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The Editor has his say……

For the past two issues I have been able to hide. First in March, behind a well-deserved thank you to David Smale who worked this desk for seven years and secondly behind Keith our president who wrote on our future as a society in July. As David can testify soliciting articles from members arguably makes up the biggest and perhaps the most satisfying part of this job. Some members write in the newsletter with verve, have a lot that is worthwhile to state, and do so regularly. We need to continue hearing from them, but for a vital society we must hear from new minds, with different perspectives. Our future depends on it. We each have a different take on the universe, and our corner of it, the make-up of this planet.

My understanding of geology gets its slant from 35 years as an exploration geologist. My current take on life, from 32 years in the United States, with stints in west Africa, Australia and Canada, after a Catholic and scientific education in New Zealand and Fiji. I retired as Chief Geologist for Rio Tinto Iron and Titanium two years ago, after specializing for 20 years in the search for titanium, starting in sediments, but moving in the last few years to mid-crustal rock. Over the years I have become astonished at the richness of our planet and how so many seemingly unlikely mineral concentration events have come to pass and been preserved. I have also been impressed by how easily such things are hidden from those lacking the imagination to consensus bust rather than consensus trust. Climate change, warming or Pleistocene cooling, is on the way. It always has been, and only people who think the planet was formed, as is, six thousand years ago can believe otherwise. Hubberts Peak will be scaled, but over how many ridges? The coincidence of future depletion and warming (or cooling) all demand we waste less, pollute less, and recycle more, especially with carbon. We need however to be careful with coercion. Will the Earth really be worse should global warming come to pass or merely different? Will civilization cease when we cross the Hubbert Range or only as we know it? Science is young, technology inefficient and we have a lot to do.

As for our Newsletter, one possibility for the future includes articles on each of the geological research establishments in New Zealand. In this issue Massey stars; our hosts for “Our Planet, Our Future” our next conference. Another proposal is a section on “New Zealand Geology Published Overseas”. Please send reviews to help make sure other Kiwi geologists do not miss new knowledge. We also seek articles reviewing how our New Zealand geology has grown in some discipline in the past say 10 or 30 years. We have had one such article this year on dinosaurs by Ewan Fordyce. There are many topics to choose from, petroleum, natural hazard and disaster prediction, petrology, coal, limnology, geophysical surveys done, sequence stratigraphy, trace fossils, and your favourite. Have a go. Rooted in science, dare to project future directions. Good leaders have to do this all the time. Make our newsletter interesting to outsiders, and our society a leader, listened to at times in the halls of power.

Kerry Stanaway, Auckland
And the President His
Hubbert and other Inconveniences

Lately, the popular press, government bodies, and perhaps even the general public seem to be becoming increasingly aware of the mounting evidence, from earth scientists and others, that our consumer-based civilisation may be in for some profound changes. How this is likely to affect the future of geology, geologists and the GSNZ is something we may need to consider.

Several years ago, Rick Sibson wrote a short but compelling article for the Listener entitled “Falling off Hubbert’s Peak”. It outlined the 1956 predictions of oil geologist M.K. Hubbert that US domestic oil production would peak in 1970, about 40 years after the 1930 peak in discoveries. He was one year out! With 80% of current production from fields discovered before 1973, and few recent major discoveries despite vastly improved exploration techniques, we are now burning four barrels of oil for every one we discover, with huge increases in demand by oil-poor China and India. This is not just fuel for SUVs and tourism, but for making just about everything in our shops, agricultural chemicals to feed a world population that is 2½ times bigger than when I was born, pharmaceuticals to keep them all alive, and fuel to carry food and products to global markets. Rick quoted predictions that global oil production would peak about now; others give us another decade or so. If correct, and it seems likely, we are about to start the second (downhill) part of the Hydrocarbon Age’s bell curve. There will still be hydrocarbons (including “non-conventional” sources – tar sands etc) for many decades but it gets increasingly costly (monetarily and environmentally) to extract. The little public reaction I heard to Rick’s article was total denial. “Rubbish, this can’t happen, there’s lots of possibilities”. Although the recent the Royal Society (NZ) report on “Energy Opportunities” suggest that we might be better placed than most, some major changes would be required. However, none of the much vaunted alternatives would seem to come close to replacing all that the world does now with cheap hydrocarbons, let alone its aspirations for growth.

But there is the other related problem ~ that of the carbon locked away from oxygen for several hundred million years, which is getting back into the atmosphere and ocean. If you haven’t seen Al Gore’s “An Inconvenient Truth”, check it out. Or nearer to home, listen to James Crampton, Tim Naish, Peter Barrett, Lionel Carter, Paul Callaghan and others on “In the Goldilocks Zone” (www.radionz.co.nz/nr/programmes.inthegoldilockszone) ~ get the podcasts if you missed the broadcasts. Check the government’s (www.climatechange.govt.nz) and recent news articles in the Herald’s (www.nzherald.co.nz/climate). Although there might be disagreement with some pieces of research, the basic conclusions are becoming ever harder to refute. Global climate is changing, and the correlation between temperature and human emission of carbon dioxide into the atmosphere is just too close for coincidence. Many are probably confused because dissent has been grossly over-represented in the popular press.
(53% in US) compared with apparent unanimity in peer-reviewed scientific papers (Science: 306:1687 3Dec2004 – www.sciencemag.org). Controversy sells; although in this Newsletter it hasn’t increased circulation yet. Even in the US, influential attitudes seem to be changing. Recently ExxonMobil, long a prime advocate against any human role in climate changes, has said that “Even with many scientific uncertainties, the risk that greenhouse gas emissions may have serious impacts justifies taking action.” (Tomorrow’s Energy, Feb 2006). This almost echoes a statement signed by most of the world’s academies of science, including the NZ and UK Royal Societies, in 2001.

Assuming for a moment that “peak oil” and anthropogenic “climate change” are probably real, are we contemplating “the end of civilisation as we know it” within a generation or two? Probably for South Saharan Africans, Bengalis, Tuvaluans, and Inuit. Not necessarily for most of us, assuming the kind of wisdom and cooperation that has been rare in history. We are however all in for some profound changes – beginning with the way we think about the future.

Close to home, what is this going to mean for the future of New Zealand geology and the GSNZ? Remember the old timers at Kaikoura? Fifty years ago, most geology was being funded (ostensibly at least) to help find new resources. We played a key role in the world’s present prosperity – and its problems. But now, if we find more hydrocarbons or coal, can they be burnt? If we find more minerals, how many will still be economic with increased costs of smelting and transport? Exploration geologists have become a small (but still vital) part of our membership but could become rarer. Geologists involved with environmental issues, in one form and other, have increased in numbers and will probably continue to do so. We need to know about the earth and its complexly interactive processes for quite different reasons.

If, as a few responsible geologists think, there is still doubt about the science or conclusions, what tests would they suggest are needed to provide proof? But, just in case prevarication leads to irreversible or catastrophic changes, what actions must be taken now? Have we clarified the scenarios and risks for New Zealand’s long term future yet?

To get some of these ideas across to the generations who will be most affected maybe we need to teach earth science as a basic, critical and exciting part of human survival, rather than as training for future geologists. With few earth science graduates in schools, it has been suggested that aspects of recent curricula have deterred teachers, as well as pupils, from any involvement. Few seem to feel like Bill Bryson “it sort of hit me with a bang – that my whole existence was going to be on this planet . . . at least I should understand how this one works”. Perhaps teaching needs to start with the big overviews ~ the plate tectonics ocean conveyor, environmental processes and the evolution of life. Local rock outcrops studies may have to wait. Future generations will need a better understanding of their place as an animal species with the same constraints as any other life-form, but also a geological agent responsible for some of the most dramatic changes, including mass extinctions, since the rock hit Yucatan.

With Geosciences06 “Our Planet, Our Future” at Massey in a couple of months and the International Year of Planet Earth a year later, it is perhaps time to start thinking where New Zealand geology might be going in the longer term as well as in the more immediate future.

Keith Lewis, President
Soil and Earth Sciences, Massey University Institute of Natural Resources.

Kerry Stanaway, Auckland

Massey occupies a compact campus on a hill just south of Palmerston North. The original university building, completed in the late twenties, is an unusual, early example of art deco with delightfully original New Zealand motifs set into the concrete walls. The initial agricultural college grew from a joint effort between the Auckland and Victoria colleges of the then University of New Zealand. Victoria also set up a branch locally and irreverently referred to as ‘the twig’ which was absorbed when Massey became a separate university after the Parry Commission report in the early 1960s.

Soil and Earth Sciences within the Institute of Natural resources occupy the bottom floor of a not unattractive late 60’s early 70’s vintage concrete slab edifice, now undergoing a total revamp due for completion and full re-occupation in mid 2007. A separate wooden structure known as the ‘the hut’ currently temporarily houses the senior staff. This will become HQ for graduate students after the revamp and the current ‘magma chamber’ for PhD students and the ‘middle earth’ room for masters students might then become the ‘lower hut’ since ‘upper management’ will have moved back to the main building with new lab and lecture spaces.

The Institute of Natural Resources is very much a “soft rock” terrestrial geology school and offers B.Sc. and M.Sc. courses in Earth Science and a double major B.Sc. in Earth science with environmental science as a minor. Quaternary research is a strength and Massey offers an M. Sc. in such research. It also offers graduate diploma, masters and PhD courses in emergency management where courses in town planning, geography, psychology, risk-management, occupational health and safety mix with Earth science. Regional planning students also take some of the Earth Science courses. A Batchelor of Applied Science course now replaces the Batchelor of Agriculture and Horticulture courses formerly offered.

The Institute began life as the Department of Soil and Field Husbandry in 1927. Experimentation with drainage began in 1938 and evolved into the Drainage Extension Service that closed in 2004 when it became obvious that most research had already been done and any new work could be carried out by industry. The Soil Science Department was added in 1961 with the Fertilizer and Lime Research Centre following in 1983. In 1998 Earth, Soil and Plant Sciences as well as Agricultural and Horticultural Systems Management and Ecology merged to form The Institute of Natural Resources with Professor Russ Tillman, a specialist in soil fertility and fertilizers, as Head. Professor Vince Neall became Group Leader for the Earth Sciences and Associate Professor Mike Hedley became Group Leader for Soil Science and Director of the Fertilizer and Lime Research Centre.

Historically drainage studies have been important to better utilizing the wet low-lying Manawatu River basin soils as well as the loess soils of the upper terraces with their fragipan layer that made for water-logged winter quagmires. The solution developed in the upper terraces was a unique system of drainage called ‘moles’ where a steel ‘bullet’ was pulled by
wire through the sub-surface clay-rich horizon above the fragipan, to form a smooth round clay rimmed tubular channel with access to the surface for water ingress made by the wire as the bullet was pulled along.

The reason fertilizers have received so much study in New Zealand, much of it here at Massey, is based on the fact that volcanic soils take up so much of the available phosphorus because of allophane and ferrihydrite formation, this vital nutrient becomes unavailable to plants. Whereas once research focused on making this nutrient available to plants today the focus of the work of Mike Hedley’s group has shifted to justifying the application in view of pollution run-off aspects of excessive use. A recent addition to the University is a “Zero Waste Academy” where thinking outside the box is appreciated.

Vince Neall began the Earth science program at Massey as a lecturer in 1973. His studies of volcanic soils lead to an interest in volcanic hazard research after doing fieldwork at Mt St Helens only 11 months before the catastrophic eruption in 1980. Since then volcanic hazards have dominated his interest, with studies of the Ruapehu eruptions in 1995-6. Now however, he can also be found studying the archaeology exposed by excavations of volcanic ash sequences in New Britain where human occupation goes back 40,000 years. This work is supported by an Australian Research Council grant to the Australian Museum.

FoRST funding for volcanic hazards research began under Vince in 1992 with the Massey effort going to high frequency smaller eruption stratovolcanoes such as Ruapehu rather than the low frequency but sometimes much more destructive caldera or Taupo type eruptions. Lahars originating from the more frequent stratovolcano eruptions have seen particular effort, especially within the Whangaehu River, scene of the 1953 Tangiwai disaster.

Shane Cronin, in 2004 took over the administration of both the FoRST funded work and began the Marsden Grant work on lahar studies some of which are now pursued in Indonesia. He participates in a southwest Pacific volcanic hazards research program funded by various international agencies, including UNESCO, the UNDP and the US Army with work taking place in Fiji, Tonga, Vanuatu and the Solomons. The volcanic hazards unit has 9 post grad students plus 4 post-doc fellows, 14 in all, of whom 5 are Kiwis. They cooperate with researchers worldwide, including not only other Massey Departments, but also researchers at Auckland, Waikato, and the GNS in NZ. Overseas Melbourne and Sydney (Macquarie) Universities in Australia cooperate; together with Buffalo(NY) and Oregon in the US, Kiel and Mainz in Germany, Durham in the UK, Memorial in Newfoundland and the Volcanic Health Group at Cambridge. This fluid international network possibly constitutes the world’s largest volcanic hazards researcher team.
In the Common Room—
Michael Turner, Nicole Woutersen, Thomas Platz, Suzy Cole, Seth Launson, Anke Zernack, Linda Yates

& the magma chamber
Research into the deeper processes under andesite stratovolcanoes takes place under the aegis of Bob Stewart who, like Shane, also cooperates with Ian Smith at Auckland and Richard Price at Waikato. An earlier research interest of his, working in conjunction with Lionel Carter at NIWA, delved into paleo-climate as revealed by wind-borne 1 to 10 micron quartz particles in sediments. In colder climates greater wind strengths lofted tonnes of this fine quartz into the troposphere to be deposited in sediments where it can be recognized from isotopic signature and distinguished from authigenic quartz using soil and sediment chemistry. He also has two students following in the footsteps of Massey’s world renowned researcher into the botanical uptake of elements, Robert R Brookes. Present studies include gold uptake in plants and how to increase it so as to “mine” the gold from plant ash. The uptake of poisonous mercury is another topic. Bob also has private industry funding from the Waihi Gold mine to study the rehabilitation of mine waste dumps. A new machine arriving soon is the Fourier Transform Infra-red Microscope (FTIR) enabling the study of water and gas contents in glass inclusions in minerals.

Of interest to students, too many of whom in this writer’s day, had to sit through dull almost useless lectures is the enthusiasm of Julie Palmer for this aspect of university work. She is a student of sedimentary basins, oil deposit formation and oil recovery who shares her post with Clel Wallace a student of the mineralogy of soils, ash, and loess able to fingerprint archaeological items. After a lecture Julie says, a lecturer should feel drained from communicating the passion a real geologist feels for their work.

Other staff at Massey and their interests include,

- Chris Anderson, working on gold uptake and release in plants,
- Nanthi Bolan, working on phosphate availability, soil acidification, pesticide infiltration and waste recycling,
- Lance Currie, who studies lab procedures, research management and plant response testing,
- Dave Horne, a specialist in the impact of land use on soil structure,
- Loga Loganathan, researching among other topics the magnesium and phosphorus nutrition of *Pinus Radiata*,
- Jerome Lecointre hailing from France and our December conference convener, who studies volcanic hazards and volcaniclastic deposition on Ruapehu, Tongariro and Taranaki,
- Alan Palmer, who is a soil mapping, loess, volcanic ash and Quaternary geology specialist,
- Mike Tuoy, who researches soil conservation and erosion, GIS and remote sensing and
- Warren Woodgyer whose interest is EM surveys for soil mapping.

Post graduate workers at Massey and their thesis topics include,

- Asing, Janice MSc Soil Denitrificaton inhibitors with organic manures
- Banabas, Murom PhD Soil Nitrogen leaching under oil palms in Papua N. Guinea
- Bretherton, Mike PhD Soil The water cycle in hill country
- Bishop, Peter PhD Soil High tech costings on modern fertilisers

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Brooks, Karina  MSc  Earth  Volcaniclastic sedimentation
Chapman, Ian  MPhil  EM  Volcanic risk to energy distribution in Taranaki
Chrystall, Leila  MPhil  NRM  Catchment management of the Ruamahanga River
Chuasavathi, Tham  PhD  Soil  Sewage sludge as a nutrient source & soil conditioner
Cichota, Rogerio  PhD  Soil  Sulphur cycling and leaching
Cole, Susan  PhD  Earth  Geophysical methods for understanding lahars
Cox, Juliet  MApplSci  Soil  Long term nutrient loss land treatment of dairy effluent
Crimp, Rachel  MSc  Earth  Fluorosis on Ambrym, Vanuatu
Cunningham, Debbie  DipEM  EM  Applying risk analysis to emergency management, N.Z.
Davies, George  MSc  Earth  Geology of Mangere Island, Chatham Islands
Grant, Sally  BSc(Hons)  Earth  The Tertiary/Quaternary volcanics interface at Ruapehu
Hanley, James  PhD  Soil  Mitigating phosphorus loss from drained soils
Holt, Katherine  PhD  Earth  Quaternary of Chatham Island
Ihringer, Diana  MAgribus  Soil  Sulphur in organically grown apples
James, Trevor  PhD  Soil  Herbicide leaching in innovative substrates
Johnson, Debbie  MApplSci  Soil  Nutrient budgeting , tool for catchment management
Kusumo, Bambang  PhD  Soil  VIS INR reflectance spectrometry for soil analysis
Laurenson, Seth  MSc  Soil  Land treatment of urban sewage
Martelli, Kim  MSc  Earth  Modelling pyroclastic flow hazards at Ngauruhoe
Moebis, Anja  PhD  Earth  Physical processes Tongariro Volcanic Centre Tephras
Peck, Jennifer  MApplSci  Soil  Heavy metals in biosolids affecting biological fertility
Platz, Thomas  PhD  Earth  Eruption mechanisms Mt Taranaki, the last 1000 years
Procter, Jonathan  PhD  Earth  Calibration of mass flow models at volcanoes
Raine, Peter/Chris  MPhil  EM  Pre-declaration emergency management planning
Roskrug, Nick  PhD  Soil  Traditional Maori Horticulture
Salazar Cajas, Monica  MApplSci  Soil  Reducing K on land used for farm dairy effluent
Sanchez, Ieda  PhD  Earth  VIS INR reflectance spectrometry for plant analysis
Singh, Jagrati  PhD  Soil  Nitrification and urease inhibitors and ammonia loss
Turner, Michael  PhD  Earth  10 ka eruptive and magmatic history Egmont Volcano
Wallez, Sandrine  PhD  EM  Emergency management, Lopevi volcano, Vanuatu
Woutersen, Nicole  BSc(Hons)  Soil  Microbial biodiversity with land intensification
Yates, Linda  BSc(Hons)  Soil  Aerosolic salt deposition in Taranaki
Zarour, Hisham  PhD  Earth  Groundwater of the Manawatu
Zernack, Anke  PhD  Earth  Pre-20 ka eruptive, magmatic history Egmont Volcano
Report on Visit to New Caledonia, 8-15 August 2006

Nick Mortimer, Dunedin

Over the last three years, the Pacific Fund of the French Development Agency (part of the French Ministry of Foreign Affairs) has provided a small amount of travel money to foster research contact between geologists from French, New Caledonian and New Zealand institutions. The latest exchange occurred in August 2006 and took the form of a geological fieldtrip in New Caledonia. The purpose of this trip was to look at examples and interpretations of metamorphic rocks related to Eocene-Oligocene obduction and exhumation in the Province du Nord. This was a follow-up trip to a tour of the Province du Sud in 2003 in which Permian-Cretaceous basement terranes were examined (in 2004, New Caledonia geologists were shown around Otago and Southland). The personnel involved in the current trip were Pierre Maurizot (Bureau de Recherche de Geologie et Mines, Noumea), Dominique Cluzel (Univ. Orleans, France), Yael Guyomard (Bureau de Geologie de Nouvelle Caledonie), Kirsten Nicholson (Ball State University, Indiana), and Chris Adams and Nick Mortimer of GNS Science. The rest of this article describes some highlights of the trip.

New Caledonia is a 400 km long island, much smaller than either the North or South Islands. In terms of Paleozoic-Mesozoic basement it is across strike from Queensland’s orogens and along strike from New Zealand’s Eastern Province terranes. There are no equivalents of the Western Province or Median Batholith in onland New Caledonia. New Caledonia has a Late Cretaceous-Paleogene “cover” sequence comparable to that of New Zealand, but entirely lacks the abundant Neogene subduction-related igneous rocks that are present in the North Island.

The topography and geology of New Caledonia is dominated by a mantle peridotite allochthon which has been eroded into distinctive massifs. This ultramafic thrust sheet roots into and connects with the oceanic crust of the Loyalty Basin, to the northeast of New Caledonia. The sheet was thrust over the basement from the northeast in the Late Eocene (37-34 Ma) or, as Dominique Cluzel prefers to emphasise, the basement of New Caledonia was underthrust beneath the ultramafic rocks.
A typical view driving north on Route 1. Klippen of the ultramafic allochthon form peridotite massifs throughout the country. Nickel deposits are in the laterite caps of the peridotites are mined in several massifs.

SW-NE cross section across northern New Caledonia. The autochthon (Permian-Cretaceous basement terranes and some unmetamorphosed Upper Cretaceous-Eocene cover) is the unshaded part of the diagram, structurally beneath the Poya Terrane.
A SW-NE section across the northern tip of Grand Terre crosses a number of fault-bounded slices above the autochthon. As well as the aforementioned ultramafic sheet, these include the Poya, Koumac, Diahot and Pouebo Terranes, all of which were emplaced, deformed, metamorphosed and exhumed in the Paleogene. The basalt-dominated Late Cretaceous-Paleocene Poya Terrane can be regarded as the structural counterpart of our Tangihua Complex in the Northland Allochthon. Metamorphic grade and degree of deformation increase structurally downward, culminating in the Pouebo Terrane eclogites in the core of the Mt Panie antiform. The tectonic interpretation of the isograds has changed over the decades. From a former interpretation of isograds as being part of a “frozen-in” prograde sequence, they are now recognised to mainly coincide with ductile shear zones and terrane boundaries, and thus mark the tectonic boundaries of differentially exhumed sheets.

Dominique and his colleagues have developed an integrated model for thrust sheet emplacement, obduction and metamorphic core exhumation that involves jamming of a northeast-dipping subduction zone beneath the Loyalty Basin in the Eocene. The northeast-dipping subduction polarity seems pretty sewn up in New Caledonia, with no alternatives currently under serious consideration. Contrast this with the North Island where we have a double debate on the polarity of subduction associated with the emplacement of the Northland Allochthon (New Caledonia style northeast-dipping subduction or delamination of southwest-dipping lithosphere) and also on the age of igneous rocks in the Tangihua Complex of the Northland Allochthon (Late Cretaceous-Paleocene or Oligocene or both). At the moment I am undecided if the New Caledonia model provides a silver bullet or red herring for interpreting Northland geology. Probably both!

It was a great experience to travel around New Caledonia again, it gave me a fresh perspective on southwest Pacific Cenozoic tectonic issues. No amount of reading can substitute for being immersed in the geology of a place for a week. And what of the country? Let me just say that French culture and Pacific climate make for a fine combination.
Mine de Balade at the structural base of the Diapot Terrane. Schists with a down-dip stretching lineation (in outward appearance, very much like textural zone IV Otago Schist). The metamorphosed stratiform copper deposit has an X/Z aspect ratio of >100:1.

Further reading


MEMBERS FORUM

Paleo Potpourri 6 ------ Notes on fossils and related stuff

Phil Maxwell,

More Please!

Ewan Fordyce’s article “New light on New Zealand Meozoic reptiles” in the last issue is an example of the sort of contribution we should have more of in our Newsletter. Informed and informative, with an up-to-date bibliography, it presents a review of a topic that interests many who aren’t vertebrate paleontologists, and who don’t have ready access to a good academic library. There must be other local earth science workers who could write a comparably authoritative article on their field of expertise. The articles are there of course, scattered through back issues of the Newsletter, but are not as common as they could be. Of course, writing such articles takes time away from writing papers for academic publications or compiling grant proposals, and articles in the Newsletter are never going to have the cachet of those published in peer-reviewed journals. A shame really – it’s no doubt the reason we see so few summaries in these pages of what’s been going on in our earth science/geology departments (or in GNS Science).

Ewan’s article is followed by one by Helen and Chris Templar - “The finding and recovery of a fossil giant penguin, south-west Kawhia Harbour.” The initial discovery got media coverage but it’s far better to have a detailed, first-person account of how this important specimen became to be found in the first place, and the care taken to retrieve it. Any formal description of the penguin that eventuates will be confined to the bare bones – literally – so the Templar’s article provides background to an important discovery, information easily lost.

I’m pleased to see the question of the age of the penguin cleared up – the original press releases mentioned a figure of 40 million years, which would have placed it in the Middle Eocene (Bortonian Stage). This would have made the discovery even more significant, as the only records of Middle Eocene penguins from New Zealand are of individual bones, rare ones.

More needed?

The last Newsletter also includes an article by Simon Nathan drawing attention to the on-line encyclopaedia, Te Ara, so I decided to check out what it has to say about fossils. There is a lot that is good about the entry (informative summaries, pleasant layout, useful video and audio files, and some nice images), but also a few things that made me frown.

Fossils are concisely defined as “the preserved evidence of past life,” a very inclusive definition backed up with numerous examples that hopefully will go some way to counteracting the popular idea that fossils have to be “petrified” to qualify. Next to it is a window titled “Fossil opossum” referring to road-kill impressed into road asphalt near Taupo.
I don’t want to get into an argument about whether this should be called a “fossil”, but surely the unfortunate animal was a “possum” (or has someone been importing North American marsupials behind our backs?)

“Uses and collections” covers some of the reasons why we study fossils, but doesn’t mention the contribution they can make to paleoecology, or to paleogeography and historical biogeography. (To be fair, paleoenvironmental analysis using stable isotope ratios in fossils does get a look in, but hey, a lot can be done with the fossils themselves, without having to dissolve or crush them and stick the remains in a mass spectrograph!) Under the heading “Fossil hunters” we are told “Most collecting requires only keen eyes, a geological hammer and a cold chisel.” One could add that in many places a suitably rigid knife is all that is needed. The problem of course, is that micropaleontologists don’t collect fossils this way. Disaggregating bulk samples by various techniques (including acid etching) followed by sieving, is standard procedure and surely should be mentioned; in fact, many of us use similar techniques to recover small macro-invertebrates and vertebrates.

Next we are presented with a brief account of the succession of fossils in New Zealand under the headings “Oldest fossils – Paleozoic”, “Age of the dinosaurs – Mesozoic” and “Age of mammals – Cenozoic.” (Why not “Age of trilobites”, “Age of ammonoids” and “Age of penguins” (or balanomorph barnacles, or neogastropods); in other words why follow a tired, largely boreocentric terminology that has long since passed its use-by date?) Photos of groups of representative fossils are provided for the Paleozoic, Triassic, Jurassic, Cretaceous and Cenozoic; the Paleozoic fossils are merely identified as corals, snails, graptolites etc, without any indication of where in the Paleozoic they come from, but the other fossils are mostly identified to species level. (Unfortunately, I have to point out there is no volute called “Spinomelon spinosa” – the shell so identified is an undescribed species – and the correct name for the other gastropod is Murex sul octogonus. Non-molluscan specialists may well wonder what has happened to our Cenozoic brachiopods, barnacles, corals, echinoids, etc.) Because these fossils have been photographed in groups they are in a variety of orientations, in some cases so fore-shortened they are difficult to interpret. The low resolution of these images doesn’t help either. (What is wrong with photographing individual specimens in standard orientation and combining them in the same way one would assemble a plate for print media? Or is that too old hat?) In addition to the group photos there are fine images of impressive individual fossils, including the giant ammonite and elasmosaur, mosasaur and cetacean skulls.

Other sections deal with terrestrial fossils, bird fossils and microfossils. The claim that the oldest recorded non-penguin bird fossil from New Zealand is an Oligocene albatross needs modification: a number of older bones are known, and one of these - from the Jed River in North Canterbury - is probably of Late Cretaceous age. The section on microfossils discusses foraminifera, radiolarians, and spores and pollen, and mentions dinoflagellites, but there is nothing about nanofossils, ostracods, or diatoms. (The Oamaru Diatomite is a globally important deposit and surely warrants a mention.) The only images are of three unnamed forams, bracken spores and a thin section of an unlocalised limestone showing forams and bryozoans.
A Biographies Gallery gives us “the faces behind the story.” It provides brief notes and images of collectors and paleontologists who have contributed to the study of our fossils, and – most usefully - includes links to relevant entries in the Dictionary of New Zealand Biography. However, for some reason it does not include any paleobotanists or palynologists.

The entry ends with “Further sources” which draws attention to several websites and books dealing with New Zealand fossils. Bruce Hayward’s book is a good general overview of the subject, and Joan Wiffen’s autobiography is an interesting personal account of her paleontological discoveries. The other four books, however, rely heavily on artists’ reconstructions of New Zealand fossils; these of course are mostly of vertebrates, and except for the Stace and Eagle book, “lesser” groups scarcely get a look in. Anyone wanting an identification guide will have to scour secondhand bookshops or TradeMe for a copy of Ian Speden and Ian Keyes “Illustrations of New Zealand fossils” published by DSIR in 1981. It may be out of date, but it is still the only book of its kind. A pity we don’t have the equivalent of the handbooks on British fossils published by the Natural History Museum.

Some of my criticisms may be dismissed as “picky” but in my opinion a National Encyclopaedia should be as accurate and up to date as possible. The main problem I have with Te Ara, though, is working out just who it is aimed at. I don’t expect a textbook on paleontology, but I would like to see a bit more meat on the bones (in a manner of speaking). The beauty of an on-line encyclopaedia is that corrections and additions can be made with a minimum of trouble; even more important, it is a simple matter – at least in principle- to direct an inquisitive reader to pages carrying more detailed information than that included in the main text, or to off-site links. Simon mentions plans to digitise the Transactions of the Royal Society of New Zealand, and that of course will make much of the primary New Zealand paleontological literature readily accessible to those who are interested. Te Ara has the potential to be very useful indeed, and it will be interesting to see what it looks like in five years time.

Political Incorrectness gone mad!

In the last Newsletter I mentioned the publication of Ann Coulter’s book, “Godless: the Church of Liberalism” which includes a sizable section attacking “Darwinism.” Several conservative commentators who should have known better – including Mark Steyn and Tim Blair – warmly endorsed her book and revealed themselves as supporters of Intelligent Design. Hard on the heels of Coulter’s book comes “The Politically Incorrect guide to Darwinism and Intelligent Design” by Jonathon Wells, one of the most visible of the IDists, and a mainstay of the so-called Discovery Institute in Seattle. According to those who have read it, Wells’ book is the usual creationist mish-mash of unsubstantiated assertions, misconceptions, half-truths and selective quotes. Scientists appalled by the claims made by Wells have two options – either ignore the book completely (and be accused of being unable to answer his arguments) or confront it head on (and suffer the taunt “no smoke without fire.”) Contributors to the excellent group-blog The Panda’s Thumb have opted for the latter approach, parcelling out individual chapters to those best qualified to comment. At the time of writing about a half the individual chapters have been gleefully dissected, not that this will make any difference to your typical ID supporter. However, I can’t resist repeating the following comments from the critics:
"It really is a ghastly, badly done book, and unfortunately, while it only takes one dishonest fool to spin a lie, it takes a whole team to undo it." Paul Z. Myers.

“One thing is for sure, Jonathan Wells is too modest. His recently published, The Politically Incorrect Guide to Darwinism and Intelligent Design, is not only politically incorrect but incorrect in most other ways as well: scientifically, logically, historically, legally, academically, and morally”. Reed A. Cartwright.

“If there’s something embarrassingly dumb to be done or said, it’s probably going to be done or said in the name of “political incorrectness”. That term was first used to bring attention to the political censoriousness at leftist epicenters in the 1990s, but it has mutated into an excuse for saying stupid, outlandish, misleading things.” Libertarian commentator Timothy Sandefur.

Not to be outdone, the blog 90% True came up with its own Politically Incorrect Guides. One of these, the “PIG to Math” tells you things “your math teacher didn’t want you to know” e.g. “Proofs are often unnecessary for real math” and “Numerology is a fruitful research paradigm used by a growing number of scientists and mathematicians from all over the world.” This is no sillier than the sweeping claims made in the other PIGs published by Regnery Publishing, which include the much-derided “PIG to Science” by Tom Bethell.

Spoilsports!
I recently discovered – via the excellent blog Cosmic Variance – that Nature has an editorial policy banning the use of “paradigm” and “scenario.” I wouldn’t shed any tears if “paradigm” bit the dust, but “scenario” is very useful term. Back to the thesaurus!

Stray Quotes
“Destroying rainforest for economic gain is like burning a Renaissance painting to cook a meal.” E. O. Wilson

“*There is much pleasure to be gained from useless knowledge.*” Bertrand Russell

“The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' (I found it!) but 'That's funny ...'” Isaac Asimov

“Philosophers say a great deal about what is absolutely necessary for science, and it is always, so far as one can see, rather naïve, and probably wrong.” Richard Feynman (one of the very few people who deserved to be called a genius.)

“The great tragedy of science -- the slaying of a beautiful hypothesis by an ugly fact.” Thomas Huxley
The Marsden Fund Lottery?

Bruce W. Hayward, Auckland

As I travel around the country and talk to geologists, including those who have had grants from the Marsden Fund, the dominant comment is that Marsden Fund applications (which provides government funding for innovative and quality research) are like taking a ticket in the lottery. This year I step down from a three-year term on the Earth Sciences and Astronomy (ESA) advisory panel of the Marsden Fund and to a certain extent I have to agree that there is indeed a certain amount of luck in being successful, especially as only about 8% of applications are funded each year.

During my three-year stint, I learnt a great deal about how applications are processed and judged. I feel I should share it with those who are interested so perhaps you can increase your chances when preparing your next “lottery ticket.” There are two classes of applications: Fast-Starts for early career scientists, limited to grants of up to $70,000 pa for two years, and Standard proposals which are usually funded for three years with grants up to $300,000 pa. In judging the proposals the two groups are considered separately but in a similar manner. As I see it, and maybe some of my colleagues on the panel see things differently, there are three aspects of the application process that strongly rely on luck.

Lottery 1 – the preliminary proposal stage

The application process starts with submissions of short preliminary proposals, limited to one page describing the actual proposed research and hypotheses or questions to be investigated. Recently there have been about 80 standard proposals and 15 or so fast starts for the ESA panel. The first task of the advisory panel is to select about 20% of the proposals that will be invited to submit full proposals for the second stage. So the first lottery is to make the cut and be classified in the top 20%. The process followed is the same for all Marsden panels. All proposals in our area are sent to each advisory panel member, who reads them and gives several scores based on the criteria that are publicly advertised. Standard proposals are given a score for three criteria:

1. Merit of proposal, incorporating originality, insight and research excellence and the ability of researchers to carry out the programme successfully.
2. Track record and potential of researchers relative to their opportunities and experience to contribute to the advancement of knowledge.
3. Contribution to development or broadening of research skills in NZ, particularly of emerging researchers.

Fast-Starts are only scored for the first two criteria.
All this initial scoring is done independently by each panellist. Prior to the panels first meeting the scores from everyone are gathered together and amalgamated and proposals ranked from top to bottom on the basis of their average score in criterion 1. The combined average scores of the second two criteria are used as a discriminator for proposals that are ranked close together with criterion 1.

At the advisory panel’s first full day meeting in Wellington, there is insufficient time to discuss all proposals, so with both fast start and then standard categories the proposals are discussed starting from the highest ranked proposals in criterion 1 and progressively moving down through the top-ranked 30-40%. After every member has had an opportunity to comment on each proposal there is an opportunity for panellists to revise their initial scores. A running record of the top-ranked proposals is kept until it is obvious that none of the lower ranked proposals are likely get revised scores to lift them to the top 20% and make the cut.

So the luck in this first stage is to have your proposal scored highly on criteria 1 by a significant proportion of the panel, so that it will at least be discussed at the meeting. Clearly there is some skill and some luck in making your proposal attractive to a highly diverse group of earth scientists and an astronomer, the majority of whom will have little familiarity or detailed understanding of your area of research. After three years on the panel I am convinced that some areas of earth science research are naturally more attractive to this diverse panel and other areas are extremely difficult to dress up to appear exciting, novel and for some panellists at least, relevant.

My assessment of proposals over the last three years is that at least 80% are well written and of sufficiently high quality and innovativeness that they deserve funding. How can you improve your chances at this stage? Firstly I suggest you write your proposal as simply as possible so that all panellists can understand what it is you propose to investigate, what your hypothesis may be, how original your research is, what is its context and significance, but avoid hyping it up or overselling it. At present the panel has 8 members, but each member has a three year term with 2-3 replaced each year, and thus there will be a complete turnover in composition every 3 years. The composition of the panel will influence the score your proposal will get every year, and so just because you do not make the cut one year does not mean that the same proposal will not make it a year or three later. The composition of the panel reflects the broad range of proposal disciplines: astronomy, astrophysics, atmospheric science, geophysics, physical geography, hydrology, meteorology, oceanography, pedology, and all areas of geology (geochemistry, paleontology, structural geology, volcanology, etc.). Your challenge is to make your initial proposal on metamorphic zeolites, or whatever, attractive to this diverse panel. It is likely that only one panellist at most will have a relatively detailed understanding of what you propose and they will only get a chance to better explain to the panel what you are proposing if you score in the initial top 30-40%.

At this stage I should add that conflict of interest is taken very seriously by Marsden administrators and panellists. If any panellist is listed on a proposal they leave the room whenever such proposals are discussed and they do not hear of any results of these discussions until everybody else does. If panellists have some close association (e.g. relatives, close work colleagues, research collaborators, friends) with any named applicants then they do not participate in scoring or discussing those proposals.

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Lottery 2 – the full proposal stage

If you first ticket comes up in the first 20% and you are invited to submit a full proposal, then the second lottery has quite different parameters. In this round the percentage successful is currently ~30% (i.e. 7-8% of original total submitted). Once again the longer full proposals are scored independently by the panellists using the same criteria, and at the final meeting are ranked and discussed on the basis of criterion 1 scores, with combined scores for 2 and 3 used as a discriminator. The applicant’s goal at this stage is to get a high overall score, particularly in criterion 1. To reach this stage all the proposals have already scored very highly in the combined opinion of the panel, so how do they choose between a highly diverse range of appealing proposals. My experience suggests that panellists are strongly influenced (but not exclusively so) by the comments in the three referees reports and the applicants responses. Panellists rely on the referees to pick up things like possible flaws in research design, assumptions, or overstated cases of originality or significance, as most proposals fall well outside the expertise of panellists. The referees’ scores for proposals are also a guide, although panellists try to check that the score matches the comments and that obviously biased or outrageous scores are disregarded.

In my opinion, the second lottery depends entirely on who referees your full proposal, what they write and how they score it. So you should tailor your full proposal more for a non-NZ scientist who hopefully understands research in your discipline. Marsden staff aim to obtain three referee’s reports for each proposal. More than 90% of referees are from outside NZ and only one is usually chosen from your provided list. An ideal referee’s report needs to show that the referee fully understands the science behind the proposal and would hopefully highlight all the best parts, its originality, novelty, cutting-edge, its high chances of success and contribution to scientific advancement, and should preferably score it in one of the top two categories. Here is the lottery: some referees write fluent, convincing and optimistic reports, while others are naturally hypercritical and deem it their job to find something wrong or questionable; referees in some smaller disciplines will always support applications for research in their field, while others in more competitive or broader disciplines may on principle never score a proposal in the top category; some referees (too busy, too tired, whatever) just skim the proposal and do not fully comprehend the detail and their reports reflect this and don’t help your chances; other referees provide a score, with only one paragraph of comment which provides no reasoning behind the score. When the competition for funding is so tight at this level, even one unfavourable comment by a referee may be all that is needed to tip the balance. Applicants are given the opportunity to respond to the referee’s comments and these responses are carefully read by panellists, but once the seeds of doubt have been sown (whether ill-founded or not) it is hard to completely negate them. Excellent rebuttals do influence the panel, but do not resort to attacking the referee nor be tempted to use it as a means to expand your application just because you can fill 2 pages. How might you increase your chances in this second lottery? – quite frankly I do not know, so long as you have done your best, within the page constraints, to clearly lay out why, what and how you propose to do research that will convince a referee (overseas’ scientist in your discipline).
Lottery 3 – the quality of competitive bids
Your chances of ultimate funding success depends on the amount of funding available and the quality of the competitive bids each year. Some years there appear to be more proposals that are extremely highly ranked by referees than other years. It is pure luck whether you strike a year with lots of highly-rated competitive proposals or not, and this could well be the only factor that determines whether your proposal would get funding one year but not in another. The advice here is that if you make the full proposal stage and have really positive referee comments but do not get funded, you are well advised to resubmit next year.

Level of funding
Clearly, only being able to fund 7-8% of proposals is diabolical. Somehow we all need to take every opportunity to emphasise to politicians and government officials that overall funding for the Marsden Fund needs to be greatly increased (4 fold would be a good start). During my 3 year term I have heartened by the great ideas and talent in NZ earth science, if only they could all be funded. This year the number of applications in ESA dropped by ~10-15%. The Marsden Council openly says that the amount of funding that is disbursed to each panel area is strongly related to the number of applications and their typical costs. So, for those of us who have previously been fortunate in having a Marsden grant, it could be said that it is our obligation to continue taking tickets every year to help keep the level of funding up for earth science projects.

Conclusions
I am not sure I have any conclusions. Can you or I recommend a better system, probably not, short of running it completely like a lottery (which would save thousands of hours of scientists time and redirect $ into research) – but that would never convince the politicians nor the funders (NZ taxpayers) that they were getting the best science for their dollar. My comments above are meant to inform and hopefully help applicants when they are filling out the forms. They are not intended to criticise the system, other panellists, and certainly not the hard-working and dedicated Marsden Fund staff. What I have written is based on my personal observations. Good luck to you all.

'An Inconvenient Truth': climate change is indeed a moral issue

Bob Carter, Townsville

Al Gore’s movie on global warming, An Inconvenient Truth, has surely been the subject of more reviews and media comment than any other film in recent history. Not least because of the unflagging razzmatazz with which Mr Gore has undertaken a world “author’s tour” to invoke publicity. The Australian media - with Four Corners, the Andrew Denton Show and Phillip Adams in the vanguard - have fallen compliantly into Mr Gore’s sticky fly-trap, producing breathless hagiographies of a man and film whose message is rooted in junk science.
Film reviews typically contain four types of information. What a film is about: in this case, human-caused global warming. How well a film is made: this one being a beautifully crafted, photographed and edited production. How well the actors play their roles: the only actor here, Al Gore, scrubs up moderately well, exhibiting no obvious hanging chads though delivering an over-rehearsed, and somewhat self-indulgent, performance. And finally, whether a film is fact or fiction: in this case … well hang on a moment.

Those raw scientific facts that Mr Gore chooses for use in An Inconvenient Truth are mostly correct. Indeed, much of the material could have been drawn from elementary university courses in meteorology, geography or geology, though one would hope that university treatments would be presented in a more balanced and critical way.

Overall, the film is a compelling account of various natural earth phenomena that have the potential to impact humanity disastrously, and therefore a graphic illustration of the fact that we live on a dynamic planet. Were the film to be stripped of its sententious script, we might be watching an episode in David Attenborough’s recent TV series, Planet Earth.

Hence, presumably, the appeal to audiences: who often break into spontaneous applause at the end of a showing, and thereby reveal both their gullibility to emotional messages and their lack of scientific understanding.

For the problem with An Inconvenient Truth is that it is well-made propaganda for the global warming cause rather than well-made climate science. Nowhere does Mr Gore tell his audience that all of the phenomena that he describes fall within the natural range of environmental change on our planet. Nor does he present any evidence that climate during the 20th century departed discernibly from its historical pattern of constant change. This is not surprising, for no such evidence yet exists.

During his movie, Mr Gore asserts that climate change is now a moral rather than a scientific issue. He is right, though not in quite the way that he might have imagined.

“The moral issue concerns the way in which much of today's environmental science - including that regarding climate change, as typified by this film - is presented to governments and the public. Mr Gore clearly believes that his presumed morally superior ends justify any means, including distortion of evidence, and in consequence he nails his colours firmly to the climate alarmist mast.”

In an interview with Grist Magazine, when asked about his film: do you scare people or give them hope? Mr Gore replied:

“I think the answer to that depends on where your audience’s head is. In the United States of America, unfortunately we still live in a bubble of unreality. And the Category 5 denial is an enormous obstacle to any discussion of solutions. Nobody is interested in solutions if they don’t think there’s a problem. Given that starting point, I believe it is appropriate to have an over-representation of factual solutions on how dangerous it (global warming) is, as a predicate for opening up the audience to listen to what the solutions are, and how hopeful it is that we are going to solve this crisis.”
Indeed. And the intellectual dishonesty involved is not restricted to Gore’s film, but has become all pervasive.

For example, professional sociologists at the London-based Institute for Policy Research urge that “the task of climate change agencies is not to persuade by rational argument. ... Instead, we need to work in a more shrewd and contemporary way, using subtle techniques of engagement. ... The facts need to be treated as being so taken-for-granted that they need not be spoken”.

And the same authors then calmly advise:

“Ultimately, positive climate behaviours need to be approached in the same way as marketers approach acts of buying and consuming. ... It amounts to treating climate-friendly activity as a brand that can be sold. This is, we believe, the route to mass behaviour change”.

Add to these astonishing, Orwellesque statements, that Gore and his acolyte Phillip Adams urge that the public should take global warming seriously because “more corporations see a quid in the climate” and the crack in moral integrity becomes a yawning chasm.

The moral issue with An Inconvenient Truth is that of a person of talent, born into a privileged family, and given opportunities to rise to the position of vice-president of the United States, who then uses his privileged position to lead a campaign of misinformation. Conviction politics is doubtless needed to rise to the top of the political ladder in anywhere; conviction science, in contrast, is a contradiction in terms properly anathema to any democratic society.

Professor Hubert Lamb, doyen of 20th century climatologists, remarked in his classic book, Climate History and the Modern World that:

“The possibility of global warming, even drastic warming with dislocation of other elements of the climate pattern as a consequence, has to be balanced against the possibility of cooling, even drastic cooling, as the natural climate develops over the same period. Neither side of the balance is yet adequately known and understood”.

Precisely. Professor Lamb’s wise words were accurate in 1982 and they remain accurate today. The task of climate policy, therefore, is to ensure society’s capability to react appropriately to the full range of modern natural weather events, and to prepare adaptive plans equally for both future climatic warmings and the much more dangerous coolings. Would that Mr Gore’s army of supporters were able to comprehend this simple advice.

With respect to which, it is noteworthy that global temperature has not risen since 1998, and that scientists at the Russian Academy of Sciences have recently issued a warning that the next 20 years are likely to see the development of a Little Ice Age, similar to the one documented from Europe during the Middle Ages.

And what about the final piece of advice that is found in most reviews - should you go to see this film, or not? Yes, if you like majestic photography of the dynamic earth and understand that changes depicted will always be with us. No, if you dislike sanctimonious propaganda.

A detailed analysis of the inadequacy of the science behind Mr Gore's film can be found here:


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PEOPLE

Bob Duncan long-time member of the Taranaki Branch dies

Long term members of Geol Soc will be sorry to learn that Bob Duncan died in mid August the day after his 89th birthday. Bob was actively involved in Taranaki Geol Soc for many years as speaker, field trip leader, committee member, host, president and teaboy. We fondly remember his urn!

When the Taranaki Geology Society became a branch of GSNZ some 20 years ago Bob represented Taranaki on the national committee where he took an interest in the geo-preservation sub-committee. After Mary's death he moved to Hastings to be nearer his daughter, Catherine, but he retained his membership of the Taranaki branch of GSNZ; he joined us for the Wairarapa field trip, and drove over to speak about his visit to the La Brea tar pits.

In Hawkes Bay he started a geol group for U3A, and joined the HB branch of the Royal Society. Bob will be long remembered by family and friends.

NEW ZEALAND ROCKS

The West-Flowing Pliocene “Clevedon River”, Auckland

Bruce W. Hayward, Hugh R. Grenfell, Jeff L. Mauk, Phil R. Moore

In June, members of the Auckland Branch and GeoClub visited Kidds Beach (R12/720560) on the southern shores of the Manukau Harbour (Fig. 1). We were attracted to the area as a result of reports from Jeff Rankin, South Auckland Rock and Mineral Club, that the gravel beach contained quartzose pebbles not seen anywhere else locally and most similar to what they collect in the Coromandel Ranges. In recent years David Kear (e.g. Kear, 2000, 2004) had made us well aware of Hugh Battey’s report of Coromandel-derived cobbles in a Pliocene conglomerate (Puketoka Formation) in the Maramarua area, 30 km south-east of Kidds (Battey, 1949) and the implications for the age of formation of the Hauraki Graben that now lies between the Coromandel and Hunua Ranges (Hochstein and Ballance, 1993).
Stratigraphy and age

We found that the normally shelly shoreline of the Manukau was replaced by a gravel beach of red, grey and white pebbles for at least a 2 km stretch. It didn’t take long to figure out that these pebbles were being eroded out of the adjacent intertidal shore platform formed of weakly bedded conglomerate with some west and north-facing cross-bedding. The conglomerate overlies limonitic sandstone and includes some lenses of log-bearing, carbonaceous sandstone and mudstone. The geology of this area was mapped by MSc student Keith Berry (1986), who’s maps show that this is the largest outcrop of a Pliocene “red chert conglomerate” unit that has a number of other smaller exposures along the harbour coast between Karaka and Clarks Beach (Fig. 1). Berry also studied a number of local drillhole sequences and showed that this conglomerate is underlain by early Pliocene shallow marine Kaawa Shellbed (Opoitian-Waipipian age; Berry, 1986) and is overlain by widespread rhyolitic pumiceous sands. These latter sediments presumably were transported down the Waikato River to this area from the TVZ following the start of volcanism in that region sometime after 2 myrs ago (Briggs et al., 2005). Thus the age of the conglomerate must be somewhere within the late Pliocene (c. 3-2 myrs ago). This was confirmed by the discovery of the leaf of a “brassi” group (large-leaved) beech in one of the carbonaceous lenses (R12/f80), a group that had largely disappeared from NZ by 1.5-2 myrs ago (Cooper, 2004).

Figure 1A. Location of the Pliocene conglomerate at Kidds Beach and possible source of its pebble lithologies. The inferred North Hunuas-Coromandel provenance of the conglomerate points to a west-flowing Pliocene “Clevedon River” prior to major subsidence of the Hauraki Graben.
Pliocene conglomerate composition and provenance

The conglomerate (and modern beach gravels) is dominated by subangular pebbles of red-brown cherts and grey argillite/greywacke clearly derived from the Waipapa Group (Table 1). The nearest source is the uplifted Hunua Ranges, but red cherts are rare in the southern and western parts closest to Kidds Beach (Schofield, 1976, 1979). The greatest concentration of chert units outcrop in the north-east Hunuas to Waiheke Island area (also the source of McCallum’s red chip used widely on Auckland footpaths). The next most common clasts are more rounded pebbles and even cobbles of cream-white crystalline “vein” quartz. Some of this has inclusions of chert that link its source to the Waipapa rocks, but other more massive and more coarsely crystalline quartz is more reminiscent of vein quartz typically encountered on Coromandel Peninsula. Other rarer pebble lithologies that are most strongly linked to a probable Coromandel source are of silicified wood, chert, sinter? and silicified flow-banded rhyolite. Rounded andesite pebbles also could be sourced from the Coromandel volcanics, but an equally possible source is the Kiwitahi andesites that outcrop along the eastern side of the Hunuas (Black et al., 1992). As the crow flies the nearest andesite source is the Waitakere Ranges to the north-west, but this seems improbable as it is contrary to the direction indicated by all the other lithologies.

The shape of the pebbles reflects a combination of their hardness, jointing, and distance transported. The softest and largest clasts are well-rounded but were locally derived Waitemata Sandstone. The smallest and most angular pebbles are the red cherts - sourced from the hardest and most closely-jointed rocks but transported c. 30 km. Clasts transported the furthest (c. 50 km) are those inferred to be derived from the Coromandel volcanic region. These are all the hardest lithologies in the Coromandel Range (fresh andesite, quartz, silicified rhyolite and wood) but even so most have been rounded during their long journey. None of the more common softer lithologies found on Coromandel Peninsula (e.g. rhyolites, ignimbrites, altered andesites) are present in the conglomerate and presumably were not hard enough to survive the journey. The most convincing Coromandel-sourced pebble has vein quartz and andesite together – a combination not seen in the Waitakere Ranges nor Kiwitahi andesites.

**Table 1.** Character of the cobbles and pebbles in the Pliocene Conglomerate

<table>
<thead>
<tr>
<th>Lithology</th>
<th>%</th>
<th>Size</th>
<th>Shape</th>
<th>Provenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandstone</td>
<td>30</td>
<td>&lt;50 cm</td>
<td>r-wr</td>
<td>Waitemata Sandstone (local)</td>
</tr>
<tr>
<td>Red-brown chert/argillite/Waiheke</td>
<td>30</td>
<td>&lt;8 cm</td>
<td>sa-sr</td>
<td>Waipapa Gp, N Hunuas-Waiheke</td>
</tr>
<tr>
<td>Grey argillite/greywacke/Waiheke</td>
<td>25</td>
<td>&lt;10 cm</td>
<td>sa-r</td>
<td>Waipapa Gp, Hunuas-Waiheke</td>
</tr>
<tr>
<td>White “vein” quartz (Waipapa Gp)</td>
<td>10</td>
<td>&lt;20 cm</td>
<td>sr-r</td>
<td>Coromandel &amp; Hunuas</td>
</tr>
</tbody>
</table>
| Grey andesite ?Waitakeres        | 5   | <10 cm| r     | Coromandel, ?Waiheke, ??
| Flow-banded rhyolite             | <1  | <10 cm| r     | Coromandel                |
| Silicified wood                  | <1  | <10 cm| sr-r  | Coromandel                |
| Chert/sinter                     | <1  | <6 cm | sa-sr | Coromandel                |
A west-flowing Pliocene “Clevedon River”

The probable provenance of the pebbles in the Kidds Beach conglomerate requires a transport route from the N Hunuas-Waiheke area. Geological maps (e.g. Edbrooke, 2001) show the existence of a narrow elongate “half graben” directly linking the two areas and now occupied by the Clevedon Valley and Ardmore-Papakura lowlands. This valley lies between two uplifted NW-tilted blocks of Waipapa “greywacke” with the Hunua Ranges to the south and the Whitford –Maratai block to the north uplifted along the NW-trending Papakura Fault. Coal exploration drillhole 8427 in this “half-graben” intersected Eocene and Miocene sedimentary rocks sitting atop greywacke basement (Edbrooke et al., 1994) and indicate that it is clearly downfaulted and not purely erosional through the greywackes. Thus it would seem that a west-flowing river passed through this valley in the mid or late Pliocene. The present arrangement of islands and flooded valleys at the eastern end of the Tamaki Strait (between Waiheke and the Hunuas) suggests that several west-flowing tributaries fed this ancient “Clevedon River”, and one or more of these could have originated from the vicinity of Coromandel township, prior to the subsidence of the Hauraki Graben.

A substantial west-flowing river through the Auckland region may seem counter-intuitive given the present geography, but further north much of northern Auckland and Northland is predominatly drained by west-flowing rivers (e.g. Hoteo, Manganui, Wairoa, Hokianga) and reflect the general western tilt of the geology of the Northland-Auckland peninsula. Prior to the foundering of the Hauraki Graben this western tilt seems to have extended south-eastwards to the Hunua-Coromandel region. Much of the central Coromandel Range is tilted eastwards today and suggests that maybe the Hauraki Graben may have been an area of thermal up-doming prior to the grabens formation.

Figure 1B. Present day west-flowing Northland rivers due to regional tilting.

References:


Figure 2 View looking west along Kidds Beach. Exposure of northwest-dipping Puketoka Formation conglomerate and sandstone. Derived cobble beach in the background.
Figure 3 Nothofagus “brassi” group (large-leaved beech) fossil in one of the carbonaceous lenses (R12/f80).

Additional note from Hugh Grenfell  [h.grenfell@geomarine.org.nz]

The Puketoka Formation has also been extensively mapped around the Tamaki Estuary, the Manukau Harbour (Kermode 1992, Edbrooke, 2001) and the Waikato Basin (Kear and Schofield 1978). It seems to have been applied too broadly. Certainly the Tamaki Estuary (e.g. St Kentigens) and other Manukau Harbour (e.g. Ihumatao) sediments have quite a different provenance (i.e. TVZ derived fluvial, pumiceous sediments, palaeosols and tephras). This contrasts with Kidds Beach and indeed Battey's type locality at Puketoka trig (greywacke, Coromandel rhyolites, andesites). Arguably the younger?, or possibly even contemporaneous, TVZ derived deposits should be differentiated from the Coromandel / greywacke sourced sediment
Note on the occurrence of fossil amber in the Caversham Sandstone (Miocene), Otago.

Seabourne Rust  
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Rare and interesting, three isolated samples of fossilised resin were collected from the marine-deposited Caversham Sandstone at Puketeraki, Otago, New Zealand by the author between 1996 and 2001. The sandstone is a prominent unit outcropping along the coast of the Dunedin region, and at Puketeraki (south end of Karitane beach) the unit is at least 25m thick, forming vertical cliff faces and a shore platform below. The main structure at Puketeraki described by Toha (1993) is an asymmetrical anticline plunging out to sea (east).

Sedimentology, paleontology and age
The Caversham Sandstone is a greyish calc-arenite which tends to weather yellow. Toha (1993) noted that the unit, although consisting of mixed carbonate and terrigenous sediment, usually contains more than 50% carbonate particles (skeletal grains plus micrite) and perhaps is better termed the ‘Caversham Formation’. It is mostly massive to decimetre-bedded, and becomes glauconitic towards the base. Marine macrofossils are scattered throughout the unit, with occasional concentrations and shellbeds. Echinoderms and brachiopods are common, with notable molluscs and bryozoans present, rare but significant fossil cetacean material has also been recovered. The depositional setting seems to vary slightly through time but overall is inferred as marine: outer-mid shelf depths near the base of the unit, becoming shallower, higher up in the formation.

The macro- and microfauna (foraminifera) present in the Caversham Sandstone at Puketeraki are consistent with an Otaian-Altonian (early-mid Miocene) age.

Fossil amber
Three isolated samples of amber, all of a rounded shape and approximately 10-15cm across, were collected separately; two were in boulders fallen from the bluff above, one was in situ on the shore platform beds. All are now housed in the Geology Department OU collections, University of Otago (specimens OU 31117, 31150 & 31151). The beautiful colour of these specimens varies from orange, deep red to very dark brown. Thin sections show they are translucent, clear enough for any inclusions to be identified; bubbles and flow structures are present, but as yet no foreign bodies, such as branch fragments or insects have been seen. Small pieces of are light enough to float on water, and heated produce a resinous odour. Although brittle, the surface of each amber sample is rounded and smooth, suggesting abrasion. One piece (OU 31117) has surface pits, the deeper filled with sandstone matrix.
Source of the resin
Amber is generally resistant to both physical and chemical erosion, hence the possibility exists that it has been reworked from older strata. It may have travelled significant distances by floatation prior to being incorporated into the sediment.

Of extant New Zealand trees, the Aracauraceae in particular and several podocarps are capable of producing significant amounts of resin. Forests must have existed in early Miocene times to the west in Central Otago, where plant remains are abundant in terrestrial sediments of the Manuherikia Group (e.g. Mildenhall, 1989). Pollen from araucarians and podocarps are present in other Miocene horizons of the South Island.

Thomas (1969) found that amber from Miocene lignite at Roxburgh, Otago, was consistent with resin from modern kauri *Agathis australis* (Aracauraceae) using mass spectrometry. Still to be analysed, this possibility seems likely for the source of Caversham Sandstone amber.

Discussion
The occurrence of these specimens is interesting and raises some questions. To be fossilised in a marine unit one must account for the burial of the amber (which is buoyant). Is the similar size and shape of these amber pieces indicative of some sorting process? Are these samples from a similar source despite being isolated from each other by some 50m horizontally and unknown amount vertically? No other amber has been recorded from the formation, the only other plant remain recovered from the locality is a single isolated leaf (OU 31118), poorly preserved and of undetermined affinity.

Although rare, there are also several pieces of rounded amber in the University of Otago collections from the marine-deposited Waihao Greensand of South Canterbury (Oligocene) and other intriguing occurrences are known, including resin washing up on New Zealand beaches (Currie pers. com. 2006).

References

Thanks to the following for discussion:
D. Lee, C. Landis, R.E. Fordyce, J. Linquist, S. Currie and the late J.D. Campbell.
Ferrar Dolerite Characteristics………….. Hastie Award Research

Emelie Guegan, Otago

Flood basalt emplacement results from eruption of dyke swarms. A large sill and numerous dykes of Ferrar Dolerite crop out on the north face of Coombs hills, Antarctica and comprise the field area for this study (Grapes et al. 1974; McClintock and White 2001; Ross 2005). Antarctica has as a major advantage superb unweathered and unvegetated outcrop areas, very favourable to field study. Propagation conditions for long distance lateral growth of dykes that feed flood basalts (Elliot et al. 1999; Elliot et Fleming 2000) have not yet been constrained, and only limited information concerning magma flow within the dykes is available. My research is a systematic study of dyke contact characteristics, fabric, geometry and orientations, in the Ferrar Dolerite province to help interpret the nature of magma flow in the plumbing system of this LIP.

This project (1) investigates the mode of magma transport through the upper levels of the plumbing system of a continental flood basalt province, (2) assesses the evolving stress regime in the lithosphere during magmatism by looking at the timing of magmatism relative to ocean opening and (3) provides further explanations concerning the mechanical evolution of fracture population, thus improving our current knowledge on mechanics of fissure eruption.

The collected information is complementary to that obtained by previous works in this part of Antarctica (e.g. Grapes et al. 1974, White and McClintock 2001, Ross 2005), and focuses on the characteristics, relative timing, orientation and distribution of dikes in Coombs Hills to expand our knowledge of how the Ferrar LIP was emplaced.

The field-work has been done during a 6-week expedition to Coombs Hill. Dyke texture, vesicularity, crystal population, and lithic-fragment content, dyke contacts with the country rock, and joint patterns within the dykes have been observed. The paleomagnetic analysis (Anisotropy of Magnetic Susceptibility) has just been finished and the results not yet analysed. The former principally involves the collection of oriented rock samples followed by the measurement of the orientation at which an applied magnetic field produces the strongest induced magnetic field in the sample. Assuming that we can use AMS to determine magma flow directions in these dykes, it will constrain interpretations of the overall magma distribution story. A geochemical study of sample collected on different magmatic bodies present at Coombs Hills has also been done to help link them.

One tentative conclusion based on field observation is that the magmatic bodies are parallel to the fractures present in the area, representing a triaxial stress field preferentially due to the vertical stress caused by the emplacement of the diatreme and the magmatic bodies rather than other tectonics stress. Furthermore the magmatic bodies are vertical bodies cutting the sedimentary layer and are mostly parallel and perpendicular to each other forming vertical magma sheets surrounding the diatreme complex. Laboratory analysis should help us confirm or not these observations and will be the main focus of my next few months.
Mafic/Felsic magma mingling processes in the Bungaree Intrusives, Stewart Island, New Zealand  ..Hastie Award Research

Rose Turnbull, Canterbury

My research involves the examination of magma mingling/mixing relationships between intruding mafic magmas into a more felsic host chamber, a process which is thought to trigger the explosive eruption of silicic magma, such as occurs in the TVZ. The focus of my study is the Bungaree Intrusives on the northern coast of Stewart Island, which exhibit excellent evidence for magma mingling to varying degrees.

To date, approximately two months of fieldwork have been undertaken on Stewart Island, involving detailed structural and textural analysis, and sample collection. Several areas of special significance were identified for more focused study, as these outcrops offered fairly continuous outcrops from varying positions within the magma chamber. This has allowed for magma mingling/mixing processes to be compared between the base, middle and top of the magma chamber. Way-up in the chamber was determined through several structures which include flame structures, load-casts, amphibole accumulations and cross-cutting relationships. In almost all instances, these structures point way-up to the south.

The dominant feature of these intrusives is one of alternating mafic sheet-like units and enclave swarms that represent multiple mafic magma replenishment events onto the floor of a crystal-rich felsic chamber. These intrusions are complexly interrelated, and are interpreted from field and thin section analysis, as representing varying degrees of mingling and mixing as a result of the intrusion of the mafic magmas into the felsic magma whilst it was still relatively mobile.

The variation in the degree of mingling/mixing between the two magmas is largely dependent upon viscosity and temperature contrasts between the two magmas. Mafic magmas are typically more dense and hotter then the resident felsic magma, and this large rheological difference results in rapid cooling of the mafic magma, and a well defined interface between the two magmas. A smaller rheological difference allows for more mixing between the two magmas to occur, and results in a poorly defined interface. Strain analysis of mafic enclaves from several locations indicates that shortening also played an important part in the development of these structures.

Further south of the Bungaree Intrusives lies the Paterson Group Rhyolite, which may represent a contemporaneous suite of volcanics. Geochemical comparison between these erupted products and the non-erupted plutonics of the Bungaree Intrusives may help to link these.

Future work will involve further petrological and geochemical analysis, microprobe analysis, and U-Pb SHRIMP dating.
Chatham Islands Limestones

Jeremy Titjen, Waikato

Since I last wrote to you at the beginning of April, much progress as been made both on data collection and analysis. At present I have just completed the petrographic analysis of all eleven limestone occurrences on the Chatham Islands. From this work I have been able interpret some initial palaeoenvironmental information about the possible depositional settings, but intend also to look at the diagenetic history of these limestones using staining techniques, cathode luminescence and possible laser ablation of the cements. I expect this to be a more expedient process, with the progress to date (involving production and initial analysis of thin sections) being the most consumptive in terms of time.

I am presently mostly concentrating my efforts on completion of the petrographic analysis of the three sedimentary dyke occurrences in the Chatham Islands. From this I hope to be able to identify common fill lithofacies and deduce the mechanisms and processes of intrusion associated with these dykes. This will be aided in part with comparisons to similar structures from the East Coast and Canterbury Basins through field observations and petrographic analysis. I also hope to complete a diagenetic study of the dykes using the same analytical techniques as those prescribed for the main limestone occurrences.

Writing of the thesis itself to date has progressed slowly with much of my time spent on preparation and analysis of the collected samples. I have however found some time to write and expect to hand-in initial drafts of my first two chapters (which contain background information on cool-water carbonates and the geological settings of the study areas) within the next month. While writing on the other chapters is yet to commence properly, I have produced a number diagrams (formulated as I conducted the sample analysis) which will form the basis for many of my other chapters.

Initially I felt very overwhelmed by the scope of my thesis but as time has progressed and I have ‘gone through the motions’ so to speak, I have begun to feel very positive about the thesis and have become very confident in my own abilities to complete high-quality, useful research.

Once again I take this opportunity to thank the Society for the award of the S.J. Hastie Scholarship.
The meeting, lasting two days, attracted around 50 participants from 18 countries, with a significant contingent (>20%) from “down under”. Including accompanying persons, the New Zealanders and Australians were Judith and Simon Nathan, Martin Brook, Amy Skogstad, Mike Johnston, Carol Bacon, Greg Clota, David and Gillian Branagan, David Oldroyd and Wolf Mayer. The convenor of INHIGEO 2006 was Algimantas Grigelis of the Lithuanian Academy of Sciences and the Institute of Geology and Geography. The meeting venue was the Applied Arts Museum, a historic building that was formerly the Vilnius arsenal. The papers were split into three sections: Geomorphology, Theory of Glaciation and Regional Aspects.

As at all INHIGEO meetings, the papers were varied both as to topic and content. There was only one on New Zealand in which Martin Brook (Massey University) presented an account of George Leslie Adkin’s observations of glaciation in the Tararua Range. David Branagan, David Oldroyd and Wolf Mayer in their papers dealt with aspects of Australian geomorphology. The key note speaker for the geomorphology section was Victor Baker, University of Arizona, who gave an enthralling account of the Late Pleistocene cataclysmic Spokane Flood and the intense debate that followed J H Bretz hypothesis that it originated from the collapse of a large ice dam when the Cordilleran Ice Sheet retreated. During the meeting, participants toured the historic buildings of the University of Vilnius, including its library of antiquarian books and manuscripts, as well as the Baroque old town.

The subsequent one day field trip to the west of Vilnius covered both the history of Vilnius and its glacial geology as well as a visit to the official centre of Europe at Bernotai. The centre’s location came as a surprise, as most would have picked a site far to the south in central Europe. As well as a marker erratic boulder of granite transported by ice from Scandinavia, there were other glacial landforms at the site such as eskers. Nearby the Neris River has exposed, in an eroding face, a section through “push and press” terminal moraines of an ice advance. After lunch and exploring the beautiful Trakai Island Castle, considerable time was spent at Aukstadvaris examining and discussing the origin of a peculiar 40 m deep circular depression in dense forest. However, the origin of the depression, aptly named the Devil’s Pit, remains an enigma although kettle hole, sinkhole or icy comet impact were put forward as possible explanations.
On Monday 31 July a field trip through Lithuania, Latvia and Estonia commenced and, after reaching Klaipeda, the afternoon was spent under sunny skies on the 97 km long Curonia Spit. This barrier sand spit is one of the outstanding geomorphologic features of the Baltic as well as being a major source of amber eroded from the remains of Eocene forests. The next morning the National Stones Museum at Mosedis was visited. Here in a park-like setting numerous large glacial erratic boulders have been preserved from being turned into aggregate and road metal. As well as the various rock types being named, and their sources identified, representative boulders have polished faces allowing the texture of the granitoid rocks to be observed. From here, the trip headed northeast and various aspects of glacial geology were observed in gravel pits and river banks under wet and muddy conditions. The most interesting stop was beside the Letzia River where highly deformed Pleistocene beds have incorporated Jurassic coal measures and which were, for many years, interpreted as a bed rock outcrop. After an overnight stop in the medieval Hanseactic city of Riga, the capital of Latvia, there was a tour of the old town and the Natural History Museum of Latvia. Then it was on across the glacial landscape to medieval town of Cesis and the old university city of Tartu in eastern Estonia. The highlight for the day was the well preserved Ilumetsa meteorite impact crater, some 30 m across with a marginal rim of earth standing several metres above the flat forest floor. Its age is estimated at 6,000 years.

On the second to last morning of the field trip, participants sought welcome respite from rain in the Saadjarve Drumlín Museum. Here the origin of the drumlins for which the area is famous was explained, and superb cross sections viewed. Hardy souls were able to climb a nearby open tower to view the drumlins themselves. Unfortunately, the weather continued to deteriorate and by the time the fishing town of Kallaste on the shores of Lake Pepsi, the fourth largest in Europe, was reached rain was sweeping across the ruffled water from Russia. Nevertheless, overhangs in the soft red Devonian sandstone, the eastern equivalent to the Old Red Sandstone, provided shelter. After several days of glacial geology, this was the first outcrop of basement rocks and the remainder of the trip, accompanied by improving weather, included a number of stops to examine the almost flat lying, weakly indurated, Lower Paleozoic sequence of Estonia comprising the renowned Baltic Klint. The lack of induration was well exemplified in a clay pit at Kunda where unweathered mudstone, looking all the world like a New Zealand Pliocene “papa”, contains Cambrian fossils.

Amongst the stops was one near Kukruse where brown organic-rich “oil shale” or kukersite is extensively exploited for power generation. The kukersite layers are intercalated with limestone containing an abundance of fossils. Most of the organic matter is, however, derived from algal mats that formerly inhabited tidal flats rather than incinerating bryozoa, trilobites and brachiopods. After mist cleared the next day, even more spectacular outcrops of the Baltic Klint were examined on the Pakri Peninsula, the site of a former Soviet submarine base, to the west of Tallinn. In the afternoon participants were guided around the old town of Tallinn before visiting to the Eesti Vabaohumuusemi. This extensive museum in a forest contains numerous buildings, many original, and other artefacts that express the history of Estonian civilisation. In the evening INHIGEO 2006 concluded with a traditional Estonian meal in the museum.
In all, a very well organised meeting and highly interesting field trips with knowledgeable guides and detailed tour notes. There were numerous opportunities to view the geology, countryside and enjoy the hospitality of three small, but culturally very diverse, Baltic countries. Perhaps what was most surprising to most participants was how much of the medieval architecture has been preserved throughout all three countries. Even under the Soviet regimes, the sense of history and geology was recognised with building restorations and the establishment of parks highlighting aspects of the landscape. With independence, and the help of the EU, the three countries are further enhancing their diverse past.

New Zealanders and ex New Zealanders beside a granite erratic at Bernotai, the centre of Europe. From left to right are Wolf Mayer, David Oldroyd, Mike Johnston, Simon and Judith Nathan, Amy Skogstad and Martin Brook.

Photo: Victor Baker
Metal Contaminants in New Zealand: Sources, Treatments, and Effects on Ecology and Human Health.

*edited by Tim A, Moore, Amanda Black, Jose A Centeno Jon S. Harding & Dave A. Trumm*

*Resolutionz Press, Christchurch; 2005  490pp*  

www.resolutionz.com

----------book review

Paul Stenhouse,  Senior Environmental Scientist with MWH( NZ) Ltd. Dunedin, and has recently moved to New Zealand, after12 years as a water quality specialist in the United States

*Metal Contaminants in New Zealand* is a technical book, published as a compilation of technical papers by various authors.  It is unclear as to whether these individual chapters, as technical papers, were written to be included in this publication.  The sequence by which, these papers are ordered in this book is quite good.  The progression of information is solid, detailing five main sections of metal lifecycles–Background, Natural and Anthropogenic Sources, Environmental Remediation, Effects on Ecology, and Effects on Human Health.  This reviewer finds this book to be an informative beginning on the various aspects of natural and anthropogenic sources of metals found within New Zealand.  The chapters contained within would be a good starting point for any scientist, who may use the information provided as a spring-board to seek out the most current information (i.e., up-to-date legislation, current guideline values or benchmarks, and local or national government practices).

With that said, there are some points raised in the book that this reviewer would like to clarify.  Within the first chapter, there is a statement that the USEPA cancer risk is $10^{-6}$, and that New Zealand adopted a $10^{-5}$ risk (presumably for caution).  In actuality, the USEPA cancer risk ranges from $10^{-4}$—$10^{-6}$, as per NCP 40 CFR 300 rule.  Anecdotal information indicates that the risk of developing cancer in one’s lifetime is between 1 out of 3 or 4 people.  An employee of the USGS wrote the second chapter, and thus, some of the conclusions may not apply to New Zealand.  While this is a good chapter as an overview, it is important for the New Zealand scientist to use the most New Zealand appropriate information when evaluating contamination.  It is also important to ensure that all solid matrices are reported as dry weight (the only form against which, comparisons can be made).  This reviewer also found that more references would be helpful during the course of reading certain chapters.  What could be considered as a pedantic need to disclose all information on a similar basis, also allows one to recreate the work of others (transparency is a basic tenet of scientific investigations).

In this reviewer’s opinion, New Zealand has an emerging focus on contamination and environmental science.  Thus, it is anticipated that legislation will be in a state of flux, resulting in further refinement and greater understanding of the nature, extent, and effects to human and ecological receptors specifically as they relate to New Zealand specific receptors.
As this field of science is relatively new, it is important to focus the conclusions on a scientific-basis, rather than one that is driven by policy alone. Thus, a word of caution when using references from overseas–they may not apply (but may be the best surrogate information available). Using Metal Contaminants in New Zealand as a reference and a guide to the sources and nature of metals contamination will allow one to be well armed with the knowledge to assist one to successfully characterise the nature and extent of contamination surrounding sites of interest. This reference, in conjunction with applicable guidelines, will help the scientist or investigator to understand the possible nature, and perhaps sources, of metals contamination during the course of an investigation.

From Sextants to Satellites: a cartographic time line for New Zealand. by Brian Marshall  New Zealand Map Society Journal no. 18, 2005. 136p. ISSN 0113-2458

Elva Leaming, Subject Librarian: Geology & Physics, University of Auckland.

Why a time line for New Zealand cartography? It was a serendipitous idea. The project initially began when the author, Map Librarian at the University of Auckland, was approached by a biological scientist, over the compilation of a chronological listing of events and explorations that had impacted on New Zealand’s botanical studies. The daunting task became increasingly detailed, and the author eventually saw the framework of a cartographic time line taking shape. So began this work, which for the delving reader, is as much an entertaining past-time read as it is an important reference work. Maps tell a story in the briefest possible form. This timeline is therefore an organized summary of a far larger story; one of adventure, practical input, hard labour and artistic skill, all which have greatly contributed to the historical mapping of New Zealand and its development as a nation.

There are a number of recently published works on the history of New Zealand surveying - Holm’s Caught mapping (2005), Byrnes’ Boundary markers (2001), and Conly’s Piet’s eye in the sky: the story of NZ Aerial Mapping (1986). However, Marshall’s work appears to be the first “comprehensive time-line” of New Zealand cartography. As such, cartography is defined broadly; surveyors, draughtsmen, geologists, explorers and even artists are included, as are map publishing, map keeping and marine charting.

As the title suggests, the time-line entries are from antiquity to recent. Listed chronologically, the earliest entry is for ca. BC 530 when Pythagoras postulated the concept of a large southern continent to balance the land mass of the Northern Hemisphere. At the opposite end of the spectrum, the final entry (2005) records the New Zealand Automobile Association’s AA SmartMap, an online mapping system providing a comprehensive street directory, the result of collaboration between the Automobile Association and GeoSmart. Within these extremes are revealed the tremendous contributions of marine and land surveyors and geologists who contributed to the shaping of New Zealand’s infrastructure. In addition there are recordings of such episodes as the Tarawera eruption (mapped by Percy Smith in 1886), the Napier Earthquake (1931- a story in itself as valuable records were lost), the publishing of the first
map to show the full extent of the Alpine Fault (1946-47) and the recent marine mapping that established the limits of the New Zealand Continental Shelf (1996-2003).

Marshall considers the many unverified claims of earlier peoples who are claimed to have visited New Zealand. He has been selective and excluded anything questionable, but has included and given a reasoned explanation for cases where a certain amount of evidence prevails. An 11-page index of persons and organizations complements the chronological text which is followed by Notes which aim to clarify any difficulties of interpretation for the reader. There are also 5 illustrations. One formatting criticism is that the printer has occasionally begun a new date at the base of a page, which can be distracting, but is of minor importance. The work is peer reviewed which adds further credibility to the content. One might observe an over abundance of geological content, but then, given that geologists were responsible for much of the country’s mapping, one could hardly argue against such due recognition.

Numerous sources are referred to in this organized cartographic history. Fifteen pages of monographs, journal articles and journal titles appear after the text. Of these, the most prestigious is perhaps the Appendix to the Journals of the House of Representatives which traces the work of a wide range of government departments including the New Zealand Geological Survey and later the Department of Scientific and Industrial Research and the Department of Lands and Survey. He also records mapping done for the New Zealand Geological Survey Bulletin. Another valuable source is Reports of Geological Explorations 1866-1893.

As explained in his abbreviated introduction, Marshall has aimed to achieve a simple listing of events - a starting point for the recording of New Zealand’s cartographic history, rather than an end product. His work allows for future expansion, whether by supplementing source material and input from other scholars, or by adding to the chronological sequence. The work could conceivably serve as a basis for further editions given time.

Marshall has been involved with maps and cartography throughout his working life; initially as Map Librarian at the Alexander Turnbull Library, Wellington, and subsequently in his current position as Subject Librarian for Geography and the Environmental Sciences combined with that of Map Librarian at the University of Auckland. He was instrumental in forming the New Zealand Map Society in 1977 (listed in this time-line) of which he is a life member. The Society has a continuing membership, an annual journal, and a newsletter “Datum” which he continues to edit.

The “time - line” is in paperback, A4 in format, and is published as New Zealand Map Society Journal no.18, 2005. It has been issued free of charge to members of the Society as part of their annual subscription. Copies are available from the author, Science Information Services, General Library, University of Auckland, Private Bag 92019, Auckland 1142, at a very reasonable cost of NZ$35 (includes postage) or may be ordered online from the Society’s website (http://www.mapsociety.org.nz/publications.html). Exceptional value when one considers the amount of research and time that has gone into its compilation.
Geology and Exploration of New Zealand Mineral Deposits,
edited by Anthony B. Christie and Robert L. Braithwaite.
Monograph 25 Australasian Institute of Mining and Metallurgy
353 pp. members $A60 non-members A$80 available as CD www.shop.ausimm.com.au

Book review

Kerry Stanaway, Auckland

New Zealand is one of the world’s more significant gold areas. Gold segregates in subduction terrains where downward dragged water saturated oceanic sediment and igneous crust have had their waters heated and flushed to the surface mixing with descending meteoric waters.

Two economic geology specialists, members of GNS, present this timely review of the New Zealand non-energy mineral exploration scene. Once again, as in the four previous monographs, the work reflects the overarching effect of gold on our exploration spending. Of 347 pages of text, fully 236 or 68% are devoted to gold, Epithermal deposits take the prize with 138 (40%); orogenic deposits occupy 64 pages (18%); placer 26 and intrusion related deposits only 8. The last form a newly recognized class of gold deposit and 8 more pages may have to slip from the epithermal grasp and move to intrusion related if the new Puhupuhi exploration models proposed in the monograph article prove valid. The influence of escaping subducted and mixed meteoric waters does not stop with precious metals however as an article on the zeolite deposits in the Taupo Volcanic Zone demonstrates. Interestingly an article on halloysite clays in Northland relates their creation to meteoric water weathering rather than upwelling heated waters. In contrast to the gold papers these two ‘industrial mineral’ articles have valuable sections devoted to research and marketing of the minerals in question.

This monograph follows the format of the preceding Monograph #13 Mineral Deposits of NZ edited by David Kear with general papers and an introduction to mineral deposits in NZ followed by papers written by experts in their topic or area.

The effect of a changing regulatory regime in regard to mining is dealt with in two papers, first in the Introduction where changes since 1971 are summarized and seen more from the government point of view, and later in an article covering placer gold mining on the West Coast where the view comes from a miner. Law changes always slow down exploration as both sides come to understand how to implement anew. Bad (for exploitation) law can be preferable to change because of this. An article on the legal principles and the spawned regulations would have been welcome and appropriate in this volume whose principal aim is sell NZ to investors. The slow pace of exploration in NZ too is surely worthy of some comment!

Good exploration articles are pregnant. Pregnant with fresh new ideas and exploration sites able to enthuse geologists and investors to test them. Most articles followed a format one would expect from such a monograph with descriptions of regional geology, deposit geology, history of exploration, deposit mineralogy, isotope studies, etc, but the inclusion of the history of exploration ideas tested and especially of new ideas suggested by past work, or incompletely tested is what makes this publication really valuable. This openness to adventure...
appears in papers on GIS modeling (showing a path being taken by Glass Earth in the TVZ among others), for volcanogenic massive sulphides along the submarine southern Kermadec Ridge, for platinum prospecting, and for gold at Puhipuhi, Ohui, Broken Hills, Neavesville, Wharekirauponga, Te puke, Ohakuri, Sams Creek and Rise and Shine. Other papers stayed resolutely to the facts as the authors saw them, relying on information to sell itself. The Otago and Marlborough papers in particular suffered from this. Yet Macraes is our biggest gold mine.

Volcanogenic massive sulphide deposits with copper lead zinc and precious metals have received scant exploration on land since the publication of the last monograph in 1989. In this they yield one 7-page overview by the editors themselves. The fact that only one drill hole was recorded only too blatantly reflects this lack of interest. Why? Lack of success to date is the most compelling reason. We do however have the rocks. Two papers and 12 pages record our active search offshore for these targets along the southern Kermadec Ridge. Work so far indicates interesting offshore potential. Could the submarine crust incorporated into NZ’s subaerial crust have mostly been obducted and thus lost these deposits to erosion? Could present exposures tend to be from deep parts of the oceanic crust, or are the masses just too small? Is our lack of Archaen examples the problem? One success, even offshore, would bring a swarm of willing seekers!

Seven deeper continental and oceanic crust layered mafic intrusives and their potential for platinum group elements have been discussed in one chapter (6 pages). There Table One lays out all the work done since 1967, two years after the first monograph on the economic geology of NZ by GJ Williams was published. Lots of geochemical and three geophysical surveys are recorded, but only 4 diamond drill holes! Surveys do not find mineral deposits, they target and give encouragement. Multiple drill holes find deposits, often after disappointing initial results. More work, more imagination perhaps, needed here. As the author writes “The small amount of reconnaissance work done to date has been very encouraging”. Clever theories that rule out or de-prioritise sites should be treated askance—look where DeBeer’s theories got them!

No doubt the big successes of the New Zealand mineral search since the last similar monograph in 1989 have been

- The opening in 1990 of the largest NZ gold mine at Macraes in Otago from which 1.8M oz have been wrung and in which a resource of 3.9Moz remains, with exploration ongoing.
- The discovery of the totally hidden Favona vein system at Waihi with 0.6M oz currently identified and more likely. As the authors wrote “Favona lay undiscovered within 2km of the world-class Martha Hill Mine for more than 100 years since the commencement of mining.”

While Favona represents one prize for persistence others recorded in this monograph include the discovery of a 200,000 oz resource at Karangahake and the work on the orogenic and intrusion related deposits around Reefton where over 2M oz have been revealed, and 437 holes drilled since 1989. Here the article authors note “Exploration in the Reefton Goldfield is made difficult by steep topography, thick forest cover, poor outcrop, a veneer of glacial sediments, and high rainfall. These features plus the environmental sensitivity of the location in the Victoria Conservation Park managed by the Department of Conservation, have required well planned and executed exploration campaigns.”
Other deposits dealt with in the monograph include the North Island ironsands in three articles plus one on the South Island ilmenite coastal sand deposits. A model for the large size of the Waikato and Taharoa ironsands is proposed that accords with this reviewer’s observations for another huge placer, this time for ilmenite adjacent to the Limpopo River in Mozambique and 40 km inland on a paleoshoreline system. The resources sit in coastal indentations, valleys or depressions where sands drifting alongshore get trapped--by being blown off the beach inland. At these sites the results of beach concentration action stored in inland dunes, are removed from the reach of longshore drift. New Zealand’s ironsands are the world’s largest placer deposits and sources of the world’s cheapest iron ore.

Placer mining of gold in the South Island is discussed in four papers suggesting that the upsurge in production in the 1988-2004 period was due to new technologies, some NZ developed. During this period 680,000 oz were produced on the West Coast alone. L&M a NZ company mined 330,000 of them in 12 projects. A paper on the Ross field outlines the history of mining and the remaining potential. Another paper presents new information on the source of the placer gold on the West Coast noting the discovery of, and positing an origin from, the erosion of numerous small gold veins in the Southern Alps.

This monograph is a worthy successor to the four predecessors, two by GJ Williams the first in 1965 rewritten in 1974 and the similar styled one previous in 1989 edited by David Kear. A ‘must have” for any exploration geologist working in New Zealand it will not only be consulted for years to come but will act as a stimulus to more discoveries. It does not suffer at all from having only black and white illustrations. The occasional color picture would have been distracting. The articles are well written. The only typographic error this reviewer found showed up in the legend for Fig5 on page 81 where part of a descriptor is missing. “Gold Window substantially”......What?

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**NOTICES**

**Royal Society Advice on New Zealand’s Energy Future**

The Energy Panel of the Royal Society of New Zealand has released its report "2020: Energy Opportunities". The Panel comprises a selection of our best energy experts from academia and business, covering a wide range of experience in energy sources and uses. They consider that the future of our energy sector is perhaps the most important problem currently facing our nation, affecting both our economic growth and our response to climate change.

The government’s new energy strategy is in development and the Panel members hope that this report will provide solid and objective technical advice that will help to
build a consensus on what this strategy should be. The report recommends actions and points to opportunities to provide a secure and sustainable energy future for New Zealand. The recommendations are that:

1) New Zealand should move to a low or zero-carbon basis for energy and transportation.
2) Biofuels have the potential to provide both the nation transport fuel and a new rural export industry.
3) Our vehicles will need to be modified to use renewable fuels and a wholesale transformation of transport will be required, including a change of behaviour on the part of the public.
4) Our electricity supply has the ready potential to reach zero carbon emissions and electricity markets could create a better investment balance between supply and demand. Currently an investment in efficiency will make available more electricity than the same investment in generation yet investments in generation continue to outweigh investments in efficiency.
5) Some form of price on greenhouse gas emissions is inevitable and we should prepare ourselves for that price. Organisations and businesses should start quantifying their carbon emissions, begin reducing them and identify the new business opportunities and threats (e.g. food miles) that the drive to reduce carbon emissions will present.
6) A sustained research effort is needed to drive indigenous solutions to our energy problems, such as reducing methane emissions from farm animals, investigating barriers to energy efficiency, growing energy crops for NZ conditions and marine energy technology.

Our energy system will continue to evolve in response to changes in technology, economics and the international response to climate change. We are moving to a carbon-constrained world, where a price will be paid for every emission of greenhouse gases. In that world, New Zealand will be able to use its natural renewable resources to maintain a competitive advantage through low cost renewable energy sources, smarter and more efficient use of the energy we have and by putting some substance behind our clean, green claims to protect our industries from dubious claims such as the "food-miles" debate in Europe.

A copy of the report is available at http://www.rsnz.org/advisory/energy/

Editors Comment: The lack of geologists on this panel has had a predictable effect. The solutions proposed slant toward agriculture and the biological sciences. Why cannot we use Kiwi ingenuity to work at recycling carbon from mined lignite coal and oil—still our indigenous largest energy sources. Our lack of sunk capital into our lignites means we can start here without the baggage that exists overseas. Nothing wrong with the solutions proposed, but why limit ourselves?
CHARLES FLEMING (1916–1987) was one of New Zealand’s pre-eminent twentieth century scientists. A geologist, palaeontologist and ornithologist, he later added biogeography, entomology, and the history of science to his specialist subjects. In 1942, aged twenty-four, he spent a year on Auckland Island as a coast watcher with the secret wartime Cape Expedition and kept a detailed and well-illustrated diary recording day to day events as well as the scientific work he undertook at No. 2 Station in Carnley Harbour. He also visited No. 1 Station at Ranui Cove and No. 3 Station on Campbell Island.


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SOCIETY BUSINESS


Overview

A year that began with nostalgia about our past at the 50th Anniversary Conference at Kaikoura has, almost inevitably, developed into contemplation about our future. That seems to be pretty bright, with an enthusiastic committee, a keen membership, and a healthy financial situation (see Treasurer’s Report). Nevertheless, there are concerns to be addressed.

Committee

The National Committee elected at the AGM in Kaikoura cinema on 1st December 2005 consisted of myself, Keith Lewis (President), Nick Mortimer (Vice-President), David Skinner (Treasurer), Helen Neil (Secretary), and Kari Bassett, Ursula Cochran, Penny Cooke, and Hugh Grenfell, and Alan Palmer. Mike Johnston continues with the wisdom of ages as Immediate Past President, and Kerry Stanaway is the new Newsletter Editor. Kerry took over from David Smale, who stepped down after an outstanding 7 years as the society’s editor. As in previous years, we are ably supported by our Administrator, Beth Wallace. During the year, there have been some changes with Penny Cooke leaving for a new career in U.K (in forensic archaeology specific to genocide sites), and Kari and Helen temporarily standing down because of impending or early motherhood. Richard Smith was co-opted to replace Penny, Scott Nodder has taken over from Helen as secretary, and Jarg Pettinga and Glenn Vallender have stood in for Kari on specific issues. In case anyone sees conspiracy here, the male replacements in each case were nominated by the women themselves.

I feel very privileged to be coordinating such a willing, responsive and cooperative group of people. All contribute to lively discussion and each has volunteered for additional roles. Particularly valuable have been Nick’s time-consuming work as Webmaster and as Coordinator of the Awards Subcommittee, Ursula’s work with publications and archivist of our past, and of course David’s absolutely vital contributions in meticulously keeping the Society’s and the Trust’s accounts in order.

At the AGM, elections were also held for trustees of the Awards Trust, which administers the funds, mainly from specific bequests, that are used to finance most of the society’s awards. Nick Mortimer and Ursula Cochran were elected to replace Julie Palmer and David Smale. Mike Johnston and David Skinner remained by virtue of holding office as Immediate Past President and Treasurer respectively.

50Kaikoura05 -- 50th Anniversary Conference

The 2005 conference was truly outstanding. The venue, at the small seaside town of Kaikoura, was a return to where the society was founded in 1955. However, it presented some appalling logistic problems for Jarg Pettinga and his Canterbury organising committee. The last minute cancellation of the chosen venue, with 245 people already on their way, would have been the final straw for most organisers. Having arranged the venue, I will admit to a moment of panic myself. Amazingly, Jarg, Janet Simes (Conference Organiser), and the mayor and community of Kaikoura had new venues arranged within hours. These turned out to include the actual schoolrooms used for the 1955 Geological Survey Conference, as well as the almost original 1930s Art Deco cinema next door. With some spectacular mid conference field trips, nostalgic displays, mad old timers at the conference dinner, and the understanding and enthusiasm of
participants, it was indeed “a conference like they used to be ~ or should have been”. There is no doubt that recent “out of town” conferences have been some of the most memorable but they are very hard work for those involved – and they are expensive. Incredibly, the Kaikoura conference came close of breaking even, despite the out-of-town venue and major additional costs associated with the 50th Anniversary celebrations. This unexpected outcome was thanks mainly to the Canterbury team’s effort in obtaining major sponsorship rather than skimping on the important stuff. We are all deeply indebted to them.

**Awards**

As is now traditional, the society’s major awards were presented at the conference dinner. In 2005 these were:

**McKay Hammer:** awarded to Chris Hollis for papers on the environmental changes in the SW Pacific associated with the Cretaceous-Tertiary boundary catastrophe.

**Hochstetter Lecturer:** The winner of this award, Bruce Hayward presented his lecture on “Deciphering New Zealand’s geological and environmental history using foraminifera” at all the main (and most minor) centres in July and August this year. His support lecture, “The last global extinction in the deep sea, during the mid-Pleistocene climate transition” was given at University centres.

**Kingma Award:** awarded to Steve Wilcox for years of selflessly operating complex electronic equipment in extremely hostile conditions at sea.

**Wellman Research Award:** to Katherine Holt to support research on soils and terrestrial climate change in the Chatham Islands.

**Hastie Scholarships:** Katy Ward (Auckland), Jeremy Titjens (Waikato), Leila Chrysall (Massey), Hunnu Seebeck (Victoria), Rose Turnbull (Canterbury), Emilie Guegan (Otago)

**Wellman Prize:** Jane Hill (Whangarei) for discovery of a fossil turtle of the genus Cheloniidae.

The student awards for conference presentations, made at the closing ceremony, were:

**Oral papers:** Best paper: Ruth Wightman (Victoria), Merit Awards: Rachael Crimp (Massey), Samuel Marx (Queensland), Cathy Joannes (Nice, France).

**Poster papers:** Best paper: Jeremy Cole-Baker (Waikato), Merit Awards: Tariq Rahiman (Canterbury), Tracy Bear (Waikato).

**Special Society Awards:** On behalf of the Society, Jarg Pettinga and Lionel Carter made special presentations to Henry Pantin, Bob Carter and Keith Lewis in recognition of their individual contributions to understanding of east coast geology over their long careers. Henry Pantin’s first paper on the Hikurangi Margin was published in 1957 and his most recent in 2003.

**Other Awards**

In June, Bruce Hayward (our Hochstetter lecturer for the year) was made a Member of the New Zealand Order of Merit in the 2006 Queen’s Birthday Honour’s List. The award was a popular acknowledgement of Bruce’s services to Earth Sciences and Conservation.

**Membership**

Membership hovers around 730, down slightly from around 745 this time last year, although numbers can vary with this range during registration for the annual conference. Membership numbers are now back where they were in the early 80s after peaking at 870 in the early 90s. I suspect that this reflects the state of our profession rather than major dissatisfaction with the Society. However, it also indicates a need to appeal more to all those interested in New
Zealand geology, and perhaps other earth sciences, including those who work away from our main “research science” emphasis.

Subscriptions
Subscriptions have remained the same now for several years and with inevitable increases in cost due to inflation, the treasurer will be proposing a modest increase in subscription at the AGM to reflect the increased costs and give a margin to undertake or support projects judged beneficial to member. The committee did discuss various cost-saving measures, including using new technologies, but saw disadvantages to members in all of them. To avoid big increases later we will reluctantly propose a modest increase in line with inflation at the AGM.

Committee Meetings
Despite a lot of the committee’s business now be conducted by email, it was still considered necessary to meet three times in Wellington this year. The meeting in February was primarily to review the preceding conference and to plan the year ahead. The June meeting discussed society finances, the coming conference, and major new publications, with an additional day to review of the society’s activities and plan for the future. The October meeting (at the time of writing still to come) will discuss procedures for the AGM, geo-education and implementation of other ideas from the June workshop.

Futures Workshop
Because committee meetings must necessarily concentrate on the routine administration of the society, the committee met for a whole day in June to think about the society’s future. We used the results of the 1998 membership survey and the follow-up report as a basis for discussion. The provisional results of our deliberations were reported in the July Newsletter #140. Some of the issues discussed included:

(i) improved links with other earth science societies,
(ii) more relevance to “applied” geoscientists and teachers,
(iii) making the society a bit more welcoming to newcomers,
(iv) improved links with and between branches,
(v) easing the work-load of annual conferences on branches,
(vi) future requirements of administrator and treasurer,
(vii) improving geoscience education in schools (need qualified help)
(viii) criteria for, and advertising of, awards, and possible gaps in awards.

Awards Trust
The Trust continues to fulfil its role of protecting the not inconsiderable funds used to support most of the Society’s awards. Trust meetings, usually quite brief, are held at the conclusion of the committee meetings. The Society appreciates the work of the Trustees, and acknowledges the considerable input of Mike, who set up and oversees the Trust’s working, and of its conscientious treasurer, David.
**Newsletter, Newsflashes and Website**

There are now three main methods of keeping members up to date with Society matters. These are:

*The Newsletter:*  
As the new editor, Kerry has been very active with new initiatives on feature articles and style, while keeping the basic format. There has been frequent use of colour, usually paid for by advertising. There was discussion on an electronic copy of the Newsletter, but not all members could handle this and it would save little money at this stage if at least some copies needed to be printed. Probably, even members who can handle big pdf files still want their copy on the desk and later on the shelf. Until there is a strong move for change, a printed Newsletter will be posted to all members.

*Newsflashes:*  
These are important in providing snippets of news quickly, and to advise members of coming events and deadlines. To take some of the workload off Nick, Penny and I have sent out some issues this year. It has made us appreciate Nick’s efforts for the last few years.

*Website:*  
The website is now a major resource with, if web stats are to be believed, over 60,000 hits a year. These are mainly during the NZ working day, with a secondary peak in the evenings. Nick has updated the website a lot during the year – a skilled and time-consuming business for which we are all grateful. He has to constantly check links, add and delete notices of meetings, and revise layouts. Major additions this year include 23 fieldtrip guides from Dunedin, Taupo and Kaikoura conferences, our 50 year history by Bruce Hayward, Auckland branch website pages, health and safety policies, including requirements for field trip safety, and links to the wealth of information in Simon Nathan’s part of the new Online Encyclopaedia of New Zealand. The website is now a major resource for anyone interested in New Zealand’s geology.

**Publications**

Ursula has had a busy year with society publications and reprintings.  
Ian Graham’s new book, *A Continent on the Move: New Zealand Geoscience into the 21st Century*, is almost ready for the printer. It will be published by the Society, in collaboration with GNS, as a GSNZ Miscellaneous Publication. A summary of NZ geoscience, past, present and future, it will be an elegant publication, with an unusual format, arty layouts and an almost funky but authoritative style. Penny and Helen have put a lot of effort into obtaining sponsorship, which seems to be paying off, so that the society will carry little financial risk. Hopefully there will be sponsorship to put a copy in every secondary school in the country. Thanks to Ian’s foresight, the Society will have a major publication in 2007 in time for the International Year of Planet Earth in 2008.

After a makeover, Peter Ballance’s *Roadside Geology* will probably be published by Te Papa Press in 2007 as an up-to-date and accessible guide for interested, non-specialist readers. Mike Johnston, after further research overseas, has submitted his biography of E H Davis to Nikau Press for publication. Daphne Lee, Jane Forsyth and Roydon Thompson are preparing a new GSNZ field guide to Central Otago, aimed specifically at schools and the interested public. They have received funding from the Central Lakes Trust and Contact Energy. Slow progress continues to be made by Otago University Press with Graham Bishop’s biography of Alexander McKay. The Society helped sponsor Mary McEwan’s publication of her father,
Charles Fleming's *Cape Expedition Diary - Auckland Islands, 1942-43*, which was published in time for the conference commemorating the bicentenary of the discovery of the Auckland Islands. We also sponsored digitising of further back-issues of NZJGG, hopefully acting as “seed money” for other funding to get the job finished.

Our best-selling guidebook *Geyserland* by Bruce Houghton and Bradley Scott has just been reprinted with copies available from Bush Press for $19.95 (see the GSNZ website for details).

Fieldtrip Safety Guidelines

Draft GSNZ Field Trip Safety guidelines have been drafted by Hugh and Penny based on guidelines used in Auckland, Waikato and Christchurch. They outline the responsibilities of trip leaders and participants to act responsibly in what can sometimes be hazardous situations. They can be accessed on the Society’s website.

Future Conference Venues

Preparations for this year’s annual conference at Massey, with the theme of “Our Planet, Our Future” are well advanced, but the committee is aware that it is a big commitment for the small group there. If the relevant branches can cope, and there are no good reason such as international conference to change, then it is anticipated that Waikato will host in 2007, Victoria in 2008, Dunedin in 2009, Auckland in 2010, GNS in 2011 and Canterbury in 2012.

AGM

Members are reminded that the 51st AGM of the Society will be held at Massey University after the end of the afternoon session on Wednesday 6th December.

Thanks

On behalf of you all, I’d like to thank all those who have given freely and willingly of their time to keep our society operating efficiently. In particular, we are deeply indebted to the organisers of our annual conference (it is a huge undertaking), to the convenor of the subcommittee and committees of branches, and of course to the members of the national committee and its administrator. Thank you.

Keith Lewis
President
Geological Society of New Zealand Inc.

Statement of Financial Performance for the Year ended 31 March, 2006

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<tr>
<th>Overall Position</th>
<th>2006</th>
<th>2005</th>
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<td><strong>INCOME:</strong></td>
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<tr>
<td>Sales</td>
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<td>Subscriptions</td>
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<td>2,265.54</td>
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<tr>
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**Surplus/(Deficit) for Year**

- 1 -

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<th>2005</th>
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<tr>
<td></td>
<td>$ 41,370.46</td>
<td>$ 7,230.67</td>
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Geological Society of New Zealand Inc.

GENERAL FUNDS

Analysis of Financial Performance
for the Year ended 31 March, 2006

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<th>Income:</th>
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<th>Publications Fund</th>
<th>Conference Fund</th>
<th>Geopreservation Fund</th>
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<td>2,332.46</td>
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<td>2,339.30</td>
<td></td>
<td></td>
<td>2,339.30</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
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<td><strong>45,743.38</strong></td>
<td><strong>2,851.10</strong></td>
<td><strong>253.33</strong></td>
<td><strong>95,605.92</strong></td>
</tr>
</tbody>
</table>

Outgoings:

| Cost of Sales | 3,765.55 |
| Awards        | 100.00   |
| Expenses:     |          |
| - Administration | 9,300.00    |
| - Audit Fee   | 700.00    |
| - Committee Meetings | 5,777.18 | 745.25 | 6,522.43 |
| - Dishonoured Cheques | 265.00 | |
| - Donations   | 1,000.00  | 1,500.00 | 2,500.00 |
| - Grants: Branches | 1,518.00 | 5,000.00 | 6,518.00 |
| - Conference  | 566.82    |
| - Insurance   | 2,147.61  |
| - Lecture Tours | 14,128.62 |
| - Newsletter Costs | 829.23 | |
| - Office Expenses | 1,450.50 | 359.96 | 167.69 | 1,978.15 |
| - Post, Printing & Phone | 372.00 | 571.33 | 572.00 |
| - Promotions  | 213.33    |
| - Royal Society - Room Rental | 1,244.92 | 0.35 | 2.85 | 1,248.12 |
| - Subscription | 639.64 | 1,169.63 | 2,809.27 |
| - sundries (inc. CC & Bank Chgs) | 590.00 | 500.00 |
| **Total Outgoings** | **39,886.03** | **6,192.68** | **7,489.06** | **667.69** | **54,235.46** |

**Surplus/(Deficit)**

|                     | 6,872.08 | 39,550.70 | -4,637.96 | -414.36 | 41,370.46 |

-2-
## Geological Society of New Zealand Inc.
### Statement of Financial Position
#### As at 31 March, 2006

<table>
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<th>Overall Position</th>
<th>31/03/2006</th>
<th>31/03/2005</th>
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<tr>
<td><strong>Closing Balance @ 31st March</strong></td>
<td><strong>174,352.10</strong></td>
<td><strong>132,002.88</strong></td>
</tr>
</tbody>
</table>

Represented by –

### CURRENT ASSETS

<table>
<thead>
<tr>
<th>Bank Current Accounts:</th>
<th>31/03/2006</th>
<th>31/03/2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westpac Trust - I &amp; E A/c.</td>
<td>45,343.23</td>
<td>37,723.06</td>
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<tr>
<td>Publications A/c.</td>
<td>37,536.81</td>
<td>14,035.11</td>
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<tr>
<td>Conference A/c.</td>
<td>7,876.85</td>
<td>5,162.54</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>90,756.89</strong></td>
<td><strong>56,920.71</strong></td>
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</tbody>
</table>

| ASB Bank - Geopreservation A/c. | 2,432.24 | 93,189.13 |
| **Total Bank Funds** | **172,749.13** | **127,105.31** |

| Stock of Publications at Written-Down Values | 3,403.63 | 2,113.95 |
| Prepayments: 2006 Conference | 768.00 | 3,990.21 |
| G.S.T. Refund Due | 0.00 | 1,123.57 |
| **TOTAL ASSETS** | **176,922.78** | **134,333.04** |

### CURRENT LIABILITIES

| Creditor - Historical Study Group | 60.00 | 0.00 |
| GSNZ Awards Trust - Current Account | 1,251.40 | 2,330.16 |
| G.S.T. Payable | 1,159.28 | 0.00 |
| **TOTAL NET ASSETS** | **174,352.10** | **132,002.88** |
## General Funds

### Analysis of Financial Position as at 31 March, 2006

<table>
<thead>
<tr>
<th></th>
<th>General I&amp;E</th>
<th>Publications</th>
<th>Conference</th>
<th>Geo-pres.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Opening Balance 1 April, 2005</td>
<td>43,436.17</td>
<td>55,293.42</td>
<td>39,455.40</td>
<td>2,817.89</td>
<td>132,002.88</td>
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<tr>
<td>Surplus / (Deficit) for Year</td>
<td>6,872.08</td>
<td>39,550.70</td>
<td>-4,637.96</td>
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<td>2,178.82</td>
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<td></td>
<td>0.00</td>
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<tr>
<td>Prior Year Adjustment (Donations)</td>
<td>978.76</td>
<td></td>
<td></td>
<td></td>
<td>978.76</td>
</tr>
<tr>
<td><strong>Closing Balance 31 March, 2006</strong></td>
<td><strong>49,108.19</strong></td>
<td><strong>94,844.12</strong></td>
<td><strong>27,996.26</strong></td>
<td><strong>2,403.53</strong></td>
<td><strong>174,352.10</strong></td>
</tr>
</tbody>
</table>

Represented by:---

- **Bank Accounts**: 52,888.34
- **Stocks**: 3,405.63
- **Deferred Charges**: 768.00
- **Creditor - Historical Study Group**: -60.00
- **GSNZ Awards Trust Current A/c**: -1,351.40
- **G.S.T.**: -2,368.75

**TOTAL**: 49,108.19

**TOTAL**: 94,844.12

**TOTAL**: 27,996.26

**TOTAL**: 2,403.53

**TOTAL**: 174,352.10

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The Geological Society of New Zealand Awards Trust

Statement of Financial Performance
For the Year Ended 31 March, 2006

**Overall Position**

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

**INCOME**

Interest 19,962.87 16,812.26
Donations 960.00 2,330.16
**Total Income** 20,922.87 19,142.42

**OUTGOINGS**

Awards 8,375.00 11,425.00
Bank Charges 0.35 2.60
Audit Fee 787.50 0.00
**Total Outgoings** 9,162.85 11,427.60

**SURPLUS FOR YEAR** 11,760.02 7,714.82
The Geological Society of New Zealand Awards Trust

Analysis of Financial Performance

for the Year ended 31 March, 2006

<table>
<thead>
<tr>
<th></th>
<th>Specific Funds</th>
<th>Non Specific</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wellman</td>
<td>Hastie No 1</td>
<td>Total</td>
</tr>
<tr>
<td><strong>INCOME:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>8,659.23</td>
<td>9,395.64</td>
<td>18,054.87</td>
</tr>
<tr>
<td>Donations</td>
<td>960.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td>8,659.23</td>
<td>9,395.64</td>
<td>18,054.87</td>
</tr>
<tr>
<td><strong>OUTGOINGS:</strong></td>
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<td></td>
</tr>
<tr>
<td>Awards</td>
<td>8,375.00</td>
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<td></td>
</tr>
<tr>
<td>Bank Charges</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit Fee</td>
<td>787.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Outgoings</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>9,162.85</td>
</tr>
<tr>
<td><strong>SURPLUS/(DEFICIT)</strong></td>
<td>8,659.23</td>
<td>9,395.64</td>
<td>18,054.87</td>
</tr>
</tbody>
</table>
The Geological Society of New Zealand Awards Trust

Statement of Financial Position
As at 31 March, 2006

Overall Position

<table>
<thead>
<tr>
<th></th>
<th>31/03/2006</th>
<th>31/03/2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCUMULATED FUNDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Balance @ 1st April</td>
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<td>330,199.22</td>
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<td>Add: Surplus for the Year</td>
<td>11,760.02</td>
<td>7,714.82</td>
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<tr>
<td>Less: Prior Year Adjustment</td>
<td>-978.76</td>
<td>0.00</td>
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<tr>
<td>Closing Balance @ 31st March</td>
<td>348,695.30</td>
<td>337,914.04</td>
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Represented by —

CURRENT ASSETS

Westpac Trust Bank Accounts:

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<th>Account Type</th>
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<tbody>
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<td>Current Account</td>
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<tr>
<td>Ready Access Account</td>
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<tr>
<td>Term Deposits —</td>
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<td></td>
</tr>
<tr>
<td>Wellman Fund</td>
<td>133,698.80</td>
<td>129,039.57</td>
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<tr>
<td>Hartie No 1 Fund</td>
<td>144,968.80</td>
<td>140,073.16</td>
</tr>
<tr>
<td>Total Bank Funds</td>
<td>347,343.90</td>
<td>335,583.88</td>
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</tbody>
</table>

Geological Society of NZ Inc. Current Account 1,351.40 2,330.16

TOTAL ASSETS 348,695.30 337,914.04
The Geological Society of New Zealand Awards Trust

Analysis of Financial Position as at 31 March, 2006

<table>
<thead>
<tr>
<th></th>
<th>Wellman Fund</th>
<th>Hastic Fund No.1</th>
<th>Total Specific Funds</th>
<th>Non Specific Funds</th>
<th>TOTAL AWARDS FUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>ACCUMULATED FUNDS</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Opening Balance 1 Apr, 2005</td>
<td>129,039.57</td>
<td>140,073.16</td>
<td>269,112.73</td>
<td>68,801.31</td>
<td>337,914.04</td>
</tr>
<tr>
<td>Surplus / (Deficit) for Year</td>
<td>8,659.23</td>
<td>9,395.64</td>
<td>18,054.87</td>
<td>-6,294.85</td>
<td>11,760.02</td>
</tr>
<tr>
<td>Transfers between Funds</td>
<td>-4,000.00</td>
<td>-4,500.00</td>
<td>-8,500.00</td>
<td>8,500.00</td>
<td>0.00</td>
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<tr>
<td>Last Year Adjustment (Donations)</td>
<td>-978.76</td>
<td></td>
<td>-978.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing Balance 31 March, 2006</td>
<td>133,698.80</td>
<td>144,968.80</td>
<td>278,667.60</td>
<td>70,027.70</td>
<td>348,695.30</td>
</tr>
</tbody>
</table>

Represented by:--

- Bank Accounts: 133,698.80 144,968.80 278,667.60 68,676.30 347,343.90
- GSNZ Current A/c: 1,351.40 1,351.40

133,698.80 144,968.80 278,667.60 70,027.70 348,695.30
Earth Science

If you are interested in studying Earth Science, give me a call and together we can plan your programme of study.

Professor Vince Neall  Phone: 06 350 5799  extn 2203

Email: earthscience@massey.ac.nz  or visit http://soils-earth.massey.ac.nz

"... there is a worldwide shortage of scientists today. Your newly acquired skills are desperately needed now to make our world a better place to live in."

Dr Alex Malahoff, CEO, GNS Science, at 2006 Massey University Science Graduation Ceremony.
Subcommittee and Special Interest Group Reports

GEOLOGICAL RESERVES SUBCOMMITTEE 2005-2006

During the year, the Subcommittee kept its usual watching brief for threats to or management issues involving our country’s important earth science sites. Among the issues demanding attention have been:

1. We made a submission to Transit NZ during the consultation phase re upgrading the Gloucester Park interchange, arguing against further major damage being caused to Hopua maar crater and tuff ring – Onehunga’s only volcano. The plans now appear to have been modified.

2. Vince Neall made a submission to DoC and Masterton surveyors about reasonable conditions that should be placed on the title of subdivided land that would help protect the Waiohine Faulted Terraces site in the Wairarapa.

3. We made two further submissions to Auckland City Council advocating the protection and possible restoration of Purchas Hill volcanic cones during the Landco redevelopment of the former Mt Wellington Quarry. We have also solicited support from a number of other groups and latest reports are that we may be making some headway in getting a reserve (see next year’s report).

4. We made a submission to Transit NZ opposing a proposal to take the top off the De Bretts tephra section on the Napier-Taupo road, but not opposing cutting the cliff back to widen the road.

5. Graeme Stevens was consulted about damage that had been done during building site preparation to an historic beach ridge at Petone.

6. We wrote to DoC offering to remove recent paint graffiti on iconic fluted boulders at Stoney Batter, Waiheke Island. They replied that they would do the job.

7. We note that projects that were the subject of two of our submissions from previous years are now proceeding in Auckland and both have taken the course of action we proposed or supported. At St Heliers Beach the lowest impact option – building an artificial reef of pseudo-Waitemata Sandstone to separate the new beach sand from the erosive forces of a storm water pipe, has been constructed. Along the shoreline of the Tamaki Estuary a new mudcrete walkway is being constructed around the foot of the St Kentigerns Cliffs with a wooden bridge across a 20 m section where the stratigraphy of interbedded peats and rhyolitic tephras (c. 1 Ma) are exposed near the base of the cliff.

Geopreservation Inventory

We continue to receive requests from local authorities, consultants and individuals for information from the Geopreservation Inventory. Some of these are emanating from our new web site, which was installed during the year (http://homepages.ihug.co.nz/~bw.hayward/NZGI/).

Eighteen sites have been added to the Inventory during the year: Auckland: Pataua Creek mouth Last Interglacial terrace, Kaipara; Waikato: Wairere Falls; Bay of Plenty: Kauri Pt Pleistocene cross-bedded marine sediments; McLaren Falls potholes; Omokoroa Pt Pleistocene peat and ignimbrite section; East Coast: Maungawhio tidal lagoon; Hawkes Bay:
Makaretu Stream “S-bend” and fossils; Makaretu Stream falls; Te Reinga Falls; Wanganui: Durie Hill war memorial tower; Marlborough: Seymour Square clock tower; Canterbury: Conway coast Holocene fossil forest; Conway coast Pleistocene delta sediments and trace fossils; Avoca Pt unconformities; North Kaikoura Peninsula Cretaceous hard-bottom fossils; South side Kaikoura Peninsula Marshall Paraconformity; Otago: Matanaka sea caves; Southland: Transit River garnet sand dunes. The number of geological sites and landforms in the inventory now stands at 2655 (2637 in 2005). We thank all those who have nominated and supplied information about these added sites.

Bruce Hayward (Convenor, Auckland), Fred Brook (Northland), Hamish Campbell (Wellington), Dave Craw (Dunedin), Tony Edwards (Wellington), Roger Fagg (Timaru), Hugh Grenfell (Auckland), Mike Johnston (Nelson), David Johnston (Waikato), Jill Kenny (Auckland) and Alan Palmer (Manawatu)

HISTORICAL STUDIES

The year for the group has been a relatively quiet one but it is pleasing to see that the HSG Newsletter has returned to two issues a year. As was explained in last year’s report, it was decided to limit the group’s Newsletter in 2005 to a single issue because the Geological Society, as part of its 50th Anniversary celebrations, published an expanded Newsletter, edited by David Smale, as well as an updated history of the Society by Bruce Hayward. However, the return to two newsletters, under the continuing editorship of Tony Hocken, means that a larger number of articles are required to compensate for the diversion of historical items into the Society’s Newsletter. While there appears to be no diminution of research into the history of geology and geologists in New Zealand, the timing of articles is never constant. Nor have people run out of reminiscences. While requests for articles have been made, such as in the last issue of the Society’s Newsletter, this rarely, from past experience, results in a flood of material. Instead a more effective way to ensure a continuing supply of articles may be to contact members of the group directly by email and rely on the Society’s Newsletter for contacting the wider earth science community. This will be trialled next year but in the meantime articles for the HSG Newsletter should be forwarded to agh@ihug.co.nz or, if email is not available:
A G Hocken
East Riding, Whiterocks Road, RD 6-D
Oamaru, New Zealand.

The research listed in last year’s report continues and includes two PhD theses. Sascha Nolden, at the University of Auckland, on Hochstetter and in Dunedin Tony Hocken is writing up his account of Hector’s life up to the time he was appointed director of the Geological Survey. Amongst those actively undertaking research are Alan Mason (Charles Heaphy and Richard Taylor), Doug Coombs, Bruce Waterhouse and Jack Grant-Mackie (various aspects of the history of Permo-Triassic geology in New Zealand), Keith Lewis (marine geology) and Bob Brathwaite and David Skinner (mining). Graham Bishop’s biography of Alexander McKay is with Otago University Press and Mike Johnston, after further research overseas, has submitted his biography of E H Davis to Nikau Press, Nelson. In addition, Simon Nathan has written several articles on various aspects of the history of geology in New Zealand for the

GSNZ Newsletter 141 (2006)
On-Line Encyclopedia of which he is scientific editor. Similarly, Mike Johnston and Graeme Stevens have prepared three short sections on history of geology for the Society’s monograph which is being edited by Ian Graham.

The year 2007 will mark the 150th Anniversary of the departure of the Austrian frigate *Novara* on the global expedition which brought Ferdinand Hochstetter to this country’s shore. It also, indirectly, launched Julius Haast’s career as a geologist in New Zealand. Celebrations of this anniversary are planned in Europe and will include the publication of an annotated translation of Hochstetter’s fifth diary by Leonore Hoke, James Bade and others. The importance of the *Novara* Expedition, and more particularly Hochstetter, is something that this country should acknowledge. However, it may be more appropriate if it was done in 2008 or 2009, which would be the 150th Anniversary of when Hochstetter was actually in New Zealand. This would be consistent with the 100th Anniversary which was marked, in 1959, by a special issue of the *New Zealand Journal of Geology and Geophysics* and Charles Fleming’s translation of Hochstetter’s account of New Zealand. Whatever decision is made, the group, and the Society as a whole, should start planning for this anniversary.

Two members of the group, Simon Nathan and Mike Johnston attended the annual meeting of the International Commission on the History of Geology (INHIGEO) held in Vilnius in August 2006. The meeting was followed by an in depth field trip through Lithuania, Latvia and Estonia and is reported on separately in this Newsletter.

The changes to how subscriptions to the Historical Studies Group are dealt with, namely that these are now being carried out by the Geological Society’s Administrator Beth Wallace, is working well. Subscription notices are now sent out at the same time as those for the Society.

*Mike Johnston*  
Convenor, Historical Studies Group  
mike.johnston@xtra.co.nz

**Branch Reports**

**AUCKLAND**  
Membership of the Branch stands at 130 (133 in 2005) and the GeoClub Section has also declined slightly to 83 (87). Branch members with email were notified of many Geology Department talks and invited to a number of GeoClub field trips, and talks. The most active part of the branch continues to be the GeoClub Section. The following regular monthly meetings were held--the venue kindly provided by the University of Auckland, Geology Department.  
Oct 05MSc talks:  
Hydrothermal system of Raoul Island: Past and present (Joanne Graaf); Geology and structure of the Hauhungaroa Range, western Taupo Volcanic Zone (Andrew O’Loan); Relations among geology, soil type and Sauvignon Blanc vineyard variation in Marlborough, New Zealand (Tim Mills).  
Nov 05 Ammonites and their kin (Neville Hudson).  
Dec 05 Members evening of presentations.  
Feb 06 Geology of South Auckland (Bruce Hayward)
Mar 06  Fossil treasures of ‘Grube Messel’ (a famous World Heritage site)  
(Manfred Hochstein)  
Apr 06  Visit to Auckland Museum’s new Volcanoes gallery (Colin Wilson)  
May 06  Nature’s archive: the Quaternary record in NZ caves. (Paul Williams)  
June 06  Hometown views - two earthquakes and tsunamis, Sumatra – Andaman Is5  
(Gegar Prasetya)  
July 06  Hochstetter Lecture: Deciphering New Zealand's geological and environmental 
history using foraminiferal microfossils (Bruce Hayward)  
Aug 06  From dust...to.....dust - transforming marine geology into forensic archaeology.  
(Penny Cooke)  
Sept 06  Silicic volcanism in eastern Coromandel Volcanic Zone. (Roger Briggs)  
Some meetings were preceded by short 10 min presentations by various members on a wide 
varying variety of topics including: Stony Batter vandalism (Bruce Hayward); Something very small 
(Hugh Grenfell); Geology of the Flinders Ranges, South Australia (Glenys Stace); the 
Pliocene Clevedon River (Bruce Hayward); Why falls (Bruce Hayward).

Twelve field trips (13 last year) were run to: Mt Wellington-Purchas Hill (Oct, Leader Bruce 
Hayward, 8 participants), Omaha Waitematas (Oct, Bruce Hayward, 20); Kaimais-Mt 
Maunganui weekend (Nov, Bruce Hayward / Phil Moore, 15); Orere Pt Xmas BBQ (Dec, 23); 
The Outpost basal Waitematas (Feb, Hugh Grenfell, 20); Kawakawa Bay Mesozoic (Mar, 9); 
Mahia Peninsula weekend trip (Apr, Bruce Hayward / Murray Baker, 18); Kaipara’s new 
Regional Park (Apr, 11); Mangawhai Heads (May, Garry Carr, 15); Kidds Beach (June, Bruce 
Hayward, 20); Panmure Basin (July, Hugh Grenfell / Bruce Hayward, 13); Kendall Bay, 
Birkenhead (Aug, Hugh Grenfell, 21). The average attendance on the field trips was 16 (19 
last year).

Many thanks to the speakers and field trip leaders for all their help and enthusiasm, especially 
guest field trip leaders Phil Moore and Jeff Mauk.

This year the branch and club co-sponsored prizes at Regional Science Fairs for the best Planet 
Earth and Beyond projects in the Far North (Kaikohe), and Mid Northland (Whangarei) 
and south Auckland (Manurewa). We also sponsored the best 2005 MSc thesis presenter, 
Andrew O’Loan, to attend and present a paper at the annual GSNZ Conference. A new 
endeavour by the Geology Club was the production of the first issue of our new 
electronic Geology journal “Geocene” (Editor Helen Holzer). It is 

During the year we saddened by the sudden death of one of the Geology Club’s 
most supportive members, Fred Haueter.

Hugh Grenfell and Bruce Hayward

WELLINGTON

The Geology Section, Royal Society of NZ and Wellington Branch, Geological Society of NZ 
hosted monthly seminars on a wide range of geological topics with several talks also 
providing cultural insights into their field areas. Speakers included a good mix of visiting 
scientists and those from local institutions. The high quality of student talks at the Beanland-
Thornley Prize Night this year was reflected in the awarding of joint winners. We also 
sponsored prizes for two geologically relevant science fair projects at the NIWA Wellington 
Science Fair. The committee would like to thank speakers for the time and effort they put into 
their presentations and members for coming to listen and discuss!
Summary of Seminars and Activities:

6th October 2005: The Beanland-Thornley Prize Night included five twelve-minute talks by post-graduate students from Victoria University. The joint winners were Katie Peters for her talk on “High-temperature ductile extension preserved in the footwall of Misima Island metamorphic core complex, Papua New Guinea” and Andrew McCarthy for his talk on “Northwest Nelson valley glaciation during the last glacial cycle”. Other talks included: “Seismic attenuation under Mt Ruapehu volcano” by Tanja Kuehler; “Results from a marine core near Lord Howe Island, Tasman Sea” by Caell Waikari; and “An introduction to the Margins Source to Sink initiative, and sediment dispersal and deposition on a muddy continental shelf at the active Hikurangi Margin, Poverty Bay, New Zealand” by Matt Wood. Attendance: 50.

- 24th August 2006: The Wellington Branch of the Geological Society of NZ awarded two prizes for projects with a geological focus at the NIWA Wellington Science Fair. First prize went to Ashley Lovel & Stacey Martin (year 8) for their exhibit on erosion. Second prize to Brigitte Engel (year 8) exhibiting stalagmites and stalactites.

Chairperson: Ursula Cochran; Treasurer: Erica Crouch; Committee: Cliff Atkins, Warren Dickinson, Andrew Jones, Beatrice Mare-Jones, Arne Pallentin, Kate Wilson. members: 179.

OTAGO

Other than Bruce Hayward's Hochstetter Lecture there have been very few talks scheduled in the 5pm slot traditionally badged as Geological Society branch talks. However local demand continues to be satisfied by the weekly lunchtime talks and weekly afternoon geophysics seminars in the Geology Department at Otago University. Once again the branch was a Fitzgerald (Year 9) for his project on "The effect of landform and rainfall on well water in the Ashburton area" and to Nathan Hall (Year 7) for his project entitled "Space Dust Rockz".

Nick Mortimer