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RESULTS OF OUR NEWSLETTER QUESTIONNAIRE

Eighty nine (89) people responded to the questionnaire on the future of the GSNZ Newsletter. This number represents about 12% of the membership and adds to the 5% who voted at the 2006 AGM where a motion carried for an on-line newsletter.

Thirty two percent (32%) of those responding favored an on-line version of the newsletter, which indicates the importance of the society making an effort to reach out. A pity we could not ask their age, as they might best represent our future.

Fourteen percent (14%) might abandon the society if a paper Newsletter was dropped. These people too, represent a constituency we cannot ignore.

Of all respondents
- 74% accept advertising, most if it helped hold costs.
- 68% favored a continuation of the paper newsletter.
- 65% approved of color pages, most if the cost were covered by advertising.
- 64% would accept an increase in subs, few demanded to see justification.
- 53% wanted to leave the content of the paper newsletter unchanged.
- 49% would accept cutting the page count (21% only if it saved costs).
- 47% would accept a reduction of the number of issues to two per year.
- 24% said they would accept stapled notes. Others registered horror!
- 11% wanted to see society news and finances on-line only.

One overseas response proposed that we have a section entitled “Where are they now?” This seems a good idea; we will be emailing a random selection of members inviting you to submit a potted history of yourself with a sentence or two on what you are doing now. You are invited hereby also, to volunteer such information with a photograph of yourself.

The editor would also love to hear from one or more people who have their finger on the pulse of things geological, willing and to pen perhaps irreverent whimsical and fun opinions on people, projects and events. If you chose, your anonymity would be guaranteed! The first-read page in Skillings Mining Review in the US many years ago were the ramblings of the “One-eyed Explorationist”. We need more in the style of the “Paleo Potpourri” of Phil Maxwell, who is remembered both in the last and this issue. A “a sort of blogging ” he called it.

Editor
A Multilayered Society and its Links

Keith Lewis, president GSNZ writes………………

The Geological Society of New Zealand that I have known from four decades of annual conferences and Wellington branch meetings is pretty much a professional society for professional geologists, with research scientists generally outnumbering those “in industry”. There seems to a clear ongoing need for an organisation, to communicate new ideas and interact socially and boisterously with peers. But, as I discovered on my recent President’s tour of the society’s branches, it isn’t the whole story by a long way. Some branches have a large and enthusiastic membership only a few of whom have any geological training at all. Members there are predominantly members of the branch and not of the national society. They attend evening talks and weekend field trips because they are fascinated by the earth around them, not because it is their career. I was also invited to visit local geology clubs and science societies that aren’t officially branches at all, but also have well attended meetings and field trips. This multi-layering of geological socialising seems to work. Two other things impressed me, the dedication of those who run the branches and clubs, and their hospitality. Thank you all.

The other issue that emerged on the tour was a desire to see closer links, including joint conference, with other earth science groups, including those involved with the commercial applications of geological science. It seems that we will continue to hold joint annual conference with the Geophysical Society. We have had joint conferences with other groups in the past. The impetus for this will need to come from members who are also members of other societies. So far, a few tentative enquiries have come up against the problem of timing; our annual conference is traditionally sandwiched between the end of the academic year and AGU. Others meet at other times, but this isn’t insurmountable. If you are aware of where there could be productive interaction with other societies, please contact your nearest committee member in both societies.

A revitalised GeoEducation Group is working hard to see that Earth Science has a rightful place in the new school curricula, with the support needed to teach kids what is happening to their rapidly changing world (see symposium at Tauranga); perhaps even enthusing a few of them to take it up as a career. Some hardly need enthusing. As I was writing the paragraph above, a desperate email arrived from a mother of rock-mad twins who had asked for a “real geologist’s kit” for their 9th birthday. Helpfully, we tried to visualise a “real geologist”. In her letter of thanks, the mother begged for “kid friendly” resources, perhaps accessed via our website, so that she and others could take kids exploring their landscape. If she had been living nearer Hamilton we could have put her in touch with the Junior Naturalist Club who discovered the fossil penguin to win the Wellman Prize last year. There is enthusiasm out there at a stage when kids are starting to think of what they want to be when they grow up (although there is theory that geologists never quite grow up). If anyone has ideas on how we can nurture youthful enthusiasm, please contact me or the GeoEducation Special Interest Group; email addresses on the cover of this issue.
GSNZ AWARDS, 2007

Call for Nominations............Nick Mortimer Awards Committee convenor

The Awards Subcommittee calls for nominations. There are no forms or specified formats for applications, but nominators are asked to read the full by-laws covering these awards, including eligibility requirements, which are available on the Society's website, *(http://www.gsnz.org.nz)* on the Awards and the Rules pages.

Please consider nominating a colleague, a student, or even yourself. Do not be put off if you have been unsuccessful in previous years. Nomination is not onerous: short, punchy proposals are often the most convincing. Announcement of most recipients of the prizes will be made at the AGM and/or Conference Dinner at the Annual Conference in Tauranga.

*All nominations should be made by email to: n.mortimer@gns.cri.nz (MS-Word attachments are acceptable). Except where noted the closing date for nominations is Friday 14 September 2007. Receipt of nominations will be acknowledged.*
GENERAL AWARDS

McKay Hammer Award
The McKay Hammer is the Society's top award and is given to the author or authors of the most meritorious contribution to geology published in the previous three calendar years (2004, 2005 or 2006). For the purposes of the award, a New Zealand contribution is any contribution by a New Zealand-based author. The award shall be for one or more publications that have not already formed the basis of the award.

Hochstetter Lecturer
The Hochstetter Lecture is delivered to each branch by a New Zealand earth scientist who is undertaking or who has recently completed a major and as yet unpublished study, and who has a reputation as a good, informative speaker. Emphasis shall be on the dissemination of new concepts or techniques, and/or of important information which modifies existing interpretations. The topic should be of interest to both professional and amateur audiences. The lecturer is encouraged to present one or more support lectures at each university earth science department plus any other activity which he or she considers appropriate.

Kingma Award
The award shall be made to the outstanding New Zealand earth science technician of that year, with the qualification that no person shall be eligible to receive the award more than once. Eligibility shall be restricted to technicians employed in New Zealand in the field of earth sciences who have been employed in that field for at least two years, who have shown marked ability in their field of employment and who have made a notable contribution to the work of their institution, field team, etc. For this award, the rules require both a nominator and a seconder and supportive references, or an application by a candidate supported by detailed curriculum vitae and two referees' reports.

Wellman Research Award
This award commemorates the huge contribution to New Zealand geology made by the late Harold Wellman. A sum of $4,000 is available for a geological or geophysical research project. The award will be based on a research proposal, with preference given to a younger scientist. The application shall be no more than three A4 pages (typed at 12 pt size), which should include the name and contact details (including email) of the applicant, a brief (<100 words) summary, the proposal itself (including a budget), and the names and contact details of at least two referees. A 1-page CV for the applicant should be attached. If requested, applicants should be prepared to be interviewed. In considering applications, preference may be given to the sort of imaginative and innovative proposal that would have appealed to Harold Wellman. The President of the Geological Society of New Zealand selects the winner, but we ask applicants to submit proposals by 14 Sept. to the Awards Committee.

Harold Wellman Prize
This commemorates Harold Wellman as an outstanding discoverer of New Zealand fossils and his appreciation of the important role of fossil evidence in the resolution of New Zealand geology. The Prize shall be awarded in recognition of recent discovery of important fossil material within New Zealand. Each rewarded fossil discovery must have been recorded in the New Zealand Fossil Record File. The Harold Wellman Prize shall be awarded entirely at the
discretion of the President of the Geological Society of New Zealand, but applicants may submit proposals by 14 September through the Awards Committee.

**Alan Mason Historical Studies Fund**

This marks the contribution that Alan Mason has made to the history of New Zealand geology. An application for an award shall be in the form of a proposal related to the history of earth science in New Zealand (initially it is assumed that awards will be relatively modest, <$700, and likely to cover some of the expenses of undertaking historical research or a contribution to publication costs). The recipient of an award is expected to publish the results in an appropriate place, and to publish a summary in the Geological Society Newsletter.

**AWARDS FOR STUDENTS ONLY**

Students may be nominated for General Awards. In particular, the Wellman Research Award (above) we prefer to give to younger scientists. Below are Awards restricted to students.

**Hornibrook Award**

This commemorates the micropaleontological and stratigraphic research of Dr N. de B. Hornibrook (1921-1994). The award shall be made to a student enrolled for postgraduate research at a tertiary institution in New Zealand. To be eligible for the award, a student should demonstrate a high standard of competence and ability to carry out research, focussed on methods of stratigraphic correlation relevant to New Zealand and the south-west Pacific.

**S. J. Hastie Scholarships**

The late S.J. Hastie left a bequest to the Geological Society of New Zealand to set up a fund to provide educational scholarships in New Zealand geology. Scholarships may be awarded to New Zealand residents to pursue research in New Zealand geology. The scholarships, primarily to assist with research expenses of honours and masters students, will normally be awarded at the time that research work is about to commence. One award per year will be offered to each of Auckland, Waikato, Massey, Victoria, Canterbury, and Otago Universities on the written recommendation of the heads of the relevant departments to the Convenor of the Awards Subcommittee. Each award will be given to the earth sciences student who, in the opinion of staff at the university, is most deserving of the distinction, taking into account proven academic and research ability, and the likelihood of significant expenses.

**Individuals do not apply to the Awards Committee: contact your HOD if interested.**

**Student Travel Awards**

Travel grants to November’s Annual Conference in Tauranga are dealt with by the local conference organising committee, not the GSNZ Awards Subcommittee. Application is made on the registration form for the conference. The conference registration deadline applies.

**Student Paper and Poster Prizes**

These are made at the Annual Conference, and announced at the closing ceremony.
Historical and contemporary perspectives on the sediments of Lake Rotorua

David Hamilton¹, Lisa Pearson², Chris Hendy², David Burger¹³, Mark McCarthy⁴, Terry Healey⁵

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Lake formation

Lake Rotorua is probably the oldest continuously inundated lake in New Zealand, occupying a caldera formed by or closely associated with the eruption of the Mamaku ignimbrite and the collapse of the Rotorua caldera (Healy, 1975; Lowe and Green, 1991). The lake has undergone drastic changes in size and depth as a result of tectonics, volcanic activity and erosion. Since the Rotoehu eruption, (~60 kyr), the lake level has fluctuated between 120 m above present (280 m asl) and 10 m below present level. The modern lake covers an area of 79 km² and has a mean depth of 10 m. Despite its long history of sedimentation, Lake Rotorua has an irregular bathymetry with features including faulted blocks, slumps, hydrothermal explosion craters, springs and large methane discharge pock marks.

Sediment and tephra deposition

The floor of Lake Rotorua comprises two quite different sediment types (Fig. 1). In waters shallower than about 10m the sediment is coarse, consisting of sand and pumiceous gravel reworked from the Kaharoa (AD 1314 ± 12) and earlier tephras. In these shallower waters, wind-driven turbulence prevents low-density fine sediments from accumulating (Gibbs, 2004). In deeper waters the sediment consists predominantly of fine diatomaceous ooze interspersed with tephra from the Okataina, Taupo and more distant volcanic centres. There is little evidence of physical reworking of this sediment. The presence of the tephras provides chrono-stratigraphic markers enabling sedimentation rates to be determined. The Tarawera eruption of 10 June 1886 deposited a 1-3 cm thick bed of dense grey mud (Rotomahana mud) (Pullar and Kennedy, 1981) across the lake which now occurs to depths as great as 1.2 m below the sediment surface. Our estimates are comparable to those of Fish (1979) who estimated sediment deposition rates around 1 cm yr⁻¹ since the Tarawera eruption. The Kaharoa tephra (Pullar and Kennedy, 1981; Hogg et al., 2003) is evident as a layer of 8-10 cm of hard white pumice layer approximately 3m below the sediment surface (Fig. 2b). Between the tephra is a diatomaceous ooze that is dominated by frustules of Aulacoseira granulata (Foged (1979). Sediment density is relatively constant at around 0.07 g cm⁻³ in an upper layer of 10-15 cm of loose, flocculent sediment, but increases rapidly thereafter with compaction of the diatomaceous ooze.
Early attempts to use seismic techniques to survey the stratigraphy of the lake sediments (Davey, 1992) were unsuccessful due to the absorption of acoustic signals by gas within the sediments. This gas was interpreted to be of geothermal origin. A recent seismic survey (Pearson, 2007) also showed no structural features of the lake sediments except where there are small, circular, flat-bottomed depressions, detectable in Fig. 1 as minute depressions in the diatomaceous ooze of the deeper bed of the lake. The depressions are typically steep-sided and up to 5 m deeper than the surrounding lake bed, and around 50 m in diameter. Similar circular depressions are common in shallow marine and lacustrine sediments and have been termed pockmarks, with their formation interpreted as a result of gas discharge (Rodgers et al., 2006). Evidence of ebullition of gas can commonly be observed at the surface of Lake Rotorua on calm days (Fig. 2), particularly over pockmarks, and also in sediment cores raised to the lake surface (Pearson, 2007). Gas captured from beneath the water surface was a mixture of

*Fig. 1. Bathymetry of Lake Rotorua, including elevation of the surrounding landscape. Note the historical lake bed (shaded mauve), the current lake extent (delineated by the brown-shaded region of coarse sediments within the historical lake bed) and the transition to fine sediments of the inner lake basin (blue regions in the interior). Mokoia Island is readily distinguished near the centre of the present lake basin.*

*Fig. 2. Gas erupting on the surface following sediment disturbance by gravity corer.*
97% methane and 3% carbon dioxide. The isotopic signature of this gas ($\delta^{13}C_{\text{carbon dioxide}}$ of +10.5‰ and $\delta^{13}C_{\text{methane}}$ of -64.3‰) provides strong evidence that it is formed as a result of anaerobic fermentation of organic matter.

Within the depressions acoustic sounding shows the presence of tephra layers separated by diatomaceous ooze (Fig. 3). Coring within pockmark areas shows a limited amount of reworking based on the presence of small amounts of coarser tephra components within the upper sediment layer. There also appears to be hierarchy of depressions, with the deepest transmitting acoustic signals and shallower depressions absorbing them. We interpret this to be a result of episodic methane release resulting in sediment with a transparent sonic signal interspersed with periods of methane regeneration when the sediment recovers its lost volume and loses its sonic transparency.

![Graph showing depth vs distance](image)

**Fig 3.** Example of a pockmark of c. 50m diameter in the sediments of Lake Rotorua at a location of 38° 05´ 37.41´´S and 176° 16´ 12.99´´E denoted by bathymetry of the track across the depression derived from the multibeam sounding. Depth is below the water surface.

**Chemical features of the sediments**

Despite the lack of mechanical reworking within the diatomaceous ooze, there is considerable chemical activity resulting in translocation of significant quantities of iron, manganese, sulfur, carbon, phosphorus and nitrogen. The loose surficial sediments appear to become anoxic within the first few millimetres below the surface, with iron- and manganese-bound trace elements consequently being released and free to migrate along concentration gradients (Motion, 2007). Constant remobilisation of adsorbed trace element species, e.g. phosphate, maintains maximum concentrations not only in surficial sediments, but also near the centre of the lake (Fig. 4). For example, phosphate concentrations may be more than three orders of magnitude higher in overlying waters than in sediment pore-waters of the inner lake.

Diffusion transports ions both upwards into relatively dilute overlying lake waters, with important consequences to the overlying water quality (Burger et al., 2007), and downwards into deeper sediments. As sulfate is reduced to sulphide, insoluble sulfide minerals, especially iron, form precipitates some of which include framboidal pyrite. As there is insufficient sulfate reduced to accommodate all of the ferrous iron produced, other ferrous minerals (siderite and vivianite) also precipitate. The mass of diagenetic minerals estimated to be present in the lake
sediments (Pearson, 2007) appears to account for the gross difference in mass between mineral loads in inflows and outflows. Recycling of the mineral may be highly dynamic and repeated several times before burial within the lake sediments or loss to the Ohau Channel outflow.

Fig 4. Phosphorus concentrations represented by coloured contours for the upper 10 cm of dry sediment from Lake Rotorua. Concentric dark lines represent depths at 3m intervals.

Eutrophication

Loads to Lake Rotorua of minerals, notably phosphorus and nitrogen, have increased markedly over recent decades in association with replacement of indigenous vegetation by pasture and exotic forestry (currently 52 and 14 % of the catchment land cover, respectively). In addition, Lake Rotorua received discharge of treated sewage from Rotorua city (population 60,000) between 1973 and 1991 (Hoare, 1980; Rutherford et al., 1996) but loads from this source have been reduced markedly following land-based effluent ‘polishing’ in the Whakawerawera forest. Tributaries to Lake Rotorua arise mostly from very large groundwater aquifers that have long residence times; recent isotopic dating of lake inflows indicates time lags of c. 15 to 140 years for water from the catchment to be expressed in tributary inflows (Morgenstern et al., 2006). Consequently there is a lag in the time that it takes for tributary inflow composition to equilibrate to the prevailing land use. For example, current nitrogen loads are estimated to have increased approximately 7-fold from those of the 1950s and may not plateau until around 2200 when they will be nearly 10-fold higher than 1950 levels. None of the projections of future nitrogen loads takes account of intensification of pastoral land, for
which nitrogen fertiliser use is estimated to have increased by around 160% in six years to 2002 (Parliamentary Commissioner for the Environment, 2003; Hamilton 2005). This increase in nitrogen loading to Lake Rotorua has overwhelmed the benefits of reducing nitrogen loads through removing wastewater inputs to the lake in 1991.

The impact of additional nutrient loading from tributary inflows to the lake has reinforced the significance of the lake sediments to the eutrophication process (White et al., 1978; Burger et al., 2007). Additions of organic matter directly from historical wastewater inputs and indirectly from decay of nutrient-stimulated algal biomass have created a high sediment oxygen demand that is reflected in periodic deoxygenation of bottom waters when the lake water column stratifies for more than a few days during periods of warm calm weather (Burger et al., 2005). This process enhances the translocation of minerals, and is accompanied by notable releases of phosphorus and nitrogen, to such an extent that these internal fluxes strongly dominate the gross nutrient loads to the lake system. Both in situ measurements of these fluxes (Fig. 5), using benthic chambers to isolate the parts of the sediment, and laboratory incubations (Fig. 6) confirm the exceptionally high releases of nutrients that occur from the lake bed. Interestingly, in the latter case artificially increasing nitrate concentrations in the overlying water appeared to suppress nutrient releases from the sediments (Fig. 6), most likely associated with the oxidation of the bottom sediments arising from the oxidised cation nitrate. This finding provides insight into the array of interacting processes that govern nutrient releases and the eutrophication process in Lake Rotorua, and the significance of integrating a variety of time scales in understanding sediment dynamics in relation to the sedimentation and release of organic matter and nutrients. It is increasingly apparent that mitigation of eutrophication in Lake Rotorua in the short to medium term is likely to involve reducing internal nutrient loads as well as external loads, based on nutrient budgets for the

Fig 5. Mean phosphate fluxes from 4-day in situ benthic chamber incubations for four periods in 2003-4 at three stations of depths denoted on the horizontal axis. Error bars are standard deviations.

Fig 6. Mean phosphate fluxes from continuous flow laboratory core incubations of sediments taken Feb 2006. Incubations were carried out with overlying water that had either not been altered (unshaded) or had been enriched to 1 mg L⁻¹ nitrate concentration (shaded). Error bars are one standard error.
lake (Fig. 7), though there are preliminary indications that phosphorus content of surficial sediments may have decreased by as much as 40 % since 1995 (D. Trolle, pers. com.). Assessments of the feasibility of dredging lake sediments and adding materials to aid retentiveness of nutrients in the sediments, as well as several other engineering actions, have already been undertaken (www.envbop.govt.nz/Water/Lakes/Technical-Reports.asp). Implementation of these actions will require approval of the lake bed owners, the Te Arawa iwi, as well as further detailed scientific, economic and cultural assessments to assist the relevant lake management authorities (e.g., Environment Bay of Plenty, Rotorua District Council and Te Arawa Lakes Trust) in the decision making process.

Figure 7. Total phosphorus fluxes for Lake Rotorua for inflows, outflows and based on mean fluxes from replicate benthic chamber incubations at 7 m, 14 m and 20 m. Units are expressed as daily areal loads (mg P m$^{-2}$ d$^{-1}$).

References


We gratefully acknowledge the funding and support of Environment Bay of Plenty and FRST Contract UOWX0505, Lake Biodiversity Restoration. We also thank other contributors: Dennis Trolle, Olivia Motion, Dirk Immenga and Brad Scarfe (Waikato University)
Earth and Ocean Sciences, Waikato University

Kerry Stanaway, Beachlands

Earth science studies at Waikato University meld the disciplines of sedimentary, volcanic and engineering geology, and blend coastal marine studies hydrology and soil science to the mix. Geology is taught with a strong field and process component aimed at Recent and Cenozoic events affecting the landscape of the surrounding region. Driven by their position close to the Taupo Volcanic zone, the Coromandel Volcanic Region, the Taranaki Basin, two coastlines, several large lakes and many small volcanic centres, scientific studies seek to elucidate both the local landscape and how humans affect and are affected by it all.

The prominent Rogers family began lobbying back in the 1950’s for a university in Hamilton. A new university would not merely be an extension of Auckland University. Originally conceived to have departments of Chemistry, Mathematics and Biology only, Waikato University opened in 1964 on land formerly used by the Ruakura Research Station and now part of the Tainui Settlement. The government of the day, not keen on another geology school contributing to New Zealand’s “brain drain” by training people most of whom would find work overseas, was however fortunately won over by the “earth sciences” concept of the first Head of Department, John McCraw. John had spent most of his career with the NZ Soil Bureau and was convinced that the country needed a school devoted to the unique needs of his own country and its people. Society at the time had begun to recoil from the attempts of our ancestors to form a grasslands landscape populated with northern hemisphere animals, and was just starting to come to grips with the idea that we lived on active islands in a subduction setting not on the passive margin of a continent. This shift in outlook accompanied the political realization that the “motherland” for most of the people was no longer “home”. It had little interest in us and lay on the opposite side of the planet. Local rocks, water, plants, fauna and landscape were not merely objects of cultured northern scientific curiosity, but a southern home we needed to understand and nurture. The land especially displayed instabilities we needed to learn more about. John McCraw was appointed first professor in 1969, accompanied by two other soils workers M. J. Selby and H. S. Gibbs. In 2006 the original Department of Earth Sciences became that of Earth and Ocean Sciences.
The result of all this since 1980 has been what some claim to be NZ’s largest geo-science department. The heyday in student numbers around 1993 saw 300 students enrolled, with a large graduate school studying mostly for MSc, there being no BSc(Hons) course. Numbers have since thinned to around 170 in part because NZ now has 33 tertiary education bodies. The School has seen 534 graduate theses since the first in 1971. Many students now occupy senior positions in a wide range of industries, including regional resource councils as well as in NZ-based engineering companies. The school also has a world class commercially driven radiocarbon dating laboratory run by Dr Allan Hogg, and a fission track laboratory where study of the thermal history of rocks helps unravel the tectonic story of uplift and sinking in New Zealand and farther afield. A new laser ablation ICP-MS laboratory is on the way, along with XRF, XRD, SEM and stable isotope labs.

Campbell Cam Nelson a world-known carbonate petrologist was the foundation geologist at the department, joining McCraw, Gibbs and Selby in 1970 and becoming Chairperson from 1998 to 1997. Cam was the first to draw attention to the idea that carbonate rock formed not only in tropical places. He has shown that they can form at all latitudes even Antarctica. This is important economically because limestones yield some of the world’s major petroleum traps, a topic being studied by today Waikato by Dr. Steven Wood researching the fracture cleaved Tikorangi reservoir.

Peter Kamp another well-known sedimentary basin analyst has held a FRST grant for the past ten years supported by end-user petroleum company funds. He has been studying the Taranaki, and more recently the Wanganui and Hawkes Bay, basins, helping unravel their energy mineral prospectivity for oil, gas and coal. His and his students’ Energy Research Group data is published in Crown Minerals Petroleum Reports.

International recognition has also been achieved by the coastal marine studies group consisting of Professor Terry Healy, Drs Willem de Lange and Karin Bryan where Terry’s focus is on ports and basins, Karin’s on beach processes and Willem is known for his coastal hazards expertise, including tsunami.

Engineering Studies are today successfully led by Vicki Moon who has 15 post graduate students. Her research interests include volcanic, pyroclastic and altered materials particularly their weathering and mass wasting. She also studies erosion from development sites.

Volcanic studies are undertaken by Roger Briggs a petrologist who examines the local basaltic volcanoes as well as those of Taupo (TVZ) and Coromadel (CVR). The first provides plenty of Recent surface phenomena while the latter because of erosion provides deeper access to Tertiary feeder plumbing and alteration-gold-mineralization systems. One of Roger’s projects is the mapping at 50,000 scale of the coastal Bay of Plenty; work financed by the regional
council because of it’s value for geotechnical engineers. He also studies magma generation in the TVZ. A second volcanologist is currently being appointed.

The tradition of the soil and tephra work of the Departmental founders continues with the efforts of Associate Professor David Lowe, Dr Megan Balks and Dr Louis Schipper while applied hydrology is both researched and taught by Associate Professor Earl Bardsley and the current Department Chairperson Dr Dave Campbell.

*Current and recently completed PhD and M.Phil research topics at Waikato Department of Earth and Ocean Sciences include:*

- **Bardsley, Candice** Correlation of NZ lightning frequency with associated hydrological responses at the catchment scale
- **Bland, Kyle** Analysis of the Pliocene Hawke’s Bay Forearc Basin
- **Buckingham, John** Impact that land use is having on NZ environment.
- **Cameron, Stewart** Nitrate removal potential & hydraulic performance carbon Media for denitrification reactors.
- **Dunn, Amber** Coastal response the Gisborne Region to climatic variability
- **Esler, Will** Evolution of the Rotorua Basin, N.I. NZ since 220 cal.Ka
- **Flaim, Bryna K.** Environmental impact, proposed new deep water dredge spoil dispersal site, Hauraki Gulf
- **Fraser, Scott** Effects on Forest Ecosystems due to application to soil of pulp & paper waste solid residuals
- **Fritz, Christian** Mires And Peatlands Of New Zealand with special emphasis On Restionaceae Dominated Systems
- **Gibbs, Denis** How significant climate change as a threat to national security? A comparative analysis of three Commonwealth countries – Canada, New Zealand and Singapore.
- **Lambie, Susan** Soil organic matter loss under pasture & pine: Response to urine addition
- **Lenfesty, Omar** Maximising heat recovery in milk powder plants for energy Optimization
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<td>Stratigraphy and sequence stratigraphy of the Te Kuiti Group</td>
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Vonk, Adam  
Mid-Miocene to Early Pliocene Evolution of the Central-Western North Island Continental Margin

Whittaker, Thomas  
Stable Isotope and trace element records of climate change from New Zealand Speleothems

Xie, Zoe  
Environmental impact of effluents from dairy processes.

**M Sc Topics include**

Bell, Jessica  
Assessing the hazard of coastal cliff erosion in the Waitemata Group.

Craig, Hadley  
Volcanic Deposits – GIS – TVZ Tongariro, Ngaruhoe

Goodhue, Nigel  
Water Quality Modelling Of Maketu Estuary And Lower Kaituna River.

Griffin, Anna  
Products & processes of cone building eruptions North Crater, Tongariro

Hewitt, Dolan  
Assessment Associated With Volcanic Collapse Mount Putauaki, BOP.

Jelley, Neil  
An Integrated Water Supply Strategy For Whangamata (Coromandel Pen)

Lao, Fine  
Tongatapu, Tonga-- Coastal vulnerability to Climate change sea-level rises

Michael, John  
Integrated Water Resource Management of Laloki River Basin PNG

Pishief Katherine  
Coastal Hazard Community Surveys

Salmon, Summer  
Wave Climate on East Coast Beaches

Steeghs, Laura  
Characterising the Hydrodynamics of Mercury Bay

Tait, Greg  
Tsunami Hazard NE NZ

Te Aho, Murray  
Shore Platform Mahia Peninsula

Titjens, Jeremy  
Tertiary Skeletal Limestones and carbonate Dykes, Chatham Islands

**VICTORIA TO CO-PRODUCE CLIMATE CHANGE FILM**

The Tipping Point - a feature film about the effects of climate change on the polar regions (especially the Antarctic) is to be co-produced by Victoria and Oxford (UK) universities.

The $1.8 million (£600,000) film will feature scientists' perspectives of Earth’s changing climate, how and why it is happening and the options we have for responding. The Antarctic is prominent due to the large uncertainties in both magnitude and timing of its response climate change. Production has begun with the key scientists and film crew planning their latest trip to the Antarctic in the near future. The Tipping Point is expected to debut in 2009

**MEMBERS FORUM**
A response to the NZJGG call for papers

Bruce Hayward, Auckland

In the last GSNZ Newsletter the Editor of NZJGG sent out a call for papers to be submitted, as “there is now an empty cupboard in the NZJGG editor’s office”. There was no mention of why this might be so, but we all know the answer – the introduction of page charges to publish in NZJGG. The article even announced a new “incentive”, if authors pay $1500 our published paper will be made immediately available online, free to everyone.

I was not surprised at the request, perhaps more surprised that it has taken so long to come. I suspect the delay speaks volumes for NZ earth scientists loyalty and support for “our” journal and maybe also reflects the lack of an alternative NZ journal in which to publish. Let’s face it, the majority of NZ earth science research is now being published offshore, mostly in journals free from page charges. I suspect a second reason for the shift to overseas’ journals is the desire by University academics to publish in journals with higher impact factors to improve their Performance-Based Research Fund scores. In my opinion this trend to overseas’ journals is detrimental to our discipline here in NZ, as all of us now struggle to make ourselves aware of what is being published on NZ geology, in spite of web-based search engines.

Why are we scientists reluctant to send our papers to NZJGG and pay the relatively modest (for the present) page charges? The answer is simple. Government funding for most of our research has decreased in real terms over the last decade. There has been no increase in funding to pay for page charges. We may write it into our grant applications, but since the pot of money hasn’t increased it is an additional expense that must come from somewhere.

In the past, funding to publish NZJGG has come from subscriptions and direct government subsidies. The Royal Society of NZ, as publisher of NZJGG, is moving towards free open access for all its journals, which effectively means no subscription income. They are trying to make up the shortfall by taking it out of our research funding. That would be fine if our research funds were increasing. Instead, it is the subscription budgets of libraries that will benefit. They may need some relief after years of cost-cutting, but not at the expense of our dwindling research dollars.

Eighteen years ago, GSNZ membership strongly rejected the concept of introducing page charges for our national journal (90% of respondents; GSNZ NL 85: 4), and even made an offer to take over publication if this was the only way to save it from page charges (GSNZ NL 88: 3). The opinions of NZJGG’s major stakeholders were ignored and page charges were introduced in 1990 (but waived if you were a personal subscriber). More recently this concession has been removed and the rates increased and unfortunately NZJGG is now reaping the reward. Sure we are in a new environment with dual paper and internet publication, but the journal will starve to death if it doesn’t get fed.

NZJGG must survive, but not at the expense of our shrinking research funding.
N Z Journal of Geology and Geophysics – Update

Rob Lynch, editor NZJGG, Wellington

Following on from my call for papers made in the previous newsletter, here are a few items of news concerning the journal that may be of interest to authors and users.

1. The journal is working towards making all its published papers freely available via the internet. Academic publishers refer to this as Open Access publication. Open Access requires that payment for publication is provided from the source (e.g., research institute, university, or other research-funding body that led to the article being written) in lieu of subscriptions. Many government-funded projects presently include the costs of publication arising from the project in the funds provided. Typically, these are paid to the publisher in the form of page charges. **Where no funds are available for publication in NZJGG, the page charges are waived.**

As part of the move towards Open Access, NZJGG is published online in both electronic and print form. Online articles are presently available to subscribers only for a period of 2 years, after which they become free for anyone to view and download. In addition, the archives (back issues) of the print-only journal are being digitized and made available at no cost to users. Issues back to 1991 (Vol. 34) are available now. The remaining issues to 1958 (Vol. 1) are currently in the process of being digitised by Google Scholar and will soon be available to all.

2. Authors who would like their accepted papers to be made available for instant Open Access will get this on payment of an Open Access Fee of NZ/US$1500. Page charges will not apply.

3. Online publication has been effective in lowering the average times to publication for submitted papers. In 2006, the average time from submission to publication was 43 weeks for electronic publication, and 48 weeks for the print journal. Significantly, the time from acceptance to publication was just 11 weeks, which indicates that most time is spent in the review and revision processes. Papers are published online as soon as they are ready and do not have to wait for remaining papers in an issue to be ready before being put on the web.

4. Two new Editorial Advisory Panel members were appointed recently. Dr Joel Baker (Victoria University of Wellington) replaces Dr Michael Palin for advice on papers in the areas of Geochemistry, Geochronology and Petrology, and Dr Alan Beu (GSN, Lower Hutt) replaces Dr Roger Cooper for papers in Paleontology. The journal looks forward to working with Joel and Alan in their important and useful role. We also thank the outgoing members, Michael and Roger, for their invaluable contributions over the years.

5. The journal is re-introducing the use of paid advertising (both print and online). Advertisements to A4 size in colour or black and white will be accepted, and our rates are very reasonable. Suitable advertisements would be for products and services applicable to all sectors of the geological spectrum. The journal has a modest circulation but is widely read by a large number of individuals from libraries throughout the world. Online access through the web is also considerable. For enquiries, please contact alison.wilson@rsnz.org or check our website www.rsnz.org/publish/journals for terms and conditions.
THE TERRY LEACH SCHOLARSHIP
FOR POSTGRADUATE RESEARCH IN PETROLOGY & GEOCHEMISTRY

Hellman & Schofield Pty Ltd is offering a one-off scholarship to the value of A$20,000 to honour the life and work of Terry Leach BSc (Carleton University), MSc (Hons 1, Auckland University), M.Soc.Econ.Geol. Terry passed away 28 Feb, 2007.

The scholarship is offered to PhD students who are:

- citizens of Australia or New Zealand
- under 30 years of age
- enrolled at an Australian or New Zealand university
- members of the Australian Institute of Geoscientists (AIG) or Australasian Institute of Mining & Metallurgy (AusIMM)
- undertaking a PhD in the geochemistry, mineralogy and petrology of hydrothermal alteration associated with porphyry, epithermal, or Carlin-type deposits.

The scholarship is offered to fund costs associated with overseas field and/or research work related to the applicant’s PhD project.

The successful candidate is expected to publish their research in journals of international reputation.

A resume with details of academic performance, referees and area of PhD research should be forwarded to Phillip Hellman:

Email: plh@hellscho.com.au
Tel: 02 9858 3863
Janet Simes becomes new Administrator replacing Beth Wallace earlier this year

Janet, pictured here with Society President Keith Lewis, recently took up a new job as Society Administrator replacing the very able and amiable Beth Wallace. Many of you will recognize Janet for her leadership role in “Absolutely Organized” the group that so capably over the past years has both assembled our Conferences, and kept them from spilling prematurely onto the streets. Janet will continue her role as conference organizer, but now also will keep the society as a whole under her watchful eye.

Janet’s Society address is given on the front cover. She hails from the Wellington metro area. Janet we bid you welcome and wish you many happy and beneficial years with us.

We thank also our outgoing Administrator who kept us all corralled, productive and smiling for so many years. Beth we wish you too happiness in your new venture.
Obituary: Colin George Vucetich 1918 -25 April 2007

Compiled by Paul Froggatt, with assistance from Phil Tonkin and Alan Palmer.

Colin graduated from Canterbury Agricultural College (now Lincoln University) in 1941 with a Bachelor of Agricultural Science. He then enlisted for Army service and was posted to a medical corps on the strength of undertaking the medical intermediate in his first year at university. On being demobilised in 1946 Colin was employed as a soil surveyor in the Christchurch office of the Soil Bureau DSIR, engaged on mapping the northern part of the Canterbury Plains. In 1951 Colin was transferred to Rotorua and worked on a number of soil surveys including forestry and the area south of Rotorua being opened up for farming. This culminated many years later in the publication of the detailed soil bulletin of the Waiotapu Region, a publication Colin was very proud of. The Rotorua survey brought him into contact with the two major influences on his future research career – volcanic ash soils (and the tephra layers that underlay them) and Alan Pullar, a fellow soil scientist from Canterbury days, who was then mapping the soils of the Gisborne plains.

Colin began mapping the soils east of Rotorua while Alan was mapping the soils and interbedded tephra layers west from Gisborne. They naturally joined forces for a combined study of the tephra layers – the parent materials of their soils. However a geologist at Geological Survey, Rotorua (Jim Healy) was also interested in the “ash layers”. Jim took exception to these two soil scientists encroaching on his geology patch so Colin and Alan undertook weekend “picnics” where they might meet up at opportune road cuttings throughout the central North Island to record the stratigraphy and to extend their mapping of the layers. A compromise eventually resulted in the 1964 Geological Survey Bulletin 73, with Healy publishing his work on the stratigraphy of ash layers near Taupo (as Part I), and Vucetich and Pullar their study on the distribution of the layers from Taupo to Gisborne (as Part II).

Following completion of the Gisborne plains soil survey in 1959, Alan Pullar was transferred first to Whakatane and later to the Rotorua Office. Colin was transferred back to Christchurch in 1957. Alan’s work on tephra stratigraphy and Colin’s work in Canterbury where charcoal was being discovered in a soil stratigraphic context, was restricted by a verbal directive to soil surveyors not to investigate below a depth of 3 feet. This put a halt to soil stratigraphic work of any kind, although I believe the family “picnics” continued through this time. It was not until about 1968 that the Director General, DSIR gave Alan permission to continue his tephra investigations.
The tephra stratigraphic work undertaken by Vucetich and Pullar resulted in an extensive body of knowledge that for the first time explained the distribution of volcanic ash soils and their unique properties. The soils work could not be published without the tephra stratigraphy, but it was not until 1969 that Vucetich and Pullar were able to publish the volcanic stratigraphy of the Rotorua region, work they had undertaken largely in a private capacity. The companion paper on Taupo followed in 1973, together with a detailed set of distribution maps of each tephra layer. They remain as some of the most significant papers in Quaternary geology in New Zealand. The papers set the standard for stratigraphy, established the detailed distribution of each layer and the overall chronology and touched on the environment, climate and ecology implications. Much of this work was presented at the international INQUA conference held in New Zealand in 1973, which for the first time displayed to the international community the extensive research knowledge developed in NZ. Much kudos accrued to New Zealand and to the Soil Bureau from this work.

In the mid-1960s, the Government decided to fund a number of new “industrial research” positions at universities, and Prof Bob Clark of Victoria University appointed Colin to the position of soil science (Pedology), a position he held from 1965 until his retirement in 1982. At Victoria, Colin established tephra stratigraphy as a solid academic study. Proximity to the main Soil Bureau offices and laboratories at Taita helped foster relationships with pedologists and soil chemists. To assist Colin with lecturing and fieldwork, the Geology Dept established a junior lecturer position, filled in turn by Vince Neall, Russell Howorth and Paul Froggatt. A technical position was also provided, filled initially by John Hunt.

In his time at VUW, Colin supervised or contributed to the supervision of 12 PhD and four Masters theses in Geology as well as others in Ecology. He also made several expeditions to Antarctica to work on the soils in the Dry Valleys.

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree/Qualification</th>
<th>Year</th>
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<tbody>
<tr>
<td>Phil Tonkin</td>
<td>MSc</td>
<td>1966</td>
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<tr>
<td>Peter Williams</td>
<td>PhD (in ecology)</td>
<td>1970</td>
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<td>Barry Kohn</td>
<td>PhD</td>
<td>1973</td>
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<td>Derek Milne,</td>
<td>PhD</td>
<td>1973</td>
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<tr>
<td>Vince Neall,</td>
<td>PhD</td>
<td>1973</td>
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<td>Wayne Topping</td>
<td>PhD</td>
<td>1974</td>
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<tr>
<td>Russell Howorth</td>
<td>PhD</td>
<td>1976</td>
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<td>Helen Roxburgh</td>
<td>MSc</td>
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<tr>
<td>Peter McIntosh</td>
<td>PhD</td>
<td>1977</td>
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<td>Bruce McFadgen</td>
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<td>Hugh Wilde</td>
<td>MSc</td>
<td>1979</td>
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<tr>
<td>Warakoon Kaewyana</td>
<td>MSc</td>
<td>1980</td>
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<td>Ian Nairn</td>
<td>PhD</td>
<td>1981</td>
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<td>Paul Froggatt.</td>
<td>PhD</td>
<td>1982</td>
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<tr>
<td>Alan Palmer</td>
<td>PhD</td>
<td>1982</td>
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<td>Dennis Eden</td>
<td>PhD</td>
<td>1983</td>
</tr>
<tr>
<td>Brent Alloway</td>
<td>PhD</td>
<td>1989</td>
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Colin was always a field scientist. With a spade or auger and soil in his fingers he wove a magical story that he could never recreate in a lecture. The soil and landscape talked to Colin and he freely interpreted it, often in his own language – descriptive and memorable. A prominent dark paleosol in the Bay of Plenty was “Hematite Harry” and a weathered ignimbrite was “Spotted Dick”. There were many more descriptors, explained with passion and reverence, accompanied by a wry smile set off with twinkling eyes and animated bushy eyebrows. Colin let the field evidence speak for itself, drawing out careful descriptions from students and inviting them to consider, compare and deduce. He seldom imposed his own conclusions on the discussion, but carefully chosen questions would shepherd you along a more rigorous path.

Although Colin was not exactly accident-prone, his enthusiasm often led to interesting situations, some involving the Police. On a field visit to a new road cutting near Wellington, Colin placed his briefcase full of notes and camera on the roadside while he worked on the outcrop. Whilst Colin and Harold Wellman were stranded high on this cutting, a car stopped, the driver jumped out, grabbed the case and departed at speed. Some days later, a phone call from the Police reported that a conscientious person had handed in the case, “left lying on the roadside”. In another incident, Colin and the then Director of the Soil Bureau decided to check the soil in a paddock beside the Desert Road prior to an international conference. They had jumped the fence and dug quite a large hole before the local Police stopped and asked them what contraband they intended burying on HM Prison land.

In retirement, Colin and Margaret moved to Waikanae where the local gardens benefited from his years of soil science and where Margaret’s roses won many prizes. Colin maintained his involvement in research, spending a time at Massey University where he supervised his final student, Brent Alloway. Colin also became involved in local U3A groups, encouraged by Paul Vella. His enthusiasm infected many people and he is warmly remembered in the local community, as he is in the soil science and Quaternary geology groups. His pioneering work lives on in climate studies, natural hazards research, geology, soil science and ecology. Road cuttings dominated Colin’s research life, and his family recorded this in the newspaper notice “May you find the ultimate road cutting”. It will be high, wide and many-layered if it is to satisfy all of his interests in the land.

**Bill Wingate, Obituary**

**Bruce Hayward, Hugh Grenfell, Auckland**

Bill Wingate died suddenly on his Opotiki farm on May 20 2007, aged 67. Many members may not recognise his name, but if they have been to a Society conference in recent years or been on a few of the associated field trips they will recognise his face, his friendly smile, pertinent questions, and infectious enthusiasm. Bill was a non-professional member of our Society, a strong supporter of the Waikato Branch, and a regular (often accompanied by his wife Jill) on all of the longer field trips run by Auckland Branch’s Geoclub Section in recent years. Bill was one of those rare breed of farmers who, despite his lack of formal geological training, had an unquenchable thirst to understand the rocks and landforms. Although isolated...
in Opotiki, he taught himself the basics and later intricacies of our discipline. He always did his homework before attending a field trip by obtaining and reading up on all the available scientific papers he could find. Often he was able to provide the answer to a geological question when the trip leader didn’t know or couldn’t remember.

In 2002, Bill was pleased to be able to lead 25 Geoclubbers around the geological features of his Opotiki area, and he was looking forward to this year’s GSNZ Conference coming to his Bay of Plenty patch. Just the weekend before he died, Bill joined Geoclub for a 4 day trip to North Cape geology. He was so keen, that he caught a bus to Auckland and back (nearly a full day trip each way), as Jill had to stay home to help look after the latest grandchild that had just arrived that week. Bill had been researching Northland’s geology and was full of questions and comparing it to his local East Coast area. At the last stop of the trip, Bill was happy to pronounce that Northland’s Runaruna mud volcano was far bigger and better than the many he had visited up and down the East Coast.

Bill will be sorely missed by the New Zealand geological community. Those of us in the north will also miss his great company and geological map reading skills. Our sympathies go to Jill and their family.

Photo: Bill Wingate explaining the detailed tephra stratigraphy of a grass-covered road cutting, inland Whakatane, April 2002.
John Patrick Anthony O’Brien OBE, ED
Geologist – Soldier – Family Man 1942 – 2007

Rick Sibson, Dunedin

(with help from J. Ash, J. Ashby, R. Briggs, M. Brown, A. Happy, and K. Stanaway)

John O’Brien left us suddenly and without warning on February 14, 2007. To those of us who passed through the University of Auckland Geology Department in the late 1960’s - under the benign sway of Arnold Lillie and Nick Brothers – we had lost our Sergeant Pepper. John’s life and career were hugely influenced by a father he barely knew. A Major in the NZ Army Medical Corps, Desmond O’Brien was killed in Egypt in the last days of World War II. Mother Kitty was a physiotherapist, sister Maureen a doctor who spent many years in Beirut. John was, in a sense, an accidental geologist. His early university life had been driven by a wish to follow the family tradition in medicine, first at Otago University (where he satisfied another personal goal by enlisting as a paramedic in the Territorial Force of the NZ Army) and then in Auckland where he pursued a BSc in Chemistry as an alternative path to Medical School. Geology was taken as a filler but eventually won him over and he went on to complete an MSc with Honours in Geology.

As our senior by a few years, John was mentor, advisor about life in general and, to some extent, father confessor. This extended not only to the blokes but also to young women who, much to his exasperation, persisted in regarding him as an entirely trustworthy father figure to whom they could pour out their hearts. An unquenchable party man, he was always good for an argument, rarely making concessions. At a memorable graduate party at the Brothers where pitchers of martini were offered to unsuspecting beer drinkers (Nick had just returned from a Californian sabbatical and thought the department needed toning up) it was only John who was unfazed when Rhoda Lillie swept in declaiming “Well lads, what shall we talk about – religion, politics or sex?”. He was game to discuss all three and at great length. His paramedical abilities were also in demand – he was drafted as a field assistant on Geology Department field research in New Caledonia. No band-aid medic, he relishing the prospect of injuries arriving fully armed with splints and tourniquets.

Work as an exploration geologist took him first to the Northern Territories of Australia in search of uranium, and then to Thames in Coromandel re-evaluating the Monowai Reef and other gold prospects. It was about that time that he met up with the twin Rowland sisters, recent arrivals from Lebanon, one of whom – Karen became his wife in 1977 and the other, Kate, a lifelong friend. It was also during this period that he developed an enduring professional relationship and friendship with another exploration geologist - Ian Grant – together they went on to establish a consultancy group - Applied Geology Associates (AGA) - which expanded rapidly operating throughout New Zealand, up into the Pacific, and to Southeast Asia. Projects included mineral exploration, rehabilitation of old dredging ground in Malaysia, geotechnical engineering including quarry, landfill, and slope design, and aggregate supply for industrial development in the Auckland area. AGA grew to become one of the leading non-governmental employers of geologists in Australasia but was not immune...
to the economic downturn of the late 1980’s and was eventually dissolved by the partners. John then set up as a home consultant, focusing on the supply of aggregates and industrial minerals. He was largely responsible for the identification and development of important new basalt resources in the Bombay Hills and North Auckland. An intensely practical geologist, he was highly regarded for his pragmatic approach and complete integrity. Notably, he provided consulting services without any hint of conflict of interest to the three main aggregate suppliers in Auckland. He will be remembered by his industrial colleagues for his unfailing pursuit of a means of understanding and predicting the demand for aggregates, particularly in Auckland, which resulted in his appearance as an expert at resource management hearings and the publication of several papers on the subject.

Throughout all this, other interests were maintained. On occasional trips back to NZ during my 20 years overseas, I found that Second Lieutenant O’Brien (despite an intense dislike of weaponry) had metamorphosed progressively into Lieutenant – Captain – Major – Colonel, and eventually into Brigadier J.P. O’Brien commanding the NZ Territorial Force. Beyond question, his prime motive as a military officer was that of “keeping-the-peace”. He was appointed aide-de-camp to Queen Elizabeth II during her visit to New Zealand in 1995. But undoubtedly, the driving forces behind his life were family and his Catholic faith. The O’Brien family grew with the arrival first of John David, then the twins Daniel and Joanna – the last, somewhat to her father’s surprise and delight, has taken up a career in geology.

To those who worked with him, be it in geology or in the military, John O’Brien was a consummate professional, to others he was the greatest of friends, always good for a rousing argument and with a fine disdain for academic clap-trap, stalwart in character and resolute in his faith. He is and will continue to be greatly missed.
Phillip Alan Maxwell, 5 April 1940- 5 February 2007

Alan Beu, Lower Hutt  a.beu@gns.cri.nz
Ewan Fordyce, Dunedin    ewan.fordyce@stonebow.otago.ac.nz
Bruce Marshall, Wellington    brucem@tepapa.govt.nz

Phillip (Phil) Alan Maxwell was born in Christchurch, and went to school and university there. He became New Zealand’s leading early to middle Cenozoic molluscan paleontologist of the middle to late 20th century, and it is interesting to follow the career of a scientist who has been, and will continue to be, such a leading light in New Zealand Cenozoic paleontology.

In his eulogy at Phil’s funeral, Phil’s brother John provided a revealing overview of Phil’s background and upbringing. He particularly followed Phil’s development through two streams – books and music. His first memories include listening together to “The Goon Show”, “Lost in Space” and the “Lever Hit Parade”, in that long-lost time before television. Phil’s hobbies at that time included stamp collecting and Meccano, and he was keen enough on Meccano to subscribe to the magazine, and to keep a large Meccano collection in good condition, part of which was displayed at his funeral (among evidence of many other surprisingly diverse interests). But popular (and sometimes rather subversive) music was perhaps his greatest passion in life, continuing until the very end. Folk music was the most important element of this, and he was the leading light in the organisation of a folk music club in Christchurch during his PhD years. Another passion was the growing of cacti and other succulents, particularly during the seventies and eighties. He later applied his knowledge of paleobiogeography and evolution to their study, and published papers on cactus evolution. Charles Darwin’s

Phil at Waihao River, South Canterbury, with a block of presumed Kauru Formation (Early Eocene) containing fossil turrid gastropods and plants.
Photo by R Ewan Fordyce
life and work was also of great interest to Phil, and a highlight of his life was his visit with Sue in 1985 to the Galapagos Islands, following in Darwin’s footsteps. On the same trip they searched out cacti in their desert habitats in central Mexico and Baja California. In later life Phil and Sue had a marvellous collection at Waimate.

Phil won a scholarship to Christ’s College in 1953, and became particularly known there for excellence in mathematics. New hobbies included book binding, astronomy, and reading about space travel, mystery novels, and one we particularly recall on our many field trips together – science fiction novels, the more scientific the better. After about 1958 he began an interest in chemistry and bought books on organic and inorganic chemistry. The garden shed filled with glass apparatus, and satisfying experiments (mostly explosions) were carried out. He began a chemistry degree at Canterbury University and, although he graduated BSc in chemistry, somewhere along the way he was “grabbed” by geology. He took a “fill-in” unit of geology during his first university year but, as John said, “it didn’t stop there”. He had the two well-known paleontologists Doug Campbell and Robin Allan as lecturers that year, and he told us (AB) that the field trip to Westland with Robin Allan had so inspired his interest in paleontology that he had to forget the chemistry and continue post-graduate work in geology. (In his later career, Phil published on Eocene and Miocene fossils from Westland localities.)

He went on to win the Von Haast Prize in geology, not bad for a late starter! Phil mentioned that lectures in petrology, which one would expect to appeal to a chemist, were so dry as to provide an additional reason to move into paleontology. It is noteworthy that Robin Allan was a personal friend of Karl Popper’s (Popper was at Canterbury from the late 1930s), and it seems that Allan’s philosophy – presumably in turn influenced by Popper – significantly influenced Phil. There are parallels also with the career of Harold Finlay, who graduated as a chemist but then practised as a paleontologist.

Compared with many other paleontologists, who started out with childhood shell or fossil collections, Phil came to the subject rather late in life, but he apparently made up for that by voracious reading and “knowledge-gathering”, for he was soon well-known to Charles Fleming in the Geological Survey, and upon completing his MSc he more-or-less replaced Anne Scott in Lower Hutt. His reading and study of molluscs continued at a voracious level throughout his life, and he always had exciting new ideas on the relationships of New Zealand molluscs, obscure genera that strange early Tertiary species might belong in, and novel concepts of phylogenetic relationships – but, sadly, much of it lost with his death. Phil was remarkably widely read on other subjects too, notably evolution, phylogenetics, paleobiogeography and the history of geology, and he kept pace assiduously with advances in disciplines as diverse as chemistry, physics, and astronomy.

Phil carried out his usual brilliant, original research mapping the geology of the Kaiwara Valley, in North Canterbury, for his MSc, but most of this also remains unpublished. He discovered a new melange belt in the Torlesse greywacke, the Random Spur Melange, and within this a large block of Jurassic green basaltic tuff containing many small molluscs. Originally he must have collected from this simply by breaking up the rock, but in later years, at the Geological Survey in Lower Hutt, he put endless patient hours into breaking this rock down by crystallising hypo, and sorting out the many micromolluscs. Although a rich fauna resulted (the gastropods published by Klaus Bandel, Phil, and Joachim Gründel in 2000), it was put together over many years, only one or two useful specimens resulting from each
subsample broken down by crystallisation. Phil had identified almost all the gastropods to genus level (or knew they were novel) before Bandel saw the material, and also had identifications on the bivalves, but the bivalves have not yet been published. It is a testament to his generally laid-back approach that Phil was amused, rather than angered, that the Bandel et al. paper mistakenly proposed a modern land snail (inadvertently mixed with the Jurassic material) as a new Jurassic species.

Very patient washing and picking of huge samples also characterised Phil’s research on Cenozoic molluscs, and he was the first to wash samples for micromolluscs at a huge range of New Zealand localities. The “picking” of micromolluscs led to other discoveries, for example, of diverse fish otoliths, passed on to Werner Schwarzhans for monographing and, surprisingly, a tiny Eocene bird egg. Phil was typically generous in collecting and sharing material of interest to other specialists. In addition to otoliths, he routinely passed on vertebrate material, decapods, barnacles, plant material, and so on.

All the famous localities where New Zealand Cenozoic stratigraphy began, and molluscan paleontology flourished, in Phil’s great “stamping ground” of South Canterbury-North Otago, were subjected to his rigorous sampling and picking over many years of patient work. It had spectacular results for the knowledge of the fauna, of New Zealand paleobiodiversity, and of the history of the modern New Zealand fauna. He particularly realised that the Eocene faunas of this area were much more extensive and diverse than published accounts would suggest, and devoted a large part of his research life to patient, painstaking research on the diversity and relationships of these faunas. His greatest work remains unpublished, on the 350-odd species of Early and early Middle Eocene molluscs of the upper Waihao Valley around “Pentland Hills” Station, an entirely novel range of tropical faunas including bivalves boring in blocks of reef coral. We hope to complete this “nearly done” work for publication.

Phil did complete a number of major publications, on the Stillwater Mudstone Miocene molluscs of Westland, and of course his PhD thesis on the Middle and Late Eocene molluscs of McCulloch’s Bridge, in the lower Waihao Valley in South Canterbury, for which he won the Geological Society of New Zealand’s McKay Hammer award. These publications are notable for their attention to detail and, in the case of the Stillwater Mudstone bulletin, the innovative application (for New Zealand) of molluscan taxonomic structure analysis. He also made a huge contribution, especially on Paleogene molluscan systematics and stratigraphy, to the major overview volume on the history of the Cenozoic molluscan fauna of New Zealand, “Cenozoic Mollusca of New Zealand” (Beu & Maxwell, NZGS Paleont Bull 58, 1990); the volume won a DSIR Ministerial Award for Excellence in Scientific Research. He also published a number of smaller papers (listed below), but at least a dozen papers were incomplete at the time of his death. His emphasis was definitely on getting a thorough, exacting, painstaking job done, rather than any personal ambition to achieve a senior position, but his great interest in a wide range of subjects often meant that he moved on to an exciting new topic before finishing off an earlier one.

One major contribution to paleontology that will remain little-known unless it is publicised here is Phil’s contribution of up-dated lists of NZ Cenozoic molluscs (e.g., in Dennis Gordon’s “Species 2000”, in press) and to Marsden Fund research led by James Crampton. Phil contributed a list of the 2000 species of unnamed New Zealand Cenozoic molluscs that he was
aware of (and their ecological and other characteristics) to this research, enlarging the database significantly from the original 3000-odd species. Building on “Cenozoic Mollusca of NZ”, this has enabled the New Zealand fauna to be particularly useful world-wide for investigating patterns and processes of evolutionary history and mode at the species level, in a Marsden project led by James Crampton.

Another aspect of paleontological history that must be mentioned here is the field trips. While Alan Beu was still at Victoria University, he and Phil started annual visits to Parengarenga Harbour, in the far north of New Zealand, on one occasion accompanied by George Scott. The amazing, richly diverse faunas in a range of earliest to late Early Miocene (Waitakian-Altonian) localities in the almost continuously exposed section around the north shore include many warm-water taxa, and are quite different from those of the rest of New Zealand. They spent several trips slopping about in the Parengarenga mud, and one or two with almost unmanageable boats that became hopelessly stuck fast as soon as they touched bottom, and had trouble finding drinking water on some trips. Altogether they got to know the harbour more intimately than either had wanted! But they collected marvellous faunas, including Phil’s washings of several shellbeds, and they remain in the GNS Science collection as an important contribution to New Zealand’s faunal history. Then, when Beu joined the Geological Survey after graduation, they began a series of annual visits to the major South Island localities, including those of Phil’s “stamping ground” but also in Southland, particularly at Clifden on the Waiau River, in Westland, and in North Canterbury. At virtually all these localities now, even Clifden, it is almost impossible to make a diverse collection of molluscs, so the trips were important for two reasons: they passed Phil’s knowledge of South Island localities on to Beu, and they were able to assemble irreplaceable collections at the time when the localities were maximally exposed. These collections cannot be emulated now, and they are a huge contribution to the knowledge summarised in “Cenozoic Mollusca of New Zealand”. Collections must be made when localities are available; none last very long. These collecting trips culminated in the Survey’s first great “paleontological expedition” to the Chatham Islands in 1976, when interest in recollecting the famous fossil localities led to all and sundry getting involved and, eventually, a published major summary of the stratigraphy and paleontology of the islands (compiled by Hamish Campbell). In later years, Phil contributed significantly to field trips associated with the Geological Society.

With the move south to Waimate in 1990, Phil developed strong links with Ewan Fordyce, Daphne Lee and Andrew Grebneff at the Department of Geology at University of Otago, and also with Norton Hiller at Canterbury Museum. Phil was involved as a contract curator at Canterbury Museum, helping to check and organise the mollusc collection. He also enjoyed a number of field trips recollecting important Northland and North Canterbury localities with Norton and other CM associates. He was a regular visitor to Otago, pursuing his own research on Paleogene molluscs, helping with collection management, and occasionally contributing in his quietly laconic, matter-of-fact way, to teaching in laboratory classes. Over the years, Phil was quite involved with Otago class field trips in the Waitaki Valley and South Canterbury, and he helped mentor students involved in mapping projects in the Waiaho Valley. Phil, and also Sue and their children, developed an interest in searching out fossil vertebrates, and often accompanied Ewan Fordyce and colleagues on prospecting and recovery trips. On one trip to Waiaho Valley, Phil hit what appeared to be part of an oyster shell in a concretion, only to realise that the fossil was bone – part of the skull of the oldest and so far most significant
archaic whale (archaeocete) skull from the Southern Hemisphere. Phil made important discoveries of Early Eocene penguins, and found and collected significant Early Miocene whales and dolphins near Awamoa Creek. Indeed, Phil was in the field at Awamoa in early January 2007, not long before his death. Another activity during the Waimate years was Phil’s involvement with IGNS Dunedin in researching the Cenozoic stratigraphy of the Q-map sheets covering the Waitaki Valley and South Canterbury.

Phil was Alan Beu’s and Bruce Marshall’s mentor in many ways, with his rich background in the “traditional” Eocene to Miocene faunas of the South Island, whereas Beu’s and Marshall’s have always been in the complementary, younger North Island and Recent faunas respectively. Together they fed off Charles Fleming’s and Jack Marwick’s knowledge of molluscs and, in particular, of New Zealand and Geological Survey paleontological history. Phil’s knowledge of New Zealand early to middle Cenozoic molluscs was vast, encyclopaedic, and in many ways original and path-breaking. His research on micromolluscs was outstanding, and he had a rich knowledge of fossil pteropods and their interesting, biostratigraphically useful evolution that remains entirely unpublished. Another interest, little-recognised, was the history of geology in New Zealand; here, again, his prodigious knowledge included personal anecdotes picked up from earlier workers such as Marwick and Allan. Although he contributed so much to science in a quiet, patient, hard-working, and determined way, it will take time for his contributions to be properly acknowledged, for he was concerned to produce quality, rather than quantity, and his specialist work is best understood by the specialist. Most of Phil’s unpublished ideas will be lost, for although he shared them willingly, we can rarely remember details. Yet, his published contributions will be used a century hence. His un refereed publications give a good idea of Phil’s wider contributions to geology (let alone the others on folk music and cacti). Topics include (among other things) fossil coconuts, heterochrony, fossil land snails, astroblemes, bivalve classification, and an otherwise unpublished record of Pliocene marine rocks in North Otago. Despite his quiet, painstaking research, he was passionately eloquent about many subjects, a very scientific-minded commentator in many areas, and, as his recent “off-line blog” contributions to the Geological Society Newsletter show, an eternal “defender of the faith” of science. His conviction that patient, painstaking picking of endless, huge samples was “the only way to go” to recognise and identify the exceedingly diverse Cenozoic micromolluscs of New Zealand meant that he was made redundant when staff retrenchment was deemed necessary in the Geological Survey, and New Zealand science has been infinitely the poorer for it. His science will live on forever, one of the greatest contributions ever by a paleontologist to the knowledge of New Zealand Mollusca.

Phil is survived by his wife Sue and their children Louise, Melinda, Alice and John. We are grateful to them, and to Phil’s brother John, for suggestions about this obituary.
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NEW ZEALAND ROCKS

Development of Multi-channel Analysis of Surface Waves (MASW) for characterising the internal structure of active fault zones as a predictive method to identify the distribution of ground deformation

Hastie Award Research

Brendan Duffy

This project is intended to build on the promising results of a class project undertaken in the vicinity of the Springfield Fault at Dalethorpe, Canterbury. It aims to correlate rock-mechanics data, obtained at an exposure of the fault and at distal outcrops, with MASW profiles of S-wave velocity. It further aims to integrate the resultant dataset with a detailed analysis of the geomorphology of the study area. By adapting and repeating the technique at geologically diverse sites, it will produce a method of reliably inferring rock-mass parameters from surface shear wave velocities, and of predicting likely damage zones based on geomorphic evidence. This should allow the proposition of a better, financially viable and scientifically informed basis for land use planning in proximity to active faulting in New Zealand and elsewhere.

My research began in late November and one a major focus so far has been the rock mechanics and spatial variations therein in the vicinity of the Dalethorpe Springfield Fault outcrop. This work has evolved into four separate but connected efforts. Firstly, the outcrop has been analysed using a standard scanline to determine rock-mass parameters such as linear fracture density, fracture spacing and. Geological Strength Index, etc. Secondly, the crosshole shear wave velocities of individual tectonized units identified within the outcrop have been measured directly using horizontal drillholes and a homemade shear wave generator. Thirdly, I am presently conducting a laboratory experiment to relate reduction in P and S-wave velocity to increasing fracture density. I am using an ultrasonic seismic analyser to measure velocities in artificially and incrementally fractured intact Torlesse Greywacke. I will then empirically derive polynomial regression equations for this relationship and compare these results with sonic velocities acquired in the crosshole experiment. Finally, I have acquired several MASW lines; the locations of which have been fixed by surveys. This will allow me to upscale my outcrop and laboratory-derived velocities and interpretations to seismic survey-scale. By surveying the locations of the lines relative to other geomorphic features of interest, I have the necessary controls to integrate the rock mechanics, seismic and geomorphic data collected so far.

In addition to rock mechanics work, I hope to begin preparing the results of the Dalethorpe study for publication in May. Considerable effort has been spent exploring photogrammetric methods of outcrop logging with the ultimate intention of producing a 3D metric model of an extremely sheared outcrop. Standard engineering geological classification of highly fractured rock is problematic so a practical method of fault zone rock mass characterization is needed.
Photogrammetric methods provide ultimate objectivity with the potential for un-biased re-interpretation at a later date and are thus particularly desirable for fault-related work. I have made several trips to Dalethorpe in order to photograph and survey the face at varying resolutions. After initially exploring in-house camera calibration and image analysis options, I have now made contact with David Park at the recently-opened Geospatial Research Centre (GRCNZ, http://www.grcnz.com/) at the University of Canterbury. Photogrammetric face logging promises to become a useful tool with the aid of David’s team’s expertise and technology. The cooperation with GRCNZ is also set to produce exciting spin-off benefits in the form of a DTM of part of the Dalethorpe study area acquired using their unmanned aerial vehicles. This is a capability they are keen to develop, thus providing mutual benefit to myself and GRCNZ.

PROTECTING WHAT’S LEFT OF AUCKLAND’S VOLCANIC HERITAGE

Bruce W. Hayward, Auckland

Over 50 years ago at our Society’s first AGM, there was discussion over what could be done to protect Auckland’s remaining volcanic cones and craters, as they were rapidly disappearing at the hands of the quarrying industry (Collins, 1957). At that time the NZ Historic Places Trust was actively campaigning for further reserves, especially for those with high archaeological values. These were not the first attempts to protect Auckland’s volcanoes, there had been a number of one off and concerted campaigns over the preceding 50 or so years (e.g. Fowlds, 1928).

Now, 50 further years on, your Society’s Geological Reserves Subcommittee still finds that much of its efforts are directed towards trying to protect what we have left of Auckland’s volcanic heritage, so it seemed an appropriate time to summarise the situation.

The young Auckland basalt volcanic field has erupted over the last ~250,000 years from about 50 centres (Fig. 1) and is currently considered dormant. These eruptions have formed maar craters with surrounding tuff rings, simple or multiple scoria cones, and lava flows that in several instances have built up sizeable shields. Other volcanic-related features include lava-flow dammed lakes and swamps, numerous lava caves and several fossil forests killed and buried by volcanic ash or lava flows.

Today, the majority of the remaining scoria cones and craters are protected in public reserves, and legal implements for protecting various aspects of the volcanic heritage are included in the Auckland Regional Plan, Regional Coastal Plan, the District Plans of Auckland, North Shore and Manukau Cities and the Auckland Conservation Management Strategy. But still this is not enough. Every year Auckland loses more, and this is not restricted to private land. Auckland’s growth continues to increase pressure on the remaining landforms, exposures and views of Auckland’s volcanic heritage through housing infill, construction of bigger and larger buildings, motorway construction, infrastructure developments, and still some quarrying.

Of Auckland’s original 17 maar craters, 2 (Styaks Swamp, Ash Hill) have been completely destroyed, a further 4 reclaimed, with 6 still reasonably intact. Only 3 maar craters
and their inner slopes (Auckland Domain, Mangere Lagoon, Waiouru) are included in their reserve.

Fig. 1. Map of the Auckland Volcanic Field (from the late Les Kermode).
All except 1 (Motukorea) of Auckland’s scoria cones have suffered some quarrying. Of the original ~40 scoria cones, 19 (Mt Cambria, Albert Park, Outhwaite Park, Te Pohawaiiki, Little Rangitoto, four of Three Kings five cones, Mt Smart, Purchas Hill, Green Hill, Otara Hill, McLennan Hills, Wiri Mt, Crater Hill, Maungataketake, Otuataua, Waitomokia) have been completely destroyed and a further 7 (Mt Albert, Taylor Hill, Pigeon Mt, McLaughlin’s Mt, Robertson Hill, Mt Richmond, Puketutu) extensively damaged. Eight (Rangitoto, Motukorea, North Head, Auckland Domain, One Tree Hill, Mt Wellington, Mt Mangere, Puiki) are completely contained within reserve and 7 others have their upper slopes and craters in reserve, but extensive housing on their slopes.

Two cones, 3 craters and 2 other volcanic sites are scheduled in the North Shore District Plan; 14 cones, 5 craters, 13 lava caves and 5 other volcanic sites are scheduled in the Auckland District Plan; and 4 cones, 4 craters, 4 lava caves and 2 other volcanic sites are scheduled in the Manukau District Plan. Today the two most active groups in advocating for the protection of Auckland’s remaining volcanic heritage, other than officers of the local bodies, are the Auckland Volcanic Cones Society (formed in 1993) and GSNZ. The Volcanic Cones Society has strengths in Town Planning, Landscape Architecture and Law with their two largest projects having involved Mt St John (house development on crest) and Mt Roskill (motorway impacts). In recent years they have broadened their activities to cover the whole field’s volcanic heritage.

In the last few years there have been a number of significant gains tempered by further losses. On the positive side, we have seen the remains of four volcanoes added to the reserve list – Otuataua, Puiki, Mangere Lagoon, Waiouru (Fig. 2). We have seen the first restoration project with Mangere Lagoon returned to its former intertidal inlet status with its small central scoria cone rebuilt (Fig. 3). An extensive area of lava flows, features and caves have been purchased and opened as Otuataua Stonefields Historic Reserve. There have also been additions to the reserves that protect Mt St John and Mt Wellington. The Grotto St pond in Onehunga, formed in a collapsed lava cave and first identified by Hochstetter (1864), has recently been purchased for reserve. We understand that the site of the northern scoria cone of Purchas Hill will soon become a reserve as the Mt Wellington quarry subdivision progresses. Legal action by the Volcanic Cones Society forced Transit to shift and modify the route of the western motorway, now under construction, so as to minimise its impact on the lower slopes of Mt Roskill. The route of a proposed new eastern highway has been diverted to avoid any damage to Mt Wellington; and the present Auckland City Council shelved plans for a new south-eastern motorway that would have passed through the crater and tuff ring of Orakei Basin alongside the railway line (the route remains designated and the motorway could be revived by future councils); recently it has been announced that Watercare has an agreement (conditional on resource consent) with the Kelliher Trust (current owners) to use the Puketutu quarry for the disposal of the solid wastes from Auckland’s sewage treatment and over 30 yrs restore the volcanoes landforms (an idea suggested to Watercare by GSNZ in the mid 1990s) and then donate the whole island to the people of New Zealand as a Regional Park.

On the negative side, quarrying of Otara Hill has been completed and the site turned into an industrial subdivision; Maungataketake scoria cone has now completely disappeared; sporadic quarrying continues in Puketutu lava flows and Crater Hill tuff ring; the outer slopes of Waiouru tuff ring have been extensively modified in preparation for their sale as expensive commercial sites; a large new motorway interchange is soon to be built in Hopua crater, Onehunga, although the design has been changed so that the shape will still be recognisable;
and widening the Pakuranga-Panmure Highway will soon add further lanes through the side of Panmure Basin.

On-going issues include vigilance to ensure that work to install lights at the end of Auckland airport’s proposed second runway do not damage Ihumatao fossil forest buried beneath volcanic ash from Maungataketake; marine erosion around the end of Brett Ave and the threat this and erosion retardation endeavours pose to this part of Takapuna fossil forest preserved in a Pupuke lava flow; the impacts of further building on the upper slopes of Mt Hobson, Mt St John and Mt Eden.

New issues of concern arise every year. This year GSNZ has been called on to comment upon Watercare proposals to replace reservoirs and pipes on several cones; we have sent in a submission opposing a resource consent application to build apartment blocks on the Orakei Basin tuff ring; prepared another submission proposing new protected sightlines between the tops of the more accessible cones, and of Orakei and Panmure Basins; and advocated public purchase of Pukaki Lagoon crater as this private land has been put up for tender.

In the near future, the big remaining issues will be to try and achieve full protection for the three volcanoes that are still largely intact, but in private ownership (Crater Hill, Pukaki Lagoon, Puketutu). One measure that might assist with this and in defending that which is already protected or scheduled, would be to achieve a greater level of recognition for the value of Auckland’s volcanic heritage. This would happen if the field and its associated prehistoric archaeological sites were to be given World Heritage status (something GSNZ first proposed in 1992). At present the Department of Conservation is considering a number of nominations to select several to be forwarded to the world body for consideration.

Looking positively on the future, maybe we can envisage restoration of some of Auckland’s volcanic landforms. We already have Mangere Lagoon and now Puketutu looks likely. Other cones that still could be rebuilt, guided by old photographs, include Pukeiti and Otuataua (both in Otuataua Stonefields Historic Reserve), Wiri Mt (crown-owned disused quarry site), Maungataketake (still being quarried below ground level, private), Crater Hill scoria cone and tuff ring (private), and Three Kings cones (still being quarried below ground level). More difficult but possible could be Mt Cambria, Little Rangitoto and the top of Mt Albert (all in public reserves, but surrounded by rich residential housing). Conceivably the floors of Pukaki Lagoon (iwi owned) and even Onepoto (public reserve) could be restored to tidal inlets.

References:
Fig. 2. The breached Waiouru maar crater and tuff ring (seen here in 1993) recently opened as a public reserve as part of the new Highbrook Industrial Estate subdivision, Otara. The subdivision included the construction of an arterial road just outside of the tuff ring which separates it from the Tamaki Estuary. Sometimes called Puakeiwiriki, local iwi restrict this name to Red Hill volcano, Papakura.

Fig. 3. Mangere Lagoon maar crater served as sludge ponds for Auckland sewage from 1959 to 2003. Subsequently restored to an intertidal inlet, with the central scoria cone rebuilt, the whole has been opened to the public as an extension to Ambury Regional Park.
Speakers will present papers on a range of topics including:

- Underground coal mining in New Zealand’s complex geology
- State of the art regional exploration in both the North and South Islands
- The critical skills shortage facing New Zealand mining companies
- Legal issues relating to mining in the Department of Conservation estate
- Environmental issues

Field trips:

- A 2 day trip to the West Coast visiting the OceanaGold Globe Progress Au mine and the Pike River underground coal mine that is under construction
- A 1 day trip visiting inland Canterbury and the Southern Alps including Coalgate bentonite and Canterbury Coal operations in Malvern Hills

Information and registration: www.ausimm.co.nz
Deadline for early bird discounted registration rate is July 13.
Hector’s missing geological map of Otago, 1864

Doug Coombs, Dunedin

For many years James Hector’s hand-coloured Geological Map of the Province of Otago hung in the museum of the Geology Department at the University of Otago. It was a truly historic document, the culminating achievement of Hector’s years as Geologist for the Otago Provincial Government from 1862 to 1864. During that time Hector carried out, effectively single-handedly, a geological reconnaissance of the whole of the South Island south of the Waitaki River. The map measures 1.380 x 1.570 m, and is well remembered by older members and former students of the Geology Department. It has not been seen since the late 1970s.

At about that time, the late Doug (J.D.) Campbell and I had become concerned about deterioration of the map, and we discussed giving it to the Hocken Library at the University for safe keeping and possible repair. Doug was acting HOD for several spells during 1978-1979, and in so far as I thought about the map subsequently, I assumed it was in the Hocken. Late in 2005 it transpired that it was not to be found there. A photograph of the map in damaged condition was taken in the Department during the 1970s (Fig. 1). The legend on the map reads as follows:

GEOLOGICAL MAP OF THE PROVINCE OF OTAGO NEW ZEALAND BY JAMES HECTOR MD FGS PROVINCIAL GEOLOGIST
GEOGRAPHICAL DETAIL FROM THE INITIAL SURVEY OF THE ADMIRALTY AND THE PROVINCIAL GOVERNMENT 1864

At least 19 separately coloured formations are shown on the map, but the key is illegible in the surviving photograph.

The first clue to the fate of the map came when a dismantled wooden frame was found in the Geology basement with a note attached saying it was the frame of the Hector map, being restored in Auckland with a grant from the Art Galleries and Museums Association of NZ. The note gave the names of two staff members of the Otago Museum and the initials JDC.

Exhaustive enquiries have established the following:
1. The map belongs to the Hocken Collections, but at some date in the distant past it was lent to the Geology Department for display in the Department Museum.
2. According to a letter dated 28.10.1977 from the Hocken Librarian, M.G. Hitchings, to AGMANZ and held in Te Papa, the Auckland City Art Gallery agreed to undertake repair and cleaning work, the price to be $300. The Dunedin Art Gallery had apparently quoted $500.
3. A letter dated 1.11.1978 from the Director of the Dunedin Public Art Gallery to the Secretary of AGMANZ states: “We understand this item is now in Auckland Gallery, and that it cannot be treated there. We are willing and able to cope with the restoration of this if we are called upon to do so.”
4. Staff of the Auckland Art Gallery have searched for the map recently and have not found any record of its having been there. The same applies to Auckland Central Library, Auckland Museum, and the University of Auckland Geology Department.
5. No past or present member of Otago Museum staff can throw further light on the problem, nor can the Director or staff of the Dunedin Public Art Gallery, nor many other individuals who have been approached.

6. The letter from Mr Hitchings referred to above, describing the map’s condition, states: “Col. photo attached”. According to Te Papa archives, no photograph is now attached to the letter. The photo shown in Fig. 1 is the best we currently have.

An enquiry by Tony Hocken to the Geological Society of London has opened up a new twist: an undated map by Hector titled “Geological Sketch Map of the Province of Otago”. This map measures 370 mm horizontally x388 mm vertically (Fig. 2). It is held in an archival collection devolving from Sir Roderick Impey Murchison. Presumably Hector sent this sketch map to Murchison, a mentor of his, to show the sort of work he was doing in New Zealand. There are interesting differences between the geology shown in the two maps; most importantly, the finished map better portrays the Southland Syncline in southeast Otago.

As his time in Otago ran out, Hector moved his attention to the broader fields of New Zealand geology. His “SKETCH MAP of the GEOLOGY OF NEW ZEALAND embodying the results of all researches up to 1865” is reproduced in New Zealand Journal of Geology and Geophysics, vol. 8, p 904 (1965). It was signed by Hector, now describing himself as Colonial Geologist, in January 1865. Hector apparently prepared this for the New Zealand Industrial Exhibition held in Dunedin that year. The same issue of NZJGG, pp 902, 903, contains geological maps of both the North and South Islands compiled about 1840–1850 by Walter B.D. Mantell. These were also praiseworthy efforts for those early days, but in no way diminish the remarkable progress achieved by Hector during his brief term as Otago Provincial Geologist.

*I am grateful to Tony Hocken for allowing me to reproduce Hector’s preliminary sketch map and for much other help; to Bob Carter and Tony Reay for colour slides of the 1864 map; to Daphne Lee; to Stuart Strachan, the Hocken Librarian; and to the innumerable other individuals and institutions who have helped in the search.*

Fig. 1. A photograph taken in the 1970s of James Hector’s 1864 Geological Map of the Province of Otago prepared for the Otago Provincial Government.
Fig. 2. Geological Sketch Map of the Province of Otago by James Hector, from the Sir Roderick Impey Murchison collection in the archives of the Geological Society, London (courtesy Tony Hocken and the Geological Society).
Elva Leaming, specialist geology librarian at University of Auckland, is currently updating GSNZ’s Earth Science theses bibliography (downloadable from http://www.gsnz.org.nz/). The 2nd edition of the bibliography was completed by Simon Nathan and Bruce Thompson up to and including 2000.

The bibliography includes all theses undertaken in New Zealand Universities on any aspect of the solid earth sciences (excludes meteorology, atmospheric and ocean studies); plus solid earth science theses of NZ (excluding Antarctica) undertaken at overseas’ universities.

Elva is going through New Zealand University theses’ lists for the period 2001-2006 and extracting earth science theses for keywording etc. She will be contacting key personnel in each university to ask if they can check over the lists as the draft nears completion. The completed supplement will be integrated with the existing bibliography and made freely downloadable from the GSNZ web site.

At this stage Elva would like to hear from anyone who has noticed an omission from the existing bibliography (up to 1999). She would also like to have information from anyone who knows of an overseas’ theses in a New Zealand earth science topic since 2000. Please supply author, year, title, University, Dept., and whether you know of a copy in a New Zealand library. Send information to Elva at e.leaming@auckland.ac.nz.

Here is the small list of overseas’ theses (since 1999) that she has compiled so far – there must be many more out there.

Bear, A. 2004. Complex facies architecture and emplacement origins of a mid-miocene mega pillow-pillow lava sequence, Muriwai, Northland Peninsula, New Zealand. Monash University. BSc(Hons)
Southall, K. 2004. The reconstruction of sea levels on the Catlins Coast, New Zealand using foraminiferal transfer functions. University College London. MSc.
Mathews, E. 2003. Stratigraphy and volcanology of a submarine apron from an offshore stratovolcano, Waitakere Group, Muriwai, New Zealand. University of Tasmania. BSc(Hons)
Carey, R.J. 2002. A volcanological study of the proximal deposits from the 1886 Tarawera eruption. University of Tasmania. BSc(Hons)


Southall, K. 2002. Modern day assemblages of foraminifera and the reconstruction of sea-levels in Ohiwa Harbour, New Zealand. Plymouth University. BSc.


Charlier, B.L.A. 2000. U-Th isotopic constraints on the pre-eruptive dynamics of large-scale silicic volcanism: examples from New Zealand. The Open University. PhD.


SOCIETY BUSINESS

Taranaki Branch of Geological Society of NZ Annual President’s Report for 2006/7

Committee
Susan Burgess President/Secretary
Ron Harris Vice President
Colin Payne Treasurer
Mark Robbins Newsletter
Diane Toole Field Trip Coordinator
Joseph McKee

Positions of responsibility
Caroline Blume Librarian
Donna Ainsworth Technical officer

After being secretary for most of the society’s life, Don Christian stepped down at the last AGM. The committee naively thought it would be easy to co-opt someone, but obviously the entire membership thought Don was too hard an act to follow. This may very well be true, but I hope someone will volunteer this year. I have taken over the correspondence, and volunteers have taken minutes (thank you Matt, Don and Mark). Thank you also to the members of the committee for their contribution to the society over the past year, and to the non-committee
officers. I am especially grateful to Donna for her expertise with laptop and digital projector which has ensured that every lecture has run smoothly.

Lecture Programme

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<td>5 June</td>
<td>AGM and</td>
<td>Volcano video</td>
</tr>
<tr>
<td>3 July</td>
<td>Cornel de Ronde</td>
<td>Hydrothermal Activity along the Mariana Arc</td>
</tr>
<tr>
<td>24 July</td>
<td>Bruce Hayward</td>
<td>Deciphering NZ’s Geological and Environmental History using forams.</td>
</tr>
<tr>
<td>8 August</td>
<td>Joseph McKee</td>
<td>Cold Seeps and Chemosynthetic Fauna</td>
</tr>
<tr>
<td>2 Oct</td>
<td>Ron Lambert</td>
<td>History of the Moturoa Oilfield</td>
</tr>
<tr>
<td>6 Nov</td>
<td>Donna Ainsworth</td>
<td>Rock Identification (hands on session)</td>
</tr>
<tr>
<td>5 Feb</td>
<td>Barry Greenbrook</td>
<td>Traveller’s Tales of South America</td>
</tr>
<tr>
<td>5 March</td>
<td>Feike de Bock</td>
<td>How Oil and Gas are formed and found (another hands on session)</td>
</tr>
<tr>
<td>2 April</td>
<td>Keith Lewis</td>
<td>Lifting the Veils, examples from Marine Geology of how we glimpse more.</td>
</tr>
</tbody>
</table>

Field trips

- 17 Feb Oakura beach section, led by Michael Turner.
- 24 March Onaero beach section, led by Ron Harris. Also Hector Day picnic, a week late because of WOMAD.

Other

At the end of 2006 we had a change in venue as the A/V room at New Plymouth Girls’ High that we have used for over 20 years has been converted to a flat floored drama room. On the minus side the library cupboard and storage cupboard (geological maps, slide projector, microscope, archives and old text books) are remote from the meeting venue; and we cannot accommodate a large audience so we do not publicise meetings regularly in Midweek .On the plus side we have the use of a science lab decorated with geological specimens and posters, and set up with a digital projector and FLAT screen.

Last August we were sorry to learn of the death of Bob Duncan, a founding member of the society. Bob was president at the time of the Taranaki Geological Society becoming a branch of GSNZ in 1986, and he represented the branch on the national committee for several years during which he was on the preservation committee. Bob wrote articles on geology for The Sunday Express, (a precursor to Midweek), gave lectures, organised field trips (I particularly remember a field trip visiting engineering projects in the city involving water: culverts, dams, stream deviations and the former waterworks), made his house available for committee meetings and social events and provided the tea urn in the days when we finished meetings with a cuppa. Some years after Mary’s death, he moved to Hastings to be near his daughter, Catherine, but he continued to regard himself as a member of our branch and attended meetings and field trips when possible.

Susan Burgess, President