

# THE BOTANIC GARDEN

A Newsletter for the Botanic Gardens of Australia and New Zealand



Issue 14 - March 2006

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## BGANZ NEWS

### Introducing the BGANZ Council

At a meeting held in Hobart last October, the inaugural interim Council of BGANZ stood aside and a new Council was appointed. The Constitution states that the BGANZ Council shall have a maximum of 14 members comprising:

- one regional representative from each Australian State and Territory elected or appointed by the regional botanic garden networks in those areas in which they exist and by agreement between the capital-city Gardens and regional botanic gardens in the other states and territories;
- two representatives from New Zealand botanic gardens elected or appointed by those gardens and
- a maximum of two members elected or appointed by the capital-city gardens.

Listed below are profiles of the new **BGANZ COUNCIL**.

#### Philip Moors - President

In 1992 Philip was appointed Director and Chief Executive Officer of the Royal Botanic Gardens Melbourne, which comprises the botanic gardens at Melbourne and Cranbourne, the National Herbarium of Victoria, and the Australian Research Centre for Urban Ecology (ARCUE).

Established in 1846, RBG Melbourne has renowned landscapes and world-class collections of living and preserved plants. Philip has guided the creation and implementation of a range of major new programs and capital developments in horticultural displays, visitor services, cultural activities and tourism, plant biodiversity and urban ecology, education and fundraising.

These projects have included the highly popular Ian Potter Foundation Children's Garden opened in 2004, the establishment of ARCUE in 1998, the rejuvenation of several RBG Melbourne landscapes and plant collections, the reduction of the Garden's water consumption for irrigation by 60% over a ten-year period, the introduction of outdoor summer cinema to botanic gardens,



and the initiation of successful major donor programs such as the Director's Circle and RBG Foundation. He has been closely involved in the creation of the Australian Garden, a new botanic garden at RBG Cranbourne celebrating the diversity and beauty of Australia's plant life. The \$15m development of the garden's first eleven hectares will open on 28 May 2006.

He was a member of the Victorian Garden State Advisory Council from 1996-1999, is a member of the Executive Board of the Committee for Melbourne, and received a Centenary Medal in 2003 for services to the community through conservation and the environment.

**Helen Paulsen - Vice-President (Australia)**



Helen was born and raised in Brisbane where she undertook studies in Landscape Architecture in the late 1970's. Her introduction to plants and the use of plants in design was guided by prominent Landscape Architect Arne Fink and developed further during her work with Townsville City Council as the Landscape Officer for the Parks Section.

Following a period raising two children

and dabbling in experimental banana farms in western Queensland, she obtained the position of Park Development Officer with Mackay City Council and joined the Parks and Recreation Program in 1998. The Mackay Regional Botanic Gardens project was an embryonic thought in the minds of the local Society for Growing Australian Plants and was supported by the Manager of Parks and Recreation at that time. The development of the design brief, Master Plan and subsequent two construction programs has been guided mostly by Helen and supported by the Council through financial and staff allocations. Helen was appointed as Curator for Mackay Regional Botanic Gardens in January 2002. The development is nearing completion of Stage Two, and to date has expended M\$6.8. The opening of Stage Two including the Play Garden is planned for 2<sup>nd</sup> July 2006.

**David Sole - Vice-President (New Zealand)**

David Sole is the manager of the Botanic Gardens of Wellington. This comprises 4 gardens: Wellington Botanic Garden, Otari Wilton's Bush (New Zealand's only public garden entirely dedicated to growing native plants), Truby King Park, an historic house and garden and Bolton Street Memorial Park where Wellington's earliest settlers are buried.



David trained as a gardener with Wellington City Council completing his National Diploma in Horticulture with honours in 1986. In late 1986 he left his employment with the City and established Sole Gardening & Landscaping Ltd. It offered landscape maintenance, arboricultural and landscape services through until 1995 when he decided to focus purely on the landscaping side of the business. Landscaping continued until 2003 when the manger's position at the Botanic Gardens was advertised. Looking for a change in career David successfully applied for the position and began in October of that year. The landscaping business was closed down.

In the early 1990's the NZ training environment was radically altered from apprenticeship to achievements through unit standards. Through his association with the Landscape Industry David was part of the team setting national standards for the new landscape units and qualification. As an executive member of the Landscape Industries Association of New Zealand he continued in this role through until 1998 and from that time remained active on a local level until his change in career.

David is currently an executive member of the Royal New Zealand Institute of Horticulture and is a Vice President (New Zealand) of BGANZ.

**Robin Nielsen - Secretary,  
Treasurer, Public Officer**

Robin Nielsen was appointed Director of the Australian National Botanic Gardens on 12 October 2000. Prior to working at the ANBG, Robin worked for 20 years in urban parks, forestry, sports facility management and was a bushfire controller from 1983 to 1989. He has Bachelor degrees in Science (Forestry) and Economics and a Masters degree in Environment Science, all gained from the Australian National University.



As a member of the Council of Heads of Australian Botanic Gardens, Robin has been active in the development of BGANZ, the Botanic Garden Newsletter, and was a stream organiser for the 2003 and 2005 BGANZ Congresses.

**Mark Fountain**



Mark has over 30 years experience covering the fields of horticulture, horticultural education and horticultural enterprise / botanical gardens mgmt.

Mark's initial experience in horticulture was in the nursery industry as a Propagator and a Production Manager. Mark has also taught a broad range of horticultural subjects at tertiary level and has been involved in adult and specific community education programs.

Mark's current substantive position is as the Manager, Botanical and Public programs at the Royal Tasmanian Botanical Gardens. In this position he coordinates the work of the Gardens' Botanical Resources, Education, Interpretation and Marketing and Events staff. Mark's position also includes project management and he has played a key role in the management of many of the Gardens' recent projects

Mark project managed the Gardens' innovative Subantarctic Plant House from inception through to completion and has a strong interest in the Subantarctic.

**Jim Grant, BSc. (Hons) Dip.Ed., PSM (Public Service Medal)**

As Director of Bioparks I have the great pleasure of working with staff, the community, government and business to develop clear future directions and partnerships for George Brown Darwin Botanic Gardens, Alice Springs Desert Park (which includes a Botanic Gardens), the Territory Wildlife Park, and Windows on the Wetlands visitor centre.

My career has been in developing visitor experiences to deliver tourism and environmental education outcomes through site and program development. I have worked as CEO of Gould Group and the National Gould League, Manager of John Wamsley's Yookamurra Sanctuary in South Australia and Manager of Post Primary Education at Melbourne Zoo. Earlier in my career I worked as an Education Officer at Melbourne Botanic Gardens and Queenscliff Marine Discovery Centre and as a zookeeper.

**Bryan Gould**



Bryan Gould is the Manager Premier Parks for New Plymouth District Council, in New Plymouth, Taranaki, New Zealand – responsible for the management of iconic landscapes, including Pukekura Park – a unique native forest and arboretum.

His primary professional interest is trees. As an arborist and landscape manager he has been involved in the management of significant plant collections and landscapes for private companies, the UK National Trust and territorial authorities in New Zealand, Australia and England since beginning his career over thirty years ago.

He is a board member of the Pukeiti Rhododendron Trust (New Zealand's foremost rhododendron collection) and is Deputy Chairperson of the New Zealand Gardens Trust (an organisation dedicated to the promotion of New Zealand gardens as a major tourism attraction). Additionally Bryan continues to have significant involvement in arboriculture matters within New Zealand and overseas.

## John Schutz



After working in various nurseries and vineyard management, John joined the Botanic Gardens in 1983 as a horticulturalist at Mount Lofty Botanic Garden. In 1988 he accepted the position of Curator of the National Rhododendron Garden at Olinda in Victoria. In 1990 he moved back to South Australia and again joined the Botanic Garden working in various positions including Curator Mount Lofty Botanic Garden, Senior Curator Adelaide Botanic Garden, Senior Curator Mount Lofty Botanic Gardens, Manager of the Hills Botanic Gardens and Manager of Mount Lofty Precinct. John commenced as Head of Gardens, Botanic Gardens of Adelaide, in the Department of Environment and Heritage in January 2003. He has overall responsibility for Adelaide, Mount Lofty and Wittunga Botanic Garden.

John is a qualified Viticulturist, studying viticulture at Riverina College, Wagga Wagga NSW; he has an Advanced Certificate and Advanced Diploma in Horticulture and a Diploma in Conservation and Land Management.

John has held various society memberships and positions including Secretary of the International Rhododendron Union for 3 years, President of the National Council of the Australian Rhododendron Society for 4 years and President of the South Australian Branch of the Australian Rhododendron Society for 5 years.

John is a fellow of the Governor's Leadership Foundation of South Australia, a member of the Governor's Leadership Foundation Network Executive, a trustee of VIVA SA, and a Board member of the Leaders Institute of South Australia.

## Mark Webb



Mark Webb is the Chief Executive Officer of the Botanic Gardens and Parks Authority in Western Australia - perhaps best known for its management of Kings Park and Botanic Garden in Perth. Mark has a background in horticultural development and research, farming, consultancy and business. He is especially keen on exploring and extending the role of botanic gardens in biodiversity conservation and plant development.

## Annette Zealley

Annette's career began with a Bachelor of Applied Science Horticulture and she has developed a career focused on the management of public gardens in the Dandenong Ranges east of Melbourne. The conservation and enhancement of heritage gardens and their extensive collections of exotic flora while keeping a balance with the values of indigenous vegetation are constant challenges in her role.



## MEETINGS AND CONFERENCES

**BGANZ New South Wales  
'Managing Regional Botanic Gardens  
– Towards 2050' Albury, NSW**

**Friday May 19th – Sunday May 21st  
2006 Lake Hume Resort**

As an active member of the Victorian Botanic Gardens Network Annette represents the interests and views of its members on the BGANZ Council.

**Neil Bollinger**, Curator of Orange Botanic Gardens is also a general member of the Council. Neil was raised on a property west of Molong NSW and spent most of his spare time in the bushland that surrounded three sides of the property.

With no weekly wage in farming Neil turned his attention to horticulture. He began his local government career in 1986 when he started with Orange City Council as an apprentice. During his apprenticeship he worked in all aspects of Parks and Gardens and completed a Certificate in Urban Horticulture. On completing his four year apprenticeship he became the Nurseryman for Orange City Council until October 1991, when he became the Nursery man at Dubbo City Council for 18 months. He then returned to Orange City Council and took up a position as a Gardener in Moulder park. Then in 1995 became the Supervisor of the Orange Botanic Gardens, where he happily remains.

On top of his studies in horticulture, Neil has obtained a certificate in Arboriculture, Certificate IV in Assessment and Workplace Training, Associate Dip in Landscape, and completed many other training courses associated with his position at the Botanic gardens.

BGANZ New South Wales invites you to attend this important gathering and participate in setting agendas and reviewing management options. We are compiling a program that involves the latest in innovations and operations of Regional Botanic Gardens. There will also be a series of workshops to enable you to participate in exploring what works and what we have to manage, to ensure our Botanic Gardens remain relevant to our customers.

Contact Paul Scannell to register, as below so we can confirm your attendance and forward all conference details. Lake Hume Resort has various levels of accommodation with a special offer of 2 nights accommodation for the price of 1.

The cost of registration for the conference is \$200 and all accommodation details are available from Lake Hume Resort on **02 60 26 4444**.

For all inquiries, please contact:  
**Paul Scannell at the Albury Botanic Gardens on (02) 60 238 769 or  
pscannell@alburycity.nsw.gov.au**

**Botanic Gardens Conservation International (BGCI) -**

**6<sup>th</sup> International Congress on Education in Botanic Gardens:**

*“The Nature of Success: Success for Nature”*

Hosted by the University of Oxford Botanic Gardens, and in collaboration with Royal Botanic Gardens Kew and BGEN (Botanic Gardens Education Network), the congress is taking place in the heart of the magnificent city of Oxford, UK from

**10-14 September 2006.**

Themes addressed during the congress include:

- Achieving sustainability: ideas and solutions
- Public awareness of plants
- Reflection on practice
- Education for all: working with challenging groups

The Congress will provide a forum for environmental educators from botanic gardens worldwide as well as educators and other staff from plant science institutes, education and conservation organisations, zoos, museums, national parks and nature reserves, to discuss these ideas and issues – particularly pertinent in the light of the United Nations Decade of Education for Sustainable Development.

For further information, please contact: [sarah.kneebone@bgci.org](mailto:sarah.kneebone@bgci.org) or visit [www.bgci.org/educationcongress](http://www.bgci.org/educationcongress)

**3<sup>rd</sup> Global Botanic Gardens Congress Wuhan, China, April 16-20, 2007**

*“Building a sustainable future: the role of botanic gardens”*

Organized by Wuhan Botanical Garden, Chinese Academy of Sciences, Hubei Provincial Government, Wuhan Municipal Government and Botanic Gardens Conservation International.

The Global Botanic Gardens Congress is held every three years and is recognized as the primary international event for botanic gardens worldwide. This is the first time a Congress has been held in Asia and will mark the 20<sup>th</sup> anniversary of BGCI.

Discussions in Wuhan will centre around the important theme of the Global Strategy for Plant Conservation. The Congress will provide a global forum for the botanic garden community to share their knowledge, experience, practice and research. An exciting scientific programme is being prepared, which includes presentations by distinguished speakers, symposia on a wide range of topics, participatory workshops, field excursion and garden visits.

In addition, all participants will have the opportunity to visit Wuhan Botanical Garden, which not only has some stunning displays of plants but is a world-class scientific institute. The host city Wuhan is the capital of Hubei Province. It is situated at the confluence of the Yangtze and the Hanshui Rivers in an area of more than 1000 lakes. Wuhan is easily accessible for both international and domestic travel with a well-connected transport system.

For further information visit: <http://www.3gbgc.com>

# NEWS FROM BOTANIC GARDENS

Royal Botanic Gardens Melbourne

## Retirement of Professor Jim Ross, Chief Botanist

Professor Jim Ross retired on 9 December 2005 after 30 years' service to the RBG. He was appointed to a senior botanical position in the National Herbarium in late 1975 and became Manager of the Herbarium in 1986. He was appointed to the then new statutory position of Chief Botanist in early 1993. Throughout his time on staff, Jim gave unswerving commitment to the RBG, and especially to the State Botanical Collection. He endured a difficult period in the Herbarium during the 1970s and 1980s, but subsequently has overseen a rejuvenation of research programs, greatly improved curation of the Collections, and development of strong collaborative links with the University of Melbourne and other agencies. Jim is held in the highest personal regard by staff from throughout the RBG, and he has been a mentor and advisor to many of them.

## Appointment of Dr David Cantrill

Dr David Cantrill has accepted appointment as Chief Botanist and Divisional Director, Plant Sciences & Biodiversity at RBG Melbourne. David is currently a senior scientist in the Department of Palaeobotany in the Swedish Natural History Museum in Stockholm. Previously he has worked at the British Antarctic Survey in Cambridge and has undertaken extended fossil plant research in Antarctica.

David and his wife both grew up in Melbourne, and he received his PhD from the School of Botany at Melbourne University. David will be taking up his appointment towards the end of June 2006.

## Out and about in Victoria

The Victorian Regional Botanic Gardens Network membership has an enthusiasm for meeting to share expertise at different Botanic Gardens around the State. As with the other Australian states geographic distances are vast and time in short supply so local meetings are being facilitated to encourage stronger local partnerships between gardens. In December 2005 members of Melbourne-centric gardens gathered at Karwarra Garden in the Dandenong Ranges in Melbourne's East.



Karwarra Vic group  
(picture: Penny Evans)

Karwarra Garden's mission is "To use Australian plants in a beautiful garden that inspires and educates". The two hectare garden was established in 1995 and is enthusiastically managed by Curator Marilyn Gray, on behalf of the Shire of Yarra Ranges, and with the support of an Advisory Committee and Friends Group. Plant collections showcase Australian plants, many indigenous to the region, in a moist sclerophyll forest setting. Featured collections include *Boronia*, *Thomasia* and *Telopea* and are complimented by a wealth of interesting species.

Karwarra is highly valued for its commitment to the promotion of Australian plants but as with many Regional gardens it struggles to achieve its full potential. In recognition of its value the Shire has facilitated the development of a Master and Management plan which at this time is in draft form. The plan will guide the future direction of the garden to consolidate Karawara's role in conservation of Australian plant material, education and recreation.

Should your interest be piqued by Karwarra further information can be sourced from the gardens website [www.yarraranges.vic.gov.au/karwarra](http://www.yarraranges.vic.gov.au/karwarra)

Annette Zealley

## ASSOCIATION OF FRIENDS OF BOTANIC GARDENS INC.

*Annie McGeachy, Secretary of The Association of Friends of Botanic Gardens Inc., introduces this important representative organisation. There will be regular contributions from the Association in future editions of The Botanic Garden.*

As a new Associate member of BGANZ, the Association of Friends of Botanic Gardens Inc. is pleased to have the opportunity to contribute to The Botanic Garden.

The Association strongly supports the BGANZ initiative and proposed direction and looks forward to developing a collaborative and mutually productive relationship for the benefit of Botanic Gardens and the community.

The Association of Friends of Botanic Gardens VIC was formed in 1993 at

the initiative of Friends of RBGM, to stimulate public interest in Botanic gardens and provide a Friends network for support, information, sharing of knowledge and experience. Due to increased interest from Friends groups in other states the Association became a national body in 2001. The current membership network represents 37 Botanic Gardens from six states and given recent interest and some planned promotion we hope to increase membership to 50.

An Association conference is held by a different member in alternate years, with members also contributing to the twice yearly news letter Campsis.

The Committee of Management meets quarterly with representatives from 9 member gardens (currently only 6) and the annual general meeting is held in April. The Association purposes and direction are being reviewed, to be completed and approved by the membership at the Association Conference at RBG Cranbourne in September this year.

President, Alex Smart, RBG Cranbourne and I represented the Association at the recent BGANZ conference in Hobart and found it stimulating, informative and very worthwhile. The keynote speaker Dr Tony Kendle, Eden Project, was exceptional. He not only set the agenda for the conference, but proposed the concept of a "pivotal generation" with the capacity to initiate change in community attitudes and behaviour, provoking delegates to rethink the way Botanic Gardens and also Friends, present themselves to the public.

I wish to extend thanks to Dr Philip Moors and BGANZ Council for their encouragement and their support of the Association.

Annie McGeachy, Secretary &  
Geelong Friends Representative.

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# ARTICLES

*The thousands of visitors who travel the world visiting Botanic Gardens would have very few opportunities to witness the establishment of a new Botanic Garden these days. Most of the world's best gardens have been established for centuries and even some of the Australian Capital City Botanic Gardens are now nearing the double century mark. There have been some gardens established in more recent times as the need to preserve our endemic species has been recognised and the focus on botanic collections moved to the local species of our regions.*

*Helen Paulsen, Curator of the Mackay Regional Botanic Garden and Vice-President (Australia) of BGANZ, has followed the development of this vibrant garden since its inception. She chronicles this experience for The Botanic Garden.*

## **Creating a new Botanic Garden – the Mackay experience.**

### **Mackay in the Beginning**

In 1876 the Manager of the State Acclimatisation Gardens in Mackay advocated the Lagoons area of West Mackay for a future Botanic Gardens. Trials of many tropical and sub tropical plants had shown remarkable responses to the rich deep alluvial soils of the site and many have since gone on to become household necessities on the menu, including mangos and sweet potatoes.

The land was designated as a Water Reserve in the early years of Mackay's settlement also the venue for recreational boating on a summer afternoon. The construction of the Water Treatment Plant on the banks of the Lagoon commenced the development of the Lagoons precinct.

Some of the uses for the Lagoons area over the next 100 years included sugar cane growing, top soil excavation for municipal projects, water supply, and recreation for local residents.

The Mackay branch of the Society for Growing Australian Plants actively lobbied the Mackay City Council for the establishment of a Botanic Garden in Mackay during the 1980's. With the employment of the first Manager Parks and Recreation in 1997, support for the establishment of the gardens was proposed to the councillors. There were a number of plans developed by Landscape Architects prior to this time that depicted open parkland development with some limited interpretive collections. The Parks and Recreation section called for expressions of interest in undertaking the Master Plan for a new Regional Botanic Gardens for the city. A number of well known firms submitted proposals and Landplan Landscape Architects from Brisbane were successful in obtaining the commission for this project. The Mackay Regional Botanic Gardens Master Plan was prepared in 2000 and formally adopted by Mackay City Council in February 2001. The chosen site for the new gardens was The Lagoons Reserve at West Mackay.

### **Pushed into Construction**

In 2001 the Queensland State Government offered grants to regional centres to promote the expansion of their city and to encourage development that would have a long term effect on improving the amenity of the regional centre. The Parks and Recreation section prepared submissions to the State Government for funds to undertake the first stage of construction of the gardens based upon the Master Plan document. The funds offered were to be matched half and half by the applicant council and be used within eighteen months of approval. The Mackay Regional Botanic Gardens project successfully gained \$1.33M

towards the first stage of the gardens. Designs were tendered and Landplan Landscape Architects in association with Fulton, Trotter & Partners (Architects) and Ullman & Nolan (Engineers) were the guiding firms behind the design and documentation for the Stage One development. Included within this stage was the Administration Building, Visitor Centre, Viewing Deck, Lagoon edge shelters, boardwalks, entrance feature, Shade Garden construction, Sarina Proserpine Garden, Malta Precinct, Japan Precinct and other associated garden areas.

The contracts were awarded to local building firm T. F. Woollam & Sons and Brisbane based landscape contractors Digit Landscapes Pty Ltd. Construction commenced on 13 May 2002. Over the next twelve months monumental tonnes of soil was moved, excavated, formed and laid to form the basis for the new shape of the Botanic Gardens. Pathways were built along the Lagoon embankments to allow for access throughout the site. Some of the new paths joined existing paths that had been installed previously as part of minor development works of the Lagoons Reserve. The iconic structure of the Building Zone rose above the Lagoon and was eagerly watched by local residents with delight and apprehension. This project was the biggest singular project happening in the Mackay region by a municipal council at the time. The garden areas of the various zones were sequentially planted as they were released from the contract, and the final plants were installed in May 2003. The citizens of Mackay and many visitors to the city held the official opening of Mackay Regional Botanic Gardens on 23rd May 2003 amid great fanfare and celebration.

### **A Time to catch our breath?**

The following twelve months were very busy with staff learning new species of regionally sourced material that had never been used in horticulture before. There were only two full time staff on the opening day supported by two casual employees. All of the staff held horticultural qualifications to Level three or better. Over the next few months, these positions were resolved into full time positions including one Team Leader and three gardeners. They had their work cut out for them, as there were 7,000 square meters of newly planted garden beds to keep in good order and try to stay on top of acres of nut grass that is endemic to Mackay. With any aeration of the rich alluvial soils, nut grass flourished and many techniques were used to reduce the seed germination rates. Radical techniques included spraying the nut grass when it was in full growth, waiting one week and then whipper snip the garden area before applying a thick layer of mulch to suppress further growth. Without the spraying of initial growth, the gardens would still have fields of nut grass cover.

Threatened plant species have been propagated and planted into the gardens, and these are treated with kid gloves by all the staff. Many of these plants have been donated by the Society for Growing Australian Plants Mackay Branch members who continue to have an active role in the gardens development. To ensure that the loss of these species through theft was reduced, the installation of plant labels was held in abeyance until after the plants had established well. Plant labels are an ongoing project with assistance from many sources in the production and placement in the gardens.

The building of Stage One reduced the area of grass to be mowed, but changed the style of lawn care to ensure that top quality lawns were developed, especially in the wedding and high profile areas of the gardens. Some areas of lawn were planted with a mix of shade and sun tolerant species to allow the grasses to establish best for individual locations. The resulting lawns have proved easy to look after and are utilised by visitors for picnicking and events.

Mackay City Council has resolved to promote the Botanic Gardens to the residents and in achieving this they have held many community based events in the gardens. The annual Festival of Arts has a musical concert entitled 'Global Grooves in the Gardens' that is themed on ethnic origins and is held on the Tropical Sun Garden lawns. Thousands of people attend this event. It involves extensive input from gardens staff prior to the day to ensure that power supply for food stalls and stages is available, that the lawn is ready for the impact of machinery and pedestrians and that the garden beds have all been barricaded off to stop people from sitting on plants and compacting the root zones of the trees and shrubs. This is on top of normal maintenance duties throughout the whole garden area.

While the first stage of development was in the planning and early construction phase, the council resolved to support the formation of the Garden Friends group. Public meetings were held in the neighbourhood and about one hundred interested residents attended. The formation of the Mackay Regional Botanic Gardens Friends Incorporated was completed in March 2003 in time for the official opening of the gardens. The friends assist the gardens staff with a variety

of skills including Herbarium Friends, Planting Friends, Visitor Centre volunteers and Guided Walks for visitors and schools groups. The formation of the group was the easy part, with the long term development of an enthusiastic and energetic group of people into a cohesive team the next challenge. The close working relationship with the Visitor Services Officer, Dale Arvidsson and myself has assisted with the continued growth of the Garden friends group into the wonderful team that we have today.

Publicity and a corporate image required that a suitable logo be selected to identify the gardens to Mackay. Upon the offer from the Mackay branch of SGAP, the Mt Blackwood Holly *Graptophyllum illicifolium*, was chosen as the logo emblem. The flower is endemic to the Mackay region and now features on all correspondence, signage and uniforms for staff and volunteers.

### **So, what have we done with the buildings?**

The buildings that comprise the main zone at the entrance to the gardens were designed around a Cooktown Orchid – *Dendrobium bigibbum* configuration. This has resulted in sweeping roof lines, central water collection points and interesting structural elements. The architects went for a "raw" finish approach to the materials used in the building with floors of broomed finish concrete, concrete block work, off form concrete in black, and galvanised steel finishes. Around the top of the walls the Architects designed polycarbonate panels to allow for natural light to the interior of the office spaces to reduce the amount of artificial light needed. Included in the design was the opportunity to expand the herbarium into the meeting room space.



top:  
Coal Garden path  
middle:  
Creating Coal Garden path  
left:  
Curator in Heritage Precint

Storage facilities for large items of furniture and display materials has been of concern, however ample storage of small items and cupboard space along internal walls has proved sufficient.

The Lagoons Gallery and Café are housed in the Visitor Centre module of the complex. These two areas have recently been air conditioned and are being set up to house the Visitor Information Centre and display area. The Lagoons Café has been leased out to a local company and they provide catering to functions and meetings within the Gallery and immediate deck surrounds. The meeting room that is housed within the Administration area is not within the caterer's area of influence. This has allowed the meeting room to be used by small horticultural groups for meetings and general presentations and is growing in popularity and acceptance.

The use of large steel beams and curved structural supports to act as an umbrella to the work spaces below provides a dramatic statement in the buildings. This unique element provides visitors to the gardens with an amazing contrast to other structural forms in the city and proved to be a drawcard to the engineering minded persons of the city. The roof water is channelled into large catchment gutters that empty the rain into the central rock gallery water feature located at the entrance to the building zones. The effect of sheets of water cascading into the rock gallery is dramatic, and combined with tropical downpours provides great wonder from those fortunate to see this occurring.

### **The ever changing landscape**

Imagine being able to view directly from your office out over newly formed and planted garden beds with

hundreds of tube grown and small plants in close proximity. Look out that same window in twelve months time and note the changes to the landscape. At the Mackay Regional Botanic Gardens we have been privileged to witness the growth of the Botanic Gardens from the first days of planting, as there are views that we alone have seen, never to be repeated (short of a major cyclone felling everything).

The use of young stock and tubestock has shown the great benefit of plants being very adaptable to changes when they are small. Advanced specimens have grown, but have not recorded growth rates of 500% in three years like the tubestock has achieved. The jungle that exists now in the Tropical Shade Garden is wonderful, however three years ago we were agonising over the loss of a small tree that provided shade to one area. These trials and tribulations make the role of staff at the gardens so much more fulfilling.

In 2003 the second round of the State Government Regional Centres Program was released. A submission for construction of the second stage of the gardens was submitted and approved with \$1.5M granted towards this stage. Designs based upon the Master Plan were documented and tendered during 2004, with construction commencing November 2004.

Stage Two development commenced with paving to the main visitor centre car park, staff car park facilities, fernery and associated storage shed construction, Palm Walk development, Gymnosperm Gardens and associated access ramps and bank stabilisation works. The location of these works adjacent to the main visitor precinct and shade garden precinct dictated the construction program during the visitor off-season.

These works were completed in time for the second birthday celebrations of the gardens in 2005. The contractors then relocated their base of operations to the northern end of the gardens site to commence the second part of this stage. Included in this section of works was the Coal Garden development, Heritage Precinct development, Water Wise Gardens, Demonstration Gardens, Regional Flora Terraces, Monsoon Waterway and associated tropical species, completion of the Torres Strait Islands Precinct horticulture works and formation of temporary car park areas. As this article goes to publication this area will be completed in readiness for the garden staff and Garden Friends to commence the huge task of planting out more than 7,000m<sup>2</sup> of new gardens.

Adjacent to the major construction site have been a series of wetland ponds constructed to assist with the purification of the Lagoons water system and to aerate the water. Planting of regional *Melaleuca leucadendra* and *Livistona decipiens* onto the formed plains and adjacent water bodies will transform a barren open alluvial flat into a demonstration wetland forest found commonly around the Mackay region. Local unique provenance material has been collected for this area.

Meandering over the wetland area is a series of elevated boardwalks and walking tracks that will lead the visitor through the regional communities on a walk of discovery. The boardwalks will link across the Lagoon to the future extension area. Regional communities from the Central Queensland Coast will be represented in this future development area.

## **New Gardens, New Challenges**

The Coal Garden has been constructed adjacent to the wetlands. It traverses the lower slopes from the wetland to the Heritage Garden and provides the visitor with a unique educational progression through the ramped pathways. Impressed into the various coloured concrete panels are interpretive representations of tectonic plates forming amid lava flows, marine life developing from methane gas bubbles, dinosaurs running through fern and cycad forests, ice age period, emergence of simple plants and the development of the flowering plants into the species of modern times. The impact of man upon the earth is shown through footprints, domestic animal tracks and various tools impressed into the concrete. Along side this path trickles the coal garden waterway with recirculated water from the main lagoon flowing over gravel swales and through lily ponds to topple down the cascade to the wetlands below. This waterway assists with the aeration of the lagoon water, and when flowing through the wetlands will receive filtration from the reeds and sedges planted in the ponds. Plants that are descendants from the primitive species will be planted adjacent to the waterway. Locally sourced petrified wood of Araucariaceae family origins have been installed adjacent to the paths and seating area. Sails soaring over the dinosaur fields suggest Pterodactyls flying over the earth. They provide shade and rain shelter to the visitor.

To assist with the interpretation of the formation of earth and soils, the Paleobotany walls have been built at the top of the Coal Garden. The walls interpret the formation of the earth's layers and include the locally mined coal, placed amid layers of other coloured stones transacted by dykes. Signage describing the area will be installed prior to the official opening in July 2006.



top:  
Gymnosperm Ramp and decks  
middle:  
Heritage Precinct walkway  
left:  
Kanaka Walls



top:  
MRBG Columnar Basalt wall  
looking up to Paleo-botany wall  
middle:  
MRBG Making the Paleo-walls  
left:  
The Fernery May 2005

Coal from the BHP Billiton Mitsubishi Alliance Gregory Mine site was collected for inclusion in the walls. Other materials donated by BMA include fossils and petrified wood that are displayed in the Visitor Centre.

Pathways traversing the slopes of The Lagoon provide opportunities for a variety of theme planting areas. One of the most visual structural elements to be recently constructed is the Forest Arbour. This structure was built from recycled wharf pilings donated by the Mackay Port Authority and provides a solid framework upon which regionally significant vines and lianas will grow. It provides a canopy over the pathway and seating area located within the arbour. Adjacent to the Forest Arbour is the Water Wise gardens where native and exotic species will demonstrate to the visitor species suitable for the home garden and the required water consumption to maintain these plants.

Planting of the Riparian Forest area will provide windbreak and shelter for species within the Early Angiosperms, Lowland Rainforest and Upland Rainforest gardens. Included in these plantings will be cabinet wood timber species from the region.

The Society for Growing Australian Plants Mackay Branch is assisting in the development of the collection for the area of Regional Flora Terraces. Grassed paths meander down the slope and provide the visitor with access to the terraced gardens where flowering species recognised as suitable for the home garden cascade over the walls and slopes. As these gardens grow, birds and small animals will colonise the area and give visitors additional opportunities for interaction with nature.

Interpretation of the natural environment is displayed in the Geology gardens where plants that grow upon the basalt, granite and sandstone soils of the region will be established amongst rock outcrops of this geological origin. The sands of the region are predominantly river and beach origins. Planting of the Tropical Coastal Lowlands will display littoral forest, dune colonies, river riparian species and water margin species. Access to these gardens is along the wetlands edge path.

One of the most interesting and potentially amazing areas will be the Monsoon Forest and associated waterway development. The water cascades down a series of stylised weirs to drop into the head of the wetlands. Surrounding the waterway and grand stairway will tower the trees of the wet tropics. Further along the area will be the Dry Tropics collection and the *Melaleuca viridiflora* collection.

Torres Strait Islanders settled in Mackay during the early cane growing industry development in the region. Their contribution to the development of the city is recognised in the Torres Strait Islands Precinct of the gardens where plants significant to the culture of these people are planted. Many of the food plants are to be included in the wetland areas and around the ceremonial dance grounds. Partnerships with the local elders and community representatives were formed early in the gardens development and continue today. This area of the gardens will become a focal area for the Community's ceremonies and large gatherings in the future.

### **For the younger visitors**

Education of the future generations is best achieved through play and the chance to explore the environment around you. Children will soon be

able to experience fascinating natural elements in association with play in the 'Under the Banyan' Play Garden. Designs are nearing completion with three areas being developed for 'Seedlings' (toddlers to 5 years old), 'Saplings' (5 to 9 years old), and "Cottonwood Scrub" (adventurous 8 year old and over). The entrance to the play garden will be through stylised "Banyan Fig" aerial roots that will provide the framework for the entrance gates, security fencing and interpretive signage. Included in the design will be bicycle parking, drinking fountains and children's artwork. Retaining walls will form three separate levels for the play garden that will be accessed from the central court. Vines supported on stainless steel cables will provide natural shade to the entrance.

The use of self shedding palms for shade in the various play zones was considered the most suitable species selection. Palm fronds are large in size and easy to remove without contaminating the sand play areas. Flowers and fruits are easily managed through removal of the flower spikes and the trunks are not readily climbed. Species will include *Wodyetia bifurcata*, *Ptychosperma elegans* and *Archontophoenix alexandrae*. A palm grove adjacent to the Dell will be included in the 'Seedlings' area of the play garden. To the western side of the play garden will be a thick planting of shade trees to provide natural canopy to the garden. As the prevailing breezes will blow from the play garden to the planting area, minimal leaf litter is expected within the play garden area.

There are plans for the establishment of a trailer to house the loose items of play equipment and basic science equipment needed to support the use of the Play Garden by school groups and

on open days. This service would be through the Garden Friends and Visitor Service section of the gardens staff.

### **The future for Mackay Regional Botanic Gardens**

The progressive development of the gardens is planned to span a further fifteen years. The capital development program established periods of development followed by periods of consolidation to enable staff numbers to increase, garden areas to be planted and maintenance operations to be managed carefully.

The securing of land across the lagoon from the existing site is in the process of going through the Department of Natural Resources. This will give an additional fifteen hectares to the existing thirty-three hectare site, making Mackay Regional Botanic Gardens slightly smaller than Mt Coot-tha Botanic Gardens in Brisbane. The Master Plan design for this area includes a restaurant, function centre, extensive car parking facilities and bio-regional planting areas. Throughout this area will be water features, gorges and waterfalls, alongside pathways and observation areas. Extensive natural bush type vegetation communities will be established on the current cane fields. The development of this area will commence after extensive research has been undertaken to gather valuable information on the regions main plant communities.

Over the next twelve months most of the Stage Two gardens will be planted and structural trees installed for successional planting as the cover grows and as the micro-climate develops. The planting of understorey plants to the Stage One areas are currently being undertaken. As the gardens grow, opportunity to expand the herbarium collection is ongoing

with a very enthusiastic group of volunteers and staff involved with this project. In future years there will be opportunities for research programs to be implemented. Currently most of the plant material is only now coming to a size that is considered acceptable to use for research purposes. This area of the gardens operations shall be progressed as budget and facilities are developed. Partnerships with Central Queensland University and the Mackay Campus of TAFE Queensland have been established and these relationships continue to expand yearly.

### In Conclusion

Mackay Regional Botanic Gardens is a young and vibrant garden with a small but enthusiastic staff.

The challenges of development, climate change, regional location and funding will all be with us for many years to come.

We welcome all visitors to Mackay and look forward to the continued development and acceptance of this garden in the field of Botanic Gardens.

Helen Paulson  
Curator

*The following article, submitted by Bryan Gould, Manager Premier Parks, New Plymouth District Council, Taranaki, NZ, and a member of the BGANZ Council, is the first in what it is hoped will become an occasional series of pieces about regional flora from diverse regions of Australia and New Zealand.*

### FROM SEA TO SUMMIT:

#### AN OVERVIEW OF TREES AND PLANTS ON MT TARANAKI TARANAKI, NORTH ISLAND, NEW ZEALAND

*Adapted from a series of original articles written for Taranaki Alpine Club*

Egmont National Park, in the Taranaki region – located south of New Plymouth city on the west coast of New Zealand’s North Island – contains over 650 different types of vascular plants\*. They form a complex inter-connected range of native species – comprising lichens and mosses, liverworts and ferns, epiphytes and lianes, grasses and herbs, shrubs and trees. Some of these plants are locally endemic and unique to the area.



Map of  
New Zealand

*Mt Taranaki stands at the centre of Egmont National Park, near New Plymouth, on the mid-west coast of New Zealand's North Island. Overall the climate is temperate, with plentiful rainfall and sunshine. Geologically the underlying igneous and sedimentary rocks are overlaid by deep layers of volcanic ash and conglomerate from past eruptions. The region of Taranaki juts out into the Tasman Sea, facing the full force of the prevailing westerly airstreams. The high massif of Mt Taranaki and its ranges modify the weather pattern, resulting in an annual 7.5m of precipitation on the northern faces.*



Mt Taranaki (2,518m) forms the central high point of an area rich in botanical diversity. The andesite peak is surrounded by an extensive apron of volcanic clastic conglomerates, breccia and tephra<sup>†</sup> deposits – termed the ringplain – which decreases in height and extends for many kilometres in all directions. Laid upon the summit cone and ringplain is a mantle of vegetation influenced by several natural factors – primarily soil type and climate. Additionally, the occurrence of plants has been modified as a result of land clearance, animal predation, human interference and past catastrophic volcanic events. Collectively these factors, with many site-specific variations, have resulted in the overall vegetation cover seen today.

A glance at the mountain indicates clearly the vegetation changing with altitude. Conditions for plant growth deteriorate with height, creating a marked transition in vegetation zones from sea level to summit. The tall trees of the lowland forest give way to the lower stunted canopy of the montane

forest, which continues upward in to sub-alpine scrub. Beyond the scrub lie tussock grasslands, herbfields and mossfields. Above 1,650m, at the limit of growth, plant cover is patchy and inconsistent, with exposed rock and scoria the dominant feature.

Overall, a botanical exploration of the mountain and the ringplain provides a fascinating insight in to a range of plants adapted to their own environmental niche.

The vegetative zones found on the mountain are described here in a series of overviews, moving upward from sea level to the summit.

*Mt Taranaki (2,518m) with the subsidiary cone of Fanthams Peak (1,966m) from the south-east. Lowland forest covers the surrounding ringplain, ascending into montane forest, scrubland, tussock grassland, alpine herbfields and summit rock zones.*

## Lowland forest

The vegetation zone described as lowland forest covers over half the 33,500ha park. Botanically there are nine identifiable variants to this forest type, but essentially it is the rimu - rata/kamahi mix which is the dominant type. The lowland forest area is where a few species of tall forest trees form the upper canopy, emerging through a complex under-storey of ferns, shrubs and small trees.

Rimu (*Dacrydium cupresinum*) shares this low elevation forest canopy with many other native trees, in particular northern rata (*Metrosideros robusta*) and kamahi (*Weinmannia racemosa*). The natural composition of the rimu/rata/kamahi mix is variable – with either tree being dominant within an area – depending upon the influences of varying soil, drainage and exposure.

Regardless of the combination we see the overall matrix of the forest as comprising these large spreading trees. Together with kahikatea (*Dacrycarpus dacrydioides*), mahoe (*Melicytus ramiflorus*) and tawa (*Beilschmiedia tawa*) and associated smaller trees and shrubs they form a plant community recognisable as lowland forest.

Interestingly, just like rimu (and, indeed, many of New Zealand's native trees) both northern rata and kamahi may adapt their form and appearance to their growing environment and as they develop through the aging stages of their lives. The variability in appearance noticeable with these trees is most apparent in differing leaf shapes and bark patterns. Rimu, rata and kamahi are all long-lived, with many specimens over 300-400 years old.

## Montane forest

The montane forest occurs between approximately 750-1,200m. The tree line varies depending upon the influence of soils types, nutrients, drainage and disturbance resulting from past eruptive events. As in the lowland areas, the matrix of distinct montane vegetation communities within the montane zone is complex and inter-connected.

The montane forest zone on Mt Taranaki is commonly referred to as “goblin forest” – a descriptive non-botanical term which alludes to the stunted tree growth festooned with mosses and lichens which is so striking to any observer. Kamahi dominates the canopy. Trees here are typically shorter in stature – a characteristic which is especially noticeable where the effect of increasing altitude and exposure to wind has restricted growth and shaped the canopy. The undergrowth is relatively open – a feature noted by early explorers and travelers, who found it easier to move through the forest.



*Kaikawaka and mountain totara, some over 400 years old – survivors of previous eruptive events. Even at this age trees may be less than 10m high and sculpted by the wind.*

Stunted wind-shorn kaikawaka (*Libocedrus bidwillii*) and mountain totara (*Podocarpus cunninghamii* syn. *hallii*) are mixed within the crouching canopies, becoming more frequent with increasing altitude.

Many trees are massive in their trunks, but squat, twisted and gnarled, having begun life as perching epiphytes on fallen logs or within the upper canopy. Evidence of previous ash and tephra deposits can be seen in areas of exposed earth. The remnants of old mountain totara and cypress which pre-date the last significant eruption (Burrell 1665AD) – some dead, some alive – are everywhere amongst the forest. Good examples of goblin forest are easy to find – particularly around the North Egmont, Stratford Mountain House or Dawson Falls areas.

Grotesque tree forms, hanging filmy ferns (*Hymenophyllum* spp.) and epiphytes are characteristic of montane (goblin) forest and are partly the result of the cooler, wetter environment. Rainfall in this zone may be up to 6,500mm per annum. Temperatures frequently fall below freezing anytime throughout spring to autumn and snow lies for lengthy periods during winter. The mountain cabbage tree, or toi, *Cordyline indivisa*, is seen at clearings within the tree cover or along the edge of tracks, where its bold foliage thrusts into the light beyond the shaded forest canopy.

Some other interesting influences on plant growth are less obvious, however. In particular transpiration – the process by which plants allow the controlled loss of water vapour and gases through their leaves – is affected by the frequent cloud cover and shrouding mist. Low transpiration rates are believed to reduce nutrient uptake which, in turn, slows the growth



cycle to very small annual increments. Additionally, the nutrients released from the decomposing leaf litter are flushed by rainfall into the soil, where the moisture percolates downwards, leaching them away, thereby limiting their availability to plants. Add to this factors such as temperature and wind and it is not surprising that many of the trees in this zone, whilst often very aged, are small in size.

*The broad sword-like leaves of the mountain cabbage tree, or toi, Cordyline indivisa – a montane forest plant that prefers cool temperatures and high precipitation.*

## Sub-alpine scrub and shrubland zone

This zone lies generally between 1,000 - 1,500m. The sub-alpine scrub and shrubland canopy is dominated by leatherwood (*Brachyglottis rotundifolia* var.) in association with mountain five-finger (*Pseudopanax colensoi*), haumakaroa (*Pseudopanax simplex*), inaka (*Dracophyllum longifolium*), *Hebe* "Egmontiana" and *Coprosma pseudocuneata*.

The dominance and distribution of the plants within this complex depends, as is so often the case, upon biophysical variables such as moisture availability, nutrient levels and wind exposure – combined with the affect of disturbance due to erosion, slippage or volcanic activity. Leatherwood forms the main tightly-packed canopy, but wherever slips occur, inaka is usually most prolific as a coloniser, followed successively by leatherwood and its associates, as the area becomes stabilised.

This is the zone of transition between the montane forest and the truly alpine tussock grassland and herbfields. Some trees occur here – but look markedly different from their forest counterparts at lower elevations, where growth conditions are more sheltered. Accordingly some stunted wind-shaped kaikawaka emerge through the leatherwood at the lower levels of the sub-alpine layer. So too mountain totara and broadleaf are found randomly and appear sculpted and shrub-like. However, with increasing altitude, the trees disappear. The canopy of the shrub matrix becomes more compact and the leatherwood gives way to mountain tauhinu (*Cassinia vauvilliersii*), mountain tutu (*Coriaria pteridoides*), *Hebe odora*, *Myrsine divaricata* and inaka.

The upper edge of the zone undulates at varying altitudes. In places it is breached by landslides, creating the circumstances for plant colonisers to begin the slow process of re-vegetation all over again, thereby changing the species composition. Tussock grasses and herbs from the higher levels make inroads wherever the land is broken or exposed. At the shrubland zone's extremity a shrub-tussock mix fades into almost pure tussockland, as altitude increases and drainage decreases.



In the upper alpine area plants become smaller in stature, hugging the ground or sheltering in crevices. Gone are the forest giants. This is the zone where life exists in miniature and although some plants are obvious, others are not. Whilst adapted to extremes these high-level plants are clinging to survival in a harsh environment of fierce winds, sub-zero cold, baking heat and shifting unstable ground. There's no shortage of precipitation as the north face of Mt Taranaki receives over 7,500mm of rainfall annually. What's important is finding a niche and holding onto it.

*The main summit at centre, hidden beyond view, with the Shark's Tooth (2,510m) at right, seen from the south-east, above Dawson Falls. Leatherwood, hebe and inaka dominate the sub-alpine scrub and shrubland plant matrix before merging, at higher elevations, in to tussockland.*

Once above the tree-line and sub-alpine scrub, heading towards the top, the views open up in to a different world where temperature, exposure, moisture and erosion define the type and extent of plant growth.

### **Sub-alpine and alpine tussocklands**

Beyond the scrub, above 1,400m, the vegetation is dominated by the alpine grasses. Referred to as tussockland the grasses occupy a zone of approximately 200m vertical altitude. Large swathes of red tussock (*Chionochloa rubra*) interspersed with silver tussock (*Poa laevis*) cover the slopes.

At the lower margins the grass is inter-laced with scrub species – including mountain hebe (*Hebe odora*), mountain tauhinu (*Cassinia vauvilliersii*), inaka (*Dracophyllum longifolium*) and semi-prostrate coprosma (*Coprosma depressa*). Throughout the central belt of the zone the tussockland is particularly dense where conditions are most favourable – in such areas every centimetre of ground is taken, with no room for other species to gain a foothold. The upper margin is characterised by more scattered spacing, fragmenting in to the alpine herbfield zone as drainage and the environment changes again.

Showy flowering plants such as golden-flowered buttercup (*Ranunculus nivicola*) and large-leaved ourisia (*Ourisia macrocarpa* var. *macrocarpa*) are commonly seen here. Their blooms are spectacular between November and February, thrusting through the tussock clumps or alongside tracks and streams at every level from the forest to the herbfields.

Searching at the lower levels of the tussockland zone often reveals the green-hood orchid (*Pterostylis banksii* var. *patens*). Its subtle colouring makes it easy to miss, but once you have spotted one you may be surprised by how many there are. The male and female reproductive parts are contained within the hood and cross-fertilise, providing the spring-loaded “exchange” mechanism is triggered. Its flower is sensitive to insects which, once they land on the petals, are instantly flicked upwards and inside the tensioned flower – temporarily trapped as unwitting pollinators, until the deed is done and they are released as the flower relaxes. Not a bad trick for a little flower.

### **Alpine herbfields**

This is the zone where, in summer, you find it hard to place your boots without stepping on some innocent flower. In mid-late January the herbfield is alive with colour en masse. It's a zone of some confusion (or at least uncertainty) amongst botanists – where many of the plants are both unique and/or closely related to similar species in other alpine areas of the North and South Island.

Mountain daisies (*Celmisia gracilenta* and *Celmisia glandulosa* var. *latifolia*), everlasting daisy (*Helichrysum alpinum*), anisotome (*Anisotome aromatica*) and forstera (*Forstera bidwillii* var. *densifolia*) carpet the stones. Anisotome is a member of the carrot family and its crushed leaves emit a strong fragrance. The careful observer will see other dwarf shrubs and plants – namely creeping coprosma (*Coprosma pumila*), snowberry (*Gaultheria depressa* var. *novae-zelandiae*), blue tussock (*Poa colensoi*), club moss (*Lycopodium fastigiatum*) and a moss (*Racomitrium lanuginosum* var. *pruinsum*).

Much of the species composition is due to variation in topography and drainage, but on a site-by-site basis, within small distances. A detailed examination of different slopes, hollows and streams will demonstrate the capacity of plants to establish in ideal (or the best available) circumstances.

In places, the herbfield includes a mosaic of moss species, sometimes to the extent that the vegetation becomes almost exclusively what is known as mossfield. Here, the mosses *Racomitrium lanuginosum* var. *pruinatum*, *R. ptycophyllum* and *R. crispulum* are evident in large distinctive hummocks. Amazingly these plants were first seen (by Europeans) by the noted naturalist Joseph Banks in 1770 when, from aboard James Cook's ship the Endeavour, he recorded "... many white lumps in companies of fifty or sixty together, which probably were stones or tufts of grass, but bore much resemblance to flocks of sheep". Good telescope. The description has stuck – and now *Racomitrium* species are generally referred to as "vegetable sheep".

The spread, presence or absence of species through the herbfield-mossfield zone varies according to seasonal change and, also, the sporadic impact of erosion. Where fragile slopes have moved, the ground is re-colonised by pioneers (usually mountain tutu (*Coriaria plumosa* and/or *C. pteridoides*) are the first to arrive) and the composition of plants reverts to a new cycle of adaptation and establishment.

### **Alpine gravelfields, stonefields, boulderfields, rocklands, snowfields and icefields**

We're really at the top now. Above 1,650m there's a lot of bare ground. The size of rock pieces – called substrate – determines the type of zone as either gravelfield, stonefield or boulderfield. Where residual lava is found the term is rockland. As with so many things, the seemingly simple barren landscape is actually a complex mix of vegetation affected by a range of physical and climatic factors such as slope angle, stability, exposure and duration of snow cover.

Plant numbers are thinning out now, but they certainly exist. Blue tussock (*Poa colensoi*) reaches about 1,900m, along with the anisotome, daisies and forstera. Above 2,000m vascular species (that is, "higher" plants, which are anatomically endowed with flowering parts) are infrequent and confined to sheltered depressions. Mountain grass (*Poa novae-zealandiae*) and dwarf sedge (*Carex pyrenaica* var. *cephalotes*) are found abundantly.

The distinction of being the vascular plant which is found highest on the mountain is taken by a minute cushion plant, an as yet un-named *Colobanthus* species, growing at over 2,400m.

Stonefields and boulderfields are scree areas prone to slippage. Living conditions are hard and impermanent. Despite this a range of plants adhere to the rock and occupy the voids between them. Along with daisies and red-stemmed willowherb (*Epilobium glabellum*) there are colonies of the mountain fern *Polystichum cystostegia*. Warwick Castle, Humphries Castle and many of the ravines are examples of such sites.

Rockland ranges from the vertical cliffs of old eroding lava extrusions to the more intact newer flows like Minirapa (a prominent geophysical feature on the north-facing slopes). Lichens (*Rhizocarpon* and *Stereocaulon*) and mosses (*Racomitrium*, *Andreaea* and *Grimmia*) cover the rock surfaces.

Above 2,500m you will be lucky to see much, other than a few minute lichens growing in rock fissures. The snowfield and icefield of the summit cone and crater are naked of plants. Clarkson advises the only plant recorded at this altitude is a single-celled alga, called *Chlamydomonas* something-or-other ..... which is very weird, but you'll know it when you see it because it causes red staining on the snow in winter.

For further information, two great references are:

- *Vegetation of Egmont National Park, New Zealand, 1986* by Bruce D. Clarkson (whom I acknowledge as a prime reference for these notes) and
- *A Field Guide to the Alpine Plants of New Zealand, 1986*, by John Salmon.

### **Bryan Gould**

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Egmont National Park is crown land, managed by the Department of Conservation.



*Looking at the Shark's Tooth across the permanent snow in the crater, from the main summit.*

*Seasonal and diurnal temperatures range from sub-zero to baking heat. Wind erodes loose surfaces shattered by the freeze-thaw cycle. Rock material is constantly shifting down the steep slopes.*

*Only alga and lichen exist here in the rockland-snowfield/icefield zone.*