GEOLOGICAL SOCIETY OF NEW ZEALAND (Inc)

Newsletter Number 140 **July 2006**

Thinking about Our Future

The President reports……

Our 50th year celebrations, honoured our past. Now it seems time to think about our future.

Often, the National Committee's time seems to get bogged down in routine administration of the many things the Society does, conferences, publications, awards, geo-preservation, queries, and funding. Somehow, we never get to thinking about how the society might adapt to a changing world. In mid June, the National Committee set aside a day for "navel gazing" thinking more in terms of evolution, not revolution, and "if it ain't broke, don't fix it". A check-up, fine tune and maintenance seemed a good idea.

The background for discussion was the membership survey of 1998. We were fortunate in having with us two of the architects of the 1998 survey and report, Jarg Pettinga and Hugh Grenfell, Hugh being still on the committee. A lot of thought and energy went into the big rethink of 1998, and a lot of recommendations came out of it – too many to implement in the short term. This was our starting point.

- ***Allocate time for "navel gazing" at the first committee meeting each year.***

Who are we?

What we do depends on who we are and what we want to be. We are predominantly a group of research scientists (including students and retired researchers). The majority are (or have been) in universities and a sizable minority in CRIs. While a significant number of members work in oil, mining, local bodies, environmental and engineering consultancies, their GSNZ membership seems peripheral, with only a few taking an active part in branch meetings and conferences. Many have their own societies and conferences. A sizeable number of overseas members probably trained or worked here at some stage and retain an interest. Only a few of our paid-up members are enthusiastic amateurs, despite the turnout at some branches being predominantly amateur. A "geo-education" drive a few years ago, tempted few teachers.

Does the GSNZ work for the present membership as it is? Stable membership numbers and little feedback suggest that probably, it does. If we broaden the base of the Society, would there be a downside? For instance, would a broadening membership make conference organisation an impossible burden? I don't think that we really had the answer to this. Most of the committee thought that we should be encouraging greater participation and interaction with applied geoscientists, particularly with the increasing number of consultants and local body employees involved with the Resource Management Act.

- ***We decided to survey our "applied" and amateur (non-university and CRI)) members, when they renew membership, to find out what they expect from the society at branch and national level. For instance, more themes or workshops relevant to applied geoscientists might be appropriate at branch meetings and conferences, together with more joint meetings and conferences with applied geo-science organizations.***

Focus on Youth

In 1998, the emphasis was on increasing the profile of women in the society. This was successful to the point where, until very recently, women outnumbered men on the National Committee. The balance has been redressed only because (albeit briefly) nearly 20% of the National Committee is on maternity leave.

Keith Lewis

However, there had been little change in integrating and welcoming new-comers into the society. It takes a bit of initiative to encourage most of us out of just networking with our peers. Shyness (as well as preoccupation) can make most of us reluctant to introduce ourselves – although a few beers and a bit of frivolity at the social functions seems to help. Many of us recognise names from publications and faces from previous meetings. But putting names to faces……there's the rub!

- ***As a start, Kerry (Newsletter Editor) will to get mug shots of each contributor and their "bio"–name and face together. Nick (Awards Subcommittee) will encourage the presenters of posters to add a picture of themselves. We will seek greater interaction with, and encouragement of, students at poster sessions and after student papers. We will be looking for ways to encourage strangers to introduce themselves at socials.***

Links with branches

Branches are in some ways the lifeblood of the society. They are incredibly diverse, from the predominantly CRI/University based group in Wellington, and the interesting group in Auckland, to the keen crowds of "rock-hounds" in some smaller centres. In the past, concerns were expressed about liaison with the National Committee, but at present all branch reps on the National Committee are also committee members of their local branches.

The need at branch level is always for interesting speakers. But most branches solicit speakers more or less in isolation. Can we make this easier? Once speakers have prepared a talk, it is usually not much more effort to give it somewhere else.

- ***We will encourage branches to put the Society administrator (Beth), the Newsletter editor (Kerry) and Website editor(Nick) on their mail/email list, and to either have their own regularly updated web-sites (a few have already) or supply the Society's Website editor with their programmes as they evolve. Each branch might then scan the others' programmes and perhaps invite a speaker to give the same talk at their place. We will also encourage members to list important visitors in the Newsletter and on the web. Some at least might be flattered into speaking away from the institution they are visiting. We will also investigate permanent on-line recording of the Hochstetter.***

Links with other Earth Science Groups

To get the broad picture of our science, we need links with other earth scientists. Many have expressed a wish to see closer links with other Earth Science Societies but how close should the liason be? Already we hold conferences every alternate year with the Geophysical Society and have also met jointly with the Geothermal Workshop group. We have had enquiries from other society office-holders about joint branch meetings and conferences.

- ***Contact the committees of other Earth Science societies (including geophysists, geotechnical/geothermal/earthquake engineers, petroleum geologists, and perhaps hydrologists and climatologists) and discuss the possibility of more joint conferences, workshops and branch meetings. Republish appropriate articles in each other's Newsletters. Investigate advertising each others branch meetings. Discuss joint administration and finance.***

Conferences:

The annual conference is one of the things that members value most. But it is getting to be a burden on small departments. Nobody really liked the suggestion of having conferences alternate years, and the idea of having most meetings in Wellington cast even more gloom. If we are to have meetings at the smaller centres the local organisers will need more help. They can't reinvent the wheel every seven years, nor be expected to have time to manage registration, finance (with GST), bookings and liabilities as well as the organising the science programme, field trips and abstract volumes. It was suggested that some branches might try to recruit local retired members to help.

The solution for many professional bodies of our size is to pay for the services of a professional conference organiser. We must have one who understands our way of doing things. Fortunately we have had the services of a company at Kaikoura, and earlier conferences proving very successful, but of course costly--$75 per registrant. This has been mainly offset by sponsorship,but sponsorship may not always be so successful. Cost increases towards the levels some other societies charge would not be popular but meeting nearly always in Wellington could be worse.

- ***The National Committee will encourage conference organising committees to use an appropriate professional organiser (preferably one that maintains continuity) to deal with registration, money, accommodation, halls, equipment, social events, printing, transport etc. The organisers might then limit their involvement to the science programme and field trips. This alone might be more than enough for departments of 4 people. The National Committee will consider having a Conference Subcommittee to help organisers, coordinate with other societies, and assist with continuity.***

Administration and finance:

Following the 1998 "navel gazing", the National Committee employed a part time secretary, Beth Wallace, to cope with membership (the big one), publications, and minutes etc. The arrangement works well for the Society The other big chore is the Society's money. We are

presently extremely fortunate that David Skinner keeps the Society's accounts and its Trust Accounts in meticulous order. Very few scientists would have the skill or the time (average about 7 hours – 1 day - a week) to do this. But hopefully we wont come to that bridge for a while. I haven't seen a figure for the time the Newsletter editor puts in, but it must be considerable.

- ***It was decided to investigate the secretarial and accounting services used by the Royal Society and member bodies.***

Geo-education

There is no geo-education rep on the committee at present. Anecdotal reports suggest that the amount and quality of education that school children receive about the earth around them is decreasing with many teachers opting out of geo-science options because they know little about it themselves and perhaps because curriculum topics aren't always the most gripping.

There may be need for reliable and interesting "resources". The new Te Ara (on-line encyclopaedia) website may help. There was a suggestion that Royal Society Teaching Fellows may produce "resources" for schools although this is presently discouraged

- ***This was an area where the present committee had little expertise and would needed to investigate further.***

Awards

Seen as an appropriate way of rewarding excellence in our science it was nevertheless considered that the criteria for some awards needed review in the light of a modern fashion for multi-author papers. It was suggested that the monetary value of awards be advertised. Although it was felt that the number of awards should be limited, it was suggested that there might be a place for some sort of award or fellowship for outstanding lifetime careers.

- ***The Awards Subcommittee will review criteria for awards, advertising of awards and the value of an award/fellowship for outstanding careers.***

At this point, your committee ran out of steam and adjourned to the Back Bencher Bar.

- ***We agreed to investigate each issue in the coming months, circulate information via email, and discuss implementation of issues at the next meeting.***

Keith Lewis, Society President
Wellington

New light on New Zealand Mesozoic reptiles

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Jeff Stilwell and coauthors recently (early 2006) published the first report of dinosaur bones from Chatham Island. The fossils include convincing material, and the occurrence promises more finds. Questions remain, however, about the stratigraphic setting. This commentary summarises the recent finds, considers earlier reports of New Zealand Mesozoic vertebrates, and reviews some broader issues of Mesozoic reptile paleobiology relevant to New Zealand.

The Chatham Island finds

A diverse team reports on the Chathams finds. Jeff Stilwell (fig. 1) an invertebrate paleontologist has research interests on the Gondwana breakup and Southern Hemisphere Cretaceous-early Cenozoic molluscs, including Chatham Islands (e.g. Stilwell & Zinsmeister 1992)(Stilwell, 1997). Several authors are vertebrate paleontologists. These include Chris Consoli, Tom Rich, Pat Vickers-Rich, Steven Salisbury, and Phil Currie, with diverse experience of dinosaurs, while Rupert Sutherland and Graeme Wilson (GNS) are well-known for their research on tectonics and biostratigraphy.

Fig 1 *Jeff Stilwell in the field Seymour Is Antarctica*
photo E Fordyce

The Chathams article describes a range of isolated bones attributed to theropod ("beast-footed," carnivorous) dinosaurs, including a centrum (main part or body of a vertebra), a pedal phalanx (toe bone), the proximal head of a tibia (lower leg bone, at the knee joint), a manual phalanx (finger bone) and a manual ungual (terminal "claw" of a finger). On names of groups, fig. 2 gives a simple guide to dinosaur classification. Specimens are catalogued in the GNS collections. Those outside the field of vertebrate paleontology might be sceptical that isolated and sometimes incomplete bones can be identified as to position (e.g. vertebra, limb) or to species. However, this approach has been thoroughly tested since Georges Cuvier proposed the idea of "correlation of parts" – that, because organisms can be viewed as integrated whole entities, a species may be identified from only a fragment of a skeleton. In vertebrate paleontology, as in human forensic pathology, the identification of single bones is based on knowledge of more-complete specimens. There is a wealth of supporting information in the global literature (e.g. Weishampel et al. 2004, Farlow & Brett-Surmann 1997), and the technique is widely and

successfully used. Of the Chathams bones, the phalanges are compellingly dinosaurian, although it is also possible that the ungual phalanx is from the foot of a large bird. The vertebral centrum does not seem to represent a marine reptile (plesiosaur, mosasaur). For this incomplete element, the authors state that position in the vertebral column and orientation are uncertain, but their conclusion that it was from a medium-sized theropod about 4 m long and 3 m high suggests far more confidence. The fragment of tibia (reportedly proximal, and thus figured upside down) cannot reasonably belong to other than dinosaur.

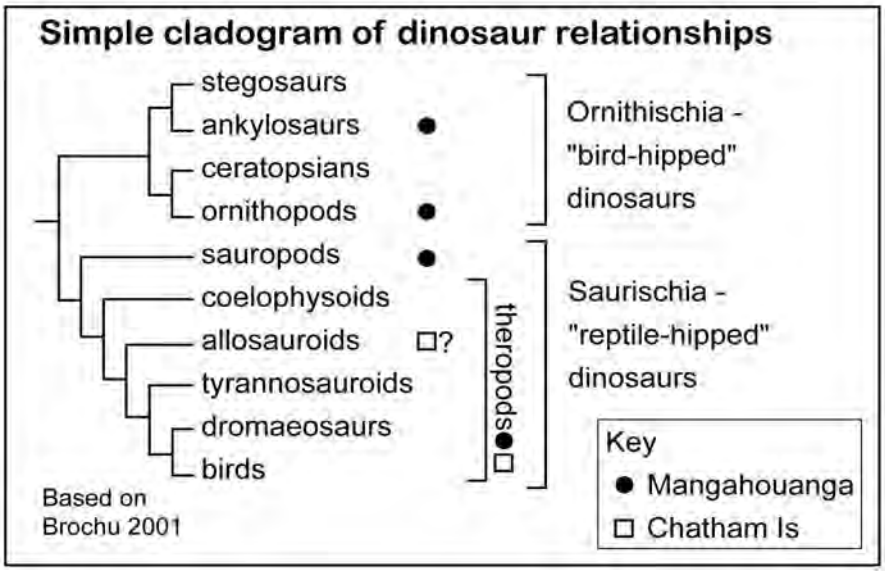

Fig 2 Simple cladogram of dinosaur relationships, based on Brochu(2001). Symbols indicate groups reported from the New Zealand Cretaceous

The stratigraphic setting is intriguing. The bones are from a coastal outcrop of Takatika Grit on the northern part of Chatham Island (see also Campbell et al. 1993: 60). This unit is a thin (~10 m) marine unit, with abundant phosphorite nodules, greensand and volcanogenic debris, resting unconformably on basement schist. Stilwell et al. (2006: fig. 2) divide the unit into 14 beds, of which 8 contain bone (although p 249 states 3 bone horizons). The article title will be taken widely to mean that the KT boundary is present in this sequence, will ensure wide citation, and will likely smooth the path to more research funding. Note, though, that the authors actually state: "The grit may represent, in part, an allochthonous accumulation of reworked uppermost Cretaceous sediments and fossils that were deposited post K–T boundary, in the Danian. However, the mixed latest Cretaceous–earliest Tertiary age of associated microfossils indicate that the K–T boundary may be present below the exposed bone-rich beds…" It's interesting to read "may be present," given the lack of a firm Haumurian (late Cretaceous) or older age for the grit. Later (p 248), it is stated that the Takatika Grit is significant for allowing reconstruction of paleoenvironment and biota from just before the KT

boundary, hinting at a Cretaceous age after all. Readers would have been served better had ages been indicated directly on the stratigraphic column of Stilwell et al.: fig. 2. I await a more-conclusive statement on age.

For now, we can assume that Cretaceous terrestrial bones were reworked into Paleocene shallow marine sediments. Is that really possible? Yes; dinosaur bones and remains of other terrestrial organisms have been collected many times from shallow marine strata. Consider, for example, Late Cretaceous dinosaurs from shallow marine Tahora Formation of Mangahouanga Stream, Hawkes Bay (Molnar and Wiffen 1994), and Late Eocene terrestrial mammal bones from shallow marine La Meseta Formation of Seymour Island, Antarctica (Reguero et al. 2002).

As with many good stories, there is an earlier history. Campbell et al. (1993: 62-64) mentioned the presence of reptile bones, possibly dinosaurian (see their fig. 4.30), in the Takatika Grit, but didn't offer a firm identification. Before that, in 1991, University of Canterbury Geosciences student Evan Meek reported bone associated with phosphorite horizons in the Grit, and collected several fragments of presumed plesiosaur bone now held in the Geology Museum at University of Otago.

Some points made by Stilwell et al. don't stand close scrutiny. For example, it is implied twice in the introduction to the paper that the dinosaurs are from an oceanic island, and on p 249 the authors emphasise that the dinosaurs are from an isolated setting nearly 1000 km east of New Zealand. These statements miss the point. "Oceanic" is correct in the sense that Chatham Island is now distant from mainland New Zealand, but in the geological sense and especially in the paleobiogeographic sense it is misleading, and the authors should know better: Chatham Island is based on New Zealand continental crust, not oceanic crust. Some dinosaur afficionados likely to read Stilwell et al. without knowledge of New Zealand geology could be confused needlessly by such wording. Stilwell et al. (their fig. 4) indeed show Chatham Island as continuous with what is now South Island, as also indicated in Fig. 3 of this review (based in turn on reconstructions by King).

Mesozoic terrestrial reptiles

The article on the Chathams dinosaurs is one of many on Mesozoic, mainly Cretaceous, reptiles from New Zealand. Our record of marine reptiles is highly informative, yet the more fragmentary record of dinosaurs – perhaps a shoe-box full of bones in contrast to a shipping-container full of marine reptiles – arouses interest because of implications to ecology and paleogeography. Early geologists hinted inconclusively at the presence of terrestrial reptiles. For example, Haast (1870: 189) commented, about Cretaceous reptiles at Waipara, "There was also, what I consider to be, the distal or lower portion of the femur, which, judging from the articulation, evidently had some affinities with terrestrial remains, such as the Iguanodon a herbivorous terrestrial reptile, of enormous size, and living in the Northern Hemisphere, in the wealden and greensand (Cretaceous) period" [original spellings and capitals retained]. Later, an anonymous author, most likely Hector (in McKay 1877: 41), referred to the tooth of a "megalosauroid . . . land saurian", apparently also from Waipara. The identity of these specimens was not elaborated on and, by 1900, there was still no firm evidence of dinosaurs in

New Zealand. In following decades, many people assumed that those reptiles had never actually been here, and the absence of evidence was taken as evidence of absence. Fleming (1962: 93), however, cautioned in generalising about the absence of fossil land vertebrates, particularly as some living forms, such as tuatara, must have had a long Tertiary record in spite of a lack of fossils.

As it happens, in 1958, Don Haw had already discovered reptile bones in Cretaceous shallow marine strata of Mangahouanga Stream, Hawkes Bay (Haw 2002), stimulating the now widely-recognised field programme of Joan and Pont Wiffen and associates including Crabtree, McKee, and Moisley. The first formal report of a New Zealand dinosaur was by Ralph Molnar (1981), who described an isolated vertebra recovered by the Wiffen group from Mangahouanga. The bone did not match any of the marine reptiles already known from New Zealand. Molnar, a Brisbane-based dinosaur paleontologist trained in USA, convincingly argued that the vertebra recovered by Wiffen was from the tail of a theropod dinosaur. Later finds, reviewed by Molnar and Wiffen (1994) and Wiffen (1996), include fragments of other dinosaurs: the partial rib from a sauropod (large quadrupedal plant-eating saurischian), the pelvis of a hypsilophodontid (an small bipedal ornithopod), a fragment of ankylosaur (armoured ornithopod), and the phalanx of a probable theropod (but possibly a large bird). Reptiles other than dinosaurs are known from Mangahouanga, including a protostegid marine turtle (Wiffen 1981), and a fragment of pterosaur (Wiffen and Molnar 1988). Beyond the primary literature, these discoveries are well-covered in popular books (e.g. Stace and Eagle 2001).

What of New Zealand localities other than Chatham Island and Mangahouanga Stream? The only other described putative dinosaur is an isolated manual phalanx (finger bone) from the Huriwai Measures (Puraroan, Late Jurassic), south of the Waikato River mouth. This single small bone was identified as probable theropod (Molnar et al. 1998); it represents the first tetrapod vertebrate described from the New Zealand Jurassic.

There are hints of other tetrapod fossils from our Mesozoic, although these are not necessarily dinosaurian and some may actually represent marine groups. Fleming et al. (1971) mentioned the "teeth having Labyrinthodont characters" earlier reported by Hector (1880, 1886) and Worley (1894) from unspecified formations (probably Triassic) at Nugget Point, South Otago, and Wairoa district, Nelson. These could represent ichthyosaurs or, alternatively, an amphibian. Fordyce et al. (2003) recently reported a bone fragment from a large “labyrinthodont” amphibian (strictly, a sterospondyl) from the basal Triassic south of Mataura.

Mesozoic marine reptiles

The New Zealand record of marine reptiles, particularly Piripauan-Haumurian (Late Cretaceous), is significant at a global level, thanks to some rather complete and informative specimens. The key groups are plesiosaurs and mosasaurs, while the main localities are Mangahouanga Stream, Haumuri Bluff-Conway, Waipara, and Shag Point. For a historical overview, and details of some of the important species, one starts with the monograph of Welles & Gregg (1971). That document arose from Welles’ visit to New Zealand in the late 1960s (Gregg 1997) to start a new phase of study on Cretaceous reptiles after a break of about

70 years since the days of Hutton. Welles and Gregg reviewed the early contributions of Owen, Haast, Hector (especially 1874), and Hutton, and the productive field work of the indefatigable Alexander McKay. The monograph also gave details of unpublished early research, and discussed the tragic loss of fossils collected by McKay and sent overseas for study. A notable contribution of Welles and Gregg was to name and describe a new species of mosasaur (sea-lizard), *Prognathodon waiparaensis*, based on a partial skull recovered from just below the KT boundary in the Waipara River section at Laidmore-Claremont. The taxonomy in the Welles and Gregg monograph is specialised, and when I read the article as a graduate student seeking an introduction to reptile anatomy and classification, I found it not very helpful; other sources, such as books by A.S. Romer, were more rewarding. (For more recent works, see Callaway & Nicolls 1997, and many articles in Journal of Vertebrate Paleontology.)

Much research on marine reptiles has been reported since 1971, and only a brief summary is given here. Material from Mangahouanga Stream (Wiffen and Moisley 1986) includes the new plesiosaur *Tuarangisaurus* and more material attributed to *Mauisaurus*, plus mosasaurs (Wiffen 1981a, 1990) including a *Prognathodon* and 3 new species: *Moanasaurus mangahouangae*, *Rikisaurus tehoensis*, and *Mosasaurus flemingi*. It would be surprising to find a diversity of closely related species (in this case, mosasaurs) of similar size in one assemblage, and whether all the latter mosasaurs are distinct is moot.

To consider fossils from northern South Island, Caldwell et al. (2005) reported new material of the mosasaur *Taniwhasaurus oweni* (including *T. haumuriensis* of previous authors) from Haumuri Bluff. Norton Hiller and Al Mannering at Canterbury Museum have made notable advances. Hiller et al. (2005) described rather complete and highly informative new material of the plesiosaur *Mauisaurus haasti* from Ngaroma, Conway River, clarifying the concept of a species named by James Hector, and confirming *M. haasti* as an elasmosaur (extreme long-necked plesiosaur). Because *Tuarangisaurus keyesi* and *Mauisaurus haasti* are not known from comparable material (the first is based on a skull, the latter on postcranial skeleton), it is not clear whether the 2 species are truly distinct. A possible third elasmosaur species may be represented by an indeterminate fragmentary elasmosaur (Hiller & Mannering 2004) from the classical locality of Claremont-Laidmore at Waipara. Yet more material is known from Waipara: most recently, Hiller & Mannering (2005) described a cluster of postcranial remains from a large concretion, apparently representing another elasmosaur distinct from *Mauisaurus haasti*. The species was not named because it lacks a skull – probably the single most important element on which to base a new species. The most-recently recovered Waipara reptile is a mosasaur, apparently a new *Prognathodon*, which includes the skull and jaws. The fossil is under preparation (see www.otago.ac.nz/geology/features/paleontology/).

From the south, the large plesiosaur *Kaiwhekea katiki* (Shag Point) was described by Cruickshank & Fordyce (2002) as a new genus in the mainly Jurassic family Cryptoclididae - a group in which the neck is significantly shorter than in elasmosaurs. *Kaiwhekea* is notable as (currently) being the only New Zealand Mesozoic reptile represented by an articulated and nearly complete skeleton, albeit with many bones represented by natural moulds. *Kaiwhekea* was compared with two other Gondwanan plesiosaurs, *Aristonectes* and *Morturneria*, also

thought to be cryptoclidids. Later, Gasparini et al. (2003) showed that *Aristonectes* is probably a specialised elasmosaur. Where does *Kaiwhekea* belong? It is not an elasmosaur in the usual sense of the term. O'Keefe (2004) used cladistic analysis to show that *Kaiwhekea* might not belong in the Cryptoclididae, but rather in the specialised cryptocleidoid family Cimoliasauridae. It is trite but true to say that more research is needed.

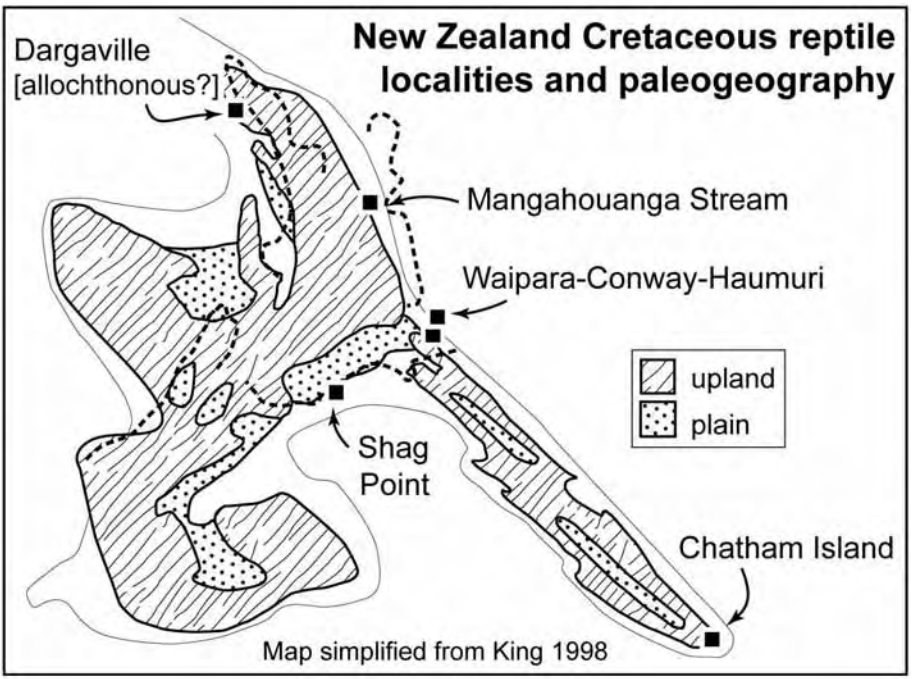

Fig 3 *New Zealand Cretaceous reptile localities and paleogeography, based on Cruickshank and Fordyce(2002) with map simplified from King (1998)*

Beyond mosasaurs and plesiosaurs, a third marine reptile group is known from the New Zealand Mesozoic, the dolphin-like Ichthyosauria. Fleming et al. (1971) reviewed the specimens, most of which were reported first in the 19th century. Probably the most tantalising fossil known by 1971 was the Late Triassic partial rostrum reported by Campbell (1965) from the Murihiku Supergroup. More Murihiku specimens have been found since, but they are too incomplete to identify (Fordyce 2003). Sachs & Grant-Mackie (2003) recently reported a fragment of snout of a presumed Cretaceous (and thus geologically young) ichthyosaur from Northland, giving hope of finding other more-complete material.

Mesozoic New Zealand – isolated in a high latitude setting

For the Jurassic and much of the Cretaceous, New Zealand was probably within or close to the polar circle (e.g. Lawver et al. 1992, Pole 1999, McLoughlin 2001, Schellart et al. 2006), implying significant seasonal variation in light and climate, and thus in biological productivity (plant growth). Further, by about 85 Ma (Piripauan; Cooper 2004), the Tasman Sea was opening, and the New Zealand landmass was presumably physically isolated from other parts of Gondwana. There are implications for dinosaur (and marine reptile) biology, as noted by Molnar and Wiffen (1994) for New Zealand, and by Rich et al. (2002) for southern Australia. In summary, in a high latitude setting, dinosaurs on an "island continent" would have had limited ability to migrate during winter cold and darkness. Marine reptiles would likely be affected by fluctuations in food caused by great seasonal variation in productivity. How many dinosaurs lived on Late Cretaceous New Zealand after separation from the Gondwana margin? Molnar (1981) noted that a small landmass would support only a small population of any one dinosaur species, and citing small population numbers that might barely be self-sustaining. His discussion, however, did not consider that home ranges of many organisms are not exclusive but may overlap; there may have been more dinosaurs on New Zealand than suggested by Molnar. It is intriguing also that some reptiles may represent late occurrences of groups otherwise reported earlier in the Northern Hemisphere fossils. Consider, for example, the Late Cretaceous plesiosaur *Kaiwhekea*, which apparently represents an otherwise mainly Jurassic lineage known from Europe, or the Early Cretaceous report of an *Allosaurus*-like dinosaur, presumably close to Jurassic forms from North America. Another "out of time" record is that of a supposed ceratopsian dinosaur from Victoria, which is older than the start of the great ceratopsian radiation of the northern Hemisphere. (Ceratopsians were "horned" herbivores, such as *Triceratops*.) Admittedly, those specimens known from nearly complete skeletons (*Kaiwhekea*) are more convincing than those based on single bones (the Australian *Allosaurus* and ceratopsian). Some of these issues were discussed further by Long (1998) and Rich and Rich (2000).

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The author R.Ewan Fordyce, Associate Professor at Otago University examining the jaw of a fossil mosasaur from the Waipara River area.

The Finding and Recovery of a Fossil Giant Penguin, southwest Kawhia Harbour.

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On 16th January,2006 Chris Templer of Waitomo led a field trip to the south western area of the Kawhia Harbour, near the settlement of Te Waitere. The trip was expected to be a routine educational fossil-hunting trip. The group of some 20 children and parentsfrom the Hamilton Junior Naturalist Club (Junats), limited by the number of watercraft available, set out across the narrow arm of the harbour to explore and learn about this well-known fossiliferous area with the expectation of finding a few fossil echinoids.

The area of interest was Te Rangiora Point, a 30meter cliff face of crumbling strata of Whaingaroa Formation, at the base of which is a rock platform of the same unit – a relatively soft, brittle, bedded sandstone of the Whaingaroan age. The base of the cliff is only a few meters from the high tide mark and would likely be reached during king tides, heavy rainfall or rough weather.

Two younger members of the group were the first to notice the unusual rust coloured objects in the rock of the shore platform, but it was two adults following later who recognised them as fossil bones and called Chris for his opinion. At first sight, it was obvious that these were the remains of a large bird and his first instinct was to compare it to one of the smaller species of moa, with which he is more intimately familiar. However, the bones were situated in rock far older than any known to contain Moa remains, and the exposed sternum had the structure of a flighted bird rather than the flattened sternum common to Moa. After further scrutiny, Chris realised that it was most likely the remains of a giant penguin, possibly a near complete specimen and likely to be of major scientific interest, both to New Zealand and internationally.

The bones were situated some ten to twelve metres from the base of the cliff and well below the high tide level where wave, tidal action and constant exposure to the elements were likely to cause rapid deterioration. In addition, the area was known to fossil hunters and frequented by collectors of *kai moana* who could be observed walking along the rock platform, which appeared a natural pathway between the rubble at the base of the cliff, and the sludge of the exposed shore at lower tide levels. The significance of the find and the potential for inadvertent or intentional human interference indicated the necessity for urgent and competent conservation. The fossil would have to be raised intact with sufficient surrounding rock to support the skeleton and safeguard it against disintegration.

On the day of discovery, due to the need for security, Chris reluctantly concealed the identity of the discovery from the Junat children. That night, on return to Te Kauri Lodge, the situation was discussed with the adults. It was agreed that, as soon as was practically possible, a "rescue" would be mounted, subject to clarification of the legal situation and suitable tides.

Fig 1 Chris Templar (overalls) and Dave Mathews planning the cuts.

Consultation then proceeded: with the Department of Conservation to confirm that the fossil was not situated on Reserve Land; with the Department of Culture and Heritage to clarify that their jurisdiction did not include ancient fossil remains; and with Te Papa to inform them of the find and clarify the legal status of rights, obligations and ownership. A senior and respected representative of the local Maori community was also consulted, and he also agreed to go with the retrieval party and perform the appropriate rites and *karakia*.

Four weeks or so after the initial find, on 16th February, a group of made up of Junat parents and a few children, off-duty DoC staff, the *kaumatua* and other willing souls, returned to the Point. The people and equipment were ferried across in two canoes, a two-man out-boarded inflatable and a small runabout. As the tide slowly dropped, water containers were filled against the time when low tide would make access to water (for cooling the masonry saws) a long hard slog through knee-deep sludge. Armed with a petrol-powered generator, a small electric jackhammer, two petrol-powered diamond-tipped masonry saws, electric drills, crowbars, hammers and chisels of extraordinary size and variety, the willing went to work. The fact that none, except Chris, had ever been involved in anything the like, or of this scale before did not dampen the resolve, but lent caution and extreme care to the excavation, in spite of the heavy duty tools in use.

The platform was cleared of rocks, then washed and scrubbed of the all-pervasive harbour sludge. A wide rectangular perimeter of approximately 1.5m x 1m was cut using the diamond saws, allowing 50 – 60cm distance from any visible bone. Then, using hand tools, rock was carefully chipped in toward the fossil, with constant scrutiny for any trace of exposed bone to a depth of approximately 200mm. When it was confirmed that there were no further bones visible around the skeleton, the jackhammer was used to deepen the trench to a level that would

Fig 2 The wide cut and working inward

Fig 3 Chris doing preliminary recovery and stabilization.

allow the slab to be separated and lifted with a reasonable chance of it remaining intact. The moment of triumph came with the aid of a meter long cold chisel driven at various points around the base - the slab containing the skeleton was finally separated in one piece from bedrock at around 4pm when the tide was again encroaching.

There was one last problem, however – a significant number of the group were a little past their prime. Lifting and moving 200kg+ of wet rock slab out through mud to the waiting boat appeared daunting until a passing pair of lads who had been out scallop diving were press-ganged into service. The slab was loaded safely and without incident into the runabout and returned to the Te Waitere boat ramp and a gathering crowd of intrigued locals.

There followed the slow and painstaking process of removing the matrix from around the bones, leaving all bones in situ and stabilising the material as it was uncovered. During this time, there was also ongoing liaison with Museum of N.Z. staff who were sent photos and measurements and provided an initial opinion that the specimen may be P*achydyptes Ponderosus.* However, Chris had made comparisons with all available figures of N.Z. fossil giant penguin material, and concluded that the Te Waitere penguin was, in all likelihood, a previously undocumented species, having more characteristics in common with *Palaeeudyptes*.

Subsequent examination by Jack Grant-Mackie, of Auckland University, confirmed Chris' earlier opinion that the specimen is not *Pachydyptes*, but more likely a more slender-boned bird of the genus *Palaeeudyptes*.

A small group returned to the site on April 22nd to further excavate in the hope of perhaps finding a skull or tarso-metatarsi. Two further cervical vertebrae were located about a metre from the where the skeleton had been, as well as a rib and 1st phalanx of the second digit (wing

Fig 4 Ready for display in the Waikato Museum

extremity) plus some evidence of bone in matrix which was brought back and is yet to be examined.

A sample of the matrix from the original rock slab was passed on to Dr Bruce Hayward, Geomarine Research, who confirmed from the foraminiferal fauna present that the rock and bird is Whaingaroan (Early Oligocene).

Negotiations between the Hamilton Junior Naturalist Club and the Waikato Museum concluded with the delivery of the fossil into the care of the Museum. The specimen will be placed on public exhibition from May 31st, and also be made available for examination by the scientific community.
To date, the bones recovered include: R&L humeri, R&L radii, R&L ulnae, L carpometacarpus, R scapula, L coracoid, cervical, thoracic and caudal vertebrae, ribs, sections of sternum, pelvis, R&L femur, R&L femur, R&L tibiotarsus, phalanges x3 (1 intact). A CT Scan has been arranged by Nikki Harcourt of Waikato Museum and further bone material may yet be revealed (we continue to hope to find a skull).

MEMBERS FORUM

Paleo-Pot Pourri 5—----Notes on Fossils and related stuff

Phil Maxwell

Kaikoura Cretaceous

Phil Maxwell

In the last Newsletter (No 139), Jack Grant-Mackie reported on the discovery of Cretaceous macrofossils in the Mead Hill Formation exposed on the Kaikoura foreshore. Given the proximity of the site to The Esplanade and its accessibility, it is hard to believe that they had escaped detection prior to the GSNZ Conference last year. The fossils are hardly common, but they aren't excessively rare either. In fact, I think we were beaten to the punch by at least 119 years, possibly more. In his monograph on New Zealand fossil fish Davis (1888: table facing p 48) recorded seven species – including *Odontaspis kaikoraensis* Davis (the spelling used consistently by Davis) - from "Kaikoura Peninsula." According to Morgan (in Chapman 1918: 35) four are from the Amuri Limestone, but the holotype of *Lamna carinata* Davis (collected by H.J. Ingles) and a figured syntype of *O. kaikoraensis* (collected by J. Davies Enys) are in a "grey calcareous arenaceous" matrix. (Material of the other species, recorded as *Lamna huttoni*, could not be located.) Chapman synonymised *O. kaikoraensis* and *L. carinata* with the widespread Late Cretaceous shark *Scapanorhynchus subulatus* (Agassiz); in addition Morgan noted the matrix of *L. carinata* includes a belemnite, so these specimens certainly came from beneath the Amuri Limestone. The other relevant collection (GS294), which was made by Alexander McKay in 1886 and apparently included only five specimens, is described by Thomson (1913, p. 83) as coming from "below Amuri Limestone, Kaikoura Peninsula." It would be interesting to know if this collection is extant, and what it contains. Are these collections from Jack's locality, or from the same area? I suspect they are, but this will be difficult to demonstrate.

Chapman, F. 1918: Descriptions and revisions of the Cretaceous and Tertiary fish-remains of New Zealand. *New Zealand Geological Survey Palaeontological Bulletin 7*. 45 p.

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Thomson, J. A. 1913: Materials for the palaeontology of New Zealand. *New Zealand Geological Survey Palaeontological Bulletin 1*. 104 p.

Sowing the good seeds
Over the last few months most of my favourite science blogs have moved to ScienceBlogs, which is run by Seed Magazine. They include Afarensis, Deltoid, Dispatches from the Culture Wars, Evolgen, Evolutionblog, Evolving Thoughts, The Intersection, The Loom, Pharyngula and Stranger Fruit. All are worth checking out. Go to http://scienceblogs.com/ for links. WARNING: opinions in these blogs will almost certainly offend. Discretion is advised.

Alas, Canada (and New Zealand!)
I thought Canada had largely escaped some of the loopier ideas that are pandemic in its neighbour to the south, particularly the varieties of creationism that are so popular there. This naïve view clearly needs revision in the light of the experience of Brian Alters, a professor in the Department of Education at McGill University. He applied to The Social Sciences and Humanities Research Council (SSHRC) for funding a study on the effect of Intelligent Design on Canadian education. This was his proposal:

"The purpose of this study is to measure the extent to which the recent large-scale popularization of Intelligent Design is detrimentally affecting Canadians' teaching and learning of biological evolution at high school, university, and educational administration. If, as suspected, this proposed study results in measurements data that indicate a significant disadvantageous interaction, we would then develop a proposal to other funding programs with the aim of researching, designing, and implementing pedagogical techniques to counteract the detrimental effects of Intelligent Design." He got this response early in April:

"*The committee found that the candidates were qualified. However, it judged the proposal did not adequately substantiate the premise that the popularizing of Intelligent Design Theory had detrimental effects on Canadian students, teachers, parents and policymakers. Nor did the committee consider that there was adequate justification for the assumption in the proposal that the theory of Evolution, and not Intelligent Design theory, was correct. It was not convinced, therefore, that research based on these assumptions would yield objective results. In addition, the committee found that the research plans were insufficiently elaborated to allow for an informed evaluation of their merit. In view of its reservations the committee recommended that no award be made."*

In other words, the committee was offended by Alters' opinion that ID is a total crock. However, Philip Sadler, director of science education at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts had a positive spin on the decision: "If he was trying to answer whether all this popularization had had an impact, he just saved the government $40,000. He found the evidence without doing the study."

About the same time the New Zealand Listener published a poll that showed 25% of those quizzed believe in the account of creation given in Genesis. This is way higher than I would have guessed. Even worse, 51% think intelligent design should be taught in schools as an alternative to evolutionary theory. If these figures are reliable then the rot has really set in!

The unbridgeable gulf
April was a red-letter month (if there is such a thing) for evolutionary biology. In short succession came announcements on the earliest known penguins (*Waimanu* species from

Waipara River); a Devonian vertebrate (*Tiktaalik roseae*) that combines characters of fish and tetrapods); the oldest known *Australopithecus*; and a Cretaceous snake with legs and sacrum. And that's just the fossils – there were also significant discoveries in molecular genetics and other fields.

What was the response of the creationists to these discoveries (apart from general spluttering and special pleading that is)? Why, a one-eyed, nose-less kitten nick-named "Cy" that will be the centerpiece of a new creationist museum in Phoenix, N.Y. Real estate agent John Adolfi plans to feature Cy's remains at The Lost World Museum when it opens later this year. According to Adolfi, other oddities on display will include giant plants and eggs, deformed animal remains and unique archaeological finds. He wrote on the museum's website that according to evolutionary theory "environmental pressures can lift species from the ape-like creature ... to us today. My question is this. Are there really positive mutations? All I can see are neutral or negative."

The unfortunate Cy's affliction apparently was not caused by mutation, but hey, why let facts get in the way of a good story?

Looking for another job?

Ever thought you are not getting the income you deserve? Silly question! Try doing something more remunerative. Earlier this year the leading creationist organisation Answers in Genesis (if "leading" is an appropriate term in this context) split, with its former branch in Australia hiving off as Creation Ministries International. This is mildly amusing, but far more interesting is information about the incomes of directors and employees of AiG posted on The Lippard Blog in March. In 2003 president Ken Ham received a salary of $125,739, benefits of $11,033, and expenses of $44,478. In 2004 the figures were $121,764, $6,887, and $63,808. Other directors (apart from several selfless souls who received nothing) were also generously remunerated, with figures ranging from about $86,000 to $132,000 (all figures are in US$ of course.) Not bad rewards for disseminating nonsense! Of course, market forces prevail – this is what a large section of the public wants, after all.

If AiG doesn't tempt you, aim higher. ExxonMobil CEO Lee Raymond's salary is $190,915…….*per day***.**

More evidence of western malaise

The following item appeared on ScienceBlogs in mid-June:

"Political pundit Ann Coulter is no stranger to controversy. The self-described polemicist, known for her outrageous statements on topics from 9/11 to the proper role of women in society, has returned to the public eye with a new book. In Godless: The Church of Liberalism, published by Crown Forum on June 6, Coulter argues that "liberalism" can be considered a religion, complete with its own creation myth: the evolutionary theories of Charles Darwin. She portrays liberals as fanatics whose zeal causes them to reject scientific evidence against evolution. So far, Godless has hovered in the #1 and #2 slots for best-selling book on Amazon.com."

Coulter's rants are vile even by the standard set by some contemporary American right-wing "commentators", but there are obviously a lot of people who agree with her, an indication of just how polarised American society has become. Her anti-evolutionary diatribe (based on misinformation supplied by Intelligent Design pundits Michael Behe and William Dembski) has been ably dissected by several bloggers, but this will make absolutely no impression on her acolytes.

Stray Quotes

"I wanted to lie down afterwards and pour lye in my ear until it dribbled out my eye sockets, just to scour the stupidity out of my brain. It's this horrible pseudo-profundity delivered by quacks, gladhanding physicists who think being in a movie makes them rockstars, and a dead Atlantean warrior, all stitched together with a boring plot about a deaf photographer searching for meaning in her life. The whole thing was so dreary and superficial that I couldn't work up the energy to even complain about it, and did my best to forget it." — PZ Myers (Pharyngula) reacts to the movie "What the bleep do we know?"

"Evolution is so simple, almost anyone can misunderstand it" – David Hull

"Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so." —Douglas Adams

"I just feel that the world of commerce and the world of intellect, by their intrinsic natures, must pursue different values and priorities – while the commercial world looms so much larger than our domain that we can only be engulfed and destroyed if we make a devil's bargain of fusion for short-term gain." —Stephen J. Gould, "The lying stones of Marrakech".

Anthropogenic stratification in an oil well (or tales of the unexpected)

Murry Cave, Greymouth.

Murray Cave

In April of this year, I finally got to undertake a re-entry of the Blackwater 1 well at Murchison (PEP 38 522) after several delays due to rig availability.

The Blackwater 1 well was drilled by the Australian Oil Corporation in 1968 using the Brown Brothers Failing 1500 drill rig (PR 148; Bulmer, J.M., 1968). The well was spudded in at 8am of March 25th 1968 and completed on May 14th 1968. The well was drilled entirely within the Mangles Formation which spans the Lower to Mid Miocene with the collar in the Tutaki member (Suggate 1984). At a depth of around 132m the well passed through a fault (referred to as the axial fault

by Bulmer 1968) encountering a higher part of the Mangles Formation, the Valley Creek Sandstone (Suggate 1984). The principal hydrocarbon shows are all well below the fault plane at a depth of between 461 and 471m (Figure 1).

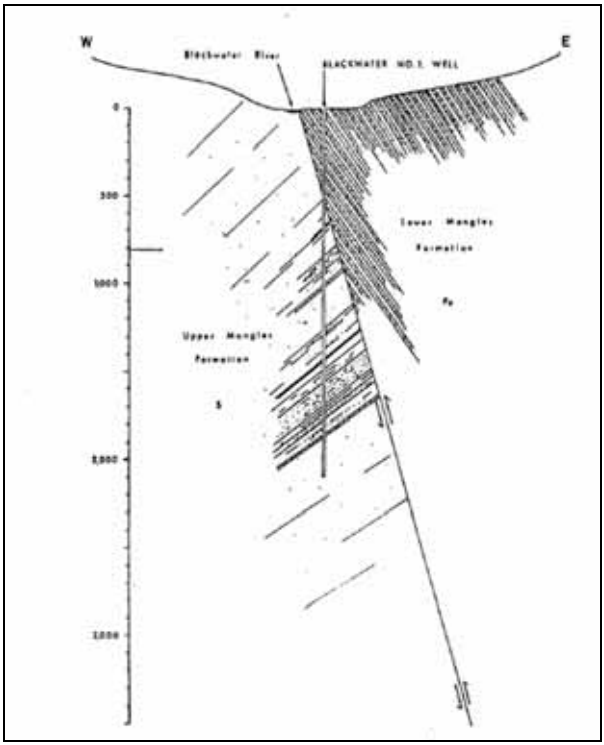
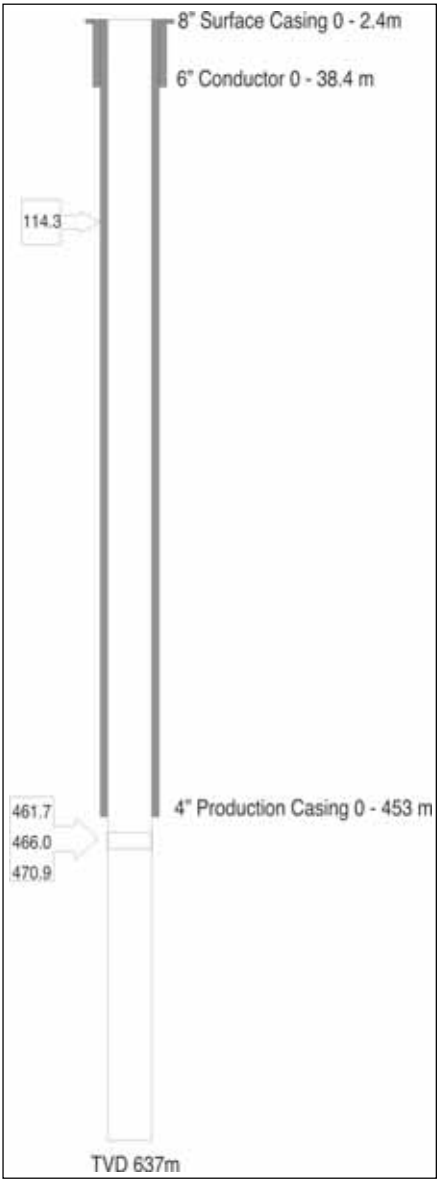


Fig 1. Initial well stratigraphy

According to my records the well was cased with 4" casing to 453m and completed barefoot below that with the oil zone immediately below that at depths between 461.7 and 470.9m. The well could not be sustainable produced when drilled because of a number of reasons. Firstly, because the casing was installed after the well was drilled, the drill company relied on a cushion of bentonite drill mud to displace the cement. Much of this cement penetrated the formation causing a high skin effect. The cement that was left could not be properly cleaned out due to the lack of equipment. The well had a TVD of 637m.

My plan was to run down to 475m and under ream the section from 471 to the casing shoe, install a cement plug below 471 and then install a slotted liner from the casing shoe to the plug to make sure the well stays open (Figure 2). Eventually a beam pump will enable production.

Figure 2. Well schematic.



There are always some risks associated with re-entering old wells for example deterioration of the casing but these we considered acceptable. There were also some specific risks with the well since an outfit called GEL briefly had a permit over the area in 2000 and they tried to re-enter the well with tubing to recover oil samples. GEL reported blockages at depths of between 35' (10m) and 87' (26m). Thus it was possible that the casing had collapsed and the well inoperable.

On re-entry, however, we found there to be good shut-in gas pressure at the surface (160 psi) and light oil at the wellhead. We also found that there were no obstructions at the depths reported by GEL. The local farmer reported that GEL "ran into the well" not with a conventional drill string as would be inferred by the GEL "report' but with a roll of standard alkathene water pipe. It was thus considered not surprising that GEL reported obstructions since alkathene is pretty stiff and as it comes in coils would have readily jammed itself against the casing.

Then at 114m we did hit an obstruction. So again we faced the prospect of the casing having collapsed. I initially wondered whether or not GEL just got their measurements wrong and where they had referred to "feet" they actually meant "metres". We circulated the well for a while and much to our surprise started to recover chunks of 3mm twisted wire along with while plastic coated 12v electrical cable. We thus had to establish the provenance of this material and as well determine what was below this wire and plastic "breccia" (Figure 3). Did this material go all the way down or was there something holding it up? I made some calls to Crown Minerals and emailed the petroleum inspector but could not elucidate any further. What they knew, we knew, ie not much!

Fig 3. wire recovered from the well.

Closer examination of the material suggested a provenance of washing line (the 3mm twisted wire) and stereo speaker wire (white plastic coated electrical cable). Since it was unlikely that there was a set of stereo speakers downhole, we had to consider the possibility that there was a geophysical logging tool of some sort. In the mean time we reamed on down through the wire layer, no doubt pushing it downhole as well as washing it up. Thus it was not possible to determine the layers thickness. At 140m we encountered another layer comprising a mix of stainless steel and brass. This ended up being quite thin and close examination suggested that this materials provenance was some sort of recording device such as a pressure tranducer. Below this, however, the mixed wire breccia continued.

At 364m the drillers reported a material that drilled like conglomerate in the hole. We increased the pump capacity and washed up some of this material. It was indeed "conglomerate" within the casing! In fact, the conglomerate was a well sorted fine pebble conglomerate with a mix of well rounded and angular pebbles. Compositionally, the conglomerate comprised predominately greywacke, with subordinate red hard volcanics, quartz and rare limestone fragments. Comparison with a "deposit" at the local roading contractors yard at Murchison suggested that the "conglomerate" was in fact finest Fulton Hogan grade 2 top course gravel!

At 435m we ran out of the conglomerate and encountered something made of fairly solid steel and penetrated around 11mm of this recovering stainless steel fragments and a brass nut and bolt. Again we had to consider whether or not this was a down hole logging tool and if so

whether or not it had a radioactive source. The rig was stood down while this was investigated (Figure 4).

Figure 4. Failing rig supplied by CW Drilling of Motueka, A single stage BOP/diverter Owned by Western Exploration was employed and fitted beneath the Sub.

Eventually, one of the people formerly known as GEL was tracked down in Texas. He denied putting anything in the hole except the tubing and a small pump and suggested that the gravel was put in the hole by the original company that drilled the well. This interpretation (if you want to call it that) did not match the facts, however, since an electrical inspector was able to establish that the white plastic coated electrical cable had not evolved in 1968 and was a far more recent electrical taxon! By default, the account from the person from GEL suggested that the steel layer we encountered at 435m was a pump installed by GEL in 2000. Since this

pump was stratigraphically lower than the "conglomerate" layer, we postulate that the conglomerate was emplaced by gravitational sliding. In other words, the idiots tipped a tonne of the stuff downhole to provide a seal above the pump!

Luckily a 12v pump is not large but still posed the risk of the tricone locking up against it which would make life very difficult and so drilling was deferred until a milling bit could be manufactured in Australia. This was duly run into the well on the 26th of April and the pump gradually drilled through. This pump was well and truly wedged against a tool joint in the casing and much to my frustration the bottom length of casing in the well unscrewed itself and shot off downhole along with the remains of the pump. At this stage having pulled out most of my hair and with a rather large bump on my head where I'd kept on banging it against the rig mast in frustration I pulled the plug and decided the best bet was to drill another well immediately adjacent to Blackwater 1. Blackwater 1A is now in the planning stages.

Despite all the hiccups there were quite a number of positives from the well.

1. Good shut in casing pressure indicates that the well had largely recovered from the damage caused by the bentonite cushion emplaced in 1968.
2. I owned a unique well, probably the only one in existence that contained a thick layer of road gravel.
3. The well produces a good quality light condensate, tests on which indicate that it can be utilised in some industrial and motor applications without refining once it has gone through a centrifugal cleaning process.
4. Indications are that despite the structural complexity of the area as mapped, the fault overlying the production zone is acting as a good seal and there is potential for additional structural traps within the area.

New Zealand earth science on the web

Simon Nathan, Wellington

The "Earth, Sea and Sky" theme of ***Te Ara***, the online encyclopedia of New Zealand, was launched recently by Helen Clark. You can see the home page on http://www.teara.govt.nz. then click on "Earth, Sea and Sky" to see the list of contents.

Te Ara is the successor to the three-volume Encyclopedia of New Zealand, published in 1966, and now a collector's item. When a revision was being discussed, it was decided to design the new encyclopedia specifically for the internet as this is where many younger people now seek information. Although there are other encyclopedias available on the web, many are commercial products available only on a subscription basis. Almost all are digitised versions of printed encyclopedias, some of considerable vintage. ***Te Ara*** is designed to be an up-to-date source of information on New Zealand that is be freely available worldwide, and can be updated as required.

There are 117 new entries on aspects of New Zealand's natural science, including 30 related to earth science listed at the end of this article. The earth science entries are mainly grouped under five headings: Geology, Natural hazards & disasters, Thermal springs & geothermal energy, ocean study & conservation, and mineral resources.

One of the things we have tried to do in ***Te Ara*** is to feature individuals who are significant in particular topics, so as you explore you can expect to come across familiar faces. Note that there are number of video and sound clips, so check that your sound is not turned off or muted.

Although ***Te Ara*** works best with broadband, it will work with any telephone or wireless connection to the internet. We spend a lot of time thinking about the farmer at the end of a remote road with a poor telephone connection, so articles will download rapidly.

One of the advantages of the internet is the ability to link with other sites, allowing the user to dig deeper for more information. Each article has a section called "Further sources", with links to up to half a dozen relevant sites. There are also links to scientific papers and original documents, which allows students to look at original material rather than always relying on secondary sources. The Royal Society has assisted by digitising a group of older "classic" papers, and much more will be available when the whole of the Transactions of the Royal Society of New Zealand is digitised later this year.

There are continuing debates about the credibility of information obtained from the internet. At its worst, web information can be outdated or perpetuate myths – as indeed can out of-date books. ***Te Ara*** represents the high quality end of web production. The material has been written by or in conjunction with experts, including individuals from universities and CRIs, and has been carefully reviewed and edited. For New Zealand scientists, this is a major step forward in making modern information abut natural science readily available to a wide audience. It is also hope that it will be a valuable resource for teaching aspects of earth science in the secondary curriculum.

Earth science articles in *Te Ara*

This page will be incorporated on the GSNZ web site, and will give immediate links to earth science articles in Te Ara

Aspects of geology

- Outline of New Zealand geology
- Sea floor geology
- Charting the sea floor
- Engineering on the sea floor
- Fossils
- Gemstones
- Geological exploration of New Zealand
- Magnetic field
- Meteorites

- Rocks and minerals named in New Zealand

Maori traditions and archaeology

- Kohatu – Maori use of stone
- Pounamu – jade or greenstone
- When was New Zealand first settled?
- Whenua – how the land was shaped

Natural Hazards

- Natural hazards – overview
- Active faults
- Coastal erosion
- Earthquakes
- Historic earthquakes
- Floods
- Landslides
- Tsunamis
- Volcanoes
- Historic volcanic activity

Mining & mineral resources

- Mining and underground resources
- Building stone
- Coal and coal mining
- Gold and gold mining
- Iron and steel
- Marine minerals
- Oil and gas
- Radioactive minerals
- Rock, limestone and clay
- Salt

Hot springs and geothermal energy

- Geothermal energy
- Hot springs, mud pools and geysers
- Life in hot springs
- Thermal pools and spas

The New Zealand Minerals Industry: Extracted from a speech given at the Nov. 2005 AusIMM Minerals Conference in Auckland by the Honorable Harry Duynhoven

Kerry Stanaway, Auckland

…… first, I would like to commend you all on your industry's continuing contribution to New Zealand's economy. **2004 has seen New Zealand's mineral and coal output top $1 billion for the second consecutive year.** To put this achievement in perspective, it represents a staggering 47% increase over the national output value recorded just five years ago.

Notable contributions over the year came from gold which increased production to 10.2 tonnes (up 9%), ironsand production at 2.3 Mt (a 20% increase), and industrial rocks and building stones (up 6***%)*** with rock for building, cement and roading showing significant rises on the back of strong regional growth and infrastructure development. Many regions, in particular Auckland, Bay of Plenty, Wellington and Southland, recorded significant increased regional activity with supply often struggling to meet demand.

By contrast the coal sector had a relatively steady year with production remaining stable at just over 5 million tonnes for the second year running. Coal exports however are now consistently exceeding 2 million tonnes annually, generating export earnings of over $200 million, and could well be higher with rail capacity improvements. Many countries throughout the world are now importing our high quality bituminous coal for steel manufacturing and other industrial uses.

It is also pleasing to report that mineral prospecting and exploration expenditure for the past year has increased by 130% to over $20 million. Good news indeed. A rise resulting mainly from a large increase in both gold exploration in the Waihi region, and coal exploration nationwide as companies seek to define future coal mines to help meet domestic and international demand. I am sure that over the duration of the conference you will have ample opportunity to listen to presentations that expand upon the development potential of the exploration work undertaken.

All the signs indicate a healthy and well performing minerals industry that has the potential to make a larger and longer term contribution to our economic well-being. While this potential is well recognised, I do not believe that it has as yet been fully realised. There are a number of valid reasons for this but with the current favourable market conditions for many of the commodities found in New Zealand, increasing recognition of the need for regionally based economic development, and improving awareness of prospectivity, I am optimistic that this potential may soon be fulfilled.

Looking to the future, the government would like to see a material increase in the level of international and domestic investment in the minerals industry. Consequently, there are a number of work streams and initiatives that the government is working on to assist in this regard. In particular, improving the cost effectiveness of the regulatory and fiscal regimes for

minerals, advocacy for the mineral estate, and improving accessibility to quality information. Most of this work is being driven from within the Crown Minerals Group.

……..An announcement of the other key project, the development of a state-of–the-art data management system that provides for the dissemination of open file industry reports and geotechnical data, was made recently. This new system, which is a continuation of the strategy to increase exploration investment by improving understanding of its geological potential with greater volumes of geotechnical data, is planned to be operational before the middle of next year. It will provide free public access to all petroleum, coal and minerals exploration data acquired over the past 30 years. The provision of this sort of data is a key driver for attracting investment into New Zealand and ensuring permit holders have access to the latest information to enable them to work their permits.

Australian Synchrotron to Study Papatuanuku too.

Kerry Stanaway, Auckland

The National Scientific Advisory Committee to the Australian Synchrotron continues to solicit interest from New Zealand researchers, and others, in the synchrotron light source facility already under construction in Melbourne and due to commence operation in March 2007. The Victorian Government has committed AUD$157million, and a funding partnership that includes New Zealand has committed AUD$40million to date. For further information anyone interested can look up website www.synchrotrotron.vic.gov.au or email specific enquiries to contactus@synchrotron.vic.gov.au

The rationale for building a synchrotron in Australia was that the user community had seen major growth with limited access to overseas machines hampering future research in priority areas. The Victorian synchrotron will be state of the art with an energy of 3GeVand a capacity to provide photons from the infra-red to the hard x-ray region i.e. wavelengths from 10^{-3} to $10^{-11.5}$ metres.

Electro-magnetic radiation from the synchrotron possesses the following special properties 1) high brightness, thousands of times more intense than from conventional x-ray tubes, 2) a wide energy spectrum, 3) tunable to any wavelength, 4) highly polarized (linear, circular, or elliptical) 5) emitted in pulses as short as a billionth of a second, 6) emitted in cones at micron scale (i.e. is highly collimated and can focus to 0.2 micron areas) and 7) able to perform non destructive analyses.

Earth scientists in Australia and New Zealand have shown interest in using beamlines 4, 5, 8, 11 and 12. Beamline 4 (BL4, for small and wide angle scattering) can measure long bonding in complex molecules, BL5 for X-ray absorption spectroscopy can do the same for shorter ranges as well as coordination geometry, and oxidation state for elements above atomic number 20. BL8 for infrared spectroscopy, analyses bond structures in complex molecules and minerals, BL 11 a microdiffraction and fluorescence probe, allows fast mapping of elemental abundances and mineral identification at micron-scale in fine-scale ‘amorphous’ or ‘multi-

mineral at micro-scale' materials, while BL 12 designed for circular dichroism, can see the larger-scale structures in large molecules.

Might these technologies enable the fluid inclusion study proposed for hot spring feeder systems (see Waiotapu article review)? Is it possible that paleontologists might use this machine (BL 10 imaging) for phase contrast x-ray imaging to non-destructively see the inside of fossils? Could BL6 (soft x-ray spectroscopy) be used to study the magnetic properties of rocks and minerals? Study such as these coupled with periodic airborne magnetic mapping of volcanoes could show magma movement, cooling, heating and potential eruptions. Might BL3 (powder diffraction) find a use determining how strain gets stored in minerals and rocks over time periods. Samples collected periodically by drilling in fault zones, might predict strain build-up and the potential for earthquakes. Papatuanuku's youngest child, wrathful Ruaumoko needs watching here in Aotearoa!

Comments on the value of Beamline 11(BL11) capable of simultaneous microdiffraction (XRD) and fluorescence(XRF) at a micron scale will be particulary welcome, and as soon as possible. BL11 is one of the priority beamlines within a 10-year(decadal) plan forecasting Ausralian science needs.

As part of the engagement of NZ users, Society members can participate actively with the development and use of the synchrotron. Professor Jim Metson from the University of Auckland is the NZ representative on the National Scientific Advisory Committee and a NZ consortium has been established to represent the national interests in future operations. Comments passed to the addresses above can be sent to Professor Metson.

Free to a good home:
Lexique Stratigraphique International Volume V1 Oceanie, Fascicule 4, N.Z.
Contact John Rhodes rhodesja@xtra.co.nz

Donate to a Great Cause

GSNZ recently donated $1000 to SIR Publishing to digitize back issues of NZJGG, now digitized back to and including 1992.

For only $320, you can enable another volume to become freely available. The plan is to work back through annual volumes 1991, 1990 and so on, but should you give $350, you get to choose your favourite year.

For more details contact Rob Lynch,RSNZ
PO Box 598, Wellington, 6001
email rob.lynch@rsnz.org

Bruce Hayward Honoured

Simon Nathan, Wellington

Bruce Hayward was appointed a member of the New Zealand Order of Merit (MNZM) in the Queen's Birthday honours 2006. All society members will join in congratulating Bruce in receiving a small recognition of the enormous contribution he has made to earth science conservation over the last two decades.

Bruce Hayward

The natural environment of New Zealand includes the fauna, the flora and the landscape. While the first two have received considerable attention from conservation groups, there was little attempt until the 1980s to ensure that outstanding landforms and geological features were preserved. One of the problems was the lack of well-organised and scientifically credible information on New Zealand's earth science heritage.

In 1983 Bruce Hayward initiated the New Zealand Geopreservation Inventory, and has been its convenor, guiding force and major fundraiser for over 20 years. The inventory now contains over 3700 sites, each with considerable documentation. It has become the basis for classification of important earth science sites, and has been adopted by the Department of Conservation and many local authorities.

Although Bruce would undoubtedly pay tribute to the large number of people who have worked on this major project, those involved agree that it would never have happened without his inspiration, determination and organizational ability.

To increase public awareness of earth science conservation in New Zealand, Bruce has written and published two promotional books. "Landforms and geological features: a case for preservation" (1988) was the first systematic summary of New Zealand landforms and the need to preserve them. With the help of sponsorship, copies of his 1996 book "Precious Land: protecting New Zealand's landforms and geological features" was sent to every secondary school, local authority and conservation group through the country.

In addition to the national view taken with the Geopreservation Inventory, Bruce has taken a hands-on part in advocating the preservation of specific geological features. As Chairman of

the Geological Reserves subcommittee of the Geological Society over the last decade, he has prepared and coordinated submissions on draft Regional Plans, Coastal Plans, Conservation Management Strategy plans, and Management Plans up and down the country, drawing on the Geopreservation Inventory as a data source. Many submissions have advocated and supported the preservation of specific geological features, recently including Pouerua volcanic lava field, Wiri lava cave, Ihumatao fossil forest, Maungahouanga dinosaur site, Takapuna fossil forest, One Tree Point Pleistocene succession, Wiaoura Explosion Crater, and Titahi Bay fossil forest. Although some submissions have extended over several years, most have been successful because of the well-documented data, and their effective and persistent advocacy **.**

Julie Palmer – Appreciation

Chris Anderson, Palmerston North

Julie has been a force in the New Zealand Earth Science community for the past 30+ years. She has a unique blend of academic and industry experience. At the Kaikoura conference last year she stepped down from the GSNZ committee after 15 years of continuous service.

Julie graduated with a B.Sc (Hons) degree from Victoria University of Wellington in 1975. She then went on to complete her M.Sc thesis on Taranaki oilfields. This was one of the first M.Sc research projects undertaken on the potential for Taranaki to be a world-class hydrocarbon play.

Julie Palmer

She went on to the Ministry of Works as a M.Sc graduate. But her research had caught the eye of Tom Haskill who was working at what was then known as Petrocorp. Julie was headhunted by Tom, and after only two years at the Ministry of Works she officially joined the 'Petroleum Industry'.

Julie remained at Petrocorp until late 1990, working out of the Wellington exploration office for much of this time. The last 6 years saw her commuting between Palmerston North and Wellington after she, and husband Alan, moved to the Manawatu. During her time at Petrocorp she rose in seniority. She was an instrumental part of the team that explored, proved and then drilled the McKee field, the first commercial oil discovery in New Zealand. Her experience in petroleum plays grew through time spent in Canada, Indonesia and the Philippines. Julie was always keen to pass on her skills and knowledge to others. From 1984

she initiated classes (without pay I might add!) in sedimentology and contributed to the earth science papers offered by the Soil Science Department at Massey University.

By 1991 Petrocorp had become Fletcher Challenge Energy and a Julie was confronted with a new choice. She was presented with the opportunity of managing a new Asian exploration office to be located in Jakarta. However family commitments proved a stronger motivation than oil. Julie declined the offer and instead began to focus on academic and teaching pursuits in Palmerston North.

In 1996 she was appointed a Lecturer in what was then the Earth Science Department at Massey University. She has continued to develop papers in sedimentology and earth science. Her research efforts into NZ oil and gas plays have continued during her time at Massey. Many hours have been spent pouring over photomicrographs of the McKee field source rocks taken on the Massey / HortResearch electron microscopy machine. Students have benefited from her skills and knowledge; Massey graduates over the past 10 years have found positions in resource companies such as Newmont Mining, Fletcher Challenge Energy, Santos and Contact Energy.

As if finding oil and molding future exploration geologists wasn't enough, Julie has been active outside of industry and academia. Her formal involvement with GSNZ began in 1991 when she joined the committee as Secretary. Since then has filled all possible positions. Her final role was Past President to Mike Johnson. She has played an active role in the Manawatu branch of GSNZ supporting field trips, projects and numerous 'adventures'. With two daughters at Palmerston North schools she has been keenly involved with supporting the local scene; she has chaired the PTA of both Carncot and Palmerston North Girls High schools. Many hours have been spent on school science fair projects.

In recent years however she has found her true calling; an appreciation of horses. Julie is the Soil and Earth Sciences expert on horse breeds, training and feeding. She blames her daughters for this new found interest, but maybe this is just an excuse……

Julie we thank you for your energy and loyalty to the GSNZ over the past 15 years and to the development of geology and earth science in New Zealand over the past 30 years. Your ongoing hard work is appreciated by all.

Roger Ian McPherson 1933-2005 - Obituary

Bill Watters, Lower Hutt

Roger McPherson, whose death on 25 February 2005 was briefly mentioned in the Newsletter (no. 136, March 2005, p. 50), had a long and productive career, particularly in economic and applied geology, both in New Zealand and overseas.

He was born in France on 9 April 1933, and in 1957 gained B.Sc. Hons in geology at Durham University, England. During his university study he was awarded an I.M.M. Travelling Scholarship, which enabled him to travel to Finland where he worked for a mining company. From 1957 to 1959 he was employed in several parts of Canada for the Geological Survey and with exploring parties for oil companies; this work included one of the last uses of pack horses for field work in Canada, in the Peace River region of northern Alberta.

In 1959 he enrolled at the Montana School of Mines in Butte to study for an M.S. in geology. This involved him in field work for the Saskatchewan Department of Mineral Resources, from which he was able to write a master's thesis on the metavolcanic belt east of Lake Athabasca. Then followed a period partly spent with an oil company and partly teaching courses in general geology and mineralogy/petrology at Mount Royal College, Calgary, for the University of Alberta.

After a stay in Europe he came to New Zealand and was with the Geological Survey from December 1964 to December 1968. With the Survey he was based for part of his time at the Greymouth office and carried out detailed research on ilmenite-bearing coastal sands near Westport; he was also in Dunedin and took part in several economic and engineering geology projects in Otago. During his work on the Westport sands he made a detailed mapping study of old alluvial gold-mining claims, combined with petrographic examination of sand concentrates by Roy Gill who was with the Petrology Section at that time. Using a Vickers superpanner Gill produced excellent gravity-graded concentrates of heavy grains from many samples. Also, as a result of concurrent petrographic study of rocks in the river catchments, they showed that the ilmenite in the coastal sands came from higher-grade rocks in the Alpine Schist belt.

Roger Mc Pherson

From 1968 until 1976 Roger was involved in mineral prospecting and evaluation in several different countries, including a 7-month privately arranged contract in Norway, where he examined areas of copper and nickel mineralisation. From early 1976 he remained permanently in New Zealand and worked mainly for the Water and Soil Division of the former Ministry of Works and Development. His main work in the MWD was mapping for the South Island component of the New Zealand Land Resource Inventory. Mauri McSaveney, who kindly emailed me some information about this phase of Roger's work in the South Island, wrote: "Roger saw a lot of South Island mapping at 1:63 360, albeit at lightning speed. I'm sure he found much more, but I remember his remarkable discovery of New Zealand's largest landslide at Green Lake, eastern Fiordland – remarkable because it is so big that there is

nowhere to stand to see the whole thing at once, and Roger did not have 3D vision when he used air photos; it had to be first seen through a mental picture of the whole" (see also E. & M. McSaveney , p. 82 in "Awesome Forces" 1998, edited by G. Hicks and H. Campbell for Te Papa Press).

Early in 1988, however, after the break-up of the MWD, he was transferred, along with other staff, to the DSIR and finally to the Christchurch district office of the Geological Survey. On being one of the redundancy casualties of the Survey re-structuring in 1990, he set up a consulting business (McPherson Associates) and in 2000, after his wife had retired, a joint business venture with her (McPherson and Cameron Associates). Their work included various contracts to the Canterbury Regional Council, particularly on assessments of potential flood risk. The last big contract comprised a detailed study and mapping of the Lower Waimakariri floodplain, with 18 maps showing the old flood-paths from the Canterbury Plains surface into the environs of Christchurch.

His outside interests included Scottish country dancing, membership of the Christchurch Scandinavian Club, and mountaineering. He was a member of the Canterbury Mountaineering Club and had also climbed in Switzerland and Great Britain. A short article he wrote in the Historical Studies Group newsletter recalled rock climbing at Easter 1952 in the Lake District of England with Robin Oliver after meeting him and his wife Helen at Borrowdale (H.S.G. N/letter 26, March 2003, pp. 20-21).

Roger will be remembered for his friendly personality and for his contributions to the knowledge of the geology of the West Coast and compilation of land resource information over much of the South Island.

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Acknowledgments: I am very grateful to Roger's widow Alexa and to Mauri McSaveney for information.

NEW ZEALAND ROCKS

NZ GEOPRESERVATION INVENTORY ON-LINE

Bruce W. Hayward, *Convenor, NZ Geopreservation Inventory*

(b.hayward@geomarine.org.nz)

The Geological Society of New Zealand's Geopreservation Inventory can now be perused on-line at http://homepages.ihug.co.nz/~bw.hayward/NZGI/. There are links to it from the GSNZ website or you could just google search "Geopreservation" and it should come up top of the list.

The web site outlines the need for earth science conservation in New Zealand and suggests practical ways to assist these endeavours. GSNZ's main activity in promoting earth science conservation over the past 23 years has been through the compilation of the New Zealand Geopreservation Inventory of landforms and geological sites of outstanding scientific and educational value. How the inventory has been compiled is outlined together with an explanation of what data is held in the various fields in the inventory.

Because of space limitations and concerns that the inventory on-line could be misused as a guide to the best mineral and fossil sites for a commercial collector, at this time we have only listed the names of sites, metric map number, and a site's classification of importance and vulnerability.

The site allows the user to search for sites by region and by metric map sheet. It is stressed that the Inventory is always a work in progress. If you know of an outstanding site that does not seem to be in the inventory please email me with a statement of its significance that can be used to assess whether it should be included or not. Remember it is far easier to protect a site, prior to or during the planning phases of a project, than it is to get the bulldozers stopped after the project has all its RMA consents. So even if you do not envisage any threats at present, it is still worth listing a site.

The two maps (Figs 1, 2) show the number of sites in the inventory grouped by map sheet. Some areas have large numbers of outstanding sites, whereas others do not. Some of these differences are due to the diversity and variety of the geology, but clearly also the number reflects access difficulties or the proximity of large populations or University Geology Departments. Map sheets with the largest number of recorded sites are Auckland (111), Rotorua (75), Wellington (36), Taupo (34), Waitakere (33) and north-west Nelson (32). Most of the sheets with no recorded sites are those with only short sections of coast, but three land-locked sheets have no listed sites (K37, C42, E43). Are there really no important sites in these sheets ?

Fig. 1. Number of listed sites in the Geopreservation Inventory by metric map sheets in the North Island.

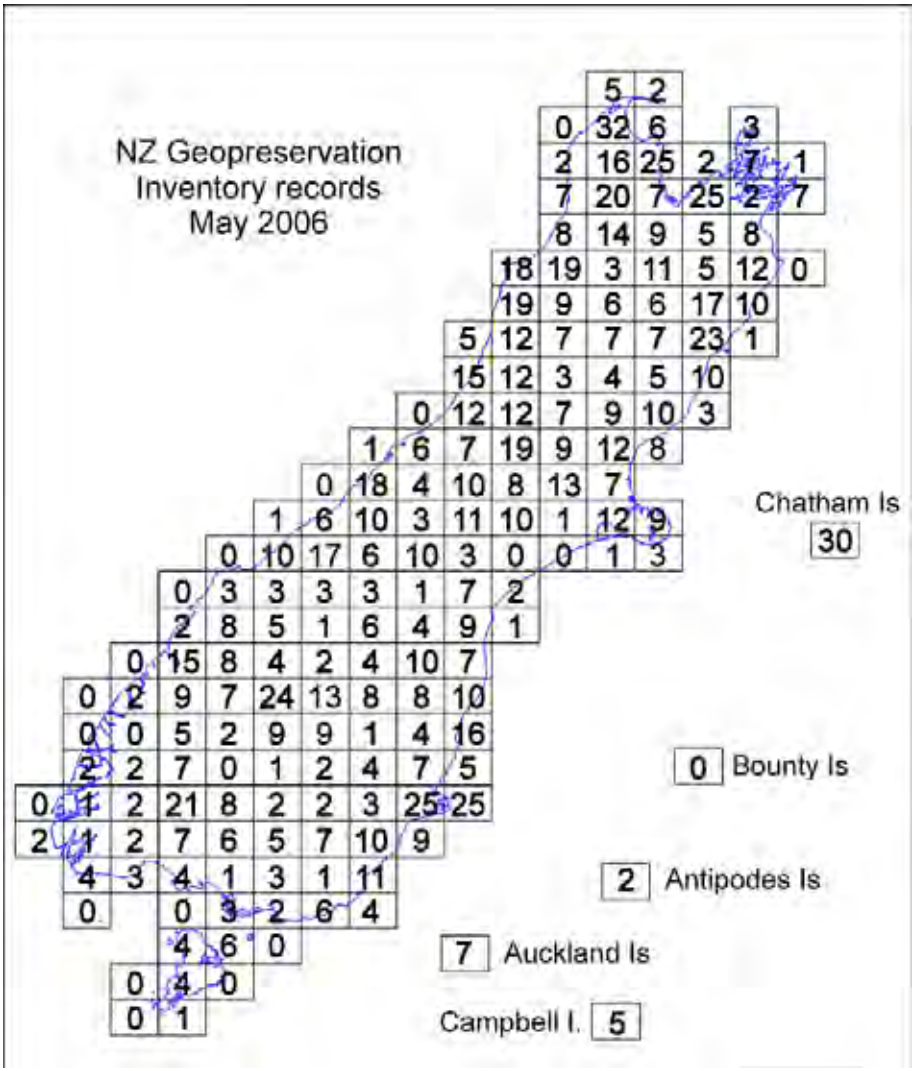

Fig. 2. Number of listed sites in the Geopreservation Inventory by metric map sheets in the South Island.

Buckets of Gold Conference

Nic Macarthur,

Buckets of Gold was a conference about the history of the development of gold dredging in New Zealand and was held in April 2006 in Alexandra. The aim was to bring together specialists and people interested in the history of gold dredging in New Zealand and bring out all their information. Underlying this was the need to highlight the importance of protecting the fast disappearing sites of gold dredging and gold mining generally in Otago.

Nic Macarthur

Organised on behalf of the Central Otago Dredge Trust, the committee was Nic MacArthur, Cam Withington, John Barry and Royden Thomson. 80 people attended, and as had been hoped, some had worked on gold or tin dredges and many more attendees were descendants of people who had. The conference provided much additional useful information and the contacts made will greatly facilitate the collation of more information in future.

Conference sessions covered the following themes: the genesis of gold dredging in Otago; operations of the New Zealand style dredges; the transfer of New Zealand dredging technology overseas; the development of the California style gold dredge from its New Zealand predecessors; the spread of the Californian dredges around the world and back to New Zealand; one paper on the hydraulic excavator and wash plant system that supplanted bucket ladder dredging; and a final session on the issues and challenges in maintaining the heritage of this world first technology in Otago. Papers discussing the West Coast aspects of the above themes were also presented.

Among the key points arising from the papers was that the bucket ladder gold dredge developed in a series of incremental steps as the demanding conditions of the Clutha and its tributaries were progressively mastered. Terry Hearn's paper pointed out that, "necessity being the mother of invention" there was an initial need for a mechanical system that could deal with the seasonal vagaries of the rivers and the restrictions of shore claim holders. Ian Church then produced the first documented spoon dredge, based on records held in the Port Chalmers museum. Dr James Ng highlighted the subtle but crucial breakthrough that Choie Sew Hoy had made in using a McQueen dredge that could mine the river beaches rather than the riverbed alone. This was more fundamental than the invention of the tailings elevator. The

latter certainly enabled the dredging of high banks but these could only be approached out of the river because of the Sew Hoy innovation.

Fig 2 *The McGeorge No3 Dredge in the Waikaka Field, Southland.*
photo Paul Wolperis and Gore District Geology Society

On the geological side John Youngson's keynote paper synthesised the development of the Otago and northern Southland alluvial deposits starting from the Cretaceous break-up of Gondwanaland. This comprehensive approach was new to many participants and attracted a lot of interest. Royden Thomson, John Barry and Paul Wopereis, respectively presented definitive papers based on geological and production data for the Sandhills dredge, which was New Zealand's and arguably in 1891 the world's first electrically powered dredge, the giant but unprofitable Lowburn dredge, and the extensive profitable Waikaka dredge field.

Other papers related to the New Zealand style dredges at Waipori (David Hill) and Glenore (Nic MacArthur), and Karen Craw of the Hocken Collections outlined the variety of mining information available there, a plucky performance given the breakdown of the data projector. Ian Church showed that Port Chalmers had been a centre of dredge building and machinery fabrication; this had included the construction of the Molyneux dredge at Clyde and tin dredges in Malaya in the 1930s. Not only that but Port Chalmers was a hotbed of dredging

entrepreneurship through Isaac Stevenson and others including local women, not only in New Zealand but also in successful early Australian and Philippine venture

In regard to the spread of New Zealand dredging technology overseas John Barry traced the career of R H Postlethwaite from Dunedin to the United States. A feature of the conference was then papers by two American and two Australian experts: Noel Kirshenbaum of San Francisco on the development of bucket ladder dredges following Postlethwaite in California; Mort Richardson of Colorado, some time owner of Consolidated Placer Dredging Inc., initiator of the Grey River Gold dredging project, and proprietor of *World Dredging Mining and Construction*, followed with a wide ranging paper about the application of California style dredges in the United States, South America, New Guinea, and the role of F W Payne, another dredge engineer from Dunedin, in tin mining - F W Payne's consultancy became the backbone of the Thailand – Malaya tin dredging industry; Syd Griffiths' (NSW) paper outlined the initiation of tin dredging in Thailand and Malaysia and their development to world scale industries.

Damien Hynes the fourth overseas speaker, and the descendant of a Waipori winch-man, gave what was perhaps the highlight of the conference, a fascinating address delivered without notes non stop for his 30 minutes. This logged the movements and achievements of New Zealand dredge builders and dredgemasters around the alluvial world, tying in Kiwi dredge pioneering in the United States, Australia, Philippines and Malaysia. Unusually, many of these came from the small dredge field of Glenore near Milton. For example the Telford brothers were part of the Woolshed syndicate. George Telford became the dredge builder for Postlethwaite in the United States while younger brother William "commuted" between Glenore, Waikaka, California, Mexico, Victoria and the Philippines mostly establishing dredging operations. Postlethwaite had designed the Goldbank dredge at Glenore and had equipped some of the others.

Fig 3 Close-up of buckets stripping topsoil, Waikaka Field.
photo Paul Wolperis and Gore District Geological

The final four presentations dealt with the historic heritage of our world significant gold dredging technology. Much of it now lies under two hydro lakes but the surface gold rush heritage is almost equally significant. What does remain at surface is decaying and in some cases is still being vandalised even after bottle and scrap collectors have destroyed many sites. Peter Petchey pointed out that there are yet some probably world-first

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mining electrical installations at risk. Another vexatious issue is that best place to restart mining is where the old miners stopped and ironically their sites and artefacts are at risk of being destroyed by modern mining. Clearly many challenges remain. More positively Kevin Jones noted that DOC is gathering information for the possible inclusion of Central Otago in a World Gold Mining World Heritage Park.

A highlight was that many papers had good quality photographs, which were now presented in their full context. Many images came from private collections or the official archives and had not been seen publicly before. Margaret Mort's photo essay on the construction of the Rimu dredges as expertly delivered by Dave Stone was an excellent example.

Additional features of the conference comprised a field trip over the Earnscleugh Tailings that showed all generations of dredging and the associated artifacts that remain.
The Port Chalmers Museum very kindly made available their working model of a New Zealand style gold dredge as detailed in Church's paper; the model will remain in Central Stories for some months yet. Emeritus Professor of Earth Sciences at Waikato University, John McCraw, who had been the manager of the Alexandra Branch of the Geological Survey and Soil Bureau (what?) and writer of many books about the mining history of the Alexandra district, gave an extremely entertaining after dinner address about the Otago dredging communities.

All told, Buckets of Gold provided, for the first time in one place, definitive compilations of technical and social information regarding the development of gold dredging in New Zealand, complete with photos in context. Equally importantly, the transfer of the New Zealand technology and expertise to the United States and to the alluvial tin fields of Malaya and Thailand was illuminated, and the network of Kiwi dredging pioneers around the world brought to light.

The Proceedings are being revised to include late scripts and PowerPoint presentations and will be available from early to mid July though the below named people.

Finally, if anyone reading this has any information to add on their own connections with gold or tin dredging in New Zealand or overseas, please contact Nic MacArthur on 03 482 1615, email nicol.macarthur@clear.net.nz, or Cam Withington on 027 2588 581, at cam.with@xtra.co.nz

Book Review: "The New Zealand Geological Timescale", GNS Monograph 22, 2004.

J M (Mac) Beggs, *GeoSphere Ltd, Lower Hutt.*

Many months ago I was asked if I'd be willing to review the then recently-published GNS monograph 22: "The New Zealand Geological Timescale". Perhaps too readily, I agreed: I have always had mixed feelings about monographs, on the one hand appreciative of their value as reference documents but on the other hand, intimidated by the encyclopedic scope. But the die was cast, and a few days later I took receipt of a 1.22 kg (net) package.

An appreciation of geological time is one of the most distinguishing learnings from an education in earth science. My own exposure to the subject began with a second-year course delivered by the late Professor J D Campbell at Otago in the early 1970's. In the lecture theatre we progressed forward through geological time as it is expressed in the strata exposed throughout New Zealand, cementing the learning experience with field trips to several of the classic sequence exposures around the lower South Island. Facing page 1 of the monograph is a portrait of Doug Campbell arrayed with ten other "major contributors to the development of New Zealand stages, and the concepts on which they area based". It must have been difficult for the editor to determine who deserved a place in this hall of fame. The absence of those who've unraveled the stratigraphic utility of fossil flora is most notable.

Chapter One, labeled "Introduction", covers a vast amount of ground and is followed by an appendix of its own. First, the rationale for constructing and maintaining a geological timescale is presented, with due reference to the status of international knowledge. We are reminded that a New Zealand scheme emerged from the inadequacy of alternatives when our geology was being explored, and it is acknowledged that subsequent advances in many fields have greatly eased the integration of the scheme with an international timescale, and the calibration of the scale by a variety of means.

The "Timescale" monograph is a defence of stages, as well as much else. The concept of local stages was under debate at Otago in the 1970's. It is interesting to compare the current scheme of New Zealand series and stages with that published in *The Geology of New Zealand* in 1978. There has been considerable revision of the upper/later part of the column, with the Hawera Series reduced to a stage at the expense of eight former stages, the discarding of the Okehuan stage and replacement of two Pliocene stages with the Mangapanian. With real contributions from non-paleontological dating methods over this range of geological time, the usefulness of traditional stages has been called into question – notably by a note added in press to Bob Carter's paper on Pliocene-Pleistocene nomenclature in the December 2005 issue of NZJGG. These arguments are acknowledged and addressed on page 10 of the monograph, with the statement, "As long as New Zealand earth scientists continue to use New Zealand stages … there is a need to have them clearly and unambiguously defined, and that is a principal purpose of this monograph". We must each draw our own conclusions depending on the utility stages may offer our individual geological pursuits.

CGS Short Courses & Conferences

Australia - New Zealand

Centre for Groundwater Studies

See Course Registration Brochures at: *www.groundwater.com.au/short-courses.html*

31st Australian Groundwater School	Mon 10 – Sat 15 July 2006 University of WA WA
5th NAPLs and Groundwater	Tue 18 – Fri 21 July 2006 UNSW Sydney NSW
2nd Groundwater Model Calibration	Wed 30 Aug – Fri 1 Sept 2006 Brisbane QLD
32nd Australian Groundwater School	Mon 25 – Sat 30 Sept 2006 Brisbane QLD
5th Australian Groundwater Modelling School: *Conceptz; Application Visual MODFLOW;PEST*	Tues 14 – Fri 17 Nov 2006 Perth WA
1st New Zealand Getting To Know Groundwater and Surfacewater	Wed 15 – Fri 17 Nov 2006 University of Canterbury Christchurch NZ
6th Australian Groundwater Modelling School: *Conceptz; Application Visual MODFLOW;PEST*	Tues 21 – Fri 24 Nov 2006 Sydney NSW
1st New Zealand Groundwater Modelling School: *Conceptz; Application Visual MODFLOW;PEST*	Tues 28 Nov – Fri 1 Dec 2006 University of Auckland NZ
2nd Australasian Hydrogeology Research Conference 9th Australasian Environmental Isotope Conference	Wed 13 – Fri 15 Dec 2006 *(Concurrent Confs)* Glenelg, Adelaide SA

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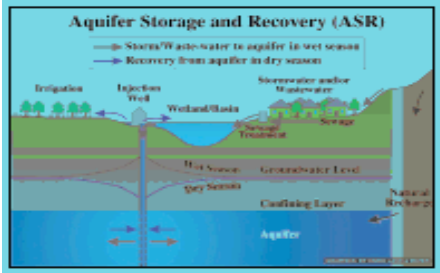

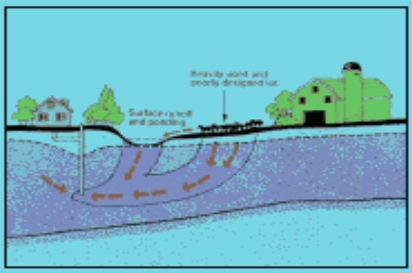

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I believe those of us who apply stratigraphy in our work will use whatever scheme seems most robust for our specific purpose. I have been frustrated to have to backwards-translate otherwise excellent work that has been referenced to international stages when the actual dating has been in terms of New Zealand stages that may have subsequently been differently correlated (eg Nelson and Hume 1977 used "late Oligocene" when discussing strata dated as Waitakian, that on modern correlation are regarded as earliest Miocene). Conversely, when available, tephras and any other radiometrically dated series are of superior utility, and in some sedimentary sequences, specific biostratigraphic schemes out-perform the stages. I have loyalty to Graeme Wilson's dinoflagellate zonation for marine strata of late Cretaceous to Eocene age, and tend to consider that its limited influence on the relevant stages suggests a hegemony of the foraminiferids (Cenozoic at least), established by Finlay and still unassailed.

The bulk of the New Zealand stage scheme (Permian to Miocene) has undergone little wholesale revision since 1978, with two Miocene stages discarded, a new stage in the early Triassic, and the splitting of a Permian stage. Many boundaries have been re-dated however. The pre-Permian stages are not "endemic", with a mixture of international and Australian units evidently meeting local requirements.

While much of Chapter One might be very useful reading for those engaged in the formal study of geology (ie a de facto text book), the rest of the publication applies a template to each epoch in a succession of 12 further chapters. This material is strictly reference matter, and the substance behind the chart (and its laminated pocket version) that will be in repeated use by so many of us for many years. A review, to do justice to the span of paleontological specializations that are integrated into the scheme, would require a team of dozens.

What is evident from an overview is how the intended uniformity is only partially achieved. Some chapters are more digestible than others, reflecting perhaps the varying number of discipline-bound authors whose contributions are unified, in turn a function of whether a single fossil group (eg graptolites) provides the whole basis for a division of time, or whether several compete for primacy (eg for the Paleogene). Also, some introductory material appears in chapters after relevant discussion in earlier chapters. For example, radiolaria are mentioned in the Jurassic chapter, but described more completely in the Cretaceous chapter.

The range charts will be of crucial importance to specialized users of this publication. I found them barely legible without a magnifying glass, but otherwise carefully presented. The text appears to have been well edited for grammar and spelling, but the figures carry a few errors: figure 1.3 has "Hamden" and "Wairakei River" mis-spelled while getting "Bryce Burn" right; conversely "Hampden" is correctly spelled in figure 1.6, but "Brice Burn" is not.

The real test of this type of publication is its shelf life, and I am confident this volume will remain a crucial reference for several decades, even while progress in refining both the relative and absolute dating of New Zealand strata must continue. As one of the authors, George Scott, has concluded in another recent publication (NZJGG, 2001), "Recognition [of bioevents that may be useful chronostratigraphic proxies is a task barely begun".
The New Zealand Geological Timescale is a must-have reference for all of us working on New Zealand strata. My review copy is already proving useful**.**

NEW ZEALAND GEOLOGY PUBLISHED OVERSEAS

Gold Concentrations in Springs at Waiotapu, New Zealand: Implications for Precious Metal Deposition in Geothermal Systems

by J.G. Pope, K.L. Brown, and D.M. McConchie…. .article on NZ geology in "Economic Geology" Vol 100, number 4, pp. 677-687.

Kerry Stanaway, *Auckland*

This paper, , describes how under-saturation with respect to *dissolved* gold in spring discharge waters might be used to discover to gold adsorbed or co-deposited with sulphides in the sub-surface spring and pool conduits. While of obvious implications for present day geothermal systems, the work may have limited use because of the difficulties of mining these sites. (Mining, however does take place at Lihir Island in Papua-New Guinea.) Traces of gold in sinters associated with extinct or waning systems may have exploration application, but again the potential may be limited, since the upper, near-surface parts of most older geothermal systems have eroded, leaving only veins and altered rock. Although never stated the ideas developed in the paper suggest that if explorers developed methods to similarly determine gold saturation in vein fluids, eg. liquid inclusions, explorers might very usefully, prior to drilling have a way to determine whether precious metals existed deeper down.

Short and succinct for *Economic Geology* this paper has only slightly over ten pages with almost five of them tables and illustrations.

Laboratory work since the 1970's reveals that gold transportation in aqueous fluids takes place using reduced sulphur ligands (HS^-), because they are several hundred times more abundant in geothermal waters than are competing similarly stable ligands such as halides. To precipitate gold dissolved from such solutions calls for either breakdown or removal of reduced sulphur, a process that can take place by oxidation, acidification, boiling, and sulphide precipitation.

Elevated gold in Champagne Pool and precipitates mean that the Waiotapu reservoir fluid that feeds it must contain gold, thus too should the other geothermal springs fed by the reservoir. Previous studies have shown that Champagne Pool cooled in a closed system that prevented the loss of reduced suphur because the boiled off gas phase enriched in sulphur was constantly fed back into the parent fluid during ascent to the discharge pool, preventing gold loss.

This study used measured gold together with other measured components, thermodynamic data and geologic modeling software to calculate a gold saturation index for each of the springs at Waiotapu. Total gold was determined by pre-concentration onto charcoal then analysis by ICP-MS—a new method for this area.

All springs in the Waiotapu field sampled by the authors were shown to be undersataurated with respect to *dissolved* gold, and in the case of the Champagne Pool, undersaturation was by

a factor of 0.4 to 0.9 times and for the other springs by 1 to 4 times. According to the saturation models developed the gold loss corresponded with the adsorbed and co-precipitated with arsenic and antimony sulphides known to exist beneath and around Champagne Pool. By inference, loss of gold in the other springs must have taken place by adsorption or sulphide co-precipitation in the feeder conduits, since it was not present in or around the springs.

Whether such "lost" gold reaches economic concentrations in the subsurface is another matter. Was it dispersed in a huge volume of permeable rock and thus rendered uneconomic? Was it concentrated in limited volume conduits, or fractures, through which large volumes of fluid passed to form veins? Even if grades seem economic, are the putative deposits too hot to mine? *Economic Geology* science is often along way from being economic! But such scientific research is a good place to start. Knowledge found one place will be applied elsewhere.

Evolution of a Submarine Magmatic Hydrothermal System: **Brothers Volcano, Southern Kermadec Arc, New Zealand** *C.E.J. Ronde & 15 others …..… .Paper on NZ geology published overseas in "Economic Geology", Vol. 100 Number 6, pp.1198-1133.*

Kerry Stanaway, *Auckland*

This beautifully illustrated paper (12 of the 35 pages are illustrations) sets out to document hydrothermal system evolution on a submerged volcanic edifice above a subduction zone. Data collected by multibeam mapping, towed camera/video, plume water analyses and dredged rock samples were compared,

- at the ends of a 3-year time span(1999 to 2002) between which times the volcano experienced a magmatic pulse shown by an increase in $^{3}He/He$ in the fluids,
- from three hydrothermal sites which spanned the range of chemical compositions seen along the Kermadec Arc i.e. from magmatic water to seawater dominance and,
- from deposits indicating recent 27 year to 1200year ages

Comparisons to hydrothermal systems above divergent mid-ocean ridge basalts show these convergent arc fluids to have more hydrogen sulphide, dissolved iron and a higher ratio of dissolved iron to manganese. A plot of the suphide precipitates on a ternary copper-lead-zinc-diagram indicated high lead, implying a partly continental crust derivation for the magmas.

The Brothers, a silicic-dacitic volcano, one of 94 along the 2500km Tonga-Kermadec subduction arc is only one 13 x 8km build-up within a volcanic complex measuring 35 x 15km. It rises 400 to 500 m above the seafloor and sports a 3 to 3.5km diameter central collapse caldera 200m deep, in which a dacitic cone has subsequently intruded, growing to 350m high. The Brothers hydrothermal sites are thought to be the most active of 28 submarine sites now documented along the arc. Subaerial hydrothermal sites occur on the North Island.

The three sites located and studied on the Brothers volcano all have hydrothermal rock alteration, and evidence high sulphidation systems emitting fluids from magmas themselves

rather than magma-heated circulating sub-seafloor waters, if not today then in the past. Around two of these sites sulphides have accumulated. Isotopes are consistent with magma-sourced fluids. Isotopes of sulphide-sulphate pairs indicate 225 to 305º C temperatures.

The first thermal site occurs in the northwest caldera wall where a system at least 1200 years old (dated using radium isotope decay) is now seawater-dominant. Fluids showed no chemical variation between 1999 and 2002. Former magmatic fluid emissions are documented in two 600 x 50m areas of 1 to 5 m high chimneys and talus. These chimneys represent choke sites along fracture conduits. The second site, another caldera wall site on the southwest rim also has a well-established magmatic derivation with sulphide-rich chimneys prominent. The youngest third site has developed on the post collapse dacite cone and in 1999 discharged high acidity (carbon dioxide) hydrogen sulphide, dissolved iron and copper (up to 3.4nM) waters that suggested direct exsolution of liquid brine from magma. By 2002 concentrations had lowered (copper fell to 0.3nM) and showed evidence of boiling within the feeder fractures.

While the Kermadec volcanic arc represents a tsumami hazard that the study of hydrothermal systems might help predict, the geothermal fluid releases also represent economic opportunity. This arises because of the unknown, but likely large number of ancient sites for this activity along the Tonga-Kermadec Arc. Extinct and dying systems may be partly or wholly buried, only detectable because of their relation to structural lineaments and morphologic features as outlined by the wonderful color images in this paper. A site on the Brothers volcano less than three thousand years old for instance, is already partly buried.

Any enthusiasm for follow-up mineral exploration is likely to be muted however by,

- the relative abundance of porphry and sedimentary basin base metal deposits in the subaerial world, with exploration and development sites emerging in places such as Mongolia Argentina, Iran, and central Africa;
- the lead times needed to develop and prove the economics of deep sea mining. The Brothers systems lie under 1800m of water. In defense of the potential, however one has to point to the depth of at least one recent land subsurface discovery;
- the unresolved issue of how to deal with newly discovered biologic systems. As indicated in the paper however, extinct and waning systems may be devoid of these potentially pesky critters. In addition systems likely to be economic are likely to be few, in contrast to the total number of life-occupied sites, and;
- the fact that this paper, like most in *Economic Geology* is long and difficult to read, so that it will seldom be read by the general run of economic geologists, mostly instead by those already committed to this avenue of research and exploration.

In the case of this paper the excellent illustrations go a long way to overcoming the last objection. The problem with *Economic Geology* articles is they seem reviewed by peers only, i.e. those already enthused by a topic. They appear not reviewed and edited by communications experts. As a result many, probably most, practicing economic geologists lacking time, long ago gave up trying to comprehend any, but those papers in their own field. If *Economic Geology* regularly put out easily read review articles on popular research themes or forced authors to halve their word count it might find a larger explorer following.

POETS CORNER

Shells. Stones. Homes. Time.
(This is carbonate sedimentology)

A snail crawls across the rock face,
Dragging the heavy shell it made from sea water.
When it dies the shell falls still,
Breaks and cracks into tiny pieces --
Leaving a pinch of sand.
There are a million snails on these rocks,
All crawling, all dying, all turning to sand.
Armfuls of shelly gravel swirl in the waves:
A beachful of sand, deeper and thicker each year –
Every new layer presses down on the old.
A thick shelly beach is buried and pressed by time.
The shells compress and dissolve into each other,
Baking a cake of rock – white and hard and grainy.
Limestone of tiny fossils:
Remains of a beach that was.
With a whirling shrieking blade the quarry is formed.
Huge cubes of white stone carved out of the hillside
Are cut and stacked like a child's blocks,
Sold and trucked away, trimmed and set –
Made solid again in the walls of a white house.
The dust settles and the house is done --
One of many white houses on the hill.
Fossils from an ancient beach form the walls,
Sand from shells of long ago,
Seawater of the past.
And a snail crawls along the wall.

Abby Smith
June 2006

TITANIC VERSES

Red rutile crystals ground, look white,
They bend and baffle light, just right.
In thin-spread coats they block our sight,
And zap at bugs in UV light.
Titanium metal, strong and bright,
From rutile ores enables flight.

Alas! High cost this wonder stuff
Due oxide bonds, titanic tough.
Source ilmenite is cheap enough,
But iron mixed stirs this rebuff,
Returns! They lack financial puff!
"Find rutile!" Our investors huff,
"Stuff ilmenite! Enough's enough!"

Now foxy rutile....object lust,
Takes crystal form in deep Earth crust.
At shallow depths red oxides bust,
As sphene and ilmenite encrust.
For rutile grains to mine we must,
Find rock iron free, inert, upthrust,
And lift abrupt, unwet, unfussed!

Add Fenner Trend to make it pay,
Where somehow iron slipped away,
Such crust unfussed, s' uncommon play.
"No way! No way!" some experts bray,
"Rutile's rare, and much too fey."
"It's such a long shot!" Most will say.

But add these thoughts, and future see,
What works today can't always be.
The need is clean, green industry,
We must, get smart, dig rutile free!

Kerry Stanaway April '96

NOTICES

INTERNATIONAL YEAR OF PLANET EARTH –2008

Vince Neall, *Massey University* *(v.e.neall@massey.ac.nz)*

At the International Geological Congress (IGC) meeting in Florence, Italy, in 2004, the Council of IUGS and the IGC issued a declaration that the geosciences can contribute significantly to a safer, healthier and wealthier world, and this potential contribution is seriously under-used by society and should be substantially increased. In wanting to achieve this goal the declaration recommended proclamation of an international year under the aegis of UN member states, to help the Earth Sciences make their full contribution to sustainable stewardship of the planet.

On 22 December 2005, the United Nations General Assembly finally adopted a resolution to proclaim 2008 as the United Nations Year of Planet Earth. The resolution designated UNESCO to organize activities in collaboration with the UN Environment Programme and other relevant United Nations bodies, the International Union of Geological Sciences, and other Earth sciences societies and groups throughout the world. By adopting the resolution the Assembly took responsibility for encouraging member states, the United Nations system and other "actors" to use the Year to increase awareness of the importance of Earth Sciences in achieving sustainable development and promoting local, national, regional and international action. The Geological Society of New Zealand, the Royal Society of New Zealand, and the New Zealand National Commission for UNESCO supported the designation.

As part of the intent of the year, it was recognised that a lead up year will be required, and that activities will cover a three year period from 2007 to 2009. Two major activities are planned – Science and Outreach. The management team hope to raise US$20 million for implementation of the Year, the bulk of which (95%) will be divided equally between Science and Outreach. A Science Programme Committee has developed ten themes, which have become the basis for a set of brochures available at www.yearofplanetearth.org. These are Groundwater, Climate, Health, Deep Earth, Megacities, Resources, Hazards, Ocean, Soil, and Life. The Committee is now calling for international expressions of interest in project development along these themes. Outreach is seen as being undertaken largely at regional and local levels, but individuals and

organizations can propose outreach projects to an Outreach Programme Committee. Further details are available on the website listed above.

Up until the designation stage, Vince Neall (Massey University, Palmerston North) has acted as Senior Adviser to the management team at the IYPE Secretariat. Now that the declaration has been approved, a New Zealand National Committee for the International Year of Planet Earth has been formed to liaise between the Year's Secretariat and the New Zealand geoscience community. It comprises Ian Graham (GNS Science, Lower Hutt), Bruce Hayward (Geomarine Research, Auckland), Daphne Lee (University of Otago, Dunedin), Simon Nathan (Ministry of Culture & Heritage, Wellington) and Vince Neall (Convenor). The Committee welcomes enquiries, expressions of interest, or applications for endorsement, from any New Zealand earth scientists or institutions that may be interested in participation.

Historical Studies Group Newsletter: - Articles needed

The next newsletter is being compiled from articles submitted to the executive, i.e., non-contributing, editor, for publication biannually. The next edition should come out in September 2006. However, at the moment there is insufficient material to make up an issue. So, to save the life of the September edition I need acceptable items to a minimum of twenty A4 pages (14,000 words). All twenty pages do not need to come from one author, of course, shorter items will make welcome contributors to the need. Articles are acceptable either electronically ('Word',please) or hard copy via NZPO.

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Tel: 64 3 4348188. Mob: 027 2317 144
email: agh@ihug.co.nz

New Zealand's ocean and its future—knowledge, opportunities, and management

The Royal Society of New Zealand is organising a 1-day meeting 16 November 2006, at the Hilton Hotel, Princes Wharf, Auckland, covering a full range of marine issues, evaluating their *status, knowledge gaps, future opportunities, and management issues*. This meeting is aimed at policy-makers, environmental managers, and advocates, scientists, enterprises deriving wealth from the sea and interested lay people. New Zealand, as a small country with a large EEZ, faces a number of strategic issues and challenges over the next 20 years.

Session 1

9.00 am How we see the sea; mental models and management paradigms. Dr Morgan Williams, Parliamentary Commissioner for the Environment
9.40 am The changing ocean Dr Phil Sutton, NIWA
10.15 am Living resources. Professor John Montgomery, University of Auckland

Session 2

11.15 am Living resources II. ***Dr John McKoy, NIWA***
11.50 am Mineral resources. ***Mr Ray Wood, GNS Science***
12.25 pm Developing the marine infrastructure. Dr George Hooper, Centre for Advance Engineering, University of Canterbury

Session 3

2.00 pm Technology and viewing the ocean. Dr Alex Malahoff, GNS Science
2.35 pm Managing human interaction with the ocean. Gill James, Ministry for the Environment
3.10 pm Strategic issues—Panel discussion. Confirmed members: Dr John Glaister, CEO Ministry of Fisheries; Ministry for the Environment; Dr Morgan Williams, Parliamentary Commissioner for the Environment; Dr Janet Grieve; Mr Peter Cozens, Victoria University of Wellington, Dr Basil Sharp, University of Auckland; Mr Harry Weake, Methanex .

4.45 pm Close

For further details check www.rsnz.org/secure/events/ocean2006.php

SOCIETY BUSINESS

GSNZ AWARDS, 2006

Nick Mortimer, *Dunedin*

The Awards Subcommittee is calling for nominations for Society awards for 2006. Except where noted, the closing date for nominations is Friday 29 September 2006. 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 or student, or even yourself where appropriate. This need not be an onerous task: short, punchy proposals are often the most convincing, provided they are complete and well-reasoned. Announcement of most recipients of the prizes will be made at the AGM and/or Conference Dinner at the Annual Conference in Palmerston North.

This year the Awards Subcommittee Convenor is Nick Mortimer. All nominations should be made by email to: awards@gsnz.org.nz (MS-Word attachments are acceptable).

AWARDS FOR WHICH 29 SEPTEMBER 2006 DEADLINE APPLIES

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 3 calendar years (2002-2005). 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 shall be encouraged to present one or more support lectures at each centre with a 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 for at least 2 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 2 referees' reports.

W.A. Pullar Prize
The prize shall be awarded to the author or co-authors of the most meritorious contribution to tephrochronological research in the New Zealand region published in the previous 3 years (2002-2005). Tephrochronological research shall be deemed to include its applications in any field of science, such as archaeology, geomorphology, oceanography, paleobotany, petrology, soil science, stratigraphy, neotectonics, wherein tephra studies are used to elucidate the past.

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 being given to a younger scientist. We would like the application to 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. Final selection is made by the President of GSNZ, but applicants are asked to submit proposals by 29 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 the award will be relatively modest (up to $750), 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.

OTHER AWARDS

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 of $750 may be awarded to New Zealand residents to pursue research in New Zealand geology. The scholarships shall be primarily to assist with research expenses of honours and masters students, and shall normally be awarded at the time that research work is about to commence. One award per year shall be offered to each of Auckland, Waikato, Massey, Victoria, Canterbury, and Otago Universities. All awards shall be made on the written recommendation of the heads of the relevant departments to the Convenor of the Awards Subcommittee, generally at the end of the academic year. Each award shall 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 during practical work. Individuals don't apply to the Awards Committee: contact your HOD if interested.

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 at the discretion of the President of the Geological Society of New Zealand, who can be contacted any time.

Student travel awards
Travel grants to the Annual Conference 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

GSNZ website

Nick Mortimer, *Website Editor, Dunedin*

Have you browsed the GSNZ website recently? It is regularly updated, contains a large amount of information of interest to members, and is now getting about 70 visits per day. Go to the website for

- contact information for committee members, branches and special interest groups
- complete list of GSNZ publications with ordering details for those in print
- web links page: easily reach NZ earth science university & government departments, associations & societies, and online maps & databases
- downloadable pdfs of abstracts and fieldtrip guides from the recent Whangarei, Dunedin, Taupo and Kaikoura Annual Conferences
- Hochstetter lecture tour and Annual Conference details
- images of New Zealand geologists and geology
- and many other useful items too numerous to mention

If anyone has any features, articles, links or corrections they would like to see on the website, drop an email to web@gsnz.org.nz .


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Kaimanawa horses, Mount Ruapehu in background
GSNZ encourages the advancement of geology in New Zealand. Membership is open to all who are interested in the earth sciences. The Society has more than 700 members, an elected national committee, eight branches and a number of subcommittees and special interest groups. Annual awards are made, a conference is held in a different part of New Zealand each year, and a newsletter is published every four months.
Geology & Genes III meeting, Wellington, 14 Jul 2006 (more info)
Bruce Hayward MNZM's 2006 Hochstetter Lecture details
Check out the new FIELDTRIPS page: download free fieldguides, bibliography, safety info
Pages hosted by
Not modified since 3 Jun 2006
Geological Society of New Zealand, PO Box 603 Te Awamutu.
email "gsnz_at_paradise.net.nz"

Taranaki Geological Society Annual Report for 2005/6

Susan Burgess, *New Plymouth*

Committee

President	**Susan Burgess *(who sent this report)***
Secretary	**Don Christian**
Vice Presidents	**Diane Toole and Ron Harris**
Treasurer	**Colin Payne**
Newsletter	**Mark Robbins**
Committee	**Joseph McKee, John Buchanan-Brown**

Programme

April: President's tour, Mike Johnston "Geo-Hazards in the community: Nelson response".
May: AGM followed by Diane Toole on the Burgess Shale deposits plus a video of the Tyrell museum, Alberta.
June: Hochstetter lecture by Jamie Schulmeister "Warming up the Last Glaciation". (Also the night of the Occultation of Jupiter, Jamie must have wondered if he would ever get any dinner!)
July: Rod Koughnet on Big Bend National Park, Texas, and recent developments at Mt St Helens.
Aug: At the museum with Kelvin Day and colleagues: Diana, archives; Andrew, Social History; Kelvin, Maori artefacts; Jenny, photographs; and a "what on earth are these?" quiz.
Sept: Bring your treasures night. A small group enjoyed a variety of geological objects including Ann de Bode's mystery fossil first described in 1871, Colin and Susan Payne's piece of actinolite found in Douglas Creek and David Hill's sculpture of serpentine.
Oct: Don Shearman, Taranaki Regional Council "Sustainable Land Management".
Nov: John Buchanan-Brown's collection of fossils, minerals and geological curiosities.
Dec: New Plymouth District Council hosted George Mason scholars Michael Turner and Thomas Platz presenting their research into Egmont Volcanics.
Feb: John Buchanan-Brown on the History of Fossil Collecting.
March: Massey students. Rachel Crimp on Volcanic Fluoride in Vanuatu. George Davies on Mangere Is sediments.
April: Chris Hollis on Cyclic Patterns of Global Climate Change.
Greg Browne "Late Cretaceous units of Taranaki Basin from NW Nelson eyes: the real foundation for NZ's hydrocarbons".
Field trip to Waitomo and Kiritehere.

Community connections

Ron Harris and Susan Burgess have been involved in leading field trips for the U3A Geology group many of whose members are also members of this society.

At the Science Fair the annual GSNZ award went to Carolyn de Jong “The Craters of the Moon” and the branch prize to Thomas Ngail “Iron from Sand”.

Membership

Membership has reached 50, the highest number in our 28 year history. Only about 10 belong to GSNZ of which we became a branch in 1987

The next few meetings :

3 July

Cornel de Ronde. *"Exciting discoveries in the deepsea: recent submersible dives on the Kermadec and Mariana volcanic arcs*"

24 July

Bruce Hayward, The Hochstetter lecture. *"Deciphering New Zealand’s geological and environmental history using foraminifera microfossils-ocean currents, human impacts,sea level rise, and earthquakes"*

7 August

Joseph McKee. *"Cold Seeps & Chemosynthetic Fauna"*

……..

A large mining corporation recently hired several cannibals. "You are all in our team now", said the HR rep during the welcoming briefing. "You'll get all the usual benefits & you can go to the cafeteria for something to eat, but please ... don't eat any of the other employees". The cannibals promised they would not.

Four weeks later their boss remarked, "You're all working very hard & I'm satisfied with your work. However, one of our geologists has disappeared. Do any of you know what happened?"

The cannibals all shook their heads "no".

After the boss had left, the leader of the cannibals said to the others, "Okay, which one of you idiots ate the geo?"

A hand rose hesitantly. "You fool!" the leader continued. "For four weeks we've been eating engineers and no one noticed anything. But NOOOooo, you had to go & eat someone who actually does something!!!"