NZ CLIVIA CLUB INC NEWZLETTER

Volume 7.3 Winter 2009

IT'S SHOWTIME!

Spring has sprung, the blossom is out and clivias are starting to bloom. So it's time to have a look through your plants for likely show candidates. Beautiful clivias, interesting clivias, we encourage you all to enter your favourite plants in the shows. The first show is in Tauranga on Sunday 27th September from 1.00 to 4.00 pm at Plantstruck Nursery, 139 Te Puna Road, Te Puna. The Auckland Show is on Saturday 3rd October at the Botanic Gardens, Hill Road, Manurewa from 9.00 am to 4.00 pm. Contact details in the What's Happening section.

The shows last year were a great success.

BIG DAY OUT.

Blessed by good weather, our Saturday outing combined with the AGM made for a fun Clivia day for all.

Starting off in the morning at Ian and Shirley Baldick's place at Ramarama, a good crowd came to view their garden to enjoy the beauty of the Magnolias and the many interspecifics in flower under the trees.
From there people carried on to Terry and Pam Hatch's place, Joy Plants, further up the road in Pukekohe East.
A sausage sizzle was laid on by the club and the smell of onions certainly got appetites going well. Some attendees added to the feast with their kind donations of cakes, scones and chocolates and that was really appreciated by all. Thank you to those members.
There was plenty to look at with Clivia book's, seeds and plants for sale. The Clivia display always starts good conversations and questions seeking breeding tips.
In all, about 60 members turned up from as far afield as Wellington, Whangarei, Tauranga, Rotorua and New Plymouth so a lot of socializing with old friends and acquaintances and new friends made.
The results of our AGM saw a new Chairman for the coming season in Terry Hatch. Other new members to the committee were Keith Hammett (Our original Chairman) and Rao Kamineni. Existing members continued on being Alick McLeman, Tony Barnes, David Olsen and Diana Holt.
Ian Baldick resigned as Chairman and from the committee but we know he will be around at our meetings. Thank you Ian for all your hard work over the years. Your voice rounding up the troops will also be missed! Chris Webb also stepped down from the committee but will fill the role of Club Auditor keeping in touch with our progress
After the meeting there was a tour of Joy Plants by Terry and Lindsey, which is always enjoyed by everybody. The Hatch's clivia thrive under the canopy of Totara trees which seem to have a magical symbiotic relationship with their clivia plants.
It was great seeing so many members enjoying the day and the good friendships shared.
A special thanks to Ian and Shirley, Terry and Pam for sharing your beautiful properties with us all.
We look forward to meeting with our friends again at our Shows in September and October.

Ian and guests under the Magnolias.

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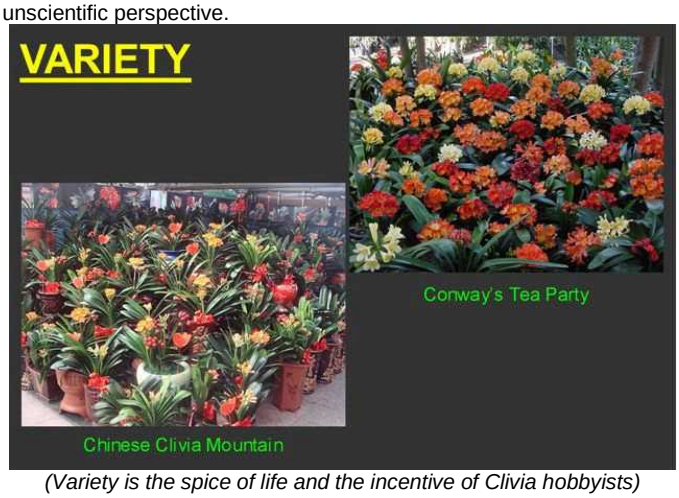
HYBRIDISATION STRATEGIES FOR THE HOBBYIST

By Alick Mcleman

(Based on a slide presentation at a meeting of the New Zealand Clivia Club on 29th July 2009)

Perhaps a more appropriate title for this article would have been "**Foolin' around with Clivia**". I have no horticultural or scientific background. A banker in my other life, I have been 'playing' with clivia for the past 18 years, ever since I first saw a lone C miniata in flower under a tree in a newly acquired garden in Johannesburg. At the time I didn't even know what a clivia was, but it was love at first sight and I snaffled the clivia away from my green-fingered wife, Frances, who had excitedly discovered how easy it was to grow them from seed.

Apologies therefore to the scientists in our ranks for my somewhat unscientific perspective.



(Variety is the spice of life and the incentive of Clivia hobbyists)

My hybridising of clivia has been influenced by two fundamental concepts:

1. The first is Mendel's theory, which I have come to interpret as "**What you put in, is what you get out**". As I understand Mendel's model if you breed for any genetic trait, that trait could re-emerge in the 2nd and later generations. It follows that one can set goals based on genetic characteristics in a first generation cross. To illustrate, if you set a goal of producing a yellow pendulous plant you could cross a yellow miniata with an orange gardenii as depicted in the table. In the first generation (F_1) this would produce 100% orange, very similar, semi-pendulous, slightly-flaired flowers. If the siblings are then crossed (F_2) 25% of the progeny will be yellow (depicted by the yellow block of squares) and 25% of these yellow clivia will tend toward the gardenii form, 25% toward miniata, and 50% would be somewhere in between. You've now reached your objective of yellow, pendulous clivia. But your goal could have been for other traits like plant form, leaf width, floret count, colour distribution, etc., etc. And the progeny will, of course, have inherited genetic traits other than your prime objectives as well.

	Open Orange	Pendulous Orange	Open Yellow	Pendulous Yellow
Open Orange	Open Miniata Type	Open Semi Pendulous	Open Split yellow	Semi Pendulous Split yellow
Pendulous Orange	Open Semi Pendulous	Pendulous	Semi Pendulous Split yellow	Pendulous Split yellow
Open yellow	Open Split yellow	Semi Pendulous Split yellow	Open Yellow	Semi Pendulous Yellow
Pendulous Yellow	Semi Pendulous Split yellow	Pendulous Split yellow	Semi Pendulous Yellow	Pendulous Gardenii Type Yellow

WHAT YOU PUT IN - IS WHAT YOU GET OUT

Mendel's Model

2. The second concept has to do with the pigments in the clivia flower. In 2004/5 the New Zealand Clivia Club through Dr Keith Hammett sponsored an experimental pigment analysis of a range of clivia flowers. This was first published in the club Newsletter Vol.3.1. of March 2005 and is reproduced in this issue. This helped me to appreciate the artists' palette that we have to work with.

As illustrated in the table below we have two pigments to work with, red anthocyanins and yellow carotenoids, the red pigments in the surface cells and the yellow in the fleshy cells behind. In effect we are looking through a red filter into a yellow background, hence the dominant orange colouring of clivia.

But it is not like applying paint with a paint brush. The pigments are rather of the nature of the dot-matrix used in newsprint. The variation in colour is thus due to a change in intensity of pigment 'dots' and not a colour change, and this variation in intensity can occur in either the red or yellow pigments, or both. So red, orange and peach flowers all have the same red anthocyanin and yellow carotonoids, but the intensity varies. Flowers are yellow in the absence of red anthocyanins and white in a flower is due to the complete absence of any pigment in that part of the floret, the air in the empty cells appearing white in the same way as a waterfall appears white, because of the air bubbles.

CLIVIA FLOWER PIGMENTATION ANALYSIS

FLOWER COLOUR	CAROTENOID	ANTHOCYANIN	RATIO
Dark red	8.2	1.6	5.1
Orange	3.2	0.35	9.1
Pastel (dilute orange)	4.2	0.21	20
Chubb's Peach	4.8	0.07	68
Dark Yellow	9.6		
Near White	1.4		

Pastel Queen

So you can draw logical conclusions to use in creating your masterpieces. The darkest reds have the highest intensity of anthocyanins, the dot matrix being so intense as to be opaque (and the analysis also detected blue pigments in the darkest reds, which adds another dimension); the peaches and pastels have low levels of red anthocyanins and a relatively high level of carotenoid, so you're seeing a lot of yellow through a relatively transparent red filter; and the 'near' whites have a very low carotenoid level because you are looking mostly at empty air-cells; and if you then superimpose a low red anthocyanin filter over the latter the colour will tend to be pink.

And so the clivia hybridist wields his artist's brush in the combination of these two concepts.

Breeding for colour: Colours of similar pigment intensity will tend to breed true. Crossing your deepest reds will tend to produce more reds but with some variation in the intensity, and in some the red may be even more intense than in the parents. This is how one would breed for more intense reds.

Similarly, crossing your deepest compatible yellows will tend to produce a few deeper yellows, and crossing your palest compatible yellows will produce a few that are paler, leading to near whites and ultimately, perhaps, the white clivia. (*Note on compatibility: The genetic defect which resulted in the failure to produce red anthocyanin pigment in yellow clivia can occur in different genes or at different levels in the chemical process, hence we refer to group 1 & group 2 yellows, and there are perhaps other yellow groups as well. All group 1 yellows will have the same genetic defect and if crossed with another group 1 yellow will produce 100% yellow progeny. The two plants are then said to be compatible. If crossed with a yellow of another group the progeny revert to orange. Most yellows in New Zealand will be compatible group 1 yellows*)

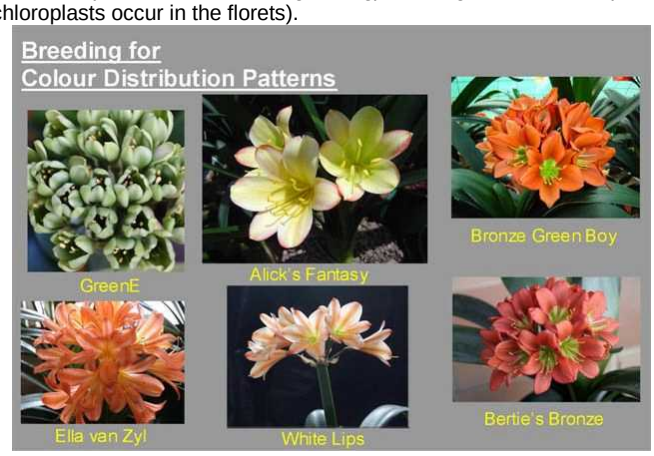
There are however exceptions. Some peaches have arisen as natural mutations in habitat and in cultivation. Chubb's Peach and some other peach strains are said to be 'group 1' and compatible with group 1 yellows, that is if crossed with group 1 yellows they will reproduce 100% peach or yellow progeny in the first generation. Most peach plants of this strain have already been crossed into yellow to improve the flower form and, in my opinion, tend therefore to behave as though 'split for' yellow. (*See the next subheading*).

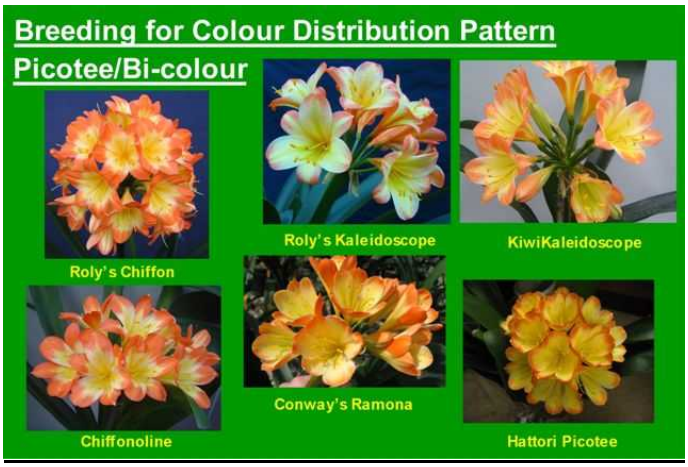
Another group of peaches, which include Cameron's or Tipperary Peach, the Californian Victorian Peach, etc, will also in my experience breed true, but if crossed with group 1 yellow or the Chubb's Peach strain will revert to orange in the progeny. Similarly, pastels, which have similar pigmentation intensity to the peaches but have been produced by diluting red pigments through repeated crossing with yellows, and are therefore split for yellow should reproduce pastel and yellow if crossed.

Recessive Genes/Recovery of colour & other traits: Helen Marriot of Melbourne in an article on interspecific breeding stated:
"*In much of his breeding Nakamura (a leading Japanese breeder) has commonly used orange and yellow forms of C. miniata, his notion being that use of different species and colours in combination could give rise to new mutations, including colour mutations*".
As already pointed out in the discussion of Mendel's model, crossing a yellow with an orange will result in 100% orange progeny. However, the gene(s) responsible for the failure to produce red anthocyanin pigments in the yellow is recessive, and the orange clivia is said to be 'split for' yellow. (The correct term is 'heterozygous', but I can't even pronounce the word) The point is that plants can be split for traits/colours other than yellow and these traits/colours can then be recovered in later generations as per Mendel's model.
A particular interest of mine has been to recover rare colour forms using this principle. So for instance I have been able to recover the 'non-group 1 or 2' Thurston Alpha and Thurston Beta yellows through sibling crossing seedlings where the Alpha or Beta were either an ovary or pollen parent.

The rare Wittig Pink is by all accounts sterile to its own pollen, but I've been able to recover the colour by sibling crossing Wittig Pink X Chubb's Peach hybrids. Similarly I have been able to reproduce in a plant I registered as 'Golden Dusk®' an extremely rare habitat plant colour, Thurston Ngidi Pink Champagne, again by sibling crossing a hybrid with the Ngidi Pink as one of the parents.
At present I am aiming to recover the lovely Conway plant, Sunrise-Sunset, by sibling crossing Sunrise-Sunset/Twins Yellow hybrids, all of which flowered orange.
But recovery possibilities are by no means limited to colour. The same can be said for colour patterns, umbel, floret and foliage forms, variegations, multipetals, etc.

Breeding for Colour Distribution Patterns: Another area of interest to me is the variation in colour distribution through the florets, resulting in bicolours and picotees (where the red pigments display as a trim at the edges of floret), splashes (where the red pigments display as irregular blotches of colour), white lips (a sort of reverse picotee with a white trim displaying at the edges of orange to red florets), ghosting (a fading of the red pigments in the petals), watercolours/party-colours (a washed effect in pastels, similar to ghosting), and green throats (where chloroplasts occur in the florets).





In most instances the inheritance of colour distribution patterns will also be genetic and, for instance, in repeated crossings of bicolour forms some progeny will tend towards the picotee form. A plant which some have found to be particularly effective in this form of hybridisation is Roly's Chiffon, a plant selected for its deep white throat out of the large plantation of Roly Strachan in KwaZulu Natal. This is illustrated in a plant I've named 'Chiffonoline' produced from a cross between Roly's Chiffon and Crinoline, another Strachan selection. Similarly, I produced KiwiKaleidoscope® through another Strachan plant, Roly's Kaleidoscope. But I still have a way to go towards some of the lovely picotees that have been produced internationally, such as Conway's Ramona and the Japanese Kazumi Hattori picotee in photo, but I'm working on it.

Breeding for Form of Florets and Umbel: It may be desirable to cross plants with a view to improving the umbel or floret form through the selection of parent plants which have a high floret count (30 plus) or larger than normal florets, recurved petals, etc. Worthy of mention is Vico yellow, a plant which has been used all over the world to improve floret form. David Brundell in Auckland has done a lot of work with an original Vico clone gifted him by Sir Peter Smithers, improving not only yellows but other colours as well, producing plants with huge umbels and giant florets.

(John Meyer's head in photo illustrates the size of the umbels).

Vico was later extensively used by Yoshi Nakamura in Japan and I have used some of his genetic material in breeding for recurved petal florets, a form I find most attractive because of the 'eyelash' appearance of the protruding anthers.

Similarly, plants are being bred for petal forms like multi-petals, keeled petals, and even plants with no petals at all. Some find very wide petals attractive while others strive for a spider form with narrow petals. It's a matter of personal preference.

Breeding for Foliage Form and Appearance:

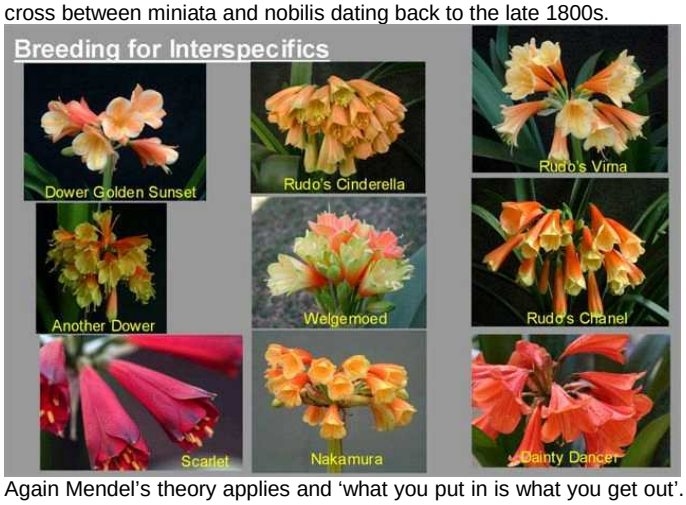
For years the Chinese and Japanese have been concentrating on foliage, striving to produce ever smaller plants with leaves as wide as they are long, and using the Japanese Daruma as base.

Some have lovely variegated leaves with vertical stripes of white and pale green contrasting with the darker green of the leaf. There are even plants with attractive horizontal variegations of different types, referred to as Akebono in Japan or LOB (Light of Buddha) in China. Very little hybridising has been done with these plants in New Zealand and even in China and Japan not much has been done to improve the flowers and colour range.

It would seem that variegation is passed on through the ovary parent, the vertical variegation being caused by a genetic defect in the meristem of the plant failing to produce chloroplasts. This defect then reflects itself as a stripe as the leaf grows out of the meristem, the width and number of stripes being dependent on the number of defective cells in the meristem. This defect/stripe can carry through to the peduncle & pedicles and on into the berries and seeds, producing another generation of variegates. It is generally accepted that ovary parents with pin-stripe variegations make the best mother plants.

Inter-specific Breeding:

This is the area of clivia hybridisation which is stimulating so many around the world. All clivia species will cross with one another. Although flowering at different times, pollen can be stored indefinitely in the freezer to facilitate hybridisation between the species with spectacular results. The Australasian cyrtanthiflora, which is fairly common in various parts of New Zealand & Australia, was an early cross between miniata and nobilis dating back to the late 1800s.



Again Mendel's theory applies and 'what you put in is what you get out'. Crossing different colour miniata with one of the pendulous species will produce attractive F1 progeny, all very similar, semi-pendulous, midway between the two species in form and in similar shades of pastel, orange or red, sometimes retaining the green tips of the pendulous species. These F1 plants are then split for the miniata colour which may be recovered in the F2 and later generations.

It has been found that caulescens, robusta and gardenii lend themselves to quick-growing, robust progeny when crossed with miniata, with the former two species perhaps contributing to a higher floret count in the progeny.

Many are tempted to cross the F1 back to miniata, but in doing so are diluting the genetic contribution of the two original parents, and I suggest that better results could be obtained by sibling crossing the F1 seedlings so as to exploit their genetic base to the full.

Sourcing Breeding Material:

So how do you acquire suitable breeding material?

While some quality plants can be obtained at reasonable prices here in New Zealand, some of the really special stuff costs a fortune. For instance at an auction at the 2006 clivia conference in South Africa a top price of R30000 (NZ$6000) was paid for green-throat yellow. The asking price for a very desirable Bronze green-throat, Bertie's Bronze, is $2000. And these prices are far from unusual. Add to that the importation and quarantine costs and you'll soon run out of money unless a millionaire.

The point is that this genetic material can be acquired by way of seed. My experience is that imported plants take a fair while to recover from the trauma of importation and, in some instances, the change from one hemisphere to another, so that flowering is sometimes delayed for a number of years. This makes seed grown plants a viable alternative.

Here in New Zealand seed is made available from time to time though the New Zealand Clivia Club. The writer produces an annual international seed catalogue in February/March each year and anyone wishing to be placed on the emailing list can email me at clivia@xtra.co.nz. Otherwise there are numerous international growers of note who make seed available, but in particular both the KwaZulu-Natal Clivia Club (Brenda Nuss nuss@futurenet.co.za) and the Cape Clivia Club (Mick Dower jdower@iafrica.com) produce comprehensive annual seed catalogues. This is a great way to build up your collection. And reading international clivia publications will help you to identify desirable genetic material.

And you will also find that established growers are very generous when it comes to making pollen availablefrom their best plants.

The Future: New genetic material is constantly becoming available. For instance a group of miniata plants discovered in a Transkei habitat in the 1990s and appropriately named the Appleblossom complex (Q1; Q2; Q3; etc) because of the colouring are now becoming more widely available. These have already been used to produce lovely pink colours. The new species C mirabilis was only discovered a few years back. Then we have the blue pigments found in clivia like Conway's Jean Delphine. All have the potential to add a new dimension to clivia hybridising. The future has to do with what **YOU** are able to create with the resources at **YOUR** disposal.

HAVE FUN FOOLIN' AROUND WITH YOUR CLIVIA

***Clivia* Flower Pigment Analyses**
Sponsored by the New Zealand Clivia Club
Experiment organised by Dr Keith Hammett
Analyses conducted by Dr Ken Markham at Industrial Research Ltd, Lower Hutt, New Zealand

Salient Points:
Questions posed
a. What is the relationship between red, orange and pastel (dilute orange) coloured blooms ?
b. What is the relationship between dilute orange and peach colouration ?
c. What is the relationship between dark yellow and palest cream ?
d. Can putative Type I and Type II yellows be distinguished on the basis of flower pigment analyses ?
e. Do pendulous species such as *C. nobilis* and *C. caulescens* have similar pigment profiles to *C. miniata* ?
f. If so can these parents be detected in interspecific hybrids ?
Analyses not requested
a. Presence or absence of chlorophyll, the only green pigment found in plants.
b. pH of each sample.
Limitations
a. Need to obtain a range of samples at the same time and to send these quickly to Wellington.
b. Pigment is not evenly distributed either within or between tepals.
c. The colour of tepals is seen to change as they age.

Methods
a. Tepals were removed from fully opened mature, but fresh flowers, and sent for analysis on Monday 11 October 2004.
b. Ideograms were prepared indicating colour chart readings of perceived areas of colour for both inner and outer surfaces of both petals (broad) and sepals (narrower).
c. Separate recordings were made using the Cape Clivia Club (CCC) and the Royal Horticultural Society (RHS) colour fan 1966 edition. In many cases the ranges of colours on the CCC chart were inadequate to make a recording.

Chemical Analyses
a. Petals were organised into samples of comparable weight.
b. Samples were ground and pigments extracted in appropriate solvents.
c. Carotenoid pigments were estimated by absorption spectroscopy.
d. Anthocyanin pigments were estimated by:
(i). Absorption spectroscopy.
(ii). Two-dimensional paper chromatography examined under UV light.

Results
Samples were supplied numbered at random so the analyses were carried out blind. The analyst had no knowledge of the questions until the analyses were finished.
The results have been reordered in the table to reflect the questions posed. Numbers 1-6 in column 4 represent a progression from darkest red to palest dilute orange.
The original clonal 'Chubb's Peach' is compared with a derived peach at positions 7 & 8.
Positions 9 & 10 compare a dark yellow with a very pale cream, while 11 is a putative Type II yellow.
Single accessions of the species *C. nobilis* and *C. caulescens* are compared at positions 12 &13, while hybrids involving these taxa are shown at positions 14 & 15.
Examples of absorption spectra for carotenoid pigments are presented in the graph.

Discussion.
It has been established previously that Clivia flowers have a dual pigment system. Yellow colouration is the result of carotenoid pigments. These may be thought of as oil paints. They occur in deeper cell layers and are contained in little sacks called plastids.
Unlike many other flowers, Clivias do not have water based yellow flavonoid pigments.
The surface layers of cells contain the red/blue water soluble anthocyanin pigments so that when we look at an orange coloured Clivia flower, we are looking at a yellow background through a red filter.
Yellow Clivias have been recognized as having lost the ability to produce the red pigments.
This can be clearly seen in the table where the yellow Clivias show no anthocyanins at all.
The dark yellow Clivia 'BLY' shows the highest level of carotenoid pigment while the palest cream shows a very low level and has virtually lost the ability to produce any pigments. This bodes well for the production of a near white flowered Clivia.
It is not possible to distinguish between putative Type I and Type II yellows from these analyses.
In the red/orange series the darkest red Clivia 'Nakamura Crimson' has both more anthocyanin pigments and greater concentrations of these, plus a high level of yellow carotenoid pigments.
The potentially blue pigment Anthocyanin 3 (D-monoglyceride) is well represented which suggests that if pH were to rise, purple colouration might be possible.
At the other end of the spectrum, 'Tony's Pastel' has greatly reduced levels of all pigments.
'Nakamura's Bronze' owes its bronzing to the presence of chlorophyll, although analyses were not carried out to determine the levels of this pigment.
The peaches are interesting as they indicate that although anthocyanin pigments were not easily visible on the paper chromatograms they were present at very low levels and are still acting as visual filters. The ratio of carotonoids to anthocyanins is very high, even if the
carotenoid levels themselves are not especially high.
In as much as Tony's Pastel has been obtained by serial backcrossing to yellow, the data suggest that if this process were continued, perhaps using a dark yellow, peach colouration
might be obtained by this route. There is no evidence from our data to support the hypothesis of peach colouration being a distinct single gene mutation comparable to that causing yellow colouration.
Although in the table, the data for carotonoids are presented as if it were a single pigment, like the anthocyanins, it is made up of different components. These can be seen in the carotenoid spectra graph. The *C. miniata* cultivars 'Chubb's Peach' and 'BLY' have essentially the same profile although the level of 'Chubb's Peach' is half that of 'BLY'. The pattern for 'Nakamura Bronze' is however a surprise as this was considered to be a pure *C. miniata* cultivar.
However, the peak at 416 nm is characteristic of *C. nobilis* (not shown) and the trace is that of a *C. nobilis* x *miniata* hybrid. Presumably the strong chlorophyll component of 'Nakamura Bronze' comes from *C. nobilis* ?
In a similar way, the hybrid nature of 864/04 and 'Armani' is reflected in their carotenoid spectral patterns. This will be reported more fully later.
This single set of analyses on just 15 samples has expanded our knowledge of *Clivia* flower pigmentation, but was essentially a range finding exercise. We are now in a better position to resolve more critical questions. For example the question of pigment expression in relation to cell pH might be explored, while the use of other techniques might resolve whether there is a fundamental difference between putative Type I and Type II yellows and between dilute oranges and peach.
There are strong clues for breeders in the data. Darker yellows, near white cultivars, darker reds and purplish tones appear obtainable, given patience and time. The potential offered by interspecific hybridization has been clear for some time. However the data presented here show that they offer both new pigments as well as variation in flower shape and pigment patterns.
The complexity of the interaction of different pigment systems in *Clivia* underlines the naivety of attempting to construct simplistic genetic models of colour inheritance with no understanding of the physiological and developmental mechanisms that lead to perceived colour in *Clivia* flowers.

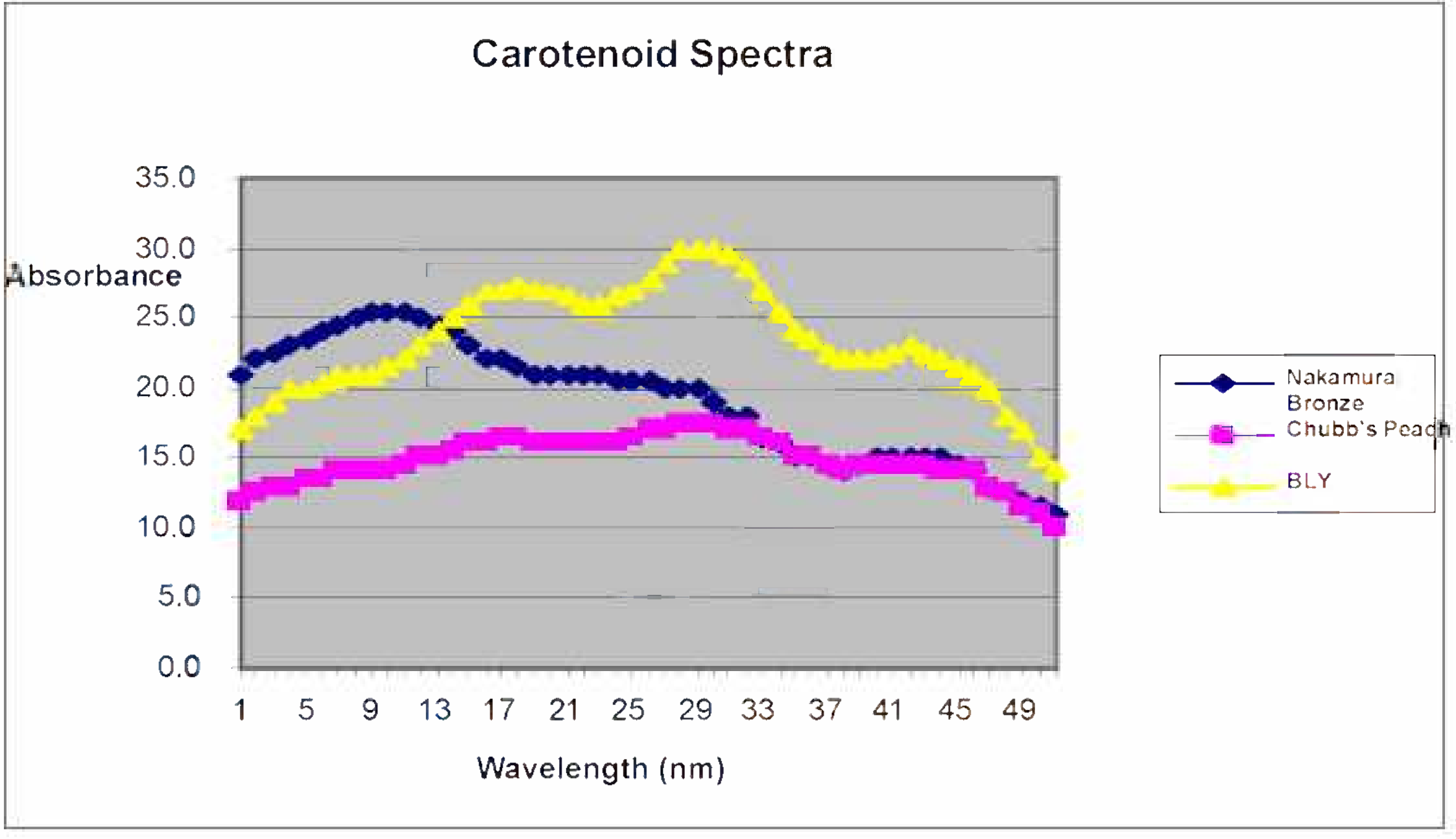
	Name/Code	Observed Petal Colour	Carotenoid	Anthocyanin	Carotenoid/Anthocyanin (C:A ratio)	2D-PC Visible Components***						
						Anthocy-1 (P-monoglyc	Anthocy-2 (P-diglyc)	Anthocy-3 D-Monoglyc)	HC-1	HC-2	HC-3	Flavones/ol
1	Nakamura Crimson	Dark Red	1	8.2	1.61 (5.1)	+++	+++	++	p			-
5	Nakamura Bronze	Bronzed Red	2	5.6	0.88 (6.3)	+++	+++		p			-
11	8319/04 Grandiflora (sic)	Stronge orange German hybrid	3	2.9	1.12 (2.6)	+++	++		p			-
14	NZ miniata	Pale Orange	4	3.2	0.35 (9.1)	+	+	w	p	p		-
8	Peach Melba	Mid Pastel (Dilute orange)	5	4.2	0.21 (20)	+	+	+	p	p		-
4	Tony's Pastel	Palest Pastel (Dilute orange)	6	2.8	0.09 (31)		+		p	p	p	-
6	Chubb's Peach	Original Peach mutation	7	4.8	0.07 (68)	w			p	p		-
3	Alick's Peach	Derived Peach	8	3.8	0.06 (63)				p	p		-
7	BLY	Dark yellow	9	9.6	-				p	p	p	-
10	8160/04 Palest yellow	Palest yellow	10	1.4	-				p	p		-
2	Natal Yellow	Putative type 2 yellow	11	7.2	-				p	p	p	-
12	C. nobilis	Species	12	2.8	0.47 (6.0)	w	++		p			-
15	C. caulescens	Species	13	1.4	0.09 (16)	w			p			-
9	864/04 C.caulescens x m	Interspecific hybrid	14	2.3	0.25 (9.2)	+	++	w	p	p	p	-
13	Armani	Interspecific (C. nobilis x miniata ?)	15	2.8	0.33 (8.5)	++			p	p	p	-

Notes

*Carotenoids expressed as β-carotene equivalents in mg/g of live petal x1000.

**Anthocyanins expressed as pelargonidin-3-glucoside equivalents in mg/g of live petal. Carotenoid Anthocyanin (C:A) ratio in parentheses.

***P=pelargonidin-like; D=delphinidin-like; HC=hydroxycinnamic derivative; + =relative level, p=present; w=


Carotenoid Spectra
Absorbance
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1
5
9
13
17
21
25
29
33
37
41
45
49
Wavelength (nm)
Nakamura Bronze
Chubb's Peach
BLY

OPEN DAYS

At the AGM growers were encouraged to open their collections / gardens to members and visitors during the miniata flowering season.

Here is a list of the open days for growers in the Auckland area:

Saturday/Sunday 19/20th & 26/27th September 2009 **Dawn to Dusk**

David Brundell, Gardenza, Glenbrook Beach Road, Waiuku

Saturday 19th September 2009 **9.00am to 4.00pm**

Alick McLeman, 26 Merfield Street, Glen Innes, Auckland

Saturday 26th September 2009 **9.00am to 4.00pm**

Dr Keith Hammett, 488C Don Buck Road, Massey, Auckland

Terry, Pam & Lindsey Hatch, Joy Plants, 78 Jericho Road, Pukekohe East

Alick McLeman, 26 Merfield Street, Glen Innes, Auckland

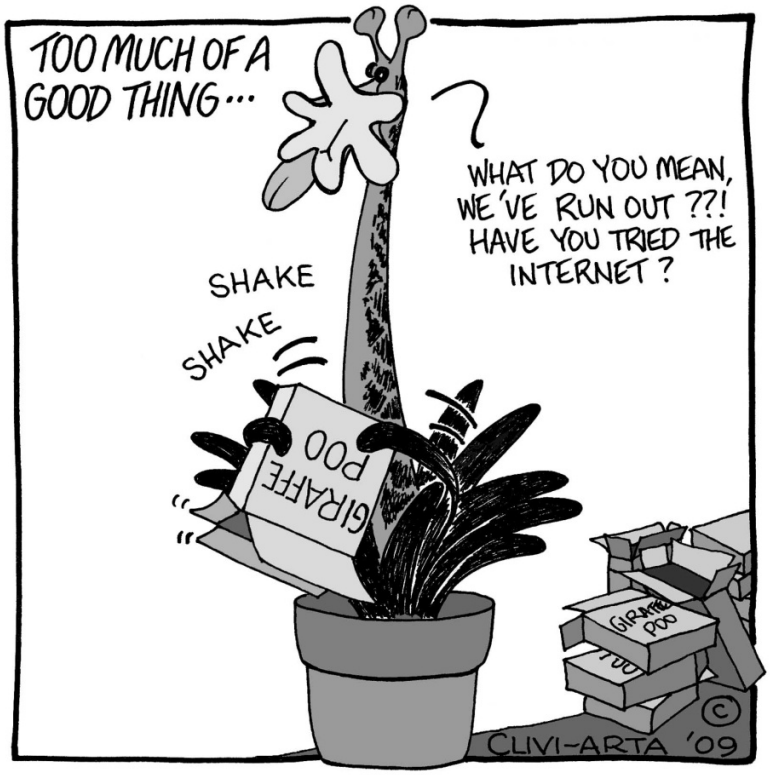
Bring a friend, wear sensible shoes & pack a picnic basket

WELLINGTON OPEN DAY

Here is an opportunity for our Wellington members to visit an extensive planting of clivia. Mike and Janet Askew are opening their garden to the public on Sunday October 4th , the date chosen because the clivia will be in flower. This will be a fundraiser to help sufferers of Huntington's Disease and there will be a gold coin donation for entry.

There will be plants and other items on sale towards a good cause. The address: 149 Old Hautere Road, Te Horo

Phone: 06 364 2414, or 027 453 1521



What's Happening

Open Day

Saturday/Sunday 19/20th & 26/27th September
Gardenza , Glenbrook Beach Road, Waiuku

Saturday 19th September
Alick McLeman, 26 Merfield Street, Glen Innes

Saturday 26th September
Dr Keith Hammett, 488C Don Buck Road, Massey
Joy Plants, 78 Jericho Road, Pukekohe East
Alick McLeman, 26 Merfield Street, Glen Innes

Tauranga Show

Sunday 27th September 1.00am – 4.00 pm at Plantstruck Nursery, 139 Te Puna Road, Te Puna.

Auckland Show

Saturday 3rd October 9.00am - 4.00pm at Botanic Gardens, Hill Road, Manurewa.

Caroline's Pride, a yellow C. Robusta

Interspecific grown by Jude Shapland