

# C CONTENTS

Editorial		3
Genetic Variation in <b>Clivia</b>	— Johan Spies	6
<b>Clivia</b> Under Threat	— Vivienne Williams	12
Pollination in <b>Clivia</b>	— John Manning	17
The Significance of Colour and Ultraviolet Patterning in <b>Clivia miniata</b>	— John Manning	23
Photographing <b>Clivia</b> in the Ultraviolet	— Ian Coates	26
Why do <b>Clivia</b> Flower when they do?	— John van der Linde	27
Odd Umbels	— Roger Dixon	29
Photographic Competition Winners		30
What's in a Name?	— Johan Spies	32
Nuclear DNA Content in <b>Clivia</b>	— Ben Zonneveld	35
In Search of <b>Clivia mirabilis</b>	— Hein Grebe	38
<b>Clivia nobilis</b> — Cinderella of the <b>Clivia</b> World	— Charl Malan	45
The <b>Clivia</b> at Mbashe	— Allan Tait	47
<b>Clivia miniata</b> 'Bella Donna Oprah'		49
2004 Show Selection		50
<b>Clivia robusta</b> — the "Swamp <b>Clivia</b> "	— Keith Hammett	56
<b>Clivia robusta</b> 'Maxima'	— Roger Dixon	62
<b>Clivia gardenii</b> — Autumn's Delight	— Brian Tarr	63
Yellow <b>Clivia miniata</b> from the Habitat	— Fred van Niekerk	67
<b>Clivia miniata</b> — Colour Mutations and their Breeding	— Sean Chubb	75
Have Genes, Will Travel — on the Trail of 'Vico Yellow'	— Roger Dixon	78
Single Flowers		82
New Developments in <b>Clivia</b> Breeding in Japan	— Shigetaka Sasaki	86
Fungal Pathogens Associated with <b>Clivia</b>	— Wijnand Swart	91

# Editorial

This Yearbook is mainly about the various *Clivia* species as they are found in the wild. The reason for this will become apparent to you as you read this Editorial.

A wide range of topics is covered. For the first time we have some clarity on the nature of the pollinators of the various species and on how the plants so artfully attract them to visit their flowers. Articles about *Clivia* breeding, the main interest of many of us, feature again, though less prominently than last year. There are also photographs of Show winners, and the best of the entries in the Clivia Society Photographic competition.

Speaking of photographs, we are delighted to be able to provide a forum for the publication of pictures, not only of plants in the wild, but also of some of the wonderful plants that are increasingly being bred by enthusiasts around the world. Please continue to share them with us. The old saying that a picture is worth a thousand words has much validity for many of our readers, especially where photos provide them a neat balance to the more scientific or technical articles that are meat and drink to others.

Several articles, and the photographs which illustrate them, highlight the diversity of the gene pools in the wild, diversity that is increasingly under threat. Indeed, habitat destruction and the relentlessly growing demand for *Clivia* for traditional medicine ('muti') purposes may lead to some local populations becoming highly endangered or even extinct, as Vivienne Williams warns in her article, "*Clivia* under threat".

Even where cultivated plants have been made available to traditional medicine practitioners, their wild cousins are regarded as more potent in medicinal and magic properties, the

slow-growing *C. nobilis* being highly sought-after. The problem with this indiscriminate harvesting of *Clivia* – the whole plant is pulled out by the roots, which are usually chopped off for easier transportation of the parts – is its total and utter unsustainability. Possibly as many as 30 000 to 40 000 plants a year of all the species, except *C. mirabilis*, are being taken from their natural habitats in the Eastern Province, KwaZulu-Natal, Mpumalanga, and even the neighbouring country of Swaziland, for sale in traditional medicine markets throughout South Africa. *Clivia* grow in isolated stands, and whole populations, with bewildering genetic diversity that has arisen over thousands or even millions of years, can be wiped out quite easily. A rare population of naturally occurring hybrids is a case in point, as described for us by Allan Tait in his article, "The *Clivia* at Mbashe". Indeed, many populations of *Clivia* in many parts of the country have long since disappeared.

The largest known population of yellow-flowering *C. gardenii* is in the news. The plants grow in the protected Ngame Forest in northern KwaZulu-Natal, some 120 km north of where the first yellow-flowering *C. miniata* was found. This variety has recently been described and named *C. gardenii* var. *citrina*. The article "*Clivia gardenii* – autumn's delight" by Brian Tarr places this variety in the context of the entire *C. gardenii* complex. Their relative inaccessibility should have provided them with some protection against illegal plant collecting, but unfortunately even they are not safe – some of the best populations have already been removed.

South Africa has laws to protect the most endangered species within its borders. Penalties for violating these laws include

heavy fines and imprisonment. But, as so often happens, there is a discrepancy between law and practice, and *Clivia* parts are freely transported from where they are collected to where they are displayed and sold. It would appear that the reason the authorities are not prepared to enforce the laws to protect *Clivia* is because of their importance as powerful 'muti' and because the 'industry' provides at least some employment for thousands of otherwise poverty-stricken people.

Also, as John Winter said in his paper "Collecting *Clivia* in their natural habitat", delivered in 2002 at the Third International *Clivia* Conference, "...many *Clivia* populations have been destroyed through the harvesting of timber for building, firewood, and to establish arable land. This destroys the shade canopy and ultimately results in the death of the *Clivia* population which grew in the shade of these trees". In addition, some members of the horticultural trade and some *Clivia* enthusiasts have collected selected forms from the wild.

The world-renowned Pondoland centre of plant endemism, the habitat of the recently named *C. robusta*, which is described for us in an article by Keith Hammett, is at also risk, but for another reason. There is a proposal for a major new toll-road to be built through the area.

So, dear readers, we trust that you will enjoy reading about *Clivia* in the wild. May these articles and the accompanying pictures inspire you to join the tours to *Clivia* habitats that are being arranged as part of the 2006 International *Clivia* Conference. This occasion may well provide one of the last opportunities to see *Clivia* in their habitat, other than on privately-owned land.

There is of course an intimate relationship between naturally occurring diversity and *Clivia* breeding. Plant breeding has often been described as 'the management of evolution', with selection by man replacing natural selection.

As we raise more highly-bred 'domesticated' plants it becomes all the more important that a wide pool of genetic diversity is preserved in nature, in national botanical gardens and in the collections of private individuals – let 'Conservation by propagation' be our motto. Unless this is done, we the current generation of *Clivia* breeders, with our ever-increasing emphasis on the creation of highly-specialized plants with a narrow genetic base are, in effect, working against the interests of future generations of breeders.

There has been much comment and also heated exchanges in the *Clivia* world for many years now, mainly about a taxon which had not been clearly and categorically placed, due to its somewhat variable nature and appearance. We are referring to the saga of the 'Swamp *Clivia*', now formally described as *C. robusta*. This taxon has been variously identified and misidentified on the basis of its size, its leaf shape, its habit and its habitat. A number of papers in this Yearbook pertinently address the issue in looking at what exactly is a species and how does one circumscribe it, and also consider the variation to be found within such a species.

The evolution of the genus itself is also looked at, and Ben Zonneveld's contribution on DNA content supports the progressive evolution of *Clivia* from the most primitive form *C. mirabilis* through *C. nobilis*, *C. robusta*, *C. gardenii* and *C. caulescens*. Previous work has shown that *C. miniata* is closer to either *C. gardenii* or *C. caulescens*. The difference between these pendulous species and the open-flowered *C. miniata* is very noticeable, but genetically small. Is it not possible that the mutation that gave rise to the open flower arose at various places within the distribution of the pendulous species, thus explaining the very wide range of *C. miniata* when compared to the very distinct ranges of the pendulous

species? This would also explain the very great variation found in *C. miniata*, both physically and genetically. The DNA-based research published to date does not always give locations for the plants included in the analyses. It would be interesting to see where the plants used in the different phylogenetic analyses came from - maybe the location plays a much bigger role than previously thought.

A recent highlight for many of us has been the release of *C. mirabilis* seedlings to *Clivia* enthusiasts all over the world. These were grown on by John Winter at the Kirstenbosch National Botanical Gardens in Cape Town from seed collected in the habitat at the Oorlogskloof Nature Reserve in Northern Cape - a real labour of love by John and his small team of helpers. The reserve is managed by the Northern Cape Nature Conservation Department and the proceeds from the sale of these plants will be used to benefit the local people.

This is an excellent example of enlightened authorities cooperating with *Clivia* enthusiasts to put into practice the dictum of 'conservation by propagation' for the preservation in private collections of specimens of a rare and endangered species. As a matter of interest, we understand that plants were distributed

throughout South Africa, and also to enthusiasts in Germany, U.S.A, Australia, U.K, Netherlands, Japan, Switzerland, Hungary, Portugal, Sweden Denmark, France and Belgium. Also, plants are being grown on for possible future importation into New Zealand, when the laws of that country permit.

With this exciting species in mind, we trust that you will especially appreciate Hein Grebe's stimulating article about his visits to *C. mirabilis* habitat, and enjoy the photos that illustrate it.

*Clivia* in the wild appear to be hardier than many of the pampered highly-bred plants in our collections. The *Clivia* Society is sponsoring research into the diseases that affect our home-grown plants. The article by Wijnand Swart sets out some of the early results that have so far been obtained.

Finally, we thank all those who have prepared the articles and sent the photographs that have made this publication possible. There is a large and growing body of knowledge and experience within our world-wide '*Clivia* fellowship'. We encourage more of you to share what you know, and to show off the beauty of your plants, by submitting articles and photos for publication in the next Yearbook.

**The Editors July 2005**



Roger Dixon



Claude Felbert



John van der Linde