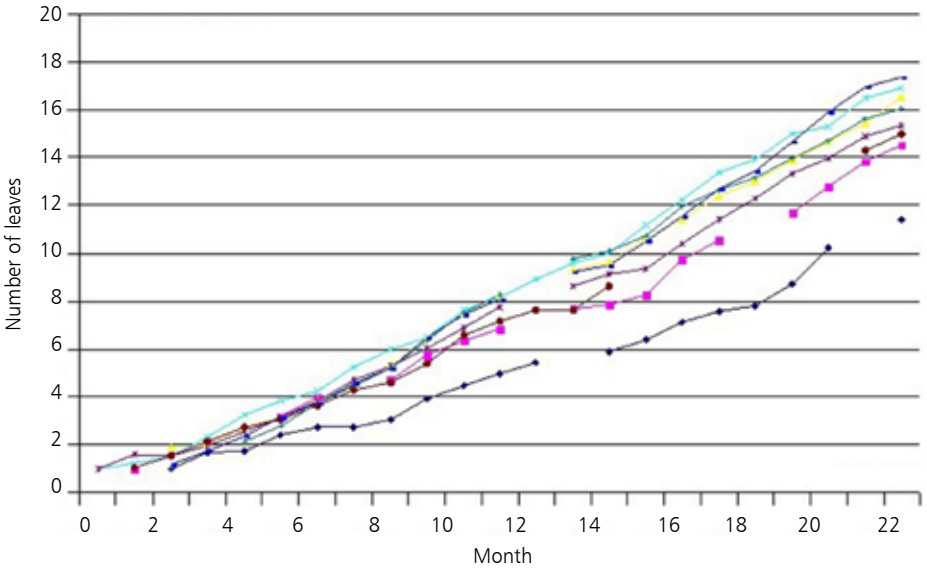
- Internationally, a lot of *Clivia* breeders are hybridising to produce exquisite new colours. There is enough variety in colour and quality to work with for the commercial market.
- At this stage very few of the Belgian Hybrids have been crossed with the newer flower colours.

Chinese forms

- In China, a phenotype of the plants developed there, strives for perfection with regard to the leaves. The desired plants feature dark green leaves which are broad and fan shaped.
- Including this plant characteristic in the 'new' *Clivia* generation adds value to the *Clivia* and the emphasis of the appeal of the *Clivia* may shift to one of a green houseplant.

Other material

- Tetraploids
  - The future will tell, but tetraploidy and multiploidy will undoubtedly play a very important role in the future. The flowering times and flower size will be influenced.
- Multitepal
  - This will also allow the flower volume to be further increased. As far as I know, this form has not yet been crossed with the existing 'Belgian Hybrids'.
- Japanese variegations and Japanese breeding



Graph 1: Clivia's growth curve of 8 different years. If after 23 months a growth of ±16 leaves can be realized, a floweing percentage of ±75% can be expected.

based on the unusual

- Owing to the large variation in the offspring, this does not yet offer any opportunities for a retail market.
- There are possibilities with Akebono forms of leaf colouring, but wholesalers at this time tend to believe that these leaves are unhealthy.

5. Further thinking…

Is *Clivia* interest decreasing? Is it correct that *Clivia* interest appeals mainly to older people? If so, what can we do to change this? Should we accelerate efforts to breed new colours? What else can we do to make the *Clivia* more desirable?

Is there an opportunity leading on from the above story or for garden Clivias?

Is it possible to achieve the above goal on our own, or is co-operation the magic word to arrive at desired results much faster?

- We could start by comparing the same 'clones' by sowing the same seeds and see how their growth varies under different conditions? Do they all have the same length to width ratio?
- How fast are they growing? We could design a graphical tracking system, with each one with his own growing circumstances. (see graphic 1)
- We could encourage universities all over the world to do more research on the possibility of the *Clivia* as an air purifier.
- Promoting an interest among consumers in all countries, as Steve Hickman is currently doing in the UK.
- We could develop a central database that could co-ordinate the collection of knowledge by breeders and lead us to a new understanding of Clivias.
- We could investigate other aspects of *Clivia* growth. What is the reason why some peduncles remain short or are slow to lengthen? What influence does altitude, latitude and light spectrum have on *Clivia* growth? Why do the Spring buds need a cold period, whereas the late summer buds and flowers do not seem to need this cold period?
- Is there at present a plant that happily flowers at higher temperatures?

Review of *Clivia* Groups and Mutations

George Mann, Michael Holt & Pieter Saayman

The flowering season is an exciting time for breeders and growers of *Clivia* plants. The challenge facing all enthusiasts is the decision regarding the pollen and berry plants for seed production. The decision to be made is not a simple one and will depend on the outcome desired. The breeding of specific colours is more easily achieved with a knowledge of the colour groups of plants. Wessel Lotter wrote an article on the yellow flower groups. These are now well established as Group 1 and Group 2 yellows. Some of the yellow plants do not breed as the yellows in Group 1 and 2 so groups have been added to accommodate these yellow flowering plants.

Group 1 yellow Group

Group 2 yellow Group

Various classifications haven been made listing the names of plants and Groups to which they belong.

Some plants on the lists previously available are known not to belong to a certain listed group, so we were tasked with updating the known plant groups. The lists we have made is based on the current information and may at some point be altered.

5.1. What is a compatible group of plants?

When referring to plant compatibility, we are referring to the flower colours the seedlings will produce, when two compatible plants are crossed with each other. The seed-

lings of such a cross will produce flowers of a similar colour to the parents. The reason for this is the sharing of genetic colour mutations by the parents.

The advantage of knowing which groups the various plants fit into will help with the prediction of the flower colour when crossing compatible plants.

Plant compatibility groups are known for yellow peach, peach, splash and blush types of *Clivia miniata*.

5.2. Colour Mutations vs Colour Patterns

A colour mutation is a genetically inherited variation found in *Clivia miniata*. A colour pattern describes the colour distribution on a *Clivia miniata* flower.

Not all *Clivia* flowers fall into the groups listed below. Orange for example is the standard dominant colour of *Clivia* and as such is not a mutation like those listed below. The orange flowers do however have various colour patterns.

A good example of colour patterns would be the 'Chiffon' type plants which are generally large white throated orange flowers. Other examples are 'White Lips' and 'Ghost' flowers which have parts of the tepal colour diluted, giving the appearance of a 'ghost' pattern. When breeding with these plants the outcome produces a percentage of similar flowering plants. With a cross of similar genetic mutations, the offspring produce a 100 percent similar results to the parents. We will focus on genetic mutation groupings rather than on colour patterns.

Group 1 Peach

Group 2 Peach

5.3. Methods used to test a group

There is only one fool proof method of finding out which group a *Clivia miniata* belongs to. This is done by pollinating the flower with the pollen of a known plant Group. With some mutations you will be able to identify the compatibility by observing the pigmentation of the seedlings. In other crosses, flowering is necessary to prove compatibility.

'Bleeding' of the colours on the tepals or berries when damaged is not a good indication of the Group. Similarly the leaf shape and

'Four Marys' hybrid

'Appleblossom' hybrid

leaf tip are also not a reliable source for grouping plants. bit of deductive knowledge, it is also possible to include a specific plant into a group. Common sense is also a way in which plant Groups can be deduced. For example: if Plant A is compatible when crossed with Plant B and Plant B crossed with Plant C are genetically compatible then it's safe to assume that Plant A and Plant C are genetically compatible and belong to the same group.

5.4. 'Splits'

A split can be defined as a plant that came about by crossing a plant with a mutation with a plant with no mutation or crossing plants with different mutations, resulting in a plant that is orange in colour. This plant will now be carrying 50% of the genetic mutation of the original parents.

These orange splits are often the result of ignorance, incorrect information, misunderstanding of the Groups, a labelling problem or part of an intentionally breeding programme. To improve certain traits such as flower size, flower count or flower shape the production of a 'split' is intended. This 'split' is then crossed back to the parent or a sibling. The result will produce a percentage of plants with the same mutation but with some better traits than the original mutation plant. By breeding a split plant back to its parents' mutation one can retrieve a percentage of plants with a mutation but also some better traits than the original plant.

5.5. Strain or Series of plants

Many plants available for sale have resulted from the crossing two plants with the same mutation or selfing a plant with a colour mutation. This method is an easy way in which to produce a similar colour mutation. All these resulting plants will be included in the same strain. All the plants in the strain are similar without been identical. Examples of these include the 'Pretty Pinks', 'Hirao', 'Tipperary Peach' and '777'.

The plants in a strain may not be identical in looks, however they look similar in colour, are classified in the same Group and will be compatible with each other. When outcrosses are made with plants not included in the

'Alpha Ndwedwe' Group

strain, the resulting seedlings are no longer part of that particular strain of plants.

5.6. Current Known Compatibility and Groupings.

From our own experience and from colleagues, we have compiled the lists of plants included in various Grousp. Only *Clivia miniata* and freely available hybrids are included.

The terms Group 1 and Group 2 were originally used for yellow flowering plants. Over time some peach flowering *Clivia* have been found to be 'compatible' with Group s – however over the years some peach coloured *Clivia* have been found, that are 'compatible' with either Group 1 or Group yellow flowering plants. The seedlings are unpigmented resulting in flowers of varying shades of yellow and peach. These peaches have been included in a subcategory within the group of yellows with which they are compatible.

'European Peach' Group

GROUP 1 PLANTS

Yellows

The majority of yellow *Clivia miniata* fall into this group. Flowers are yellow, produce yellow berries and the seedlings from crosses within the same group are unpigmented when germinated.

- Albany Yellow
- Arturo's Yellow
- Blitz
- Chiba Yellow
- Col Pitman Yellow
- Eshowe Yellow
- Howick Yellow
- Jim Holmes Yellow
- Jumbo Yellow
- Karkloof Yellow

- King Hamelin Yellow
- Kirstenbosch Yellow
- Mare's Yellow
- Miss Perfect
- Noyce's Yellow
- Pat Quinn Yellow
- Pen Henry Yellow
- Saunders Yellow
- San Marco Yellow (syn. Solomone Yellow)
- Sir John Thouron Yellow
- Sleeping Beauty
- So Excited
- Vic Daniels Yellow
- Vico Gold
- Vico Yellow (syn. Smithers Yellow)
- Watkins Yellow
- Yellow Green Girl

Peaches

Flowers are a peach colour and seedlings from crosses within the same group are unpigmented when germinated

- Albany Peach
- Chubb's Peach
- De Villiers Peach
- Gail's Peach (syn. Reed's Peach)
- Lotter's Peach
- Vico Peach

GROUP 2 PLANTS

Yellows

The flowers are yellow, produce yellow berries and seedlings from crosses within the same group are unpigmented when germinated.

- Auriel Batten Yellow
- Banshee Yellow
- Centani Yellow (syn. Qntani Yellow)
- Cynthia's Best
- Cynthia's Dream
- Dwesa Yellow
- Golden Fleece
- Nano
- Natal Yellow (syn. Giddy Yellow, Gibelo Yellow, Holl's Yellow, Swellendam Yellow, Stella Parish Yellow)
- Pat's Gold
- Port St. Johns Yellow

'Pretty Pink'

'Splash' by '777' hybrid

- TK Hirao
- TK Miniature Yellow
- TK Original
- TK Yellow
- Transkei Yellow
- Tsolo Yellow

Peaches

Flowers are peach in colour and seedlings from crosses within the same group are unpigmented when germinated.

- Cranrao
- Cransley Peach (syn. Meg's Peach)

GROUP 3 YELLOWS

Plants flower yellow with a pink colouration of the tepals as the flowers mature, berries are red and seedlings from crosses within the same group are pigmented when germinated.

'Tessa'

- Celtis Kloof Yellow
- Greendale Yellow
- Oribi Gorge Yellow
- Peacevale Yellow
- Potterill Blush Yellow

ALPHA YELLOW GROUP

A small group of yellow flowering plants. The flowers are yellow, produce yellow berries and seedlings from crosses within the same group are unpigmented when germinated.

- Ndwedwe Alpha Thurston
- Ndwedwe Beta Thurston
- Mvuma Yellow

'EUROPEAN PEACH'/PINK GROUP

Flowers in this group are various shades of peach / pink, seedlings from crosses within this group are unpigmented when germinated (Tipperary and Cameron will occasionally have pigmented seedlings which flower peach in colour).

- Anderson's Peach (USA and Aus.)
- Anna Meyer Peach
- Cameron Peach
- Conway's Sunrise Sunset
- Conway's Tessa
- Pretty Pink
- Simply Pink
- Tipperary Peach
- Victorian Peach
- Wittig Pink

APPLEBLOSSOM - TYPE GROUP

Flowers are generally white, infused with pink towards the tips of the tepals and seedlings from crosses within the same group are pigmented when germinated.

- Appleblossom Strain
- Gloria
- Helgaard
- Mopi Hirt

FOUR MARYS - TYPE CLIVIA GROUP

Flowers are light yellow or white infused with pink that bleeds to a darker shade of pink to hints of mauve as the flowers age, unpigmented seedlings are produced when crossed with plants within the same group.

- Hanti (syn. Brenthurst)
- Four Marys
- Gordonia
- Lady Jane
- Meltzer's Picotee No.2 (pink blush)
- Monet
- Ngidi Pink Champagne
- Paljas
- Wintersong

SPLASH CLIVIA GROUP

Flowers are generally yellow in colour with a pronounced red colouration on the back of the tepals, seedlings from crosses within the same group are unpigmented when germinated.

- 777 Series
- Andrew Gibson
- Discovery
- Fairytale Series
- Meltzer's Picotee No.1 (spotted)
- Msubo Nguni
- Msubo Wow
- Naude's Peach
- Royal Gala Series
- Ruby Stewart
- Rumpelstiltskin
- Splash Series
- Strawberry Cheesecake
- Waterkloof Blush (syn. Pietersen Blush).

Clivia Kingdom's Vision of the Future

Paul and Sue Kloeck

We have always loved Clivias and they have always had an important place in our garden. In 2003 after an accident, we decided to pursue *Clivia* growing and breeding as a serious hobby. Our approach to *Clivia* breeding was to get hold of the best breeding material available. We visited most of the leading breeders in South Africa and managed to get hold of some superb genetic material. After completing our visits to the local breeders, we than decided to visit the tour international *Clivia* growers and visited Belgium, Australia, New Zealand, Japan, China and the USA.

We have approximately 40,000 Clivias growing under shade cloth and a further 40,000 plants in the garden under trees in an area of 2 hectacres. Like all *Clivia* collectors, we started off by collecting a wide range of species and *Clivia miniata* hybrids. We find that by concentrating on a more limited number of breeding lines, we are able to develop the best features of the plants in our chosen groups.

Our choice of *Clivia* breeding is now limited to five different breeding lines.

Our first line has been developed from our plant 'Blushing Virgin'. This plant has been exceptionally successful at several shows around South Africa and we have now 'retired' from show appearances. The progeny of this plant always have perfect, spherical umbels, often with double peduncles. This 'flagship' pollen parent, has produced a variety of colours from pink to pale oranges, watercolours and guava colours. 'Blushing Virgin' is split for yellow and has produced some spectacular yellow flowers.

'Blushing Virgin'

'Blushing Virgin Pink Princess'.

'BV Virgin Queen'

Our second breeding lines has developed from the hybridising two of our Japanese plants and one of our Chinese plants to produce a range of *Clivia* flower patterns, we call 'Tangelo'. The range of 'Tangelo' plants are small and compact with broad leaves. They have high flower counts and form offsets readily. The range of colours vary from picotee patterns to splash and blushes. Versicolour and 'tanchoo' patterns have also been produced.

'Tangelo range'

'Tangelo range'

The third breeding line is the 'COTY' range. This range developed over time from seed produced originally by crossing yellow and light orange plants. The offspring from this range of plants have light velvety colours and spectacular versicolours. The pollen viability is a challenge and the seed production is poor.

Pierre de Coster gave us five seeds in 2007. He predicted that they would produce interesting versicolours. Photographs of

'Tangelo range'

'COTY range'

the first flowers were sent to Pierre and he suggested we call these plants 'Belgian Four Marys' (B4M). The choice of name was related to the diverse range of colours that form as the flowers open and then age with time. We have been successful with this range, producing several eye-catching versicolours, picotees and bicolours.

Our fifth line of breeding is our interspecific range. We have concentrated on breeding

'COTY Flushed Pink'

'B4M range'

an olive and bronze range of interspecific flowers. This line of breeding has provided great pleasure, but also some frustration in breeding the colours we want to strive for. The most successful of these are 'Gangrene Swirl', 'Brazen Hussy', 'Kumikazi' and 'Gun Metal Chartreuse'.

'Gun Metal Chartreuse'

'Kumikazi'

PHOTOGRAPHIC COMPETITION

Introduction

Glynn Middlewick

Thank you to all the photographic entrants. All of you are winners. The selection of images submitted was a feast for the eyes.

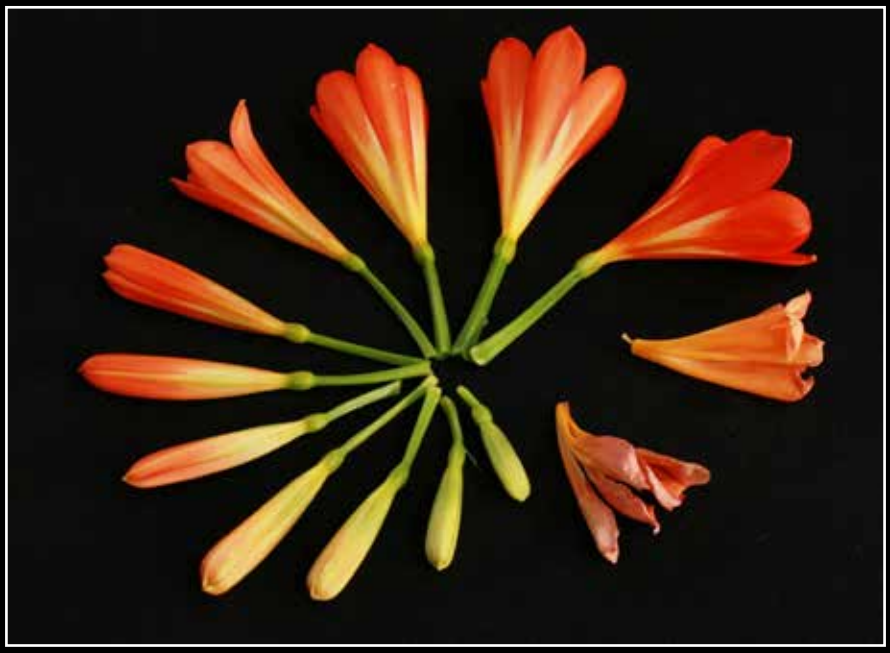
The images were assessed for their photographic quality, so the prettiest image would not necessarily win the competition.

The three judges for this competition were Ian Coates, Claude Felbert and Peter Lambert. Each judge assessed the images independently and allocated a mark out of 100. My role was to add up the marks and find our which were the highest scoring images. The final positions were based on the combined points of the three judges. The two plants chosen for the front and back cover were decided on points alone. Congratulations to the top two entries by points in the overall competition. The top two were Anzette Snyders and Carrie Kruger. Anzette's image of the stages of maturation of a clivia flower has been chosen for the front cover of this Yearbook and Carrie's image of an interspecific flower will appear on the back cover of this Yearbook.

Some wise words from Ian Coates: The visual basics have never changed. Images need to be correctly exposed and they need to be in focus in certain areas and deliberately out of focus in others. The subject matter will always be part of the attraction in an image which needs to be suitably lit and the lighting controlled, if necessary, by additional lighting or using baffles or reflectors even in habitat. Getting the perfect picture can be hard work! The composition of an image is vital, as are any unwanted distractions or blemishes. Such features must add to the impact of the image and not be distractions.

PHOTOGRAPHIC ENTRIES

ART CATEGORY

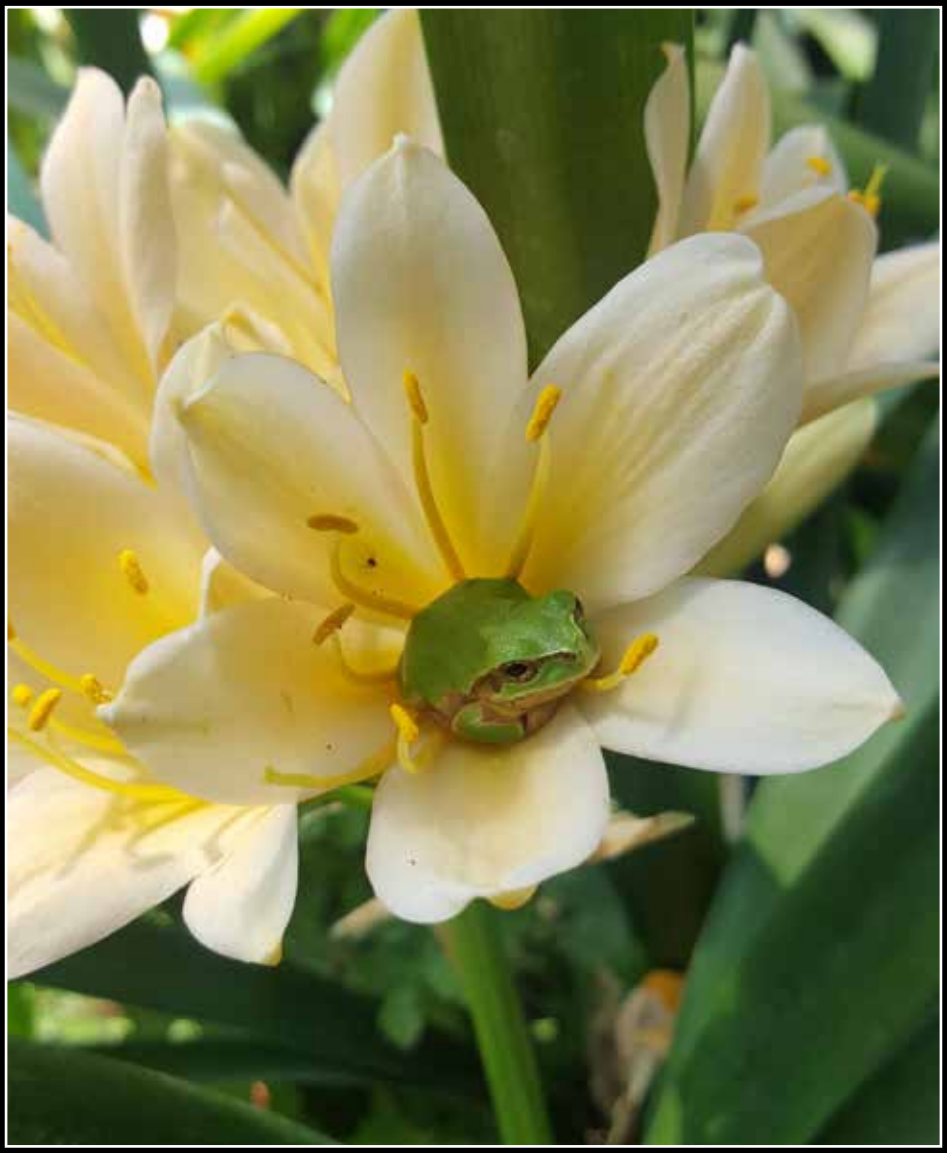


Art Categroy, 1st Place. Anzette Snyders

Art Category, 2nd Place. Cary Schneider

Art Category. 3rd Place. Karel Stanz

Art Category. 4th Place. Carrie Kruger



Art Category. 5th Place. Cary Schneider

Art Category. 6th Place. Carrie Kruger

Art Category. 7th Place. Mike and Angie Riska

Art Category. 8th Place. Karel Stanz

INTERSPECIFIC CATEGORY

Interspecific Category. 1st Place. Carrie Kruger

Interspecific Category. 2nd Place. Carrie Kruger

Interspecific Category. 3rd Place. Alex Mikhalevitch

Interspecific Category. 4th Place. Carrie Kruger

Interspecific Category. 5th Place. Elize and Pikkie Strumpher

Interpecific Category. 6th Place. Dawie van Heerden

Interspecific Category. 7th Place. MIke and Angie Riska

Interspecific Category. 8th Place Alex Mikhalevitch

MINIATA CATEGORY

Miniata Category. 1st Place. Carrie Kruger

MIniata Category. 2nd Place. Pikke & Elize Strumpher

MIniata Category. 3rd Place. Carrie Kruger

MIniata Category. 4th Place.
Dawie van Heerden

Miniata Category. 5th Place.
George Mann

Miniata Category. 6th Place. George Mann

Miniata Category. 7th Place. Jaap Smit

MIniata Category. 8th Place. Carrie Kruger

Miniata Category. 9th Place. Elize and Pikkie Strumpher

Miniata Category. 10th Place. Pieter Saayman

PENDULOUS CATEGORY

Pendulous Category. 1stp Place. Carrie Kruger

Pendulous Category. 2nd Place. Carrie Kruger

Pendulous Category. 3rd Place. Andrew Kazewski

Pendulous Category. 4th Place. Karel Stanz

Pendulous Category. 5th Place. Alex Mikhalevitch

SINGLE FLOWER CATEGORY

Single Flower Category. 1st Place. Andrew Kazewski

Miniata category. Carrie Kruger

Single Flower Category. 2nd Place. Anzette Snyders

Single Flower Category. 3rd Place. Carrie Kruger

Single Flower Category. 4th Place. Karel Stanz

Single Flower Category. 5th Place. Anzette Snyders

Single Flower Category. 6th Place. Andrew Kazewski

Single Flower Category. 7th Place.
Carrie Kruger

Single Flower Category. 8th Place.
Karel Stanz

Single Flower Category. 9th Place. Mike and Angie Riska

THE CLIVIA SOCIETY: MANAGEMENT DETAILS

Website: www.cliviasociety.org • Information: gcmidd@mweb.co.za

POSTAL ADDRESS: P O BOX 74868, LYNNWOOD RIDGE 0040 PRETORIA

Chairman	Glynn Middlewick: Mobile: +27 82-650-1463; e-mail: gcmidd@mweb.co.za
Vice-Chairman	Dave Garriock: Mobile: +82-799-5206, e-mail: david.garriock@akzonobel.co.za
Secretary	Joy Woodward: Mobile: +27 072-487-7933 or 021-671-7384; e-mail: capeclivia@ibox.co.za
Treasurer	Clayton Jonkers: Mobile: +83- 267-7206, e-mail: clayton.jonkers@crowehorwath.co.za
Extra Member	Hennie van der Mescht: Mobile: +83-511-9519, e-mail: hvdmescht@vodamail.co.za
Publications	Glynn Middlewick: Mobile: +27 82-650-1463; e-mail: gcmidd@mweb.co.za
Australia	Lisa Fox, 88 Mangans Road, Lilydale, VIC 3140, Australia Tel. +61 417 087 667; e-mail: lisa.fox@gmail.com
New Zealand	Alick Mc Leman clivia@xtra.co.nz>
United Kingdom	Steve Hickman: Riseholme, 54 Greenside Lane, Hoyland Nursery, Barnsley, South Yorkshire, S74 9PZ , United Kingdom Tel: 044 0771 718 2169; e-mail: stevenhickman@btconnect.com
Europe	Aart van Voorst: Tel: +031 25 252 9679; Frederik Hendriklaan 49, HillegomTE 2181, Netherlands; e-mail: a.vanvoorst@snelnet.net
USA	David Loysen, 208 Shaw Hill Road, Stowe, Vermont, VT 05672, USA Tel. +1 802 253 2528; e-mail: shawhill208@gmail.com
Public Relations Officer	Carrie Kruger: Mobile: +83-343-1288, e-mail: utopia@mweb.co.za
Judging Standards	Hennie van der Mescht: +83-511-9519, email: hvdmescht@vodamail.co.za
Registrar of *Clivia* names	Ken Smith: Tel: +61 24 754 3287; e-mail: cliviasmith@idx.com.au
Research	Felix Middleton: Mobile: +27 84 701 9915;

CONTACT DETAILS OF SOUTH AFRICAN CLUBS AND INTEREST GROUPS

Border Interest Group	Peter Miles: Cell: +27 83-463-6229; e-mail: petermalcommiles@gmail.com
Cape Clivia Club	Joy Woodward: Cell: +27 72 487 7933; e-mail: capeclivia@ibox.co.za
Eastern Province Clivia Club	Chairman – Marius Meyer: Tel: +27 61-405-4501; email: marius@mla-ec.co.za
Free State Clivia Club	David Fourie: Cell: +27 72 614 3091; e-mail: fouriedm@telkomsa.net
Garden Route	Rocco Kriel: Tel: +27 44 879 0040; Cell: +27 83 653 9644; e-mail: kriel@telkomsa.net
Joburg Clivia Club	Glynn Middlewick: Tel: +27 11 476 1463; e-mail: gcmidd@mweb.co.za
KwaZulu-Natal Clivia Club	Alfred Everson: e-mail: alfred.everson@arcelormittal.com; Cell: 083 304 0826
Lowveld Clivia Club	Secretary: Morne Dorfling Cell: +27 83-282-8053; email mornedorfling75@gmail.com
Northern Clivia Club	JJ van Wyk: Cell: +27 83-307-7707; e-mail: jjvwyk@iafrica.com
Northern Free State Clivia Club	Stefan Ferreira: Cell: 083-663-0046 e-mail: stefanoutdours@gmail.com
NKZ-N (Newcastle) Interest Group	Alfred Everson: Cell: +27 83 304 0826; e-mail: Alfred.Everson@arcelormittal.com
Overberg Clivia Interest Group	Felicity Weeden: Tel: +27 78 710 9485; e-mail: fillylilly@telkomsa.net
Vryheid Interest Group	Nico Grobbelaar: Cell: +27 84 273 1632; e-mail jannic5603@gmail.com

ISSN 1819-1460