

Merlin Trip to Dullstroom, South Africa



Observing terrestrial Orchids and other wildflowers

January 2011

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Acknowledgments

I would like to thank the Merlin Trust for awarding me £616 towards this trip and to Joanne Everson, Merlin Trust Secretary for her support with my Merlin trust application.

I would like to thank Gerrit van Ede, Dullstroom Terrestrial Orchid Conference organiser for having the insight to bring together the expert speakers for such a successful conference and for opening my eyes to the wetland and grassland habitats of South Africa.

I would like to thank Gavin Meggy for being my wonderful travelling and plant hunting companion and for doing all the driving.



Botanising in the Veloren Valei Nature Reserve, Dullstroom

Front cover photo – *Brunsvigia radulosa*

Contents

Acknowledgments.....	2
Introduction	6
Aims of Trip	9
Itinerary.....	9
The Conference.....	10
The Dullstroom Wild Flower Show	12
Conference Aims	13
The Lectures.....	13
Lectures and Speakers	14
The Field Guide	14
The Veloren Valei.....	15
Associated Plants	35
Burning Management of Verlorens Valei	40
Long Tom Pass.....	43
Cultivation at Kirstenbosch	51
Conclusion.....	53
Further trips	53
References	55
Appendix 1 – Lecture write up.....	57

List of Plates - All photos are have been taken by Lucy Hart except Plate 10

Plate 1 Gavin standing next to a <i>Brunsvigia radulosa</i> showing its scale	10
Plate 2 <i>Brunsvigia radulosa</i> flower	11
Plate 3 <i>Dierama</i> sp.	11
Plate 4 <i>Gladiolus ecklonii</i>	11
Plate 5 Samples of Veloren Valei flowers	12
Plate 6 Beautiful habitat-like arrangements.....	12
Plate 7 Picked samples for arrangements	12
Plate 8 Children's drawings on their local flora	12
Plate 9 Gerrit van Ede Conference Organiser in Veloren Valei.....	13
Plate 10 Field guide cover (photo: Umdaus Press, 2008)	15
Plate 11 Veloren Valei wetland and grassland habitats	16
Plate 12 <i>Satyrium ocellatum</i>	17
Plate 13 <i>Satyrium neglectum</i>	18
Plate 14 <i>Satyrium neglectum</i>	18
Plate 15 Found the spare wheel	19
Plate 16 <i>Satyrium longicauda</i> inflorescence.....	19
Plate 17 <i>Satyrium longicauda</i> flower.....	19
Plate 18 <i>Satyrium longicauda</i> basal leaves.....	20
Plate 19 <i>Satyrium parviflora</i> inflorescence.....	20
Plate 20 <i>Satyrium parviflorum</i>	20
Plate 21 <i>Satyrium parviflorum</i> basal leaves.....	21
Plate 22 <i>Satyrium trinerve</i>	22
Plate 23 <i>Satyrium trinerve</i> wetland habitat.....	23
Plate 24 <i>Satyrium cristatum</i>	24
Plate 25 <i>Satyrium cristatum</i>	24
Plate 26 <i>Disa versicolor</i>	25
Plate 27 <i>Disa versicolor</i> inflorescence	25
Plate 28 <i>Disa versicolor</i> in the veld	25
Plate 29 <i>Disa cooperi</i> inflorescence	26
Plate 30 <i>Disa cooperi</i> flower	26
Plate 31 buck eaten <i>Disa cooperi</i> orchid	26
Plate 32 <i>Disa rhodantha</i>	27
Plate 33 <i>Disa brevicornis</i>	27
Plate 34 <i>Disa patula</i> var. <i>transvaalensis</i>	28
Plate 35 <i>Disa patula</i> var. <i>patula</i>	28
Plate 36 <i>Corycium nigrescens</i> or <i>C. dracomontanum</i>	28
Plate 37 <i>Schizochilus zeyheri</i>	29
Plate 38 Botanising in the Veld at Veloren Valei with <i>Disa versicolor</i> in the foreground.....	30
Plate 39 <i>Neobolusia tysoni</i>	30
Plate 40 <i>Habenaria dives</i>	30
Plate 41 <i>Disperis tysonii</i> multi flowering stems.....	31
Plate 42 <i>Disperis tysonii</i> flowers	31
Plate 43 <i>Disperis cardiophora</i>	32
Plate 44 <i>Disperis cardiophora</i> inflorescence	32
Plate 45 <i>Disperis cardiophora</i> basal leaves.....	32
Plate 46 <i>Disperis renibractea</i>	33

Plate 47 <i>Eulophia parvilabris</i>	34
Plate 48 <i>Eulophia hians</i>	34
Plate 49 <i>Eucomis van de merwii</i>	35
Plate 50 <i>Eucomis autumnalis</i>	35
Plate 51 <i>Craterostigma wilmsii</i>	36
Plate 52 <i>Moraea elliotii</i>	36
Plate 53 <i>Gladiolus papilio</i>	36
Plate 54 <i>Gladiolus ecklonii</i> (non mottled form).....	37
Plate 55 <i>Agapanthus inapertus</i>	37
Plate 56 <i>Moraea moggii</i>	37
Plate 57 <i>Colchicum melianthoides</i>	38
Plate 58 <i>Aloe ecklonis</i>	38
Plate 59 <i>Crocoshia paniculata</i> in wetland habitat.....	38
Plate 60 <i>Pelargonium luridum</i>	39
Plate 61 <i>Kniphofia multiflora</i>	39
Plate 62 <i>Watsonia confusa</i>	39
Plate 63 <i>Cycnium racemosum</i>	40
Plate 64 Sourveld grasslands at Veloren Valei.....	41
Plate 65 Showing the effects of burning on the right of the photo.....	42
Plate 66 Misbelt grassland habitat on Long Tom Pass.....	43
Plate 67 <i>Disa saxicola</i>	44
Plate 68 <i>Disa amoena</i>	44
Plate 69 <i>Disa amoena</i> flower.....	44
Plate 70 <i>Disa rungweensis</i>	45
Plate 71 <i>Disa stachyoides</i>	45
Plate 72 <i>Habenaria lithophila</i>	46
Plate 73 <i>Schizochilus cecilia</i> subsp. <i>transvaalensis</i>	46
Plate 74 <i>Pterygodium hastatum</i>	47
Plate 75 <i>Satyrium longicauda</i> - half pink half white flower.....	47
Plate 76 <i>Aristea</i> sp.	48
Plate 77 <i>Aristea</i> sp. close up of flower.....	48
Plate 78 Endemic <i>Gladiolus</i> sp.....	48
Plate 79 Endemic <i>Gladiolus</i> sp. growing on the road side.....	48
Plate 80 Pine plantation off Long Tom Pass	49
Plate 81 <i>Disperis lindleyana</i>	49
Plate 82 <i>Disperis virginalis</i>	49
Plate 83 <i>Cynorkis kassneriana</i>	50
Plate 84 <i>Mystacidium flanaganii</i>	50
Plate 85 <i>Begonia sonderiana</i>	50
Plate 86 Graham Duncan, with the orchid collection at Kirstenbosh NB	51
Plate 87 Terrestrial orchid collection during dormant period	52
Plate 88 <i>Lithops</i> sp. growing as a weed in a <i>Brunsvigia</i> pot - a different world of weeds.....	52

Introduction

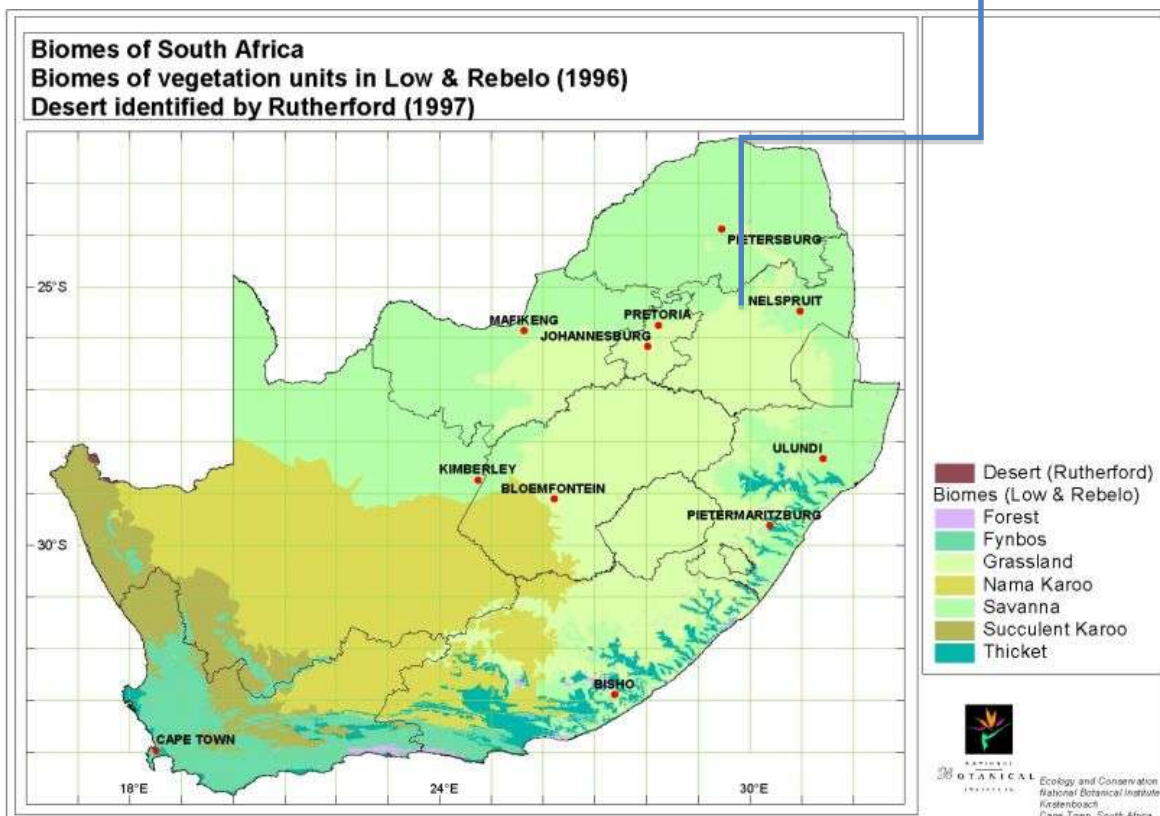
South Africa is world renowned for the diversity of its plant life. The region accounts for less than 1% of the world's land surface but may represent as many as 10% of known species of flowering plants (Manning, 2009). Included within this lies the smallest and arguably the richest of the world's six floral kingdoms – the Cape Floral Kingdom covering 0.08% of the world's land surface, but containing about 3% of the world's plants (SANBI, 2011).

The first major collections of southern African plants reached Europe in the late seventeenth and early eighteenth centuries (Manning, 2009) and since then botanists and horticulturists have been mesmerised by their diversity and beauty. Many South African species such as *Nerine sp.*, *Ixia sp.*, *Scadoxus sp* are highly sought after and admired by UK collectors as well as others with equal admiration such as *Knifophia sp.* and *Agapanthus sp* are the staples of south England's gardens.

This my third trip to South Africa and I am already planning my fourth. Each time I go my eyes are opened to new and exciting species with exquisite blooms that I have never heard of and my trip to Dullstroom, Mpumalanga was no exception.

South Africa is divided into groups called Biomes that are based on dominant forms of plant life and prevailing climatic factors (SANBI, 2011).

Dullstroom, Mpumalanga



Vegetation map of South Africa (SANBI, 2011)

Dullstroom is within the grassland biome which was particularly exciting as I have not experienced this type of vegetation habitat before.

The grasslands cover the high central plateau of South Africa and are defined as those areas where grasses dominates the vegetation and where woody plants are absent or rare. Most grassland occurs in high-rainfall areas, where thunderstorms and hail are common in summer and frost is common in winter. The grassland biome is regarded as the third-richest area in terms of plant species diversity in South Africa , with a total number of 3788 species (Enviro-Info, 2001).

Manning (2009) describes grassland habitats of South Africa as ranking with fynbos and succulent karoo as one of the best vegetation types to see wild flowers.

Aims of Trip

I expect to achieve a greater understanding of terrestrial orchids of this the Dullstroom area by observing their wild habitats under guidance of the expert speakers as well as learning from the formal lectures at the Terrestrial Orchid Conference I am attending. I am especially excited to photograph the wild populations of orchids and to study their associated plants.

Itinerary

Date	Activity	Accommodation
Wed 26 th Jan. 2011	Internal flight (already in South Africa)- depart East London, South Africa, 1805 arrive Johannesburg 1930, with 1Time Airways, then pick up hire car and drive 2.5 hours to Dullstroom, check into accommodation	Rainbow Lodge – self catering chalet, 30 min drive from Conference
Thurs 27 th Jan 2011	Explore the local area in the morning. Conference Registration and Wildflower Show opening in the afternoon - start of the Conference	Rainbow Lodge – self catering chalet, 30 min drive from Conference
Fri 28 th Jan	Terrestrial orchid lectures in the morning and guided field trip to orchid sites in the afternoon	Rainbow Lodge – self catering chalet, 30 min drive from Conference
Sat 29 th Jan	Terrestrial orchid lectures in the morning and guided field trip to orchid sites in the afternoon	Rainbow Lodge – self catering chalet, 30 min drive from Conference
Sun 30 th Jan	All day guided field trip to orchid sites in the Sabie area	Rainbow Lodge – self catering chalet, 30 min drive from Conference
Monday 31 st Jan	2.5hr drive back to Johannesburg Airport. Internal flight - depart Johannesburg 1245 arrive Cape Town 1455	Gavin's Mum's house
Tuesday 1 st Feb	International flight from Cape Town to London Heathrow	

The Conference

During 27 to 30 January 2011 I attend the first Dullstroom Terrestrial Orchid Conference. The conference consists of morning lectures until lunchtime and then afternoon guided field trips to the Veloren Valei Nature Reserve to see the orchids in their natural habitats.

Dullstroom is a pretty village located in the Province of Mpumalanga on the north-eastern side of South Africa, approximately 257kms (159 miles) from Johannesburg. Verlorens Valei is a proclaimed Nature Reserve, about 13 km from Dullstroom. The reserve is in an undisturbed area of the Steenkampsberg Plateau with wide-open rolling grasslands and wetlands. The plateau consists largely of high-altitude grassland, ranging between 1700 and 2274 metres, broken by rocky outcrops. It is one of the highest areas in Mpumalanga (Linx Africa Pagemaster, 2003).

Before the conference started Gavin and I have a chance to explore the local area. The Veloren Valei is only open to the public by appointment and visitors must be with guides so we look for flowers on the road sides for the time being which turns out to be just as rewarding. I had noticed large pink spherical patches in the fields whilst driving over and on closer inspection, I am utterly astounded - it is my first ever sighting of a *Brunsvigia* in the wild, in full flower.



Plate 1 Gavin standing next to a *Brunsvigia radulosa* showing its scale



Plate 2 *Brunsvigia radulosa* flower

Under the APG3 system *Brunsvigia* is now a member of the Alliaceae family (formally Amaryllidaceae). The spectacular inflorescences are huge and we observe some reaching 1m in diameter. At maturity the inflorescence detaches from the peduncle and becomes an excellent dispersal mechanism as it tumbles across the ground in the wind. The capsules split or break open and release the fleshy seeds over long distances (SANBI, 2005).

Other exciting species are sighted that afternoon which gave us a taste of what to expect over the next few days.



Plate 3 *Dierama* sp.



Plate 4 *Gladiolus ecklonii*

The Dullstroom Wild Flower Show

The Conference got underway with an informal meet and greet evening at the opening of the second year of the Dullstroom Wild Flower Show. Gerrit Van Ede's, (the conference organiser) latest venture is the establishment of the show which is trying to inspire and educate local people and tourists that pass through the village about the wildflower species growing in the Dullstroom and Veloren Valei Reserve. With permission, flowers from the reserve were picked and beautifully arranged to demonstrate the diversity of the reserve under one roof. Local schools have participated in the show and young children have been drawing and learning their local flora.



Plate 5 Samples of Veloren Valei flowers



Plate 6 Beautiful habitat-like arrangements



Plate 7 Picked samples for arrangements



Plate 8 Children's drawings on their local flora

The Conference organisers have been botanising in the Veloren Valei Reserve for over 20 years and wanted to share and make known the importance of the sight to the rest of the world. Gerrit vanEde has been documenting orchid species since 1989 and assisted Nature Conservation in recognising and understanding the orchids in the reserve.



Plate 9 Gerrit van Ede Conference Organiser in Veloren Valei

Conference Aims

The purpose of this conference is to concentrate on the ecology, conservation and tourist attraction of terrestrial orchids. Furthermore, it would like to heighten the awareness that orchids are valuable plants and protected plants. By highlighting the tourist attraction potential the organisers hope to achieve greater support to their protection (Van Ede, 2011).

The Lectures

The speakers are experts in their field and give fascinating lecture contributions providing a wonderful insight to the orchids of the area. The three main genera – *Disa*, *Eulophia* and *Satyrium* are each introduced each have a separate lecture devoted to them describing their botanical features and habitats. All the lectures work and link well together, supporting the aim of the conference and other aspects. Some dealt with the orchids that we will see in the field and some described related species in neighbouring African countries such as Madagascar, Tanzania and Zambia. There is an appropriate balance of background information for example dealing with orchid threats and conservation projects. Pollination systems and complexities are addressed and Johnson (2011) declares pollinators are responsible for orchid distribution. The botanical and technical of information is at the optimal level, leaving the audience captivated. Cultivation techniques are touched on but could have been elaborated, however this is a highly specialist subject and because it was the first conference of its type many things are only now being introduced- perhaps a subject to be covered in the next conference.

I find Professors Steve Johnson's lecture on orchid pollination particularly enthralling as he makes comparisons to species found on Table Mountain that I have seen and photographed also. All the lectures were very enjoyable and encouraged interesting group discussions after with questions.

Being familiar with UK's native orchids and the common hybridisation in *Dactylorhiza* I asked Steve Johnson if much hybridisation goes on with *Disa* species – the answer no because each species is very specialist and will not share the same pollinator.

The conference attendees range from orchid fanatics to complete novices but everyone had an underling passion for wildlife and natural habitats. People travelled from Mpumalanga, Durban, Johannesburg, with some visitors from Germany, the US and four of us from the UK (including Johan Hermans, Chairman of the Orchid Committee of the Royal Horticultural Society). There were about 60 attendees who were mainly in the 50 – 70 year old age gap with a few people in their 30s and 40s.

Lectures and Speakers

Prospects for the Conservation of African Terrestrial Orchids by Professor Harold Koopowitz

Conservation Status of SA Terrestrial Orchids by Frans Krige

**Emphatic Eulophias* by Douglas McMurtry *

**Disa – Mpumalanga's flagship orchids* by Lourens Grobler

Cynorkis and some other Madagascan Terrestrial Orchids Johan Hermans

**Pollination Systems of Grasslands Orchids in Southern Africa* by Professor Steve Johnson

**The Genus Satyrium in Southern Africa* by Allan Abel

**The Other Orchids that lurk in the grass* by Gerrit van Ede

The asterisked (*) lectures are directly related to our field visits and I have referenced the information I learnt throughout the report. See Appendix 1 for written up notes on Professor Harold Koopowitz's opening lecture.

The Field Guide

Three of the four authors of 'Field Guide to the Orchids of Northern South Africa and Swaziland' speak at the conference. This field guide aids the identification of the orchids of the four northern provinces and Swaziland, some 210 species in 35 genera, in a comprehensive informative format accessible to professionals and amateur enthusiasts. The book is a specialist field guide and describes many orchid species you will not find growing anywhere else – which is why it I have referred to it throughout this report and when in the field looking at the orchids themselves. I am thrilled I own a signed copy that they were selling at the conference.

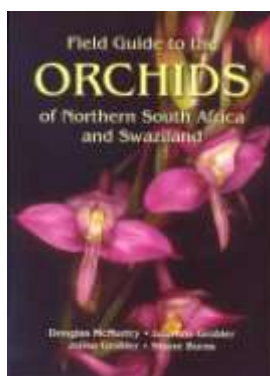


Plate 10 Field guide cover (photo: Umdaus Press, 2008)

The Veloren Valei

Verlorens Valei Nature Reserve is a Provincial Nature Reserve proclaimed in 1983. The Mpumalanga Parks Board manages this reserve, including catchments and wetlands. The grasslands and wetlands in this area provide a habitat for a remarkable variety of interesting fauna and flora (Krige, 2011).

Veloren Valei means 'Lost Valley' which was the name of the farm which is now the site of the reserve. Other farm names included Wanhoop meaning 'Despair', Frischewaagd meaning 'New Challenge' and others indicating the difficulties the Dutch settlers experienced in this area that was misty and cold (Van Ede, 2011).

The prevalent grassland type here is Highveld grassland with grey sandy loams derived from sandstones or black clay from ecca shales. *Eulophia* and *Habenaria* orchid species are found in the dryer grassland and *Disa* and *Disperis* in the wetter areas (McMurtry *et al.*, 2008).

Temperatures are high in the summer up to 29° C but due to altitude (2000m on average above sea level) there are severe frosts regularly throughout winter (June to August) with temperatures as low as -13° C and snow has occasionally been recorded. Reliable summer rainfall commences in November through to April followed by a dry season of 6 months from May to October (McMurtry *et al.*, 2008). Cubey and Bopp (2003) state 10% of all grass species found in the world grow in the Highveld and the habitat has given the UK some of the best known garden plants from South Africa, such as *Agapanthus*, *Dierama*, *Gladiolus*, *Eucomis autumnalis*, *Nerine bowdenii* and many more.

The sight is of special interest as it is situated on a watershed between the Oilfants River and Crocodile River drainage systems on the Steenkampsberg plateau. It has more than thirty untouched wetlands occurring on the sight. The main wetland type is freshwater marshes caaled vleis and the areas remain waterlogged throughout the year. The area is of particular importance because a variety of wetlands characteristic of the region are represented. The area is has a high ecological value as it supports high botanical diversity.

A total of 379 plant species have been identified at Verloren Valei Nature Reserve, Of the 379 taxa identified, 106 (28%) are protected species under the Mpumalanga Nature Conservation Act 10 of 1998, six are endemic to the Drakensberg Escarpment of South Africa, 11 are endemic to South Africa and six species are classified as Rare (Harebottle *et al.*, 2001).



Plate 11 Veloren Valei wetland and grassland habitats

The reserve is particularly important for Wattled Cranes and is in one of the last areas that it is able to breed successfully due to its freshwater wetlands. The habitat provides the cranes with suitable nesting sites in which to rear their young. The wetlands also provide the fitting breeding environments for fish and amphibians especially since trout have been introduced into the rivers and wetlands in the surrounding areas and which naturally have a severe impact on fish and amphibian populations. (Krige, 2011).

In addition to this, peatlands occur on the reserve sight. Peat is very unusual and rare type of wetland in South Africa and adds to the conservation value of the sight (Harebottle *et al.*, 2001).

Farming has changed on the Veloren Valei over the past 20 years farmers used to farm sheep but now black deafer cattle graze on the land and are destroying the veld by trampling their vegetation with their much bigger feet (Van Ede, 2011). Van Ede (2011) has also noticed over the past 20 years he has been visiting the reserve, that some of the flowering times have changed slightly. *Satyrium ocellatum* and *Disa rhodantha* used to flower at exactly the same time but now *S. ocellatum* is slightly later.



Plate 12 *Satyrium ocellatum*

After the morning lectures we drive out to the reserve. We are all eager to try and find the orchids to see for ourselves. Before we even leave the Walkerson's Hotel where the conference is being held, we stop the bus and all get out to photograph a *Satyrium neglectum* specimen growing on the roadside.



Plate 13 *Satyrium neglectum*



Plate 14 *Satyrium neglectum*

There are 98-100 species of *Satyrium* - 93 in Africa, 2 in Asia and 5 (4 endemic) in Madagascar (Abel, 2011). *Pachites* is the nearest relative found in the Western Cape province

S. neglectum can be found growing from North Eastern Cape to Tanzania and grows in moist grasslands usually between 1500 – 1600m at sea level flowering between October to March.

After a 5 minute drive we get to the reserve and are divided into guided groups with Gerrit leading my group.

This year the rain had been late and the roads were full of wet potholes and we lost a wheel to the mini bus. Fortunately it was the spare and not one that was being used.



Plate 15 Found the spare wheel

The first and most abundant species we see in the reserve is *Satyrium longicauda*. It prefers the dryer grassland areas of the reserve (Abel, 2011).



Plate 16 *Satyrium longicauda* inflorescence



Plate 17 *Satyrium longicauda* flower



Plate 18 *Satyrium longicauda* basal leaves

The twinned basal leaves are a reliable character to identify *S. longicauda*. Flat leaves are produced on sterile shoots and the inflorescence grows up behind the leaves, smaller leaves are produced up the flower stem (Abel, 2011).

Satyrium has two spurs for each flower reminding me of a pulled out tooth with its roots still intact. *Satyrium* refers to the greek word *styros* – meaning two horned satyr, half man half goat – the two spurs are ment to resemble the satyrs two horns (McMurtry, 2008).



Plate 19 *Satyrium parviflora* inflorescence



Plate 20 *Satyrium parviflorum*

Abel (2011) emphasises the point that the flowering season is triggered by the wet seasons regardless of whether it is winter or summer. I found this fascinating as in the UK we expect flowering to occur depending on the temperature seasons. In South Africa the rainy and dry seasons are key to plant growth. For example *Satyrium parviflorum* tends to flower near the end of the wet season and so species growing in the Western Cape will flower September to October receiving winter rains and in Veloren Valei which receives summer rains the orchid will flower in January to March.



Plate 21 *Satyrium parviflorum* basal leaves

The basal leaves of *S. parviflorum* are arranged up the flower stem unlike *S. longicauda*.



Plate 22 *Satyrium trinerve*

S. trinerve is not easily confused with other species as it had recognisable pure white flowers with distinctive yellow dorsal and sepal petals. We find the species growing with its roots fully emerged in water.



Plate 23 *Satyrium trinerve* wetland habitat



Plate 24 *Satyrium cristatum*



Plate 25 *Satyrium cristatum*

S. cristatum is a common orchid in Veloren Valei and found in moist grassy areas up to 2500m.

Another orchid species found in mass in Veloren Valei is *Disa versicolor*. There are 179 species of *Disa* with 32 found in Mpumalanga including 8 endemics (Grobler, 2011). *Disa versicolor* from found in Dullstroom has an intense colour. *Versicolor* means changing or varying in colour, which is a distinguishing feature of this species. Here the flowers change from pink to brown showing both stages of flowering on the inflorescence at the same time. The spur is hidden in *D. versicolor* unlike *D. maculomarronina* where it is visible (Grobler, 2011).



Plate 26 *Disa versicolor*



Plate 27 *Disa versicolor* inflorescence



Plate 28 *Disa versicolor* in the veld



Plate 29 *Disa cooperi* inflorescence



Plate 30 *Disa cooperi* flower

Disa cooperi is named for Thomas Cooper (1815 to 1913) an English botanist and plant collector who studied plants in South Africa and Lesotho (Kesting and Clark, 2008). This species has an intense soapy floral fragrance and is pollinated by hawk moths (Johnson, 2011).



Plate 31 buck eaten *Disa cooperi* orchid

Buck and antelope eat the orchid flower buds before the flowers open. This is when they are at their most nutritious being full of pollen. When the flowers open and disperse their pollen then mammals do not bother to eat them.



Plate 32 *Disa rhodantha*



Plate 33 *Disa brevicornis*

D. rhodantha is a fine looking species with glowing flower spikes up to 58cm tall. This species prefers undisturbed permanent vleis and is under threat from cattle grazing and dam developments (McMurtry *et al.*, 2008).

D. brevicornis prefers wet and damp conditions where grasses stay shorter until around January . This species appears to respond well to areas that have been burnt (Grobler, 2011).



Plate 34 *Disa patula* var. *transvaalensis*



Plate 35 *Disa patula* var. *patula*

Disa patula has two varieties that are both very similar and difficult to tell apart. McMurtry *et al.* (2011) describe the differences; *D. patula* var. *transvaalensis* have a narrower inflorescence and usually a longer spur than *D. patula* var. *patula*.



Plate 36 *Corycium nigrescens* or *C. dracomontanum*

Corycium nigrescens and *C. dracomontanum* are very closely related and are impossible to tell apart if still in bud and very difficult at other times. They enjoy growing in high altitude grasslands as long as there is enough moisture (McMurtry *et al.* 2011).



Plate 37 *Schizochilus zeyheri*

Schizostylus is a small genus of 1 species confined to southern and south-central Africa. The size of the plants depends on the size of the surrounding grasses. *S. zeyheri* is the most common of the genera and occurs in sour veld, most commonly along seepages, along stream banks or in permanent vleis (marshes).



Plate 38 Botanising in the Veld at Veloren Valei with *Disa versicolor* in the foreground

We moved to another area of the reserve and came across a more new species for us that day. Some parts are drained and other areas were fully saturated which encourages diversity.



Plate 39 *Neobolusia tysoni*



Plate 40 *Habenaria dives*

Nebulosa is a small genus of 4 species confined to southern or south central Africa. *N. tysonii* is the only species to be found in the Veloren Valei (McMurtry et al. 2008). Although it has a slender habit its pure white lip makes it stand out amongst the veld.

Habenaria is a large genus of over 800 species distributed through tropical and subtropical regions of the world. *H. dives* is a ubiquitous and widespread species of high altitude sour grassland that is damp to wet during the summer but usually not water logged.



Plate 41 *Disperis tysonii* multi flowering stems

Plate 42 *Disperis tysonii* flowers

Disperis is a large genus of 84 species occurring in southern and tropical Africa. 21 species grow in Madagascar with a few species in Asia (McMurtry, 2008). *Disperis* is a particularly showy genera with some specimens having multi flower stems. It enjoys a high altitude sour grassland moist habitat in full sunlight. *D. tysonii* has a more pointy hat looking dorsal petal and the flowers are faintly scented.



Plate 43 *Disperis cardiophora*



Plate 44 *Disperis cardiophora* inflorescence

Amongst the short sour veld we manage to find a charming stand of *Disperis cardiophora* flower stems. This species reaches 15cm high and so is hard to spot but a real gem once you get low enough photograph it.



Plate 45 *Disperis cardiophora* basal leaves

Its basal leaves are tiny in comparison to its blooms and it is amazing how it supports itself. Van Ede (2011) believes there must be a strong mycorrhizal association with this species to support such impressive flowers.



Plate 46 *Disperis renibractea*

Disperis renibractea is a larger species with equally as delightful flowers whose lateral petals flair out to 8mm on either side.



Plate 47 *Eulophia parvilabris*

There are 155 species of in Africa *Eulophia* with 45 species from South Africa, and six species local to the Conference (McMurtry, 2011). *Eulophia parvilabris* is one of the grandest of orchid flowers we see in the Veloren Valei with an inflorescence diameter of about 16cm. We discover it growing amongst the moist rocky outcrops seeking shelter but in full sun.



Plate 48 *Eulophia hians*

Eulophia hians flowers for only two weeks of the year and so we are lucky to find it in flower during our short time at the reserve. The rains had come late to Dullstroom this season and so generally many things were flowering later, demonstrating how influential the rains are on the orchid species.

Associated Plants

In this high altitude grassland and wetland habitat I find the number of species that are recognisable through UK horticulture quite incredible.



Plate 49 *Eucomis van de merwii*

On a number of occasions we come across a choice plant, common in UK horticulture – *Eucomis*. It is a real treat to see them growing in the wild and an excellent reminder to keep them well watered in the summer time as they were very happy in their moist grassland in full sun.

E. van de merwii is a strange spotted looking species and unfortunately is now rather rare in the reserve. *E. autumnalis* was more common with purple forms as well as green. One specimen was growing with its roots completely submerged in water although some were in much drier areas demonstrating the adaptability of this genus and probably why it does so well in southern England.



Plate 50 *Eucomis autumnalis*



Plate 51 *Craterostigma wilmsii*

Around the same areas of the *Disperis* we came across what for a second looked like another *Disperis* however at a second inspection this is in *Craterostigma wilmsii* the Lindeniaceae (formally Scrophulariaceae) and has an enchanting common name – Moles Spectacles (Manning, 2009). The flowers stand 12cm high and had colonised an open patch in the dryer grassland.



Plate 52 *Moraea elliotii*



Plate 53 *Gladiolus papilio*

In the UK I grow *Gladiolus papilio* as a cut flower and it was a real privilege to see it growing in the wild in very damp conditions. The striking markings on the inside of the flower make it ideal for a high arrangement to look up in.



Plate 54 *Gladiolus ecklonii* (non mottled form)



Plate 55 *Agapanthus inapertus*

Having now seen *Agapanthus inaperatus* growing in the moist grasslands I think the conditions I grow it in at home are shamefully dry. However it is an extremely reliable bloomer within the garden and its sleek umbels are particularly appealing in the garden and in the wild.



Plate 56 *Moraea moggii*



Plate 57 *Colchicum melianthoides*



Plate 58 *Aloe ecklonis*

Colchicum melianthoides is found growing at high altitudes and has a shorted pedicel than the garden *Colchicum* we see in UK gardens. Here it was often growing between rocks receiving shelter.

Associated species growing in the grasslands includes an *Aloe ecklonis* which seemed rather strange to us as we associate aloes with arid habitats and water conserving plants and here it was growing next to *Crocsmia paniculata*.



Plate 59 *Crocsmia paniculata* in wetland habitat

Crocsmia paniculata was found in abundance in the reserve and indicated wet patches within the veld.



Plate 60 *Pelargonium luridum*

Pelargonium luridum is a tuberous perennial with extremely attractive baby pink flowers growing in moist grasslands through eastern South and tropical Africa.



Plate 61 *Kniphofia multiflora*



Plate 62 *Watsonia confusa*



Plate 63 *Cycnium racemosum*

Cycnium racemosum from the Orobanchaceae family is a hemi-parasitic herb growing amongst the rocks in the moist grassland (Manning 2009).

Burning Management of Verlorens Valei

During the conference Van Ede (2011) explains the burning techniques currently used in Verloren valei.

Over millions of years fire has been a regular occurrence, which has maintained the diversity of the Verloren Valei. Fires have naturally started by lightning storms, rocks rolling down a hill and creating a spark, baboons smashing rocks together to create sparks and human activity from 1 million years has played apart in the history of fires where they used to purposely burn the sour veld (sour grass) – the type of grass found at Verloren Valei, as young plants that emerged after were more palatable.



Plate 64 Sourveld grasslands at Veloren Valei

Fire was used as a farm management tool to provide fodder for cattle by burning the veld. Sour veld puts all its nutrients back into the roots of the plants soon after it has set seed and therefore become unpalatable for cattle. After Veloren Valei was made into a protected reserve it was very important this fire management regime is still carried out to prevent a build up of vegetation.

Summer rainfall grass grows then the winter frosts kill it and the dead material lies on the ground and does not sufficiently compost down but creates a build up of thatch. This thick layer of dead plant material is extremely flammable and needs to be managed regularly to reduce the risk of quickly spreading and uncontrollable fires.

Regularly burning the veld removes the thick layer of combustible material and reduces the threats to local villages and farm properties. It also replaces minerals from the sour veld back into the soil. It removes the protecting cover of dead vegetation, which can cause drought to the soil and subsequently destroy soil organisms including mycorrhiza and seeds. It promotes flowers during the next season

The effects of burning on biodiversity are evident and each burning cycle can be recognised by a dominant plant species. 1 – 3 years is usual and a 2 year burning cycle is optimal for species numbers, if left as long as 4 years more trees can begin to appear and competition for grassland species is created.



Plate 65 Showing the effects of burning on the right of the photo

The fires are started in May after the rainy season and van Ede is keen to persuade the Mpumalanga Parks Board who manages the reserve, including catchments and wetlands to not burn regularly such as every 3 years but to vary the gaps between each burning to encourage further biodiversity.

Long Tom Pass

The last day of the conference was dedicated to the field and we met early in the morning to drive 80km east to the Long Tom Pass for even more orchid and wild flower treasures.

The Long Tom Pass was named after the cannon, which the Boers (Dutch farmers) used to try and dislodge the British from Lydenburg in the battle between the Boers and the British in the Anglo-Boer War (1899 -1902) in the Lydenburg area (A-Venues.com, 2011). Long Tom pass's highest point is 2150m above sea level which is over double of Table Mountain in Cape Town. McMurtry *et.al*, (2008) describe this habitat as Misbelt grassland where the region lies along eastern mountains and escarpment. There is a higher rainfall than the Highveld in Veloren Valei and the summer temperatures are cooler. It is claimed that the Misbelt grassland is an area of high diversity and contains 30% of the endemic and rare plant species of the four northern provinces of South Africa (McMurtry *et.al*, 2008).



Plate 66 Misbelt grassland habitat on Long Tom Pass



Plate 67 *Disa saxicola*

As its name implies *Disa saxicola* - from the Latin, *saxum*, rock or boulder, and *cola*, dwelling this species is always associated with rocks and found growing in-between rock crevices (McMurtry, 2008). This is a tiny orchid with its flowers about 8mm across. It is possible that due to its choice of a habitat it is less threatened than if it was to be a grassland species as the later are more destructible.



Plate 68 *Disa amoena*

Plate 69 *Disa amoena* flower

We managed to catch one specimen of *Disa amoena*, before it had completely gone ever. This species is quite sporadic and so it was a treat to find it at all. *D. amoena* was only first described in

1981 and may have been mistaken as *D. pulcha* in the past. Its veld habitat is windswept and open. At high altitude its preferred temperature is temperate and cool.



Plate 70 *Disa rungweensis*



Plate 71 *Disa stachyoides*

Disa rungweensis is a plant that is difficult to find in its wet exposed rocky grassland habitat due to its diminutive size. It is also very rare and McMurtry *et al*, (2008) reports it is only known from very few localities within a 10km range.

Disa stachyoides has got its name from being described as a 'dead ringer' for our common garden plant *Stachys officinalis* when pressed and exhibited as a herbarium sample by Heinrich Gustav Reichenbach in 1873 (McMurtry *et al*, 2008). As a live plant I can't see the resemblance more than

any other orchid. Its charming white blotch of white makes this high altitude species that prefers it open, sunny and well-drained rather conspicuous and distinct.



Plate 72 *Habenaria lithophila*



Plate 73 *Schizochilus cecilia* subsp. *transvaalensis*

Habenaria lithophila has a wide range and is found at varying altitudes of grasslands that receive frost in winter or that are frost free (McMurtry *et al.* 2008). Although quite hidden amongst the grasses with its green and yellow colourations when up close this is a particularly striking species with its elongation curling lower petals and lip lobes.

Schizochilus cecilia subsp. *transvaalensis* is a very pretty, multi-flowered orchid and gives off a sweet vanilla fragrance in the afternoon. It is usually found growing at high altitude grassland rocky situations in damp to wet but well drained soils (McMurtry *et al.*, 2008).



Plate 74 *Pterygodium hastatum*



Plate 75 *Satyrium longicauda* - half pink half white flower

Pterygodium is a new genera that I have not come across before. *Pterygoeides* means wing like in greek – referring to the side petals. There are 18 species with all but one occurring in southern Africa. *P. hastatum* is the most common high altitude grassland species and often found growing on its own (McMurtry *et. al*, 2008).

Satyrium longicauda also grows in the Misbelt grasslands and we came across a very curious looking specimen that was exactly half pink and half white. This was a pigment mutation in the flower spike with anthocyanin not present in one half. It was as if someone had painted it and drawn a line down the middle with a ruler.

Other associated wild flowers includes *Aristea sp* and an endemic *Gladiolus sp.* – so uncommon that we were not sure of the exact species but very beautiful nevertheless.



Plate 76 *Aristea sp.*



Plate 77 *Aristea sp.* close up of flower



Plate 78 Endemic *Gladiolus sp.*



Plate 79 Endemic *Gladiolus sp.* growing on the road side



Plate 80 Pine plantation off Long Tom Pass

The greatest threat to the Mistbelt Grassland habitat is afforestation using alien tree species and pine and wattle plantations already occupy vast stretches of former grassland (McMurtry *et al.*, 2008). Astonishingly some species have adapted to these man made alien pine habitats and flourish due to the lack of competition from other species. During our day trip to Long Tom Pass we found *Disperis virginalis* and *D. lindleyana*, just about to flower growing amongst the fallen pine needle forest floor. Over the last 40 years man's intervention has actually increased population numbers of *D. virginalis* which used to be considered rare (McMurtry *et al.*, 2008).



Plate 81 *Disperis lindleyana*



Plate 82 *Disperis virginalis*

Cynorkis kassneriana and *Mystacidium flanaganii* have also taken home in this relatively new habitat and we are surrounded by *Begonia sonderiana* plants in full bloom that are taking advantage of the shade.



Plate 83 *Cynorkis kassneriana*



Plate 84 *Mystacidium flanagani*



Plate 85 *Begonia sonderiana*

Cultivation at Kirstenbosch

I was privileged to meet Graham Duncan a specialist horticulturist at Kirstenbosch National Botanical Garden, where he curates the collection of indigenous South African orchids and other bulbous plants. He showed me around the orchid collection at Kirstenbossh NB and we discussed the cultivation methods he used.



Plate 86 Graham Duncan, with the orchid collection at Kirstenbossh NB

Western Cape (where Kirstenbosch NB is) and Mpunlanga are climatically very different and so it is difficult to make a direct comparison of growing species in cultivation and in the wild. Kirstenbossh do not grow the species I saw in the wetlands habitats of Verloren Valei because they are so specialist however some terrestrial *Satyrium* species are grown in the orchid collections and can be noted upon.



Plate 87 Terrestrial orchid collection during dormant period

The key to successful growing at Kirstenbosch NG is the watering. *Satyrium* are regarded as being quite easy as long as the pots are kept dry in the dormant season in winter. Due to the difference in the rainy season all the collections were dormant. The potting media consists of industrial sand, silica sand and fine compost and plants are potted on every 4 years. Terracotta pots are ideal for air movement



Plate 88 *Lithops* sp. growing as a weed in a *Brunsvigia* pot - a different world of weeds

Conclusion

I have a passion for terrestrial orchids from around the world as well as British native species. I have planted a number of native species in a long grass area at RBG, Kew and am continuing to monitor their progress and explain to others their growth patterns. To support this work I like to observe orchids in their natural habitats in the UK but also strive to see other species around the world to gain a better understanding of the varying habitats, life cycles and the botanical range of the family. I have previously observed terrestrial orchids on other funded field trips including Almeria, Spain, Ireland, California and North Carolina, US. All these areas provide contrasting growing conditions and the Veloren Valei and Long Tom Pass in Mpumalanga, South Africa has offered another amazing array of different orchid species which is enthralling to see firsthand.

Studying the original habitat of a species is an exceptional way of learning the growing requirements of a plant and the soil type, temperature and moisture levels can be noted and related back to our cultivation techniques in the UK. Observing plant associations is also a fascinating learning tool as we can try to consider what would grow well together in cultivation to mimic conditions in the wild. Although the cultivation of terrestrial orchids of Veloren Valei is highly specialist and not widely published many of their associated plants are in cultivation in the UK and I can now make reference to their natural environments when cultivating them.

Studying the flora in this grassland habitat has made me more aware of the effects of rainfall and rainy seasons rather than temperature as we do in the UK. When discussing the flowering time or growth cycle of the orchids you must consider when it rains in that part of the world - not what month it is.

I am very grateful to all the speakers of the conference to share their knowledge in their lectures and when in the field. To observe and explore the grassland habitats of South Africa has opened new doors within my passion for plants and I am very eager to re visit this area again in the future.

Further trips

South Africa has won my heart and I am very keen to return to study the flora at more depth. There is so much scope for future field trips we are spoilt for choice on where to go and what plant types to focus on.

The Cape Floral Kingdom lies as an L shape between south of Clan William to Cape Town and then east to Port Elizabeth and although only comprises 88,000km² (just more than one third of the size of the UK, holds 10% of the world's flora (Moll, 2006). This is the richest part of south Africa and so much potential for a future botanising field trip.

McMaster (2006) writes about the treasures of the Eastern Cape and has led an Alpine Garden Society trips to the region over the past few years in January February. This is an area I am particularly interested to visit and having had my first taste of standing next to a huge *Brunsvigia* inflorescent I am very eager study and see geophytes flowering in the wild.

Having spent time botanising in Mpumalanga I am inspired to travel more within this north area of south Africa and other Southern African countries. Grimshaw (2011) writes about the alpine regions tropical Africa and highlights the floral beauty of the Bale Mountains in Ethiopia and the upland grasslands of Kenya and Tanzania.

Kitulo National Park which is a protected area of alpine grassland and montane forest in the southern Highlands of Tanzania was discussed by a number of speakers during the conference (see Appendix 1). I would relish the opportunity to visit this park to observe more natural species as well as having an insight to this pioneer conservation project.

References

MPUMALANGA TOURIST ATTRACTIONS

http://www.mpumalangahappenings.co.za/places_to_see.htm

Abel, A 2011. The Genus *Satyrium* in Southern Africa. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

A-Venues.com, 2011. *Long Tom Pass, Mpumalanga* <http://www.sa-venues.com/attractionsmpl/long-tom-pass.htm> [accessed 5/05/11]

Enviro-Info, 2001. *Biomes*. [online] <http://www.environment.gov.za/enviro-info/nat/biome.htm> [accessed 20.03.2011]

Cubey, J. and Bopp, W. 2003. Home to 24,000. *The Garden*, 128(1), pp18-25

Grobler, L. 2011. *Disa – Mpumalanga's flagship orchids*. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

Grimshaw, J. (2011) Giants and Dwarfs. *The Alpine Gardener: Alpines without Frontiers*, 79(1), pp167-179

Harebottle, Douglas, Mr Johan Eksteen, Anton Linström, Frans Krige, 2001. *Information Sheet on Ramsar Wetlands (RIS)*. [online] http://www.wetlands.org/RIS/_COP9Directory/Directory/ris/1ZA017en.pdf [accessed 25/04/2011]

Linx Africa Pagemaster, 2003. *The Grasslands and Wetlands of the Steenkampsberg Plateau*. [online] <http://www.dullstroom.info/natura/steenkampsberg.html> [accessed 20.03.2011]

Kesting, D. and Clarke, H. 2008. *Botanical Names: what they mean*, Wild Flowers of the Cape Peninsula, 3rd revised and enlarged edition. Flora Documentation Programme: South Africa

Koopowitz, H, 2011. *Prospects for the Conservation of African Terrestrial Orchids Conservation*. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

Krige, F. 2011. *Conservation Status of SA Terrestrial Orchids*. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

Manning J. 2009. *Field Guide to Wild Flowers of South Africa*. Struik Nature: Cape Town

McMurtry, D. 2011. *Emphatic Eulophias*. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

McMurtry, D., Grobler, L., Grobler, J. and Burns, S. 2008. *Field Guide to the Orchids of Northern South Africa and Swaziland*. Umdaus Press: South Africa

Moll, E. 2006. The Cape Floral Kingdom, *The Alpine Gardener: South African Special*, 74 (Sep. 2006), pp278-295.

South African National Biodiversity Institute (SANBI), 2011. *PLantzafrica.com*. [online] <http://www.plantzafrica.com> [accessed 20.04.2011]

Tanapa, 2008. *Kitulo National Park, Tanzania National Parks, The official website*. [online] <http://www.tanzaniaparks.com/kitulo.html> [accessed 25/04/2011]

Tanzania Safari Channel, 2002. *Kitulo National Park*. [online] <http://www.tanzania-safari-channel.com/assets/files/pdf/kitulo.pdf> [accessed 5/05/11].

Umdaus Press, 2007.

http://www.umdau.com/index.php?controller=product&path=19&product_id=22 [accessed 26.04.2011]

Van Ede, G. 2011. *The Other Orchids that lurk in the grass*. [lecture]. Dullstroom Terrestrial Orchid Conference, Dullstroom, South Africa 27 – 29 January 2011

Appendix 1 – Lecture write up

'Prospects for the Conservation of African Terrestrial Orchids Conservation' by Professor Harold Koopowitz

The conference opening lecture was given by Professor Harold Koopowitz, who has recently retired as Professor of Biology in the Department of Ecology and Evolutionary Biology at University of Californian at Irvine. He has accumulated many orchid related accolades over his impressive career and to name one, in 2003 who was awarded the Herbert Medal in 2003 by the international bulb society, the highest and honour they can bestow upon a person for meritorious achievement in advancing the knowledge of bulbous plants. Koopowitz kicked the conference off by addressing the issue that faces all orchids in the wild – their threats and conservation.

He started off by introducing the historical challenges of orchids populations making the following points;

- Collecting for growers.
- Unsustainable trade – over collecting.
- Deforestation and land conversion.
- Pollution – affecting insect populations and subsequently pollination. Over use of insecticides such as malathion in Zambia to keep the fruit fly out of USA through imported produce.
- All the above leading to genetic erosion or extinction.

Horticultural trade has affected less than 1000 of the 25-30,000 orchid species. However it has probably responsible for less than 0.0% of orchid species extinction.

Koopowitz went on to identify the root of the threat to orchid problem increasing human populations which leads to an increase in the following

- a) Pressure on land for agriculture - land conversion
- b) Cutting of forest wood for fire
- c) Carbon footprint – climate change

Population Plates

Optimistic forecast – 2040 world population will peak and then decrease.

Pessimistic forecast – population just keeps climbing.

	Population in 2008	Population in 2050
World	6,707 million	8,909 million
Africa	973 million	1,700 million

Chikandra

Koopowitz asked the audience if anyone has heard of Chikandra. Everyone looked at him blankly and was not familiar with it which was very interesting he then went on to describe what it was and how destructive it currently is to orchid populations in southern Africa.

Chikandra is a food made from the tubers and pseudobulbs of terrestrial orchids. It used to be undesirable but it is now regarded as a very fashionable cake in Zambia and orchids from northern regions have been striped of their native orchid species.

The local women prepare the cake that requires 125 tubers to make one. Each cake can be sold at 2 cents per slice and \$2.5 per cake. This cake trade counts for \$2.2 million/year.

The reference to the cake was particularly relevant because orchid genera that we will be observing in the Veloren Valei *Disa*, *Satyrium*, *Habenaria* and *Eulophia schweinfurthii*.

In 2009 Joyce Challe and Lisa Price carried out a study to see who was making chikandra. The study looked at the economic activities of households and found that non HIV and Aids infected household's mainly worked in Agriculture with 10% collecting orchids. Infected households' main source of income was orchid collecting with only 3% of this group working in agriculture.

Orchids were collected and gathered more commonly by infected orphans than non-infected because orchid collecting is less strenuous and more irregular work than farming.

Kitulo National Park

In February 2002 the Government of Tanzania established Kitulo National Park primarily for the significance of its flora (Tanzania Safari Channel , 2002). This is a remarkable achievement for plant conservation making it the first park in tropical Africa dedicated to orchids and other wild flowers.

Set at around 2,600 metres (8,500 ft) between the rugged peaks of the Kipengere, Poroto and Livingstone Mountains, 13,500 hectares of the well-watered volcanic soils of Kitulo support the largest and most important montane grassland community in Tanzania . The park supports 350 species of vascular plants, including 45 varieties of terrestrial orchid and 30 wildflower species endemic to southern Tanzania which provide breath-taking displays during the main rainy season of late November to April (Tanapa, 2008).

Climate Change

In past Ice ages parts of the planet existed at extreme temperature and plants were able to migrate to places they likes as it happened over a number of thousand of years. Climate change does not allow enough time for plants to migrate and then there is nowhere for them to migrate to.

Solar dimming – light getting into the planet has dropped by 10% due to pollution in the air caused by aerosols, smoke, dust from desertification. Reduced light results in reduced growth.

Global warming is affecting the mountain top cloud cover ecosystems that occur on the mountain tops. Warmer temperatures are making the dew point in which moisture turns into cloud higher than the mountain tops. With out the cloud cover less mist is created and plants become more stressed.

Conclusion - Summarising the problems for terrestrial orchids

- Its more difficult and expensive to propagate terrestrials (than epiphytes)
- Genetic erosion is occurring and orchid are loosing their ability to adapt
- Gene banking – terrestrial orchid seeds and their mycorrhiza are difficult to store and become less viable than other species.

- The dormancy periods of the orchids makes it difficult to monitor populations all year round.
- Very little information about how orchid populations expand – orchid demography.