Newsletter

of

The Geological Society of NEW ZEALAND

No. 9 DECEMBER 1960

GEOLOGICAL SOCIETY OF NEW ZEALAND

NEWSLETTER

No. 9 December 1960

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AIMS OF SOCIETY

The Geological Society of New Zealand was founded in May, 1955. Its objects include fostering investigations into the varying fields of earth science and serving as a medium for the expression of the views of New Zealand geologists. Membership is open to all those interested in the various branches of geology, geophysics, oceanography, mining, and the utilization of minerals and rock products.

THE NEWSLETTER

The Society publishes a Newsletter twice a year. Contributions such as personal notes, reports of meetings or conferences, descriptions of field trips, reviews or criticisms of recent publications, and similar items, will be welcomed by the Editors, c/o N.Z. Geological Survey, P.O. Box 368, Lower Hutt, New Zealand.

Unless specifically indicated, opinions expressed in the Newsletter are not to be regarded as the official views of the Society.

OFFICERS

Officers of the Society for the present year are as follows:-

President	-	Mr J. Brodie, Oceanographic Institute, Wellington.
Vice President	-	Dr R.P. Suggate, N.Z. Geological Survey, Christchurch.
Secretary	-	Dr J.B. Waterhouse, N.Z. Geological Survey, Lower Hutt.
Treasurer	-	Mr T.L. Grant-Taylor, N.Z. Geological Survey, Lower Hutt.
Committee	-	Mr. J.D. Campbell, Geology Department, University of Otago, Dunedin.
		Mr J. Healy, N.Z. Geological Survey, Rotorua.
		Mr W.F. Heinz, 14 Cox Street, Merivale, Christchurch.
		Prof. A.R. Lillie, Geology Department, University of Auckland.
		Mr J.D. McCraw, Soil Bureau, Alexandra.

AUCKLAND ACTIVITIES

The Auckland section of the Society has held regular meetings during the winter, with Mr E.J. Searle as Chairman. Mr Duncan Dow, a geologist with the Australian Bureau of Mineral Resources, gave a talk on the gold mines in New Guinea. Mr D. Kear discussed the young scoria cones and basalt flows of the Bay of Islands area from the points of view of deducing ages and inferring movements of volcanism with time. Mr B.N. Thompson described the application of geology to North Island Hydro-electric dam sites, and illustrated his talk with sections and maps of individual projects. Mr J. Healy gave a talk on the relation between heat flow and volcanism, which was followed by an extremely lively discussion on the many problems associated with rock type, time, and mechanism of volcanism.

Two University of Auckland M.Sc. graduates have departed for overseas. Mr E.N. Milligan has left for Canberra, and Mr L.N. Clarke has taken up a position with the Anglo-American Mining Corporation in South Africa. Current "honours" field mapping has been started by Mr D.L. Skinner at the northern extremity of the Coromandel Peninsula, and by Mr M.G. Laird in the area between Raglan and Whatawhata in South Auckland.

The main task of the Geological Survey in the Auckland area is the production of 4-mile maps. Sheet 2B (Barrier) has been printed and Sheet 4 (Hamilton) will follow it shortly.* Sheet 1 (North Cape) has been completed and is now being draughted, and Sheet 2A (Whangarei) is nearing completion. Two bulletins on the Mangakahia Subdivision and on the Jurassic Sequence at Kawhia are in page proof stage.

The only representative of the Auckland area to visit Copenhagen for the International Congress is Dr R.N. Brothers who, by all accounts, has been having an enjoyable period of work at the Imperial College, London. He is due to return to New Zealand in time for the next University year.

The numbers of geologists in Auckland have been swollen by the recent arrival of Mr A.M. Quennell who has retired from the position of Director of the Tanganyika Geological Survey and now resides in Auckland, and of Mr B.R. Hindson who has arrived from South Africa to join Fletcher Trust, Auckland. Several geologists from Canadian and American Mining Companies who are interested in the prospects of the Coromandel Goldfields have also passed through Auckland on their journeys.

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* Sheet 4 has now been issued (Ed.)

Society members may be interested in the following news of recent prospecting work for gold and silver in the Thames - Waihi district. The paragraphs have been copied with permission from the May, August, and September, 1960, issues of the Mining Magazine (London):

South Seas Mining, a Canadian company, has commenced development of the Sylvia gold property, three miles north of Thames, on the Coromandel Peninsula. Former underground entries are being rehabilitated and reclaimed, and diamond drilling has been started from surface. An elaborate deep drill test will be made from underground stations as soon as these can be established. The very high-grade deposition of the mine is evident from the available record of production - 95,344 oz of gold bullion from 45,712 tons of ore milled. This remarkable recovery, in the opinion of Dr A.G. Pentland, the consulting geologist, represents only half the gold content, for the tail loss in the treatment processes of the times is estimated at 50%. A deep diamond drill intersection has cut a true width of 12.0 ft of ore grading 1.45 oz of gold and 6.8 oz of silver per ton at a vertical depth of 350 ft below the previous bottom level of development.

New Zealand, South Pacific Mines - This company is now reclaiming the Waitangi gold mine at Thames and meeting with gratifying success. Mr Alfred R. Allen, resident technical representative, has reported rehabilitation of an 800 ft length of adit on the No. 2 level, within which an ore-shoot 410 ft long has averaged 0.6 oz gold per ton with indicated width of 10.0 ft. The drive is 400 ft below surface.

New Zealand, South Pacific Mines Ltd., plans to erect a 300-ton cyanide mill at Waikino for the recovery of gold and silver from the Ohinemuri River sand and the tailing from the 70-year operation of the Waikino battery. The recommendation came from Dr A.G. Pentland, consulting geologist, after receipt of the report of Wright Engineers Ltd., covering that firm's metallurgical research. The gross cost of the installation is estimated at $345,000. The river sand has a proved deposit of 498,000 tons averaging 0.091 oz gold per ton and the battery tailing 22,000 tons grading 0.395 oz. The gross value of mill feed is accordingly $2,300,374, with gold at $34.30 per oz and silver at 85 cents per oz. Wright Engineers have successfully recovered 90% of the contained gold and 70% of the silver, on which basis the recoverable value is placed at $1,981,956. There are indicated extensions concerning which Dr Pentland states: "Test work on this material has not been completed to the point where final reserves and grade can be accurately assessed, but sufficient work has been performed to provide an indication

that a very large part of the additional tonnage can be treated at a profit. Thus it is clear that the net profit from the whole operation will be over 1,000,000 dollars."

VICTORIA UNIVERSITY GEOLOGY DEPARTMENT

by Paul Vella

1960 Roll

Stage I	102
Stage II	20
Stage III	11
B.Sc. Hons.	4
M.Sc.	9
Ph.D.	5
Total students	151

STAFF John Bradley received the degree of Doctor of Science from the University of Durham in June of this year.

Professor Clark is still in England, due to leave for the United States at the end of October.

VISITING PEDOLOGIST Senor Leonel Leon, Ingeniero Agronomico of the University of Chile, previously for fifteen years Professor of Soils and Geology at the Catholic University, Santiago, and simultaneously Associate Professor of Soils and Geology at the University of Chile, now head of the Soil Research Laboratories of the Ministry of Agriculture, Chile, is visiting New Zealand on a F.A.O. fellowship. Senor Leon is co-operating with the Soil Bureau and is registered as a Ph.D. candidate at Victoria University of Wellington. He is undertaking a geological and pedological study of soils with particular reference to age sequences of soils derived from volcanic ash.

POST-DOCTORAL RESEARCH Dr Richard Blank of the University of Washington, U.S., has almost completed mapping an area of ignimbrites at Taumarunui. He hopes to accompany our party in the Antarctic this summer.

STUDENTS PAST AND PRESENT Colin Laing, who has been working for oil companies in Australia for some years, has taken a position at Gisborne with BP Shell and Todd, replacing Bert Moore. Bert left early this year to take up his appointment with the Colonial Geological Survey in Tanganyika.

NEW GRADUATES John Lewis (M.Sc. thesis - petrology of Tauhara Volcano) has taken a position as petrologist with Rhoanglo Mine Services, Kitwe, Northern Rhodesia.

Richard Heine (M.Sc. thesis - geophysical survey of Wairarapa) is at present teaching.

John Bruce (M.Sc. thesis - geology of Nelson City) has taken a position with the Soil Bureau and will be stationed at Hamilton.

The following are expected to complete M.Sc. within the next few months:

Alva Challis (thesis - geology and petrology of Upper Awatere Valley) is a petrologist at the Geological Survey, Lower Hutt. Alva this year received a University Senior Scholarship. She will undoubtedly be continuing her studies overseas.

Barrie McKelvey (thesis - joint papers with Peter Webb on Antarctic Geology) has taken a position as research assistant at the University of Armidale, New South Wales.

Garry Orbell (thesis - mapping and sedimentary petrology of Taranaki-Wanganui Series rocks in Wairarapa) has taken a position with the Soil Bureau and will be stationed at Hamilton.

Dawn Rodley (thesis - paleoecology of Waitotaran-Nukumaruan sequence in Mangaopan and Ruakokopatuna Streams, Wairarapa) is at present temporary assistant lecturer, Geology Department, Canterbury University.

Peter Webb (thesis - joint papers with Barrie McKelvey on Antarctic Geology) has taken a position as assistant micropaleontologist at the Geological Survey, Lower Hutt.

Solly Kustanowich (thesis - mapping Upper Cretaceous and Lower Tertiary, eastern Wairarapa) is now working on Foraminifera at the Oceanographic Institute, Wellington.

VICTORIA UNIVERSITY GEOLOGICAL SOCIETY EXCURSION TO D'URVILLE ISLAND Some fifteen students, accompanied by Mr Lauder and Dr Wellman, spent a week at D'Urville in July. The southern end of the island was mapped on a scale of 4 inches to a mile, particular attention being paid to the serpentine contacts.

CLASS EXCURSIONS (1) To Onekaka: Stage II, accompanied by Dr Bradley, Dr Wellman and Dr Blank. A new lower Paleozoic fossil locality was discovered at Upper Takaka - mainly rugose and tabulate corals in a thin marble band and graptolites in interbedded slates. The corals are upper Ordovician or Silurian; the graptolites are too poor to identify.

(2) To Canterbury: Stage III, accompanied by Mr Vella and Mr Neef. This excursion was held with the Canterbury University Geology Department in response to an invitation by Professor Allan. Lower Waipara, Mid Waipara, Weka Pass, the Acheron Valley, Curiosity Shop and Banks Peninsula were visited under the practical guidance of Professor Allan. Victoria students were billeted and thoroughly entertained by Canterbury students. The mingling of the two groups was most successful and should take place more frequently.

Geological features striking to North Islanders are the close resemblance of the Canterbury Lower Tertiary sequence to that of the North Island East Coast, and the remarkable correspondence of Canterbury Waiauan macrofaunas to macrofaunas of the so-called Lower Tongaporutuan in Wairarapa.

VICTORIA UNIVERSITY 1960-61 ANTARCTIC EXPEDITION This summer the following party will be working in South Victoria Land. Ralph Wheeler (Geography Department) leader, surveyor, glaciologist. Colin Bull (Physics Department) geophysicist. Ian Willis and Roger Cooper (Geology Department) geologists. Dick Blank (Geology Department) may be with the party.

NORTHLAND

by an Initiate

Northland has an almost unique reputation among New Zealand geologists. Not only does rumour have it that the geology there is complex, and most difficult to unravel, but it is commonly acknowledged as the area where almost anything can have happened.

Certainly it is not difficult to find places where the simple law of superposition appears to be no longer obeyed, and other places where the rock architect appears to have made an over-enthusiastic use of the tooth-paste tube principle in moving rocks. It is equally probable that New Zealand's geologists are still a long way from solving many of the geological problems that Northland has to offer. And problems there are, in more than usual geological abundance. It is interesting, therefore, to look back on a season's fieldwork in Northland, which covered a large portion of the Peninsula, and to consider Northland's reputation in that light.

Fiordland and Northland may have little in common physiographically, and attract geologists to them for very different reasons. They are similar, however, in each having a geological history that is almost unique, and in being at the "end of the line" in New Zealand. Geologists visit them only when they want to see the geology there, and never en route to somewhere else. In Northland's case there may even have been a tendency for geological excursions from Auckland to be southwards into the Waikato and the known, rather than northwards into Northland and the problems. Northland's isolation, therefore, can in part be blamed for the geological reputation that the region enjoys.

Dr H.T. Ferrar, who mapped large areas there, described the climate as sub-tropical. There is no doubt that the rocks have weathered badly, and to such an extent that the good outcrops are restricted to the coast and to a few creek beds. Even road cuttings, which are reliable enough even as far north as Auckland itself, become rapidly less so northwards. Podsolised clays and very indifferent weathered sandstones or mudstones offer only to the most intuitive geologist much idea of their parent rock material. Perhaps, too, the climate affects more than just the rocks. There is little doubt that the tempo of life and of work is much slower in sleepy lagoons of the Pacific than it is in New Zealand itself, and it may be that a single season's fieldwork in Northland is worth less in terms of scientific achievement than a season spent elsewhere in New Zealand. The hills and mountains are not high; but, in the heat and the humidity, the surveyor's unsympathetic declarations of heights above sea level are surely on the low side. No one has yet suggested that this same climate slows down the geologist's mind, and it is to be hoped they never will.

In some ways it is true that the geology is extremely complex. Some complexities are well known, as, for example, the appearance of beds of Eocene mudstone, over 500 ft thick, vertically on top of Oligocene limestone and coal measures.

Whatever the mechanism that caused such inversions as this, it may well have been at work elsewhere. Certainly a traveller from the Gisborne and East Cape region can find all the evidence he wants for extensions of his theories on overthrusts, nappes, diapiric structures or the like, and can rest happily in the knowledge that it will be difficult to prove him wrong on the basis of Northland's outcrops.

Not a little of the difficulty arises from the fact that Northland's geological history has apparently been a repetition of very similar events, again and again. Volcanoes are the rule and always have been. The now well-known Permian fossils are associated with marine volcanic rocks, and similar associations of marine sediments and volcanics are present in the Jurassic, lower and upper Cretaceous, Eocene and Miocene. Fortunately, differences in induration are most useful guides to the man who finds the unweathered rock. After the Miocene, when the sediments became terrestrial, the volcanics remained, and in many places the architect added a shade of respectability to his previous work by covering it with a decent cloak of basalt lava.

HAAST AND THE FIRST LYTTELTON TUNNEL

Geology in Canterbury a century ago.

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by D.R. Gregg

One hundred years ago on December 1 1860, two men clambered over the tussock and rock slopes of Mount Pleasant. The older, aged 38, was a German who had arrived in New Zealand two years before. He carried a geological pick and with it broke off specimens of rock from the outcrops on the hillside and examined them carefully. He was Julius Haast, later to become Sir Julius von Haast, Director and founder of the Canterbury Museum. The younger, a youth of 19, had been born in London and had come to Canterbury with his father and brother ten years before. This young colonist who was assisting Haast was Arthur Dobson, son of the Provincial Engineer, Edward Dobson. Arthur was in 1931 to become Sir Arthur Dudley Dobson.

Haast was carrying out the first geological survey in Canterbury. This survey was being made at the request of the Provincial Government who were in difficulties with the construct-

ion of the Christchurch-Lyttelton railway tunnel. The centenary of what can be regarded as the birth of geology in Canterbury has extra significance, as this year, when tenders are being called for the construction of the Christchurch - Lyttelton road tunnel, geologists and engineers are once more looking at the slopes of Mount Pleasant.

The Port Hills had been a major obstacle to communication between Lyttelton and Christchurch since the foundation of the settlement, and this had led to much dissatisfaction with the inadequate road and water transport. Before the construction of the railway tunnel, land communication was either by the steep bridle-path, or by light horse vehicles along the road over Evans Pass.

As early as 1854, only four years after the foundation of the settlement, the Provincial Council had considered the construction of a railway and appointed a commission of five civil engineers, including the Provincial Engineer Edward Dobson, to report on means of improving communication between Christchurch and Lyttelton. The commission recommended the construction of a tunnel through the hills, but the Council shelved the scheme as too ambitious. One man, however, was determined that the tunnel should be built; he was William Sefton Moorhouse and when he became Superintendent of Canterbury in 1857 he revived the railway and tunnel scheme. This proposal was eventually submitted in London to Robert Stephenson, son of George Stephenson, builder of the Rocket. Robert was a sick man and delegated the preparation of a report to his cousin George Robert Stephenson, who completed his work on August 10, 1859. His report recommended the present tunnel route, as opposed to another suggested route via Sumner involving six tunnels. Rock samples had been sent to England and Stephenson was confident there should be no difficulty in the construction of the tunnel, which he estimated would cost £245,071, and take five years to construct.

In October 10, 1859, a contract was drawn up between the London firm of Smith and Knight and the Provincial Government for the driving of the 1½ mile tunnel for £235,000. The contractors duly started construction in January 1860, but they met particularly hard basalt in a shaft at the Lyttelton end and an investigation drill-hole above Heathcote penetrated one of the hardest dikes to be met in the tunnel. Smith and Knight declined to carry on with the work and threw up the contract in November 1860.

During the previous year, the Provincial Council had been negotiating with Julius Haast with the intention of having him make a geological survey of the Canterbury Province. Haast had been under contract to the Province of Nelson since November 1859. Moorhouse, not daunted by the withdrawal of the contractors, asked Edward Dobson for a report on the tunnel workings, and on November 22 1860 sent for Haast to come to Christchurch immediately. By December 1, Haast and Arthur Dobson were at work on Mount Pleasant.

Haast prepared a characteristically thorough report which was dated December 1st and presented to the Council the following day. The report was based on an examination not only of Mount Pleasant but of the other hills surrounding Lyttleton Harbour, and displayed a brilliant comprehension of the structure of the volcano. He showed by constructing a vertical section along the line of the tunnel the probable thickness of each bed through which it would pass, and his report was illustrated by 34 rock specimens. The hard basalt struck at the Lyttelton end of the tunnel would only be of local occurrence, formed where the lava flows were for some reason considerably thicker than usual, and it was highly probable that such intractable rocks would form only a small part of the beds to be penetrated. Haast thought the dikes, one of which had been struck by Smith and Knight's drill-hole, would be very easily when encountered in the tunnel.

Moorhouse, on January 4 1861, obtained the authority of the Council to seek a contractor in the colonies, and left for Australia, taking with him Haast's samples of rock from the tunnel workings. In May he returned to Christchurch bearing a contract with George Holmes and Co., railway contractors of Melbourne, who undertook to construct the Christchurch - Lyttelton railway within five years for £240,500. This price included a good deal of work at the termini not covered by the Smith and Knight contract. Moorhouse was given a triumphant reception and spoke from the balcony of the Town Hall to a crowd of five hundred people. Approval was, however, by no means unanimous, and FitzGerald, the first Superintendent of the Province and Moorhouse's predecessor, violently opposed the construction of the tunnel and advocated the improvement of the Sumner Road.

Meanwhile, on January 3 1861, impressed by Haast's report on the tunnel, the Council had approved his appointment as Provincial Geologist at a salary of £500 per year, and he took up the position on February 15. This is thought to be the first permanent appointment of a scientist in New Zealand.

On July 20 1861, Moorhouse, before a crowd of two thousand, turned the first sod of the railway - the first sod of the first railway for steam locomotives in New Zealand. The driving of the tunnel was progressing steadily. The new contractors had begun from both ends in July and continued without break except for the proper observance of Sundays. Haast visited the tunnel on many Sundays, while work was stopped, mapping out in great detail the beds the tunnel penetrated. He carefully plotted his observations on a section drawn along the line of the tunnel to a scale of 20 ft to an inch. This detailed drawing, beautifully hand-coloured, is preserved in the Canterbury Museum. It is signed by Haast and dated November 19 1868, which is the date he presented it to the Museum during his term as Honorary Director. The length of the section is 36 ft and this will give some idea of the information it contains. It has already been consulted by prospective tenderers for the road tunnel and will be an invaluable guide to the rocks the engineers will encounter when work starts in 1961. The driving of the railway tunnel was the first time the crater wall of an extinct volcano had been pierced, and Haast's section attracted much attention when a copy, along with 200 rock specimens, was sent to the Paris Exhibition in 1867.

While the tunnel was under construction Haast married Arthur Dobson's sister Mary in June 1863 when she was aged 19. Haast was also busy on his geological explorations elsewhere in Canterbury and by June 1868, when his appointment as Provincial Geologist terminated, he had visited and described most parts of Canterbury and Westland. His book, published in 1879, "Geology of the Provinces of Canterbury and Westland", incorporates the results of his survey and is still the only comprehensive account of the geology of the provinces. After this time the official geological survey of Canterbury became the responsibility of the New Zealand Geological Survey of which James Hector was appointed first Director in 1865.

On December 1 1863, the railway from Christchurch to Ferrymead was opened with great ceremony and celebration. On May 24 1867, the workings in the two drives of the tunnel met and an iron rod was passed through from one side to the other. Five days later, miners on the Lyttelton side were able to walk through to the Heathcote workings. On the invitation of the contractors, Moorhouse, Haast, Edward Dobson and other guests went by train to the tunnel and travelled through it in trucks, walking through the opening that had been made that morning. On December 9, almost eight years after the original contractors started work, the first passenger train steamed through the tunnel.

P L U T O D U N E D I N E N S I S

A BEDTIME STORY FOR YOUNG PETROLOGISTS

BY

A REFORMED GRANITIZER

DRAMATIS PERSONAE

PLUTO DUNEDINENSIS	-	THE CHAMPION OF MAGMATISM - AN UPRIGHT, STRONG, AND VIGOROUS HERO.
WIFE	-	PLUTO'S WIFE WHO LIVED WITH PLUTO AT MOHOROVICIC.
GRANITE METASOMATAS	-	THE CHAMPION OF GRANITIZATION - A MEAN INSIDIOUS CREATURE KILLED BY PLUTO.
TITUS MIGMATUS	-	THE CHAMPION OF MIGMATISM - A DECEPTIVE FIEND RICHLY DESERVING A TERRIBLE DEATH AT THE HANDS OF PLUTO.
OROGENUS OROGENESIS	-	THE CHAMPION OF OROGENY - AN UPRIGHT MAN LEAD ASTRAY BY THE SCHEMING OF GRANITE METASOMATAS.

Once upon a time there was an old troll named Pluto dunedinensis. For millions of years he lived peacefully at his home Mohorovicic thirty miles below the present city of Dunedin. One day he said,

"Wife, do make me some of your delicious olivine nodule cakes."

Now his wife was a good cook, but it was mountain building season and the isogeotherms were high; she was hot and flustered, and she absent-mindedly put six, instead of the usual three, tons of alkali into her great mixing bowl. Soon a beautiful batch of black olivine nodule cakes was ready.

"Even if they are full of vesicles" she said, "they are nice and light."

A grin spread across the placid face of Pluto dunedinensis. Soon the plate was quite empty and he settled himself for his after-dinner nap.

Then that extra three tons of alkali began to have its effect. First gently, and with ever increasing violence, great spasms convulsed the tummy of Pluto dunedinensis. His tossings and turnings shook the rocks right to the surface of the earth. As his spasms were gradually dying down a taunting laugh came from above.

"Differentiation!!" roared Pluto, "I'll teach Granite metasomatas to laugh at me. Wife, bring me the bellows and hammer."

He ground his teeth with rage, and with demoniac energy pumped the bellows as the flames leapt higher and higher.

"Out of my way, wife," he said, "I must crack the rock so that my magma will reach Granite metasomatas."

Slowly the head of the great hammer was lowered across his shoulder till it nearly touched the ground behind him. His muscles bulged as the head swung upwards. There was a thud and a roar like thunder as the rock split under the blow, and the cracks sped to the surface.

On seeing the cracks Granite metasomatas realized there was little time to spare.

"I'll pour down some of my alkali liquid," he muttered, "That'll fix his indigestion."

So taking a ladle big enough to bail the ocean he emptied it down the cracks.

Pluto was taking a brief spell when the alkali liquid poured through his roof.

"Suffering serpentine," he yelled and lunged towards the forge. "Quick, wife, bring some magma to stop the pollution of our home with this vile muck."

The magma near at hand was by now mixed with alkali liquid, and his wife had no choice but to shovel it into a large cauldron. Pluto's great arms were burnished with red as he lifted it on to the forge, and soon the magma was bubbling merrily and white hot.

"Stand clear, wife," Pluto cried.

With a mighty swing he sent the white hot liquid up the cracks, but it sped past Granite metasomatas to reach the very surface of the earth.

So you see, children, that is why the first magma erupted at Dunedin was trachytic.

Granite metasomatas laughed when he saw how Pluto had overdone it.

"Get me some good clean basalt," Pluto said.

In her haste the poor woman scooped up with the basalt some gunpowder left over from last Guy Fawkes day. When the mixture reached the surface all hell was let loose and great explosions hurled lumps of basalt for miles.

Pluto cast a scathing look at his wife.

"Fresh basalt," he said.

With a madmans fury Pluto hurled the basalt at the cracks. They became white hot from Mohorovicic upwards and great floods of basalt spread over the land.

So that, children, is what happened during the first major eruptive phase at Dunedin.

Pluto dunedinensis then rested from his labours, for he was sure that Granite metasomatas would have had enough. Granite metasomatas was indeed visibly melting, but before eutectosis was far advanced he managed to drag himself away.

Now Granite was a mean calculating creature and instead of conceding honourable defeat he brooded on ways of getting even with Pluto dunedinensis. To this end he enlisted his ally the foul fiend Titus migmatus. This

loathsome creature, a master of disguise, assumed magmatic form and approached Pluto. He drove spears of the solid crust deep into Pluto's body, goading him to terrific anger.

Pluto again used basalt as his one reliable weapon. With renewed energy he scourged the rocks from Mohorovicic to the surface with terrible heat so that all that now remains of Titus migmatus are xenoliths in the great floods of basalt that again covered the land.

These, children, comprise the second main eruptive phase of the Dunedin basalts.

In spite of this setback Granite metasomatas was not yet defeated.

"I'll get Orogenus orogenesis to help," he muttered, "he at least should put an end to Pluto."

They consulted together and decided that Saxonian folding would be just the thing.

"But first give me time to collect my strength" said Orogenus.

Now Orogenus had a very loud voice which rumbled even to the centre of the earth, and Pluto had overheard the conversation. Pluto acted quickly. This time he used so much heat that Granite metasomatas died a fearful death from eutectosis, and the land was again covered by great floods of basalt.

This, children, was the third and last eruptive phase at Dunedin.

But Pluto's labours had exhausted him and he was now an easy prey to Orogenus's Saxonian folding. The rocks were bent by the cruel tyrant and finally split above Pluto's home, destroying our hero. In his dying agony he pushed up the mountain blocks which even to this day surround Dunedin.

However, some men think that Pluto dunedinensis is only sleeping and that he will awake and fight again for the

honour of Magmatism.

MORAL

Although this happened many, many years ago the story is clear for all to see in the record of the rocks. Despite this, some, admittedly those of inferior learning, believe that Granite metasomatas and Titus migmatus still live, and are still active!! But we know better, don't we, children?

Answer from children (in chorus):

"We do, wise teacher."

THE END

CHRISTCHURCH COLLOQUIUM of GEOLOGY

The Colloquium met on six occasions during the year, five times to hear stimulating talks and once for a film evening.

On 11th April Mr W.F. Heinz described "Methods of prospecting for heavy minerals and the nature of the country on the West Coast where these minerals are known to occur."

On 13th June Messrs R.P. Suggate, A.C. Beck, H.S. Gair and G. Warren discussed "Progress of four mile geological mapping of Parts of Canterbury and Marlborough."

On 1st August Mr A.C. Beck discussed "Orogenies in New Zealand."

On 3rd October Dr M.J. Frost spoke on "100,000 square miles of Western Australia."

On 8th November Mr R.W. Willett spoke on his "Impressions of the International Geological Congress in Copenhagen."

On 14th November films of geological interest were shown.

The average attendance throughout the year has increased by 17% over last year, confirming that the interest expressed in the Colloquium in its first year has been sustained.

L.E.O.

SOME RECENT GEOLOGICAL SURVEY PUBLICATIONS

Origin of Ignimbrites of the North Island, New Zealand: A New Petrogenetic Concept.
N.Z. geol. Surv. Bull n.s. 68. 1960, Steiner, A.

New Zealand Mesozoic and Cainozoic Plant Microfossils.
N.Z. geol. Surv. Pal. Bull 32. 1960, Couper, R.A.

Geological Map of New Zealand 1:250,000 Sheet 2B Barrier (1st Edition), Thompson, B.N.

Geological Map of New Zealand 1:250,000 Sheet 4 Hamilton (1st Edition), Kear, David.

Geological Map of New Zealand 1:250,000 Sheet 8 Taupo (1st Edition), Grindley, G.W.

From a recent manuscript - "The recession of these glaciers was essentially a snow-balling process".

PERSONAL NOTES

DR G.R. STEVENS returned to New Zealand in September after having completed research work on belemnites at the Sedgwick Museum, Cambridge. On the way home he visited research institutions in the United States and Canada. He has rejoined the palaeontology section of the Geological Survey at Lower Hutt.

MR M.C. PICK is now at the Geology Department, University of Bristol, England.

DR R.P. SUGGATE recently received the D.Sc. degree from the University of New Zealand.

DR N.E. ODELL recently accepted, for a period of a year or more, the SEATO Chair of Geology at the University of Peshawar, West Pakistan.

MR D.S. NICHOLSON is now production manager for Lime and Marble Limited, Port Mapua, Nelson.

MR D. DOYLE, Head Office, D.S.I.R., Wellington, attended an international conference in Rome on geothermal energy from 27 June to 2 July. The meeting was held under the auspices of the United Nations.

DR A. EWART recently joined the Geological Survey in Lower Hutt, and will be working on the petrology of some of the North Island ash showers. Dr Ewart was at Imperial College and the Royal School of Mines, London, and studied the basement rocks and pegamatites in the Kamativi district of Southern Rhodesia for his thesis. Shortly before coming to New Zealand he was a member of an Imperial College expedition to the Andes of northern Bolivia, and had previously worked for three months in Greenland.

MR J. BRODIE, Oceanographic Institute, Wellington, attended during July the meeting of the UNESCO International Advisory Committee on Marine Sciences held in Copenhagen.

DR J. IRVING, who was until recently general manager of Shell, B.P., and Todd Oil Services Limited, retired in August and is at present in Australia.

PROF. E. JONAS of the Geology Department, University of Texas, Austin, Texas, will be working at the Geological Survey, Lower Hutt, until August, 1961. He is particularly interested in clay mineralogy, and during his stay in New Zealand will study clays in several North Island localities - including the bentonite at Porangahau - and their effect on local geomorphology.

DR A.J. ELLIS of the Dominion Laboratory, Gracefield, Lower Hutt, was overseas for three months during the middle part of the year. He visited a number of research institutions in the United States and Britain, particularly in connection with chemical work on the geothermal project at Wairakei.

DISCUSSION ON TECTONIC MAP OF NEW ZEALAND

N.Z. Science Congress, Wellington, May 1960.

Prof. Hills (who has the job of organising the Oceania area) had asked the Geological Society of New Zealand for a tectonic map on a scale of 1,5,000,000 for inclusion in the Tectonic Map of the world. Everywhere but Europe (1:2,500,000) is to be covered by 1:5,000,000 maps. The Tectonic Map Sub-commission will meet in Copenhagen and probably finalise the legend. For the present congress, New Zealand had been divided into four areas and various compilers had been asked to produce maps using a very simple legend which showed folds, faults and volcanic centres, with age differentiations by colour, and any additional information in words. KEAR, GRINDLEY, BECK AND WOOD produced maps and spoke briefly on them.

In the ensuing discussion it was generally agreed that:

(a) A tectonic map of New Zealand could usefully be produced on a scale of 1:2,500,000, (or on a larger scale) but 1:5,000,000 was too small a scale to do justice to the information that was available. Several suggestions that a final publication size be requested on a larger scale than 1:5,000,000 were answered by QUENNELL who thought it certain that the proposed scale would be adhered to by the Commission.

(b) There was little enthusiasm for producing a 1:5,000,000 map, at least until the final world legend were known.

(c) That the Director of the Geological Survey might be approached with the suggestion that he could take over as a project of the Survey the problems of compilation and production of a Tectonic Map of New Zealand on a more suitable scale than 1:5,000,000.

Much of the discussion centred around what such a map as was envisaged under (c) above should contain. Suggestions etc. included:

(i) The whole should attempt to record a Kinematic History with some measure of rates e.g. of sedimentation and uplift (WOOD and others)

(ii) That areas of elevation should be marked, and given a time connotation (e.g. rise of the Alps) (BOWEN, THOMPSON, BECK)

(iii) That fold axis might be better represented in words than by symbols (BECK)

(iv) That schist structures would have to be given special thought and possibly symbols (WOOD)

(v) That oceanographic data, which would differ greatly in detail from place to place, should have different symbols from that on land (e.g. only the form, not the structure was mapped) (PANTIN)

(vi) That rock type and/or age could usefully be added to the base map (GENERAL), but in Tectonic Maps time was a more important factor than rock type (HEALY)

(vii) That stereographic projections might usefully be incorporated to condense some of the data (GUNN)

D.K.

Seen in a recent rock and mineral catalogue -

Of course we have Ingumbrites !

THE COPENHAGEN CONGRESS

by R.W. Willett

During my recent visit to geological institutions overseas probably the most important event of interest to members of the Geological Society was the International Geological Congress at Copenhagen. The Congress was a mighty affair. The actual attendance was of the order of 3,000 and even though it was highly organized by the Danes and their northern countrymen it was too big for comfort.

The pre-Congress tours, as one expects from the northern peoples, were also highly organized and were a delight. I think this view is shared by all New Zealanders who participated in both pre-sessional and post-sessional tours.

The Congress itself suffered from the fact that it was held in two separate buildings some distance apart. Because of its size, every session clashed with just about every other session, to say nothing of Council and Bureau meetings. On top of this of course were the meetings of the International Commissions that are now part and parcel of the International Congress set-up. One had to decide from the programme where one was going to be at certain specified times, and had to stick to that programme. A direct result of this clashing of sessions and the distance between the Congress buildings was the tendency at the conclusion of a paper for people to rise during the discussion and noisily tramp out of the room on their way to another session. This was complicated by the fact that an equal number, with equal noise, tramped in; sometimes it became so embarrassing that the Chairman of the session had to call the whole meeting to order. This coming and going of course was not improved by the fact that many of the rooms were schoolrooms with long desks, or folding seats which clattered alarmingly.

New Zealand was well represented by Dr Brothers from Auckland, Professor Clark from Wellington, Dr Gage from Canterbury, Professor Coombs from Otago, on the University side; and on the Geological Survey side by Dr Fleming, Dr Kingma and myself. In addition Mr B.W. Collins, Assistant Scientific Liaison Officer, London, and the foundation Secretary of the Geological Society, was present as was Mr Doug Hamilton who is at present at the University of

Reading. Two well-known New Zealand ex-patriots were present also:- one always expects to meet them at international meetings - namely, Professor Frank Turner and Dr Brian Mason.

The paramount interest of the New Zealanders was the fate of our invitation. The New Zealand Government had authorised myself as Director of the Survey to present a formal invitation to the Congress to come to New Zealand in 1964. In some ways we thought we had this "in the bag", but in the first few days at Copenhagen it was apparent that this was not going to be so easy. The Indian delegation, under the leadership of Dr Roy, was particularly keen to have the Congress in their country and at one time there was a vague suggestion that one of us could be prevailed upon to withdraw. That was entirely unlikely as I think both New Zealand and India were keen and fully prepared to undertake the gigantic task of organizing the Congress. It was my privilege to make the formal invitation for New Zealand before the Council and it was very well received. It looked at the last moment (in fact a well known English geologist was prepared to bet me 5:4) as if we would gain it. However, as the voting proceeded it was soon evident that we were on the way out. The acceptance of the Indian invitation was quite clear cut and I promptly asked the Council to endorse it by proposing the motion that the Indian invitation be unanimously accepted. This was carried enthusiastically and I think although we actually lose the Congress, New Zealand gained a lot in spreading knowledge of itself and its geology.

Papers in the Congress were a very mixed bag, and on the whole one had the impression that the standard was not what one should expect of such a gathering of geologists. I found this comment supported by others, and several delegates, particularly some from the United States, stressed to me the reason for the low standard of papers at such Congresses. Many institutions demand that a person going to such a Congress should present a paper; without that pre-requisite their chances of obtaining financial support are hazy. Consequently we have the exhibition of the same papers appearing Congress after Congress, and a procession of pot-boilers which should not be tolerated. On the other hand of course there were some outstanding papers, and I don't think it is too parochial to say that all New Zealanders who presented papers presented really new material with new ideas, and excellent diagrams and slides;

I found comment on that aspect of the New Zealand effort very favourable.

The main aspect of a Congress is to meet people, and discuss geology with them, propose visits to various countries and to one's own country; in this Copenhagen was again an excellent meeting ground. However, the size tended to reduce the efficiency of this aspect of the Congress as it was very difficult to see people unless a firm meeting could be arranged. The smallness of the central Congress meeting place did not contribute at all to enabling one to run into casual acquaintances.

I think the Congress is reaching the point where size must be taken into consideration if it is going to be an efficient parliament for the geologists of the world. The acceptance of the principle of forming an International Geological Union was I think a step forward, and this could well lead to streamlining of the Congress, additional funds being made available through the International Council of Scientific Unions and perhaps assisting in the meeting of the various international unions (e.g. the International Palaeontological Union) apart from the Congress itself. These small groups would act much more efficiently if meeting on their own rather than running their meetings parallel with the large and unwieldy Congress itself.

McKAY HAMMER AWARD FOR 1959

At the Annual General Meeting in May, the McKay Hammer Award for 1959 was presented to Dr H.W. Wellman of the Geology Department, Victoria University of Wellington, for his paper, "Divisions of the New Zealand Cretaceous", published in the Transactions of the Royal Society of New Zealand.

NEW MEMBERS

The following members have joined the Society since May, 1960.

Andrews, P.B., 22 St Andrews Square, CHRISTCHURCH

Ballance, P.F., Geology Department, University of Auckland AUCKLAND

Beck, R.I., 12 Park Street, INVERCARGILL

Breed, William J., Museum of Northern Arizona, Fort Valley Road, FLAGSTAFF, Arizona, U.S.A.

Chappell, J., Geology Department, University of Auckland, AUCKLAND

Chronic, J., Department of Geology, University of Colorado, BOULDER, Colorado, U.S.A.

Dalziel, A., P.O. Box 3, GREYMOUTH

Daniel, I.L., Geology Department, University of Otago, DUNEDIN

Doyle, D., C/o Head Office, D.S.I.R., WELLINGTON

Dunn, C.W.H., 56 Collins Street, CHRISTCHURCH

Ewart, Dr A., N.Z. Geological Survey, P.O. Box 368, LOWER HUTT

Gregory, M.R., Geology Department, University of Auckland, AUCKLAND

Harper, C.T., Geology Department, University of Otago, DUNEDIN

Hodgson, Dr W.A., Geology Department, University of Otago, DUNEDIN

Jonas, Prof. E., C/o N.Z. Geological Survey, P.O. Box 368, LOWER HUTT

Latham, Dr W. McD., WHITIANGA

Lowry, D., Geology Department, University of Auckland, AUCKLAND

McGill, I. ., Geology Department, University of Otago, DUNEDIN

Mansergh, G., 32 Portland Road, Remuera, AUCKLAND

Mason, G., Geology Department, University of Auckland, AUCKLAND

Maxwell, P.A., 11 Marshall Street, Opawa, CHRISTCHURCH

Mayer, W., Geology Department, University of Auckland, AUCKLAND

Osinski, W.P. von, Hamilton Bros. Ltd., 532 Petroleum Building, AMARILLO, Texas, U.S.A.

Quennell, A.M., 89 Owens Road, AUCKLAND

Rhodes, J.M., 4 Leichhardt Crescent, Fannie Bay, DARWIN, N.T., Australia

Rogers, Dr J., N.Z. Geological Survey, C/o Chemistry Department, University of Otago, DUNEDIN

Scott, Miss P.C., No. 4 R.D., CHRISTCHURCH

Spicer, L.R., Geology Department University of Auckland, AUCKLAND

Stadnyk, M.P., Geology Department, University of Canterbury, CHRISTCHURCH

Contributions for the next issue of the Newsletter will be extremely welcome. Please sent them to the Editors, C.o New Zealand Geological Survey, P.O. Box 368, Lower Hutt, New Zealand.
