HISTORICAL STUDIES

GROUP

NEWSLETTER

No. 5.

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GEOLOGICAL SOCIETY
OF NEW ZEALAND

"New Zealand is an admirable geological school: there travellers may see the form of Vesuvius, the dome-shaped summits of Auvergne, the elevated craters of the Caraccas, and the geysers of Iceland. Taupo, Tongariro, Rotomahana, Rotorua, and White Island are almost unrivalled geological curiosities."

- A. S. Thomson
The Story of New Zealand, 1859

EDITORIAL

A bumper issue of the Newsletter this time - we have secured a journalistic 'scoop' in being able to print Les Kermode's 'Ferdinand Hochstetter in New Zealand'. This occupies almost half the issue and because of its length and the number of contributions received from members (keep up the good work) our regular features 'In the Beginning' and ' From the Historical Studies Group Archives' do not appear in this issue.

Our Newsletter is now attracting interest from outside the Society and much interesting information is being received from these sources e.g. Garry Tee's article on Mantell in this issue. Garry has sent us a lot of material which we will be printing in future issues. We will also be printing items on James Mackintosh Bell received from Bud Cumming in Canada.

All sub-committees and specialist study groups are required to submit an annual report to the Society. I am working on this at the moment. If you have any ideas that you would like me to include (?details of current research etc.) send them to me. You will have to be quick though - the deadline is September 30.

This deadline also applies in another area - your abstract for the Society's Conference. If there is enough of them we will be able to have an Historical Session.

At the conference we will also be having our second annual meeting so bring your ideas with you when you come.

Don't forget the'Bibliography of New Zealand Geology'. We have already sent four pages of addenda to earlier bibliographies to Dallas, plus a few items in the historical field for the current project.

Alan Mason
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Herne Bay
Auckland, 1002

MONOTIS, TRECHMANN, AND HAROLD WELLMAN

Harold Wellman has provided us with some hitherto unpublished background information on a paper he, George Grindley, and Bill Munden wrote forty years ago - ' The Alpine Schists and Upper Triassic of Harpers Pass' in Trans. Roy. Soc. N.Z., vol.80. We had written to Harold suggesting that he make a contribution to our newsletter from his vast store of memories. He replied as follows:

Your letter reminds me that I am in my mid eighties and thus part of history. Soon I shall be history itself without any redress. My trouble is that I forget what has been published and what not. I am sure the spit story has been, by Pat Suggate, and I am fairly sure that this one has not.

The location is above the Regent Theatre, Greymouth, in what was then (1949) the office of the Geological Survey. Those present included Bill Sara, George Grindley, and myself.

One sunny morning who should appear but Dr. Trechmann himself. We had all heard of him but had no idea he was at Greymouth. He had a good story to tell. He had been round the schools of Greymouth and had found a single specimen of the fossil Monotis. It will be understood that he had already in 1920 described the Triassic fossils of New Zealand and was fully aware of its importance when found in the Southern Alps. It turned out that the fossil had been collected by Bill Munden who at that time was working in the Wallsend mine near Greymouth. He later rose to Mine Superintendent for the Waikato Mines

We - that is, George Grindley and myself - realised the importance of the find and arranged with Bill to revisit his site. The story is told in the joint paper by the three of us. The gist of the paper is that we found poor material at Bill's original locality but other specimens at two new localities. We made a map -none existed then- using panorama photos, and added the geology. On checking up we found that many specimens of Monotis had already been found in the Southern Alps. Our advance was not in finding the fossil but in tying it in to the rocks. I am certain that when Bill made his find Dr. Marwick was almost certain that the Monotis fossils in the Alps came from infaulted out liers, and that the main rocks of the Alps were much older. I see, on looking it up, that Jimmy Park was about right for the age of the greywacke away from the Alpine Fault, Permian-Jurassic, but far too old for the rocks nearer the Alpine Fault, Cambrian to Ordovician.

On reading through the paper on the Trent River Monotis I find that I have left out two items: How to find Monotis and how to get names attached to geographic features. Apparently the method for finding Monotis is the same as for finding Graptolites. You break many rocks choosing those of fine grain, but not so fine that they break on the cleavage, but break along the bedding planes. For the naming - Mt. Monotis and Confirmation Rill are still where we named them- we just named features that needed naming and left it to the Lands and Survey Department to use new mapping when it came their way

While he was at Greymouth we asked Trechmann if he had visited Alexander McKay during his first visit to New Zealand. As you know, McKay had found the all-important Permian brachiopod at Wairoa Gorge, Nelson in 1878 and had aged the rocks accordingly. In 1911 Bell etc. put the rocks upside down and called them all Jurassic on a supposed Inoceramus. The wrong mapping continued until 1917 when Trechmann revisited McKay's locality, refound the fossil and put things right.

Trechmann replied that he had and that he had mentioned to McKay the refinding of his fossil and had expected a warm welcome from McKay. The only response from McKay was "Well, what did you expect?". Clearly McKay had little respect for Bell etc and had full expectation of the truth soon prevailing.

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Editorial Note :

The year that Harold met Trechmann (1949) was the year of the Seventh Pacific Science Congress held in Auckland and Christchurch. In our recollection among the highlights of that Congress were one involving Harold Wellman and another involving C.T.Trechmann.

The first was Harold's landmark address on the Alpine Fault . The second was the Congress Garden Party at Sir Frank Mappin's residence in Auckland, now Government House. Trechmann evidently found the function boring (which it may well have been) as he stretched out on the lawn, dark suit and all, for an afternoon nap, oblivious to the amazed glances of the other guests

Incidentally, there is an intriguing entry for Trechmann in the Bibliography of New Zealand Geology-

'New Zealand and my Forbidden Theory of Mountain Uplift.' Privately printed for the author in 1950.

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BOOK REVIEW

Pettijohn, F.J.'Memoirs of an Unrepentant Field Geologist: A Candid Profile of Some Geologists and Their Science,1921-1981.' University of Chicago Press, Chicago and London.1987

Pettijohn was the author and co-author of two books on sedimentary rocks that made his name and were very influential in New Zealand and other countries,as well as the United States, in the fifties and sixties. With uncanny accuracy his book gives the flavour of those Surveys and University Geology Departments of the time in which I worked, in the U.S.A., Australia, Britain and New Zealand. For want of sufficient mathematical training Pettijohn never really came to terms with the revolutions in geology that were caused, after the Second World War, by the chemists, physicists and Mathematicians who had contact with geology during the Manhattan Project (the Atom Bomb). They licked their lips and moved in, using money in millions of dollars instead of cents. (They had been used to doing things that way.) Hence Pettijohn's assessment:

> Where does this leave all the avant garde geology? The mass spectrometers and the study of radioactive and stable isotopes, the microprobe, and spectrographic analysis and trace elements? These are the new and most expensive tools, which require the services of a chambermaid and a megabudget to support—tools that produce mountains of data from a shoebox full of samples gathered on a weekend collecting trip, data that a computer must record and digest. These sophisticated tools are, in the last analysis, just expensive hand lenses to look at a rock and tell us what's there. They enable us to see things we cannot see with the naked eye, but tools for observation is still all they are. They are not an end in themselves or a solution to any problem. We tend to forget that.

True, these things are only tools and methodologies, and have spawned a few isotope junkies,but they have worked revolutions.

Pettijohn's account did remind me also,that there were basically significant failures using the older approaches which, in their day, were hailed as wonders, such as studies of the heavy minerals of sandstones, and studies of roundness, sphericity and other bits of waste and nonsense.

The book contains a lot of gossip, but all young geologists who are starting out on jobs or research degrees should read it so that they can see what happens to grass-eaters when they stay in a paddock where the grass is drying out and turning brown. It does not save your soul to be cynical and unrepentant after the event. You have to make sure that you are in a paddock that is going to stay green, or turn green if you make it do so.

H. J. Harrington
Canberra

THE TARAWERA ERUPTION

Max Gage has sent us the following article which he first published in Bull. Geol. Soc. Am., v.83, 1972. In view of its historical interest we are pleased to have his permission to reprint it in our newsletter

Heiken and Lofgren (1971) draw comparisons between glass spheres making up a significant portion of the lunar "soil" samples collected by the *Apollo* missions, and air-borne volcanic glass spheres produced by fountaining low-viscosity basaltic lava at Kilauea Iki in 1959. The latter are described as essentially smooth surfaced, ranging in diameter from 2 μ to several millimeters, and composed of clear brown homogeneous basaltic glass. It is noted that spheres are normally not welded to other spheres, owing either to a low population of spheres per unit volume, or to the early formation of a thin rigid skin. Similar spheres produced by a surface explosion of 500 tons of TNT are also described.

The authors cite no other references to volcanic spheres, and the Kilauea Iki examples are presumed to be their own observations. It may be true that this phenomenon is rarely observed, but chances for survival of these fragile glass bubbles after landing must be small, and even less for their recognizable incorporation in tuff or tephra deposits. The only other example known to me comes from a non-geological eyewitness account of the June 10, 1886, Plinian eruption of Tarawera Volcano, 20 km southeast of Rotorua, North Island, New Zealand. So ephemeral was the life of these spheres that they escaped notice in geological reports of the eruption (*see* Grange, 1937, p. 10–12 for a list of references, and p. 79–84 for a summarized account). Although in a dominantly rhyolitic area, fresh basaltic magma was produced by the 1886 eruption and dispersed entirely as scoria lapilli, fine ash, and basalt-coated blocks of older lava and ignimbrite. The main eruption began at 1:30 a.m. and lasted only a few hours, but hundreds of square kilometers were devastated by mud and ash fall, the configuration of the land greatly altered by destruction of a former lake, and at least 102 persons were killed.

Roger Delamere Dansey, who was in charge of the post office and telegraph station at Rotorua at the time,[1] described millions of blue stars swirling and drifting across the sky below a pall of ash resulting from the initial upward fiery blast of the eruption. Descending, the stars disappeared before reaching the ground, presumably because their illumination was reflected from the incandescence of the volcano and from accompanying electrical discharge, which was cut off when the reflecting objects fell into the shadow of intervening hills and forest. Fearing the unknown falling objects, Mr. Dansey and those with him tried to avoid them, but one touched his hand lightly and felt cold. When daylight returned a search was made, but nothing could be seen on the ground. However, thousands of dark glass balls were seen floating off the shores of nearby Rotorua Lake. They were up to tennis-ball size or larger, thin as a soap bubble, smooth and round, and each one was pierced by a hole with a raised rim. Because of their fragility it was probably difficult to pick them up, let alone preserve them. Since the whole area became buried under ash in a later phase of the same eruption, it is not surprising that no spheres were reported afterward by geologists examining the area. Apart from size difference, the spheres must have closely resembled Figure 1(A) in Heiken and Lofgren (p. 1046).

Other detailed descriptions of the appearance of the eruption have been published, but I know of no other reference to glass balls. It seems likely that Mr. Dansey was among those questioned by the geologists collecting data afterward, so we must assume either that the falling spheres were displaced from memory by more spectacular and perilous happenings, or that they were dismissed as hallucinations not worth recording.

[1] This account is included in an unpublished collection of reminiscences entitled "Our Fathers Have Told Us." They were gathered from 1915 to 1920 by Edith Mary Storey and assembled in 1926 in one volume, now in the Alexander Turnbull Library, Wellington, New Zealand.

The case for homologous origin of lunar and terrestrial volcanic glass spheres appears to suffer from the rarity of terrestrial examples, and the Tarawera occurrence may be considered as useful support.

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Grange, L. I., 1937, The geology of the Rotorua-Taupo subdivision: New Zealand Geol. Survey Bull. 37, n.s., 138 p.

Heiken, G., and Lofgren, G., 1971, Terrestrial glass spheres: Geol. Soc. America Bull., v. 82, p. 1045–1050.

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In sending this article to us Max mentions that at the time of the eruption his mother, then 10 years old, lived at Miranda where her father was postmaster. They could hear the explosions and thought, at first, that the Russian fleet was attacking Auckland.

Max has also given us a postscript to his article -

I have since come across the obituary of Roger Delamere Dansey which appeared in 'The Katipo' (staff journal of the P & T Dept.) of October 20, 1934. It includes the text of the telegram which he dispatched from Rotorua at the time of the Tarawera eruption. It surely is an historic document which you might like to print. He went back to Rotorua after retiring in 1912 and died there at the age of 83 on August 10, 1934. -

> "We have all passed a fearful night here. The earth has been in a continual quake since midnight. At 2.10 a.m. there was a heavy quake, then a fearful roar, which made everyone run out of their houses, and a grand, yet terrible sight for those so near as we were presented itself. Mount Tarawera, close to Rotomahana, became suddenly an active volcano, belching out fire and lava to a great height.
>
> "The eruption appears to have extended itself to several places southwards. A dense mass of ashes came pouring down here at 4 a.m., accompanied by a suffocating smell from the lower regions. This immense black cloud, which extended in line from Taheke to Paeroa Mountain was one continual mass of electricity all night, and is still the same.
>
> "Between the roar of the thunder, the roaring of the three or four different craters and the stench, and the continual quaking of the earth, several families left their homes in their nightdresses, with whatever they could seize in the hurry, and made for Tauranga. Others who were lucky got horses and left for Oxford (now Tirau). Judging from the quantity of ashes and dust here, I fear serious results to the people at Wairoa and all the Natives round Tarawera Lake."

From the same ' The Katipo ' article Max has also sent us the following short biographical note on Dansey -

> During his term as P.M. at Rotorua, Mr Dansey also acted as clerk of the Court, Native Interpreter and actively identified himself with local affairs. For his services during the volcanic eruption he received the thanks of both Houses of Parliament.
>
> He was a French and German linguist above the average, while his knowledge of the Maori language and customs caused him to be regarded as an authority on native affairs.
>
> In 1900 Mr Dansey was transferred to be Postmaster, Waitara, and in 1904 he was promoted to Ashburton from which office he retired on superannuation in 1912.

For more information on Dansey and his telegram readers are referred to Ron Keam's definitive study of the eruption - 'Tarawera'.

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'TONGUE IN CHEEK' DEPARTMENT :-

Department of Geology & Geophysics
University of Sydney, FO5.

21 September 1990

MEMO to Dr G. Clarke

Re. Missing microscope

I was delighted to learn that you are to spend a field season in Antarctica and I hope that you have a most enjoyable and productive stay.

I would however like to remind you that in 1909 when Prof. T.W.E. David was in Antarctica he lost one of the Department's Swift petrographic microscopes. It was prominently marked "No 27". Please endeavour to find the missing microscope as we anticipate a large third year class in 1991.

Eric Middlemost

Eric Middlemost
Co-ordinator of microscopes

(Reprinted from Newsletter No. 12 of the Earth Sciences History Group of the Geological Society of Australia)

LAURENCE CUSSEN IN THE WAIKATO

Laurence Cussen was appointed District Surveyor at Hamilton in 1877. (Stanley, R D 1992.)

Over the next twenty-six years his work took him to every part of the Waikato basin as well as to the King Country and the Coromandel. He became keenly interested in the Waikato River and in studying its course he concluded that there had been a number of course changes in the river's history. He was also intrigued by the flights of well-preserved terraces to be seen in many places alongside the river. Cussen summarised his observations and conclusions in papers presented to the Auckland Institute in 1888 and 1893. This was the first attempt to deal in a comprehensive manner with the geology and physiography of the North Island's largest river basin, which, he said, "due to a combination of the effects of volcanic action and planetary denudation, is of more than ordinary interest". (Cussen, L. 1888, p 406.)

He postulated four course changes in the Waikato, with a long space of time intervening between each, viz: (1) via the Waiotapu valley to the sea in the Bay of Plenty; (2) through the ranges between Titiraupenga and Whakamaru; (3) via the Hinuera valley towards Matamata and the Hauraki Gulf; and (4) through the Maungatautari Gorge into the middle basin of the Waikato at Cambridge. The alluvial deposits and flights of terraces to be seen in all these areas he interpreted as evidence of a series of lakes, some of them of very large extent, which had eventually been drained by downcutting of the river, the terraces marking different stages in the lowering of the lake levels. These conclusions were no doubt influenced by his observations at Lake Taupo in 1885, where he described a terrace extending right around the lake, indicating that the water stood for a long period well above its present level.

Cussen accurately interpreted the nature of the Hinuera disjunction. "Here we have a broad, well defined valley, bordered on either side by water-worn cliffs....sloping down through Hinuwera in a north-easterly direction towards Matamata. It is confluent with the valley of the Waikato above. ... I think that this was its old natural vallley and that the Waikato once flowed through it to the sea in the Hauraki Gulf." However the reasons for the course change were by no means obvious, and although the terraces above the disjunction led Cussen to postulate the former existence of yet another lake he noted that "were the contour and levels of the valley as we now find them there would be nothing to impound the water in the lake."

He therefore concluded that the changes in the river's course were due to "subterranean movements altering the surface level of the land; aand these movements.... were of a paroxysmal character,or, at least, too rapid to allow the river to erode its channel deeper as the land rose". (Cussen, 1893, p 406).He suggested that at one time the land was "100 ft higher than now" and at another the land in the Hauraki was "1000 ft lower than now". Such tectonic explanations were widely accepted at the time; Cussen quotes work by a Mr James Stewart and by S Percy Smith in similar vein. The geologists of that time did not know about the climate-related sea level fluctuations of the Pleistocene and their significance in river downcutting and terrace formation.

However Cussen did not hesitate to contradict the experts. He argued against Hochstetter's opinion that the Middle Waikato basin was formerly "a bay of the sea, extending from the Hauraki Gulf far into the interior." He concluded instead that the basins were filled with an alluvial deposit, with no trace of marine sediments.(Cussen, 1893, p402).

Thus Cussen recognised the alluvial deposits now called the Hinuera Formation "made up mainly of rounded particles of pumice interstratified with layers of clay and rhyolite sands", noted that they were to be found in both the Waikato and upper Hauraki basins, and concluded that they were brought down by the Waikato River into both basins. Obviously he lacked the advantage of carbon dating to determine the age of the alluvium, but he observed and described both the Hinuera Formation and the Taupo Pumice Formation and was aware of the existence of a time interval between them.

Though Laurence Cussen had no formal training in geology, his analysis of the Waikato and Piako basins is a fine example of close observation, careful description and logical reasoning in the the context of the state of geological knowledge of New Zealand in his time.

On a less theoretical level, Cussen shortly before his death in 1903 reported on the proposed site for the town of Otorohanga, noting that it was very liable to flooding and recommending Kiokio, a few kilometres away, as a more suitable town site. As often happens, expert advice was ignored and Otorohanga has since paid heavily in flood damage and flood prevention work. (Norris, H C M, 1958).

R D Stanley

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Norris,H C M 1958 Talk to Waikato Historical Soc, reported in Waikato Times 14 Mar 1958.

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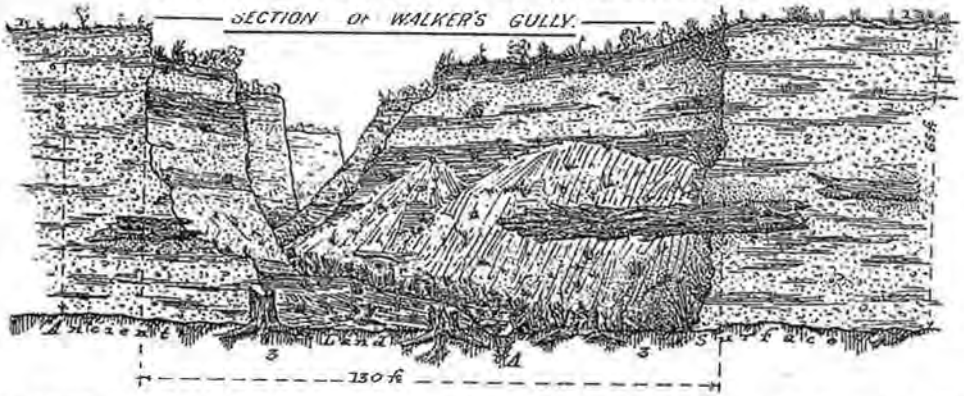


1. Land surface
2. Stratified alluvial beds of Gravel, Pumice sands & clay, inclosing trunks of trees.
A. Stream, 5 feet deep.
3. Ancient Land surface, disclosing trunks of trees as they grew, their roots penetrating the old soil.
Scale 30 feet = 1 inch.

Taupo Pumice Formation overlying Hinuera Formation at Walker's Gully, four miles southwest of Cambridge. Trans. NZ Inst.XXI 1888 Pl XXXV.

FERDINAND HOCHSTETTER IN NEW ZEALAND

Les Kermode

[This contribution was presented orally (and illustrated with 80 colour slides) as the Historical Studies Group Plenary Talk at the 1990 Geological Society Conference in Napier. Normally an article of this length would be published as two parts in consecutive issues of the Group Newsletter. However, in view of Hochstetter's importance as the "founding father" of New Zealand geology, plus the fact that some previously unpublished information is also included, it has been decided to print the full article in this issue.]

Fig.1. Portrait of Ferdinand von Hochstetter (1829-1884) taken in Vienna.
Photographer: Julius Leth. Archive: Alexander Turnbull Library, Wellington, N.Z. (F94412½).

"Through a combination of lucky circumstances it fell to my lot to provide a scientific foundation to the geography and geology of New Zealand." With these thoughts Ferdinand Hochstetter reflected on his inimitable achievements of 1859.

Christian Gottlieb Ferdinand Hochstetter was born in Esslingen near Stuttgart, in southern Germany, on 30 April 1829. He was the son of a clergyman and was educated at a local school and a church seminary. Ferdinand, like his father, was keen on natural sciences, especially geology, so as soon as he had finished the clergymen's course he transferred to Tübingen University where he presented his Ph.D. dissertation on calcite crystals. After graduation Hochstetter made a study tour which included the small, young volcanoes of the Eifel district in the Rhine valley, and eventually reached Vienna where the cultural variety and scientific opporunities of that city were a tremendous stimulus to him. The following year, at the age of 24, he joined the Austrian Geological Survey. Almost immediately his outstanding capabilities were recognised and he was sent to produce a geological map of the district surrounding mineral springs in Bohemia. In a few years he compiled and published a large map and eight other geological reports.

During the 1850s the young Austrian emperor Franz Joseph and his brother Archduke Ferdinand Maximilian were enraptured by the numerous discoveries of the natural sciences. Because the archduke was also Commander-in-chief of the Austrian Navy, he was able to plan a spectacular enterprise. A naval training ship - the sailing frigate *Novara* - would voyage around the world to show the flag, to establish trade, and, by carrying scientists on board, would achieve some exciting exploration. The prodigious output of scientific publications by the young Hochstetter led to his selection as geologist for this scientific extravaganza, and he was asked by the Austrian government to write popular newspaper reports of the expedition.

Ferdinand Hochstetter was of slight build, had a delicate constitution, and suffered throughout his life from bronchitis. In temperament he was quiet, serious, unselfish, courteous, tactful, and very industrious.

Fig.2. Portrait of Ferdinand Hochstetter, taken in Auckland, 1859.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2679).

Fig.3. Commercial Bay, Auckland, 1859. Part of panorama from Britomart Point.
Photographer: Bruno Hamel. Archive: Auckland Museum (C21530).

Novara sailed from Trieste on Hochstetter's 28th birthday, and during the voyage visited the volcanic areas of St Paul Island, southern Indian Ocean, and Java, Indonesia. Eventually, late in December 1858, after 20 months at sea, *Novara* cautiously made her way towards Auckland. The weather cleared to reveal Rangitoto Island as a perfect, model volcano. Closer to the mainland Hochstetter felt that Auckland did not correspond with the expectations and mental images that he had made of New Zealand. The Governor (Colonel T.G. Browne) welcomed the expedition and requested the leader (Commodore B. von Wüllerstorf-Urbair) to allow the geologist to visit and report on the newly discovered coal deposits south of the town. Julius Haast, who had arrived from Germany on the previous day, was elated to meet Hochstetter and so many fellow countrymen. Haast had also studied geology, but did not graduate. Although of very different temperaments, the two kindred spirits quickly got down to planning natural history explorations.

When the Christmas festivities were over, all the scientists from *Novara* journeyed by wagon to Drury with artist-surveyor Charles Heaphy, medical missionary Arthur Purchas, and Julius Haast. While the geologists examined coal deposits, the other scientists were busy examining plant and animal life. Later, the whole party struggled through dense bush, over hills, and then travelled by canoe down Waikato River to Tuakau. They returned by way of Drury Hotel. The expenses (£93) for the geological investigation were submitted to the Provincial Government.

The Auckland Provincial Council was so impressed with the Drury coal report that they wanted Hochstetter to remain and continue his geological explorations. He was most reluctant to accept the proposal, until he was assured that New Zealand would pay all his expenses back to Austria. After 17 days in Auckland *Novara* sailed for Tahiti.

Hochstetter remained, and, accompanied by Haast, Heaphy, and Purchas, examined most of Auckland's volcanic cones and craters. Hochstetter recognised that the explosion craters were similar to those he had visited in the Eifel district, and that each of the scoria cones had been built in a very short period of time. He also concluded that the white, silty deposits of the Manukau lowlands were pumice silt and dust all the way from Taupo Volcanic Zone.

Later in January, Hochstetter sailed down Manukau Harbour and was most impressed with the kauri forest of Waitakere Ranges. The party crossed Manukau Entrance and sailed by derelict boat to Waiuku, then walked over the sand dunes, which Hochstetter saw to be the raw material for a future iron industry, and followed the coast to the Port Waikato mission station. The Maori porters were amused that Hochstetter collected so many worthless stones that were, in reality, important fossil shells (Mesozoic and Tertiary) and some exciting fossil ferns (Mesozoic). The distant peak of Mount Egmont was seen clearly through the unpolluted atmosphere. Back in Auckland, based at Clermont House (Princes Street), Hochstetter was busy throughout February arranging rock and fossil collections, draughting maps, and completing sketches.

Twenty years earlier, the volcanoes of the Bay of Islands district had been visited by the American geologist James Dana, and a few years later the volcanic features of the Taupo district had been briefly described by another German, Ernst Dieffenbach. Therefore, Hochstetter resolved to make a two-month journey into the heart of the island to the active volcanoes, and the hot lakes that were often described, but never scientifically investigated. All the best of equipment was needed for this long expedition on foot through sparsely populated districts, and for camping in the open every night. The party consisted of 22 people; Hochstetter, Haast, Captain Drummond Hay (as quartermaster-interpreter), Bruno Hamel (photographer), Augustus Koch (artist-observer-curator), three assistants, and 15 Maori porters, most of whom were of noble birth.

The expedition left Auckland on 7 March and, by way of Drury, again reached Waikato River where everything was loaded into canoes. Here Hochstetter discovered that the map he had bought was little better than a blank sheet of paper. Day after day the explorers paddled, visiting the exposed coal seams near Huntly, the mission school at Taupiri, and then up Waipa River. After nine days by canoe Hochstetter walked on ahead to climb Kakepuku hill, and was able to see Ruapehu from the mission house. The party stumbled onward through poorly tracked forest, over the hills to Raglan Harbour, then travelled south, inland of Karioi, to the mission station at Aotea Harbour. Later, many shell fossils (Mesozoic) were collected from the shores of Kawhia Harbour and shipped to Auckland. A burial cave in the limestone cliffs at Rakaunui was visited. Usually the Maori people were suspicious of all English visitors as potential land-grabbers, but Hochstetter's Austrian scientific party was given every assistance.

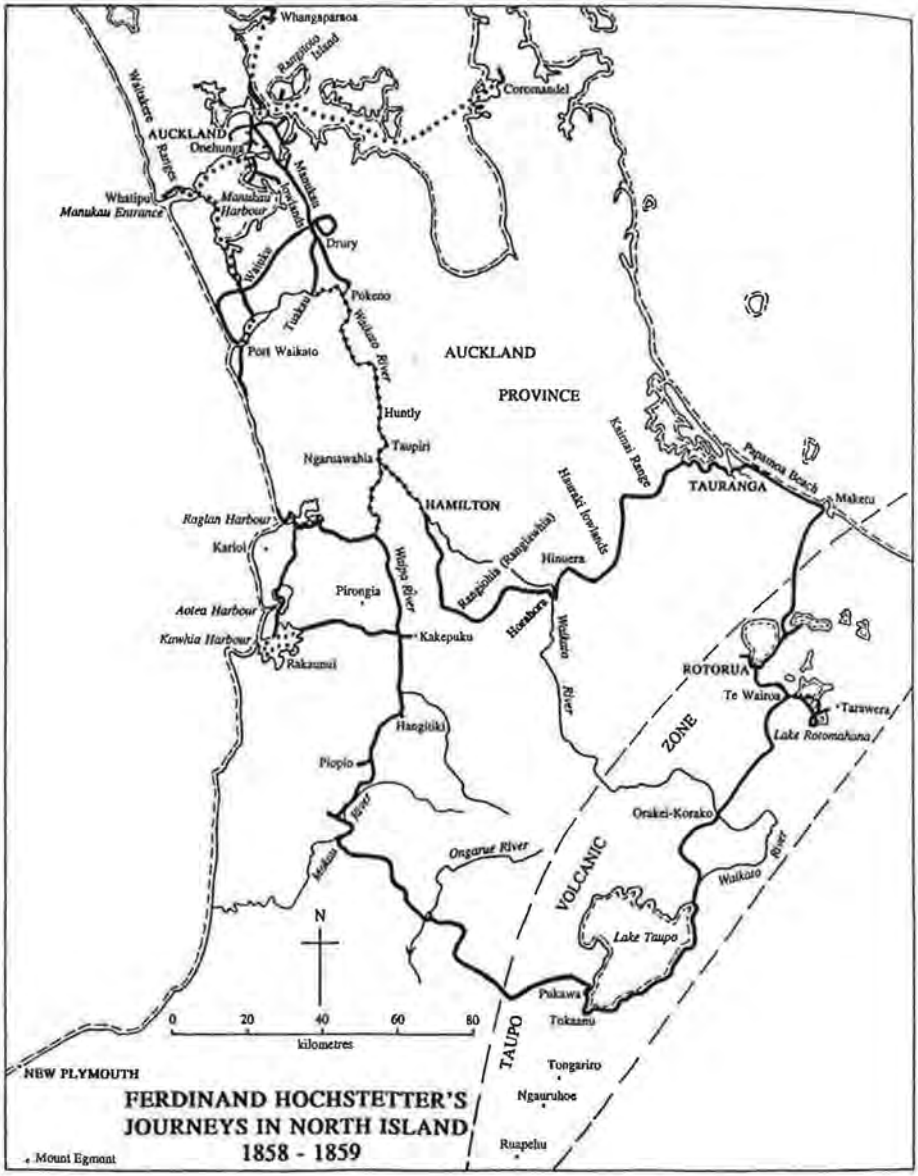


Fig.4. Map of Hochstetter's North Island journeys December 1858 - June 1859.

Fig.5. Limestone cliffs (detail) at Rakaunui, Kawhia Harbour. Compare with the engraving published in *Geologie von Neu-Seeland*, p.46.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2655).

The party tramped over the forested slopes of Pirongia mountain and returned to Waipa River for a couple of days rest before undertaking two arduous weeks in untracked forest. The photographer, with his cumbersome equipment, headed direct to Rotorua. Hochstetter visited a limestone cave at Hangatiki to search for bones of the extinct, wingless moa. Then the explorers (a party of 18) moved on through dense forest, weaving their way around limestone hollows which reminded the Austrian of the karst landscape in his homeland near Trieste. They glimpsed Ngauruhoe from Piopio hill, then descended into Mokau valley where Hochstetter did not see very much of geological interest, but kept himself busy observing the plant and animal life, and filling in details on that inadequate map he had bought, for this was country that even Maori travellers avoided. A steep climb, pushing through dense undergrowth in heavy rain, led them over another range of hills to a well-earned rest by Ongarue River. From the top of a nearby hill they were rewarded with an excellent panorama. Unfortunately Ruapehu was capped with cloud, but with the aid of a telescope Hochstetter made detailed sketches of the crater of Ngauruhoe. Numerous kiwi roamed the forest and Hochstetter collected specimens to enable him to co-author a scientific paper about them. Cathedral-like forest of rimu and totara, with an understorey of tree ferns, was common travel for the explorers.

After 14 more days in the bush, the travellers welcomed the sight of the mission station at Pukawa, near Tokaanu. Hochstetter unwisely used the first fine day to examine hot springs, and the next day when he was taken into the pa to be welcomed, he was given a most ungracious reception by a stern, gloomy man wrapped in a dirty, woollen blanket and sitting in front of an unsightly, unadorned hut - it was the great Te Heuheu, and his sense of protocol had been offended. After repeated apologies from the geologist a feast was prepared, and, for the occasion, the renowned and mighty chief dressed himself in an elegant, black suit.

The explorers were not permitted to visit the Tongariro volcanoes, because 20 years earlier, a botanist, John Bidwell, had made an unauthorised ascent of Ngauruhoe. So, without achieving the main objective of their journey, the party left with an invitation to return, except for Captain Hay, who, as agent of the English governor, was no longer welcome. They trekked past the enormous white cliffs of pumice on the eastern shore of Lake Taupo and down the Waikato River trail to Orakei-Korako thermal area. As Hochstetter crossed the scrubby, tussock-covered plain (that today is planted in pine forest) he believed he could see a relationship between volcanoes, hot springs, and fault lines, similar to what he had found in Bohemia.

After another eight days in the scrub and bush, the Te Wairoa mission station was indeed a welcome sight, but scientific examination of the hot lakes and springs was not to be frustrated by rest and relaxation. Hochstetter kept himself busy exploring, sketching, sampling, and photographing. He camped on an island in the middle of old Lake Rotomahana, but did not realise that within 28 years the whole landscape and 153 people would be wiped out by the Tarawera eruption. The map he drew of Lake Rotomahana proved invaluable when geological investigations were made into the devastated district. The hardworking Hochstetter enjoyed the comfort of the mission house to celebrate his 30th birthday, and then spent another six days in Rotorua visiting boiling mud-pools, geysers, and cold springs.

The party (together with other travellers) tramped down to the mission station at Maketu on the coast, and along Papamoa Beach to Tauranga (Te Papa mission station). Here Hochstetter was asked to mediate in a protracted and armed feud which embroiled some local Maori families. The route onward was up and over the forested Kaimai Range, across the confusing swampy Hauraki lowlands, past the bluffs of Hinuera stone, and over Waikato River by means of a log bridge near Horahora.

Hochstetter and Haast spent a night at Otawhao mission station near Rangiohia (Rangiawhia), then the party reassembled at a nondescript settlement (now called Hamilton) and once again used canoes for transport to Ngaruawahia. After an audience with the Maori king, Potatau, they continued down Waikato River by canoe to Pokeno and arrived back in Auckland on 24 May. This amazing journey had taken 78 days.

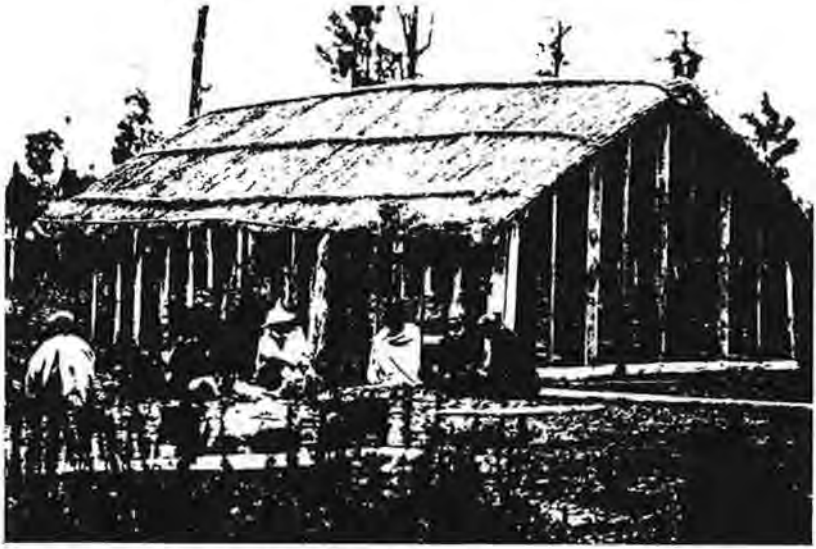


Fig.6. Reception by Takerai of Hochstetter's exploring party near Waipa River.
The visitor on the left (wearing hat) is probably Hochstetter.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2654).

Fig.7. Detail from the "Geological Formation of the Auckland District" by Ferdinand Hochstetter. This large map is thought to have been compiled (possibly by Charles Heaphy, or under his supervision) for Hochstetter's lecture in June 1859. Archive: Auckland Museum (C25904).

Once again it was time to arrange rock and fossil collections, draw maps, complete sketches, and study the results from the camera. Bruno Hamel the photographer was paid off (£35). In June, Hochstetter gave a public lecture on "the geology of the Auckland Province". It was published in the government gazettes, as a newspaper supplement, and later in book form. His coloured geological maps were printed three years later in Germany. The final expenses account that was submitted to the Auckland Provincial Government included: fare to Trieste £165, accommodation in Auckland £130:12:6, Hay's salary at £25 per month, a tent £4:5:0, Maori porters' wages £336:12:6, and so on.

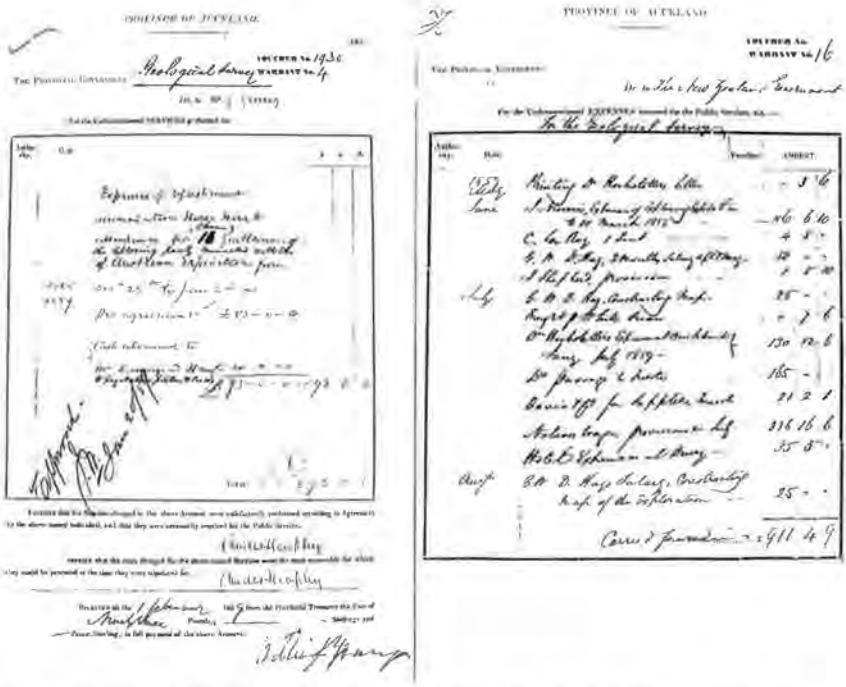


Fig.8. Expenses Vouchers authorised by the Auckland Provincial Government for the Novara-Expedition, and for Hochstetter's explorations around the province. Archive: Auckland Museum (MS18, C25905, C25906).

The settlers of Nelson were very keen for their mineral-rich province to be explored and evaluated by Hochstetter and Haast. So, late in July, the two geologists sailed from Onehunga on board the steamer *Lord Ashley* and called at New Plymouth, where they had a magnificent view of Mount Egmont, then a stormy journey took them to Wellington for one day, before continuing to Nelson.

During the next two months the nature of Hochstetter's work was more as a mining consultant than as a geological explorer, for he travelled around at the wish of prominent settlers who hoped to profit from the mineral industries of gold, copper, and coal. Although his investigations and journeys lacked an overall scientific plan, he thought that every step was attended with new results.

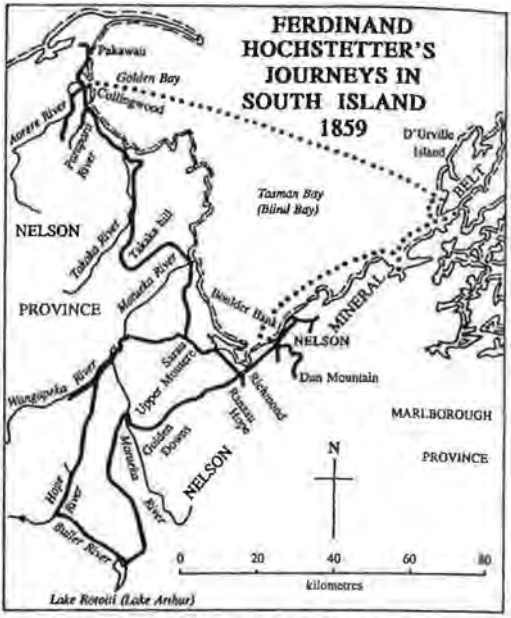


Fig.9. Map of Hochstetter's South Island journeys, August - September 1859.

After visiting a small coal mine in the rugged hills south of Nelson, the geologists were taken by the coastal steamer *Tasmanian Maid* to D'Urville Island to examine the colourful deposits of copper minerals, then the ship sailed overnight across Tasman (Blind) Bay and Golden Bay to Collingwood.

Two years previously gold had been discovered in the Aorere and Parapara valleys and men of all ages, and every occupation, were laboriously shovelling the river gravels in wet, dangerous conditions. Some of these miners had also visited small limestone caves nearby to fossick for moa bones, to satisfy the overseas demand for skeletons of the giant, wingless birds. The two geologists had not found any deposits of moa bones during their North Island journeys, so, as well as giving geological advice to the gold-diggers, they excavated some complete bird skeletons from the caves.

Hochstetter went around the bay to Pakawau where a small mine, in the forest to the west, produced good quality coal from very thin seams. He returned along the coast to rejoin Haast and to inspect an abandoned coal mine in Takaka valley. Travel through the open beech forest was very different from their struggles with the dense undergrowth of the North Island bush. The geologists crossed over the treacherously sharp marble outcrops of Takaka hill, descended into Motueka valley, and later were nostalgically delighted to find two small German settlements, at Upper Moutere (Sarau) and Hope (Ranzau).

While Hochstetter was based in Nelson (Trafalgar Hotel) he visited the long Boulder Bank that sheltered the harbour so magnificently, and he collected some important fossil shells (Mesozoic) from near Richmond. Some of the short Nelson field trips were provided with delicious lunches, such as cold chicken pie with champagne, which contrasted starkly with the North Island bush meals of crackers, boiled potatoes, pork, and a mug of sweet, black tea. A walk through beautiful bush started a two-day visit to barren Dun Mountain and the nearby copper mines. Here Hochstetter gathered samples which enabled him to describe and name a new rock "dunite".

While Haast made a quick reconnaissance of Marlborough, Hochstetter made a final exploring excursion for two weeks up Motueka and Wangapeka valleys. He crossed into Hope valley and tramped up the tussocky Buller River flats to Lake Rotoiti (Lake Arthur) where he identified the southern end of the Nelson mineral belt, and enjoyed a distant winter view (more than 200 km) along the Southern Alps. His return route was down Motueka valley to Golden Downs where for the last time he camped in the open using a triplefold blanket sack.

At the end of September Hochstetter gave a public lecture on "the geology of Nelson Province". It was published in the government gazettes and as a supplement to a local newspaper. His coloured geological map was later printed in Germany. Early in October, Hochstetter sailed by the steamer *Prince Alfred* for Sydney. He then visited the Victorian goldfields and sailed by the steamer *Benares* (via Mauritius and Suez) to eventually reach Austria early in January 1860. Julius Haast remained in New Zealand to continue geological investigations in Nelson and Canterbury Provinces.

Novara-Expedition had spent 28 months making explorations around the world and returned to Austria four months ahead of Hochstetter. The huge volume of material collected was then studied, but, despite many scientists becoming involved, it was 17 years before the 7-volume Novara project (K. Scherzer, chief editor) was finally completed. Immediately after his return to Vienna, Hochstetter visited London for several months to compare his findings with material held at the British Museum. While he was there he also discovered that his map of the Auckland volcanoes had been plagiarised and published by Charles Heaphy.

The geological volume on New Zealand (*Geologie von Neu-Seeland, 1864)* was completed within four years by Hochstetter himself. However, his most important work was *Neu-Seeland (1863),* written at the same time in an enthusiastic, narrative style and copiously illustrated. The English edition *(New Zealand, 1867)* was revised and many chapters were rewritten, but the author was then embarrassed by the New Zealand Government's long delay in paying its share of the publication costs. Another important work was the *Topographic-Geologic Atlas of New Zealand, 1863* (English and German editions) co-authored with August Petermann. Hochstetter published a further 21 reports about New Zealand.

Dr Ferdinand Hochstetter was undoubtedly the best-known scientist of Novara-Expedition. His patron, biographers, and admirers were enthusiastic. He was honoured by numerous scientific societies throughout Europe, and a personal royal title (von) was bestowed on him. On his return to Vienna Hochstetter was appointed Professor of Mineralogy and Geology at the Imperial Polytechnical Institute and was chosen to be geology tutor to the Austrian crown prince. His inaugural lecture as vice-chancellor of the technical university was on "geology and railway construction", and from it he is credited with originating the term "engineering geology".

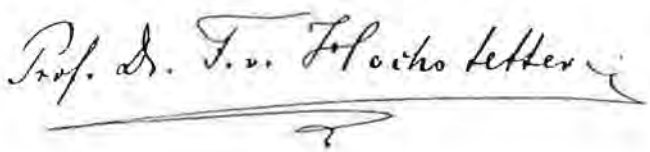
In 1861 Ferdinand Hochstetter married Georgiana Bengough, an Englishwoman, and they raised a family of eight children.

Honours never ceased; nor did the numerous new duties that this untiring scientist undertook. Despite his extra committees and prestigious lectures, Hochstetter was appointed to establish the new Imperial Natural History Museum in Vienna. Exchange exhibits were arranged, especially with Julius Haast who had continued to be involved in geology and exploration in New Zealand and was at that time establishing Canterbury Museum in Christchurch, where the employment of Andreas Reischek (as taxidermist), was recommended to Haast through Hochstetter.

Hochstetter's lifelong throat ailment eventually forced him to relinquish his teaching activities. However, although suffering from worsening diabetes, he continued his museum work for another three years until a minor foot injury caused a rapid deterioration in his health. On 18 July 1884, Ferdinand von Hochstetter died in Vienna, at the age of 55 years.

Hochstetter was a great scientist with a wide, comprehensive approach. He loved the interaction between major fields of study, as is so well demonstrated in his museum activities and in his outstanding volume *Neu-Seeland*. He was not a head-in-the-clouds scholar, but followed up his research with well-illustrated, popular presentations of the technical results. He did not shrink from the strain and discomfort of geological field work, nor from the fatigue of world-wide travel by land or sea. Nevertheless, he was at ease and confident in the presence of royalty. His talent for organisation brought many challenges to promote research, initiate congresses, and establish exhibitions, the most famous of which was the natural history museum in Vienna.

New Zealand scientists and geographers have also honoured Hochstetter by giving his name to a unique, native frog (*Leiopelma hochstetteri*); a large, carnivorous, native, land snail (*Paryphanta (Powelliphanta) hochstetteri*); a small lake (42°27′S, 171°40′E) and a nearby mountain (42°31′S, 172°01′E); a second, higher mountain (43°30′S, 170°20′E); and a steep glacial icefall (43°36′S, 170°11′E).



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GIDEON MANTELL - THE NEW ZEALAND CONNECTION

(Gideon Algernon Mantell, 1790-1852, was a prominent member of that group of English geologists, which, in the early nineteenth century, was largely responsible for the development of geology as a separate science.)

With the recent discovery of dinosaur remains in this country, interest is rekindled in the fact that the National Museum in Wellington has two of the world's most important dinosaur fossils - the Iguanodon teeth discovered by Mrs. Gideon Mantell in Tilgate Forest, England in 1822. This was the first recorded discovery of Ornithischian dinosaur remains and in his published account of the fossils (Phil. Trans. Roy. Soc.,1825) Gideon Mantell shares with William Buckland the honour of pioneering dinosaur studies.

The New Zealand Mantell connection goes further than the score or so original Mantell fossils at the National Museum. There are other fossils at the Institute of Geological & Nuclear Sciences and the Mantell papers in the Turnbull Library are the most important resource centre in the southern Hemishere for the early history of geology.

Garry Tee of the Department of Mathematics and Statistics at The University of Auckland has been an active researcher of New Zealand Mantelliana (and other aspects of early New Zealand science) for a number of years. We are grateful to Garry for allowing us to print the following text of a talk which he gave at a Vertebrate Palaeontology conference at the British Museum (Natural History) in 1982. This is the first published version of that address. As a consequence of Garry' talk, the location of these important type Iguanodon fossils was listed by Ronald J. Cleevely in a reference work,'World Palaeontological Collections'published by the British Museum (Natural History) in 1983

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In the spring of 1822, Mary Ann Mantell found two strange teeth in the coarse conglomerate of Tilgate Forest, near Lewes in Sussex [Mantell 1822, pp. 54-55; Mantell 1827, p.71; Mantell 1833, p.268; Mantell 1857, v.1., p.436]. Her husband Dr. Gideon Algernon Mantell (1790-1852) subsequently named the animal with those teeth as the Iguanodon when he recognized their similarity to the much smaller teeth of modern iguanas, and Mary Mantell's discovery is regarded as a major event in the initial discovery of dinosaurs [Delair & Sarjeant 1975].

Her son Walter Baldock Durrant Mantell (1820-1895) was apprenticed as a surgeon to his father, but in 1839 he ran away to New Zealand [Tee 1981]. Later he became reconciled with his father and sent very many scientific specimens to him [Spokes 1927, pp. 202,223,227]. Walter presented those first-found fossils of Iguanodon, together with a small selection from the many fossils collected by his father, to the Colonial Museum in Wellington, in memory of his parents. They are now in the successor to that museum, the National Museum of New Zealand in Wellington.

In addition to the two Iguanodon teeth there are about 25 choice fossils, mostly of fish and other marine organisms. Each item has attached to it a label written in ink which is faded but quite legible, and there is a general label announcing that those fossils once belonged to Dr. Gideon Algernon Mantell. The labels for the teeth declare that those are the actual specimens which Mrs. Mantell found in 1822.

Casts of those famous teeth were distributed to many people and institutions by Dr. Mantell, but their present location appears never to have been published. The biographer of Dr. Mantell lamented [Spokes 1927, Preface] that he had found few letters or other papers of Dr. Mantell, and that Mantell had not published any memoirs. However, he did add a final sentence to the biography (on p.252) reporting the then-recent gift (in 1927) of a vast collection of papers and other relics of Gideon and Walter Mantell to the Alexander Turnbull Library in Wellington, by the widow of Walter's son. That Mantell Collection is a major source of material for the history of the natural sciences in the first half of the 19th century [Hoare 1976], and a brief account of it has recently been published [Dean 1980]. It includes letters written to Dr. Mantell by almost every significant natural scientist of that period, ranging from Mary Anning to Charles Darwin, with over 270 letters written by Charles Lyell [Wilson 1972, Bibliography].

Despite the assertion of his biographer, Dr. Mantell did publish some personal memoirs [Mantell 1940, p.194], as the anonymous pamphlet Memoirs of the Life of a Country Surgeon [Mantell 1845]. The Alexander Turnbull Library has a copy of that rare pamphlet (not as part of its Mantell Collection), which is of considerable value for the study of Mantell's life, even though it does not mention geology. It gives an account of the hardships of the medical profession, with much unknown personal detail of Mantell's education, apprenticeship and practise.

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Since delivering this paper Garry has identified several other items of New Zealand Mantelliana including the microscope presented to Mantell in 1842 (at the Turnbull Library). The Historical Studies Group is now also involved in the investigations and we hope to bring you more information in a future Newsletter

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PUBLICATIONS

This year our two overseas members, Larry Harrington and Brian Mason, have both published biographies.

Larry's contribution, with co-authors A.J.Yeates, D.F.Branagan and G.H.McNally is 'Sixty years on the Rocks. The Memoirs of Professor Alan W. Voisey' (124pp.) It is a publication of The Earth Science History Group of the Geological Society of Australia. It is priced at A$20 pus postage and is available from the Society Secretary -

G. McNally
Department of Applied Geology
University of New South Wales
P.O.Box 1, Kensington, NSW 2033
Australia

Brian's 'Victor Moritz Goldschmidt: Father of Modern Geochemistry' (210pp.) is Special Publication No.4 of the Geochemical Society. Price is US$40 incl. postage and it can be obtained from -

The Geochemical Society
c/- Prof. John S. Dickey Jnr.
Div. of Science, Mathematics and Engineering
Trinity University,
715 Stadium Drive
San Antonio, TX 78212
U.S.A.

Both Larry and Brian knew their subjects personally. Larry was for many years on Voisey's staff at the University of New England and Brian was Goldschmidt's last post-graduate student although his studies came to an abrupt end in 1940 when Nazi forces invaded Norway.

Larry and Brian are not the only members of our group to publish books of historical interest within the last few years. Ron Keam's 'Tarawera' (472pp.), a magnificently produced, comprehensive study of the eruption was an Ansett Book Award prize winner.

Perhaps the Historical Studies Group should start a Memoir Series. We already have Nos. 1,2, and 3.

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SOME EARLY RECORDS OF EARTHQUAKES IN NEW ZEALAND (Part 1)

Maori tradition speaks of two earthquakes in New Zealand in pre-European times -

In the mid fifteenth century in the Wellington area and in the late sixteenth/ early seventeenth century at Lake Omapere in Northland. Only the first of these is supported by geological evidence (Eiby,1968, pp.20,21)

The first written record of a New Zealand earthquake is given by George Forster in his account of Cook's second voyage (Forster, 1777, vol.1,p.199) -

> On the 11th of May, being the ſame day we ſailed out of Duſky Bay, ſeveral of the Adventure's people, who were at work on ſhore, or diſperſed on ſhooting parties, diſtinctly felt a ſhock of an earthquake; but thoſe who remained on board, did not perceive any thing of it. This circumſtance may ſerve to evince the probability of volcanoes on New Zeeland, as theſe two great phænomena on our globe ſeem to be cloſely connected together.

Forster, who was with Cook on the 'Resolution' (in Dusky Sound at the time), is here referring to two shocks felt by the companion ship 'Adventure', under Captain Furneaux, in Queen Charlotte Sound on 11 May 1773.

The episode is also mentioned by Furneaux in Cook's official account of the voyage (Cook,1777,vol.1,p.120) -

> " On 11th of May, we felt two severe shocks of an earthquake, but received no kind of damage. "

However, Forster's book was published in March 1777, si×

weeks before Cook's, so his account has priority as the first written record of an earthquake in New Zealand.

The next recorded earthquake in New Zealand was on Sunday, 2 December 1792. The record is found in the journal of the 'Britannia' which visited Dusky Sound in 1792, and there left the first sealing gang ever placed on the coast of New Zealand. The original manuscript of the journal, written by Robert Murray (or Murry) is held in the Essex Institute, Salem, Mass., U.S.A.but an extract was published by McNab in his 'Murihiku' (McNab 1907). The following is from pages 322,3 of 'Murihiku' -

> " What we in the following days work. supposed to be a shoal, we afterwards found from our peoples information, was the Shock of an Earthquake, it was felt in a more violent manner by the people at the House, its being felt in the boat strengthens the supposition.
>
> Sunday Decr. 2, 1792.
>
> 2 P.M. we got underway and made sail out of Facile Harbour when in the Sound we saw the boat coming toward us. brot. too untill she came on board, just as the Capt. was on deck the ship having very little headway touched upon a rock or shoal, but so lightly as to be hardly perceived, the other boat in which was the mate, just came up and they said a tremor similar to what we had felt had but that inst. been felt in the boat. What this may arise from it is hard to conjecture, there was a considerable swell setting in to the bay— if this had been a shoal we must have felt it more sensibly than we did—the ship instead of striking as on a rock— trembled to a violent degree—this water looked as in deep water. "

McNab's extract of the 'Britannia' Journal was also included in his later work 'Historical Records of New Zealand' but after the first paragraph of the portion quoted above he interpolates the following -

"(Tabular matter omitted - THE EDITOR)"

The 'Tabular matter' may be merely a schedule of physical observation as is often found in Ship's logs but it could be significant that McNab makes no similar interpolation

elsewhere in his extract. Is it possible that the 'Britannia' monitored the effects of the earthquake ? The answer may be found in the McNab papers in the Turnbull Library.

Records of earthquakes experienced by some of the first european visitors to southern New Zealand and the sub-Antarctic Islands are scattered throughout McNab's 'Murihiku' which is a scholarly account of the early history of the area. Most of these refer to Macquarie Island and will be discussed in a later Newsletter. There is, however, one further mention of a mainland shock; at Doubtful Harbour, Thompson Sound. It was recorded by the sealing schooner Unity some time between August 1809, when she left Sydney, and August 1810, when she returned. McNab (1907,p.110) quotes from the shipping news of a Sydney newspaper -

> "....the people felt most sensibly the effects of an earthquake, the vessel trembled, and a noise like that of casks rolling about her desks lasted for 3 or 4 minutes"

The first paper on 'the Geology of New Zealand' was published by the Rev,Richard Taylor in the second (and last) issue of 'The New Zealand Magazine' in April 1850 although the first issue of that magazine had contained an article by W. B. Mantell 'On the Geological Structure of the Middle Island of New Zealand'. In his paper Taylor (1850, p.106) reports as follows -

> **From the evidence of a person who was formerly engaged in sealing at Dusky Bay, as far back as the year 1823, it appears that from 1826 to 1827 there was an almost constant succession of earthquakes, some of which were sufficiently violent to throw men down. At times he and his party, who then resided on a small island, were so alarmed lest it should be submerged, that they put out to sea: there, however, they found no safety, for such was the flux and reflux of the ocean that they were in the greatest danger of being swamped, and were thankful to get on shore again. The sealers were accustomed to visit a small cove called the jail, which was a most suitable place for anchorage, being well sheltered with lofty cliffs on every side, and having deep water in it close to the shore, so that they could step out on the rocks from their boats. It is situated about eighty miles to the north of Dusky Bay**

After the earthquakes the locality was completely altered, the sea had entirely retired from the cove, so that it had become dry land. Beyond Cascade Point the whole coast presented a most shattered appearance, so much so that its former state could scarcely be recognised. Large masses of the mountains had fallen, and in many places the trees might be seen under the water.

(The wholesale sliding of soil and trees also accompanied the 1929 Murchison earthquake and the stripped mountains were still visible in 1946 - H.J.H.)

Taylor also mentions a series of shocks at Wanganui in 1843 (p.105), at the same time proposing a theory on the migration of foci. -

From the sea to the base of Taupo there is a regular series of stages, one rising higher than another, until we arrive at the central plains of Tongariro. But although it is evident much of the upheavement of the land occurred during the time these volcanoes were in eruption, it is equally so that even yet the land is rising. This must now solely be attributed to the agency of earthquakes. The southern and central parts of this Island appear to be the principal seat of their action; and though in general the shocks are slight, yet, periodically, every five or six years, they have been more violent, and consequently their effects more serious. In the year 1843, Wanganui was the centre of movement, most of the chimnies in the settlement were then thrown down: the earth opened in parallel fissures; the cliffs had every appearance of being upheaved a foot on one side of the river, whilst the ground on the other side, perhaps, subsided as much. The shocks invariably came from the same quarter, W.N.W. Much sulphureous gas also escaped. The movement seemed chiefly to follow the course of rivers, whose channels may be regarded as fissures on a large scale. In 1848, a series of heavy shocks was felt, which were most severe at Wellington and its vicinity, where they did such damage, that scarcely a brick house or chimney in the town was left standing. This last visitation established one interesting fact, that the disturbing cause is not stationary: the quarter from which it proceeded has shifted from W.N.W to W.S.W. since the year 1843. It therefore becomes highly probable that this elevating power is gradually moving southward, and this idea seems to be confirmed by the frequency of earthquakes at Wanganui being greatly diminished since the seat of action has changed, which also leads us to infer that their present occurrence at Wellington will, likewise, be only for a period.

In his book 'Te Ika A Maui' Taylor gives the date of the Wanganui Earthquake as 8 July 1843 (1855, footnote p.226) and as he took up his position at the Wanganui Mission Station at the end of April that year his account of the event is almost certainly first hand . 'Te Ika A Maui' gives

additional details of the Wanganui shocks but the theory of 'migrating foci' is watered down.

'Te Ika A Maui' quotes from a number of documents on the 1848 and 1855 Wellington Eartquakes. A dispatch from Lieutenant-Governor Eyre dated 19 October 1848 (pp.228,9) commences

> "It is my most painful duty to inform your Excellency that terrible calamity has overtaken this province: an earthquake has occurred, and the town of Wellington is in ruins "

Eiby (1968) gives acomprehensive list of New Zealnd earthquakes up to the end of 1845 based on exhaustive documentary research and gives much additional information on the Wanganui episodes of 1843. Henderson (1932) also gives an historical summary. With the 1848 Wellington event we enter the period of well-documented, if not always scientifically researched, New Zealand Earthquakes.

In a future Newsletter the authors will discuss some early reports of earthquakes in the subantarctic islands.

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H. J. Harrington, Canberra

A. P. Mason, Auckland

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Almost sixty years ago, 'Sam' Maling, a member of the Historical Studies Group spent two years with the Anglo Iranian Oil Company in the Middle East. He has sent to us the following poem, first published in 1935 in 'Jottings', the local news sheet of the Masjid -i-Suleiman field. Although published anonymously 'Sam' thinks that it was written by an accountant on the company staff.

Q U E R Y

I have often wondered idly,
Can a Miliola B ?
Or do men who travel widely
Fancy things they never see ?

Who has seen a Gumbelina
Gainst the table by his seat,
Or has known a microfauna
Pon the ground before his feet ?

Who has found his mistry frying
Fillets from an Ostracod,
Or has ever caught him shelling
Peas from any Gastropod ?

When has Jottings known anhydrite
Bitter letters to complain,
Or an ode upon the Club night
In a lighter, calcite vein ?

Who, when it was getting dusky,
Ever lit an argillite,
Or with quartz of beer or whisky
Ever made a haematite ?

Who, in fact, has ever pondered
Whether dolomite have been,
Or, where'er he may have wandered,
Ever has an Eocene ?

In explanation, Sam informs us that the cook was known by the Persian term 'mistry'and he comments that the term was "very apt as to what we might expect at meal times". He goes on to comment that the Asmari Limestone was capped by a thin bed of anhydrite and Miliola B was an important foram indicating that the drillers were approaching a critical level.