

G E O L O G I C A L S O C I E T Y O F N E W Z E A L A N D

N E W S L E T T E R

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C O N T E N T S

	Page
Aims of Society, Officers, & Newsletter	1
Annual Report for 1958	2
Geological Survey Conference, New Plymouth, May, 1959 ...	3
International Stratigraphic Lexicon	5
9th N.Z. Science Congress, Wellington, May, 1960	5
Personal Notes	7
Hochstetter Centenary, 1859-1959	9
Geological Notes from the University of Otago	11
News from the Department of Geology, University of Auckland .	12
Fourth Triennial Mineral Conference, Dunedin, September 1959	13
McKay Hammer Award	15
John Henderson, 1880-1959	16
The Sequence of Molluscan & Brachiopod Life in New Zealand ..	18
Letter to the Editors	22
New Members	23

THE 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 earth sciences, including all branches of geology, paleontology, mineralogy, glaciology, geophysics, seismology, oceanography, pedology, hydrology, mining, and the utilization of minerals and rock products. There is only one class of members, and the annual subscription is at present 2/6d.

OFFICERS

May 1959 to May 1960

President	Mr D. Kear
Vice President	Mr J. Brodie
Secretary	Dr W.A. Watters
Treasurer	Dr H.M. Pantin
Committee	Mr D.R. Gregg
	Mr W.F. Heinz
	Mr I.C. McKellar
	Mr G.C. Shaw
	Mr R.P. Suggate.

THE NEWSLETTER

The Society publishes a Newsletter at irregular intervals; it is hoped about twice a year.

Contributions in the form of personal notes, short items of geological or geophysical interest, news of the mineral industries, suggestions for Society activities, reports of meetings, descriptions of field trips, reviews or criticisms of recent publications, and similar items will be welcomed.

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

This Newsletter is published for the information of members by the Geological Society of New Zealand, c/o New Zealand Geological Survey, P.O. Box 368, Lower Hutt. This issue has been edited by H.M. Pantin, G.C. Shaw, and W.A. Watters.

GEOLOGICAL SOCIETY OF NEW ZEALAND ANNUAL REPORT FOR
THE YEAR 1958.

This report concerning the period May 1958 - April 1959, was presented at the Annual General Meeting in New Plymouth, May 27th 1959.

Committee

Wellington members have been in touch during the year and the President has been informed by letter of the Society's activities.

The Committee met in New Plymouth on 26 May 1959.

Newsletter

Newsletter No.6 prepared by the Society Editor Dr Wellman, has been cyclostyled and will be issued shortly. Requests for back numbers of the Newsletter have been received from several overseas institutions.

Meetings and Conferences

The last annual meeting was held in Reefton in May, 1958 at the same time as the Geological Survey Conference. Auckland members held three lecture meetings last winter. Mr B.L. Wood represented the Society at the A.N.Z.A.A.S. meeting in Adelaide in August.

Thanks are due once again to the Director, Geological Survey for inviting members to attend meetings.

Membership

At 30th April, 1959 members numbered 232. Many overseas members have joined this year, mainly following publication of an article "Geology Down Under" by B.W. Collins in Geotimes.

Subscription

It was decided by the Committee at their meeting in Reefton that in future subscriptions would not be accepted "in advance", but that extra money would be accepted and credited towards future subscriptions. Subscriptions previously paid in advance will be honoured.

McKay Hammer Award

The Director Geological Survey has kindly consented to allow the mounted McKay Hammer Award to be permanently displayed at the Survey's Head Office. Mr I.W. Keyes kindly consented to carry out the mounting of the hammer, and Mr N. Cairns, a Society Member in Masterton, has most generously presented an engraved silver plaque to be mounted with the hammer. The Society is indebted to these gentlemen for their kindness in this matter.

Discount on Geological Maps

The Director, Geological Survey, has notified the Society that a request made this year for discount to be allowed on geological maps has been granted. The discount to Society Members is 33%. No discount can be allowed on bulletins or other publications.

THE GEOLOGICAL SURVEY CONFERENCE AT NEW PLYMOUTH

This year's Conference (the 12th) was held at New Plymouth from 25 to 29 May. As with other conferences of recent years, more time was spent in field excursions than in the lecture room; the weather was bad for the duration of the Conference and the excursions were made in wind and heavy rain. The first (26 May) was around Mt Egmont. The excursion bus and cars travelled the coastal road to Opunake, examining on the way volcanic ash-shower deposits and the numerous interesting lahar mounds (sometimes known as "conical hills") which dot the plain around the base of the mountain. This "ring-plain" has been built up by successive out-pourings of lahars (volcanic mudflows) from Mt Egmont and nearby extinct volcanoes. Sections through some of the lahars were examined in sea-cliffs at Opunake and Ohawe beaches. Tertiary rocks were also examined at the latter place. The Shell Oil Company kindly invited the party to inspect the drilling operating near Kaponga.

On the 27th the party travelled north, examining Tongaporutuan conglomerate in cliffs at Urenui, proceeding then to the Awakino Valley where fossil-bearing Triassic and Jurassic strata were examined, and, later, mid-Tertiary limestone. Mr J. Grant-Mackie of the University of Auckland conducted part of this excursion.

Next day most of the party went north again as far as Mokau, led by Mr H. Arnold of the Shell Oil Company, this time examining in more detail the mid-Tertiary strata of the Tongaporutuan Series which are well exposed on Mt Messenger and in other cliffs and cuttings between Urenui and Mokau. On returning to New Plymouth this party visited the group of small oil wells near the beach at New Plymouth; for the past 30 years some 200,000 gallons of oil have been pumped annually from these bores from a depth of about 2,200 feet. The miniature oil refinery nearby, which processes about 16,000 gallons of the crude-oil in a month, was also visited. On the same day a party of petrologists made an independent trip

by cars to the Piopio serpentine quarry beyond Awakino. The final morning's excursion was to Paritutu, one of the "Sugar-loaves" on the coast of New Plymouth. The "Sugar-loaves", recently studied by Mr H. Arnold who led the excursion there, are steep, conical masses of porphyritic volcanic rock, and their origin and history have long been debated. Similar volcanic rocks cropping out on the coast about a mile further south were also visited.

Fifteen speakers contributed to the lecture-sessions which occupied the first day of the conference. The subjects were: Tertiary Paleogeography of the Taranaki Basin (J.W.C.M. Van der Sijp); Pleistocene Geology of Western Taranaki (T.L. Grant-Taylor); Rzehakina Cushman in New Zealand (G.H. Scott); Lineations, Drag Folds, and Vergences in Central Otago (B.L. Wood); Lineations, Drag Folds, and Vergences in Southern Alps (G.W. Grindley); New Zealand Mobile Belt (R.P. Suggate); Overthrusting at the Alpine Fault (F.E. Bowen); Lower Paleozoic Stratigraphy and Tectonics, north-west Nelson (G.W. Grindley); West Auckland Structural Facts (David Kear); Tasman Glacier Regimen (I.C. McKellar); Displacement at Faults between Wairau and Hope Faults (H.S. Gair and D.R. Gregg); Extension of Geochemistry to Soils (N.I. Wells, Soil Research Bureau); Some Features of Pleistocene-Recent Rhyolite Domes (B.N. Thompson); ^{14}C Aging in Practice (J. Healy). On the final afternoon of the Conference Mr I.D. Dick addressed the meeting, Dr J.J. Reed explained possible applications of punched cards in the Geological Survey's work, and Mr J. Healy spoke on Heat Flow and Volcanism. Survey officers then attended an enjoyable function at the home of Mr D.F. Sandys-Wunsch, former Chairman of the Council of Scientific and Industrial Research.

The Conference provides a chance for geologists outside the Survey, and for DSIR administrators, and workers in related branches of science, to join Survey officers in discussions and field excursions. This year the Survey was pleased to welcome from Head Office Mr I.D. Dick, and from University geology departments Professor D.S. Coombs, Mr J. Bradley, and Mr J. Grant-Mackie. Geophysics Division was represented by Dr E.I. Robertson, Mr M. Modriniak, and Mr G. Garrick. Mr J. Brodie, Dr H. Pantin, Miss L. Todd, and Mr J. McDougall represented the Oceanographic Institute, and Mr N.I. Wells the Soil Bureau. The Shell Oil geologists who attended were Dr J. Irving, Dr J. Van der Sijp, and Mr H. Arnold. British Petroleum geologists attending were Mr D. Haw, and Mr and Mrs R. Stoneley. Miss A.M. Long and Mr W.R.B. Martin of the Chemistry Department, Victoria University, Mr W. Hill of the Atomic Energy Authority Great Britain (at present stationed in Westport), and Dr Donald F. Squires of the American Museum of Natural History also attended. As has been the custom in recent years the Annual General Meeting of the Geological Society of New Zealand was held during the Conference. Society members attending the conference privately were Mr and Mrs W. Heinz, Miss M. Warren, Miss D. Rodley, and Mr S. Kustanovitch.

G.C. Shaw

INTERNATIONAL STRATIGRAPHIC LEXICON

Vol. VI, Oceanie, Fasc. 4 NEW ZEALAND

The attention of members of the Society is drawn to the recent publication of The New Zealand fascicule of the International Stratigraphic Lexicon. This is a work with articles by 37 New Zealand geologists, edited by C.A. Fleming, and consists of a paper-covered volume of 527 pages, accompanied by 4 maps and 7 stratigraphic tables. It was published in Paris early in 1959.

Like other volumes of the lexicon, the New Zealand fascicule was published by Centre Nationale de la Recherche Scientifique, 13 Quai Anatole-France, Paris VII^e, France. It can also be supplied by H.K. Lewis and Co. Ltd., P.O. Box 56, 136 Gower St., London W.C.1. H.K. Lewis & Co. quote a price of £1.16.6.stg. per volume, plus 2/6d registered postage to New Zealand.

9th NEW ZEALAND SCIENCE CONGRESS

Wellington, 12-17 May, 1960

The 9th Royal Society of New Zealand Science Congress is to be held at the Victoria University of Wellington next year from Thursday, 12th May to Tuesday, 17th May.

The Chairman of the Geology Section is Prof. A.R. Lillie, University of Auckland.

Geological papers to be read at the Congress are invited and should be forwarded to the Convenor of the Geology Section, Dr J.J. Reed, N.Z. Geological Survey, P.O. Box 368, Lower Hutt. The following geological programme and timetable have been drawn up; this programme is now fairly definite, although minor changes may be made later.

Thursday, 12th May

Morning. Mostly taken up with general organization (e.g. enrolment, civic welcome, etc.) of the Congress

Afternoon. Symposium: A Structural Map of New Zealand. This symposium will probably consist of 4 or 5 invited papers, each dealing with a different region of New Zealand.

Friday, 13th MayMorning. General PapersAfternoon. General Papers. Also of interest to geologists will be a short palaeobotanical symposium, "Dispersal of the Angiosperms" to be organised by the Botany Section.Monday, 16th MayMorning and Afternoon. Symposium: Pleistocene and Recent volcanism in New Zealand.

This is to be a general symposium. Depending on the number and content of papers received it is proposed to arrange the papers into several sections dealing with different topics, e.g. Geophysics, Petrology, Volcanic stratigraphy etc.

Tuesday, 17th MayMorning. Chairman's Address, to be followed by a short symposium: Rate of Physical Geological Processes.Afternoon. Possible continuation of symposium commenced in morning.
Final Congress ceremonies.Excursion.

During the weekend, 14/15th May, it is hoped to run a two-day excursion to the Wairarapa. The party would leave Wellington by bus; for the first day the party could be split into two groups, one dealing more specifically with Recent tectonics in Wellington and the Wairarapa, the other with Tertiary stratigraphy in the Wairarapa. The Saturday night would be spent at Carterton. On the Sunday the whole party would go to Ngahape, where Cretaceous and lower Tertiary stratigraphy, and volcanic and intrusive igneous rocks, would be examined.

A route guide and notes for the excursion are to be prepared.

The Convenor (Dr J.J. Reed) would like to know as soon as possible the names of those wishing to take part in this excursion.

For those unable to attend the two days it is planned to organise a single day excursion; this would probably be the same as the first day of the two-day trip.

The Annual Meeting of the Geological Society of New Zealand will be held during the Congress, at a time still to be decided. It is hoped that a social function such as a sherry party will be organised.

PERSONAL NOTES

SIR CHARLES COTTON. Members of the Society extend their heartiest congratulations to Emeritus-Professor C.A. Cotton on the knighthood conferred on him in the Queens Birthday Honours List, and offer best wishes to him and to Lady Cotton.

DR A.L. WASHBURN, of Dartmouth College, Hanover, New Hampshire has taken up residence in Christchurch with his family for an indefinite period. He is interested especially in the geological functions of ice and in processes of gravitational waste-movement, and he has plans for research in these fields in the Southern Alps while keeping in touch with glaciological work in Antarctica. Dr Washburn has made his headquarters in the Department of Geology at the University of Canterbury.

DR DONALD F. SQUIRES of the American Museum of Natural History, New York, arrived in New Zealand early in the year and has been attached to the Geological Survey (Paleontological Section) in Lower Hutt. Some years ago Dr Squires undertook a revision of New Zealand Tertiary corals, and this work was published as a Paleontological Bulletin of the Geological Survey in 1958. During his stay in New Zealand Dr Squires has examined collections in most of the museums and universities and has collected widely throughout the country. He is due to leave New Zealand early in December.

DR MICHAEL J. FROST will shortly join the staff of the Department of Geology, University of Canterbury. Dr Frost is a graduate of the University of Western Australia, and lately has held a Research Fellowship at the University of Birmingham, where he has been working on the petrology of volcanic glasses.

DR MAXWELL GAGE, Department of Geology, University of Canterbury, will be absent from New Zealand during 1960 on Refresher Leave, with additional support from the Royal Society and Nuffield Commonwealth Bursary fund. His base of operations will be the University of Birmingham, and he proposes to attend the International Geological Congress in Copenhagen.

MR W.I. REILLY, Geophysics Division, D.S.I.R., has been awarded an Italian Government Scholarship. He will leave New Zealand late in November, 1959, and will work for about a year on general problems of gravity under Prof. Carlo Morelli at the Geophysical Observatory in Trieste.

DR T. HATHERTON, Geophysics Division, D.S.I.R., left early in October for the United States to take up a Commonwealth Fund Dominion Civil Service Fellowship. He will be attached to the Seismological Laboratory at the California Institute of Technology, Los Angeles.

DR J. van der SIJF, formerly of Shell, B.P. and Todd Oil Services in Wellington, left New Zealand in September for Holland. Later, he will be working with the Shell Company in Toronto, Canada.

DR J. BRADLEY, Geology Department, Victoria University of Wellington, left during September for England. He will be away from New Zealand on refresher leave until May, 1960, and will spend his time overseas at the Geology Department, Kings College, Newcastle-on-Tyne, and in France.

MR A. STEINER, Geological Survey, Lower Hutt, has been overseas since late August, and will return to New Zealand in December. He has spent most of his time visiting a number of localities and institutions in the United States, particularly in connection with his work on hydrothermal alteration at Wairakei and Waiotapu. On his way back to New Zealand he will visit briefly England, Czechoslovakia, and Italy.

MR A.C. BECK is now at the Christchurch district office of the Geological Survey.

MR A. WODZICKI, who has been on the staff of the Geological Survey since January 1957, left in August for a three-year stay at the University of Minnesota, where he will be doing research on mineragraphy and economic geology towards a Ph.D. degree.

MR R.F. HAY has transferred from Lower Hutt to the Otahuhu district office of the Geological Survey.

MR B.D. WEBBY, who has been on the staff of the Geological Survey since the beginning of 1959, left in August for Bristol University where he will study Devonian rocks in west Somerset towards a Ph.D. degree. Mr Webby, who graduated M.Sc. with first class honours from Victoria University in 1959, holds a Michael Hiatt Baker Scholarship, and will be in Britain for about two years.

MR H.E. FYFE has just returned to New Zealand from Tonga where he has been working with a geologist from the Bureau of Mineral Resources, Canberra, in a search for possible phosphate deposits.

HOCHSTETTER CENTENARY

1859 - 1959

(Editors' note: The following account was prepared for the Proceedings of the Royal Society of New Zealand by Dr C.A. Fleming who has kindly allowed its inclusion in the present issue of the Newsletter.)

Ferdinand von Hochstetter (1829-1884) was born in Württemberg, trained in Theology and Natural Sciences, and had risen to the position of chief geologist to the Bohemian section of the Austrian Geological Survey when he was appointed geologist to the Novara Expedition - a voyage of scientific exploration round the world, sponsored by the Austrian Government, in the years 1857-1859. Urged by the enthusiasm of Sir George Grey in Cape Town a year before and later by the plea of the Colonial Government for a geologist to examine the Drury Coalfield, discovered by the Rev. Purchas, the Novara visited Auckland from December 22, 1858 till February 8, 1859. The Auckland Government was so impressed by Hochstetter's report on the coalfield that he was persuaded to remain behind when the Novara sailed, in order to make extended surveys at Government expense in Auckland and later in Nelson Province. Hochstetter, who was 30 years of age, accompanied by Captain Geo. Drummond Hay as travelling marshal, by Julius Haast, whom he met in Auckland, and a party of assistants and porters, travelled up the Waikato and Waipa, deviated to Raglan (Whaingaroa), Aotea and Kawhia Harbours, pressed south to the upper Mokau and crossed to Taupo by way of the Ongarua valley and the west Taupo ranges. From Taupo he journeyed north to Orakeikorako, Rotomahana and Rotorua, thence to Maketu and Tauranga, came back to the Waikato at Aniwhaniwha (above Karapiro) and returned to Auckland via Kirikiriroa (modern Hamilton). On the way south he called briefly at New Plymouth. From Nelson he visited Dun Mountain, Croixelles, Lake Rotoiti and Cape Farewell.

Hochstetter's chief publications on New Zealand geology are: Neu-Seeland (1863), a book of description and travel later translated as New Zealand (1867), and Geologie von Neu-Seeland (1864) published as Vol. 1 (Sect. 1) of the Geological part of the Novara reports. The companion volume (Sect. 2), Palaontologie von Neu-Seeland, includes the formal description of Hochstetter's fossil collections by Zittel, Stoliczka, Ungor, Karrer, Stache and others. The Geologisch-topographischer Atlas von Neu-Seeland (Hochstetter and Petermann, 1863), republished in English in Auckland (1864) and the collection of essays and lectures published as The Geology of New Zealand in explanation of the Atlas (Hochstetter and Petermann, transl. Fischer; Auckland, 1864), should also be mentioned. Many other papers on New Zealand topics were published

in European journals.

Hochstetter's later career was described by his friend von Haast in a memorial published in the New Zealand Journal of Science (vol. 2, pp. 202-220, 1884). His life was full of activity and distinction. He was appointed the first Director of the K.K. Naturhistorisch Hofmuseum, Vienna, but died in 1884, before the official opening of the new building constructed to house the Austrian national collections. His friendship with Haast and his lasting love for New Zealand forged many links between Austria and this country in the field of natural science.

Hochstetter was the first to describe and interpret many features of New Zealand geology. In the North Island he depicted the graben-like structure of what he called the Taupo Zone and related the distribution of hot springs to fault lines. He recognised the traces of active faults near Waimangu and the faulted structure of the Paeroa Range. He left the best description of Rotomahana and the Terraces as they were prior to the Tarawera Eruption of 1886. He recognised Taupo as the source of the pumice alluvium of the Waikato and other North Island rivers and interpreted the lake basins as due to collapse of parts of the volcanic plateau. He named the Waitemata Beds and separated several other formations near Auckland city and described in detail the volcanic cones of Auckland Isthmus. He discovered Upper Mesozoic fossils at Waikato Heads and Kawhia and the many Tertiary fossils he collected formed the basis for later paleontological advances.

Hochstetter distinguished the main subdivision of Maitai Beds of Nelson, named the Maitai Slates, and described the huge concordant ultramafic (serpentine) intrusive from French Pass to Tophouse. His name dunite, for the olivine rock of Dun Mountain, is firmly established in petrological usage throughout the world. He discovered Triassic fossils near Richmond and boldly interpreted the structure of North-west Nelson. Perhaps his greatest contribution was to establish a tradition of systematic regional geological mapping that persisted in the later geological exploration of New Zealand.

Though primarily a geologist, Hochstetter took a keen interest in botany, zoology and ethnology. He was the first to collect two species of tropical ferns in the hot spring area of Paeroa, brought to Europe the type specimens of the New Zealand frog (Leiopelma hochstetteri Fitzinger), and added a number of fresh water and land mollusca (e.g. Faryphanta hochstetteri Pfeiffer) and other invertebrates to the New Zealand fauna. In the century that followed, his important part in the exploration of New Zealand and other southern lands was recognised in names given to many southern organisms (e.g. the Takahe, Notornis hochstetteri Meyer, and the mollusc genus Hochstetteria Velain).

In 1959, New Zealand geologists are celebrating the centenary of Hochstetter's visit to New Zealand. The New Zealand Geological Survey has already issued a new geological map on a scale of 1:1,000,000, and this is to be followed by an accompanying descriptive bulletin dedicated to Hochstetter's memory (N.Z. geol. Surv. Bull. 66). Towards the end of the year, the Department of Scientific and Industrial Research will issue a special Hochstetter Centenary number of the N.Z. Journal of Geology and Geophysics, devoted to papers on topics associated with Hochstetter's explorations. The Government Printer is publishing the first English translation of Geologie von Neu-Seeland (from the Novara Reports), prepared and edited by C.A. Fleming, together with maps and other illustrations that accompanied the original edition. Mr R.W. Willett delivered an account of "Ferdinand von Hochstetter, Father of New Zealand Geology", as his Presidential Address to the Wellington Branch of the Royal Society of New Zealand. Other lectures on Hochstetter's explorations and contributions to New Zealand science, were presented to the Rotorua and Canterbury branches of the Royal Society by Dr C.A. Fleming.

GEOLOGICAL NOTES FROM THE UNIVERSITY OF OTAGO

Good wishes go to Mr D. Hamilton, until recently lecturer in this department who has resigned and is now at the University of Reading where he is embarking on post-graduate research in sedimentology under Professor F. Allen. During his seven years at Otago Mr Hamilton was responsible for building up the first course in sedimentology. Mr W.A. Hodgson, now at Imperial College, London whose interests are also in sedimentology will take up a lectureship here early in 1960.

Mr B.M. Gunn and Mr J.H. Lowery, both of this department, are at present leader and geologist respectively of a summer party in Antarctica.

We are happy to welcome back to Otago Dr J. Rogers, who is established in the high temperature - high pressure laboratory as the first geochemist to be appointed by the New Zealand Geological Survey.

During 1960 Professor D.S. Coombs will be on refresher leave. He will spend about six months at the Pennsylvania State University, and will visit among other places the Universities of California and Cambridge and will attend the International Geological Congress at Copenhagen.

NEWS FROM THE DEPARTMENT OF GEOLOGY, UNIVERSITY OF AUCKLAND

The number of students of geology at Auckland has increased slowly to reach a total of ninety in 1959.

Dr Laws retired at the end of 1958 and has continued with part-time teaching during 1959. This year Mr Searle joined the staff on a full-time basis and Mr Grant-Mackie has been appointed Lecturer in Paleontology. Dr Brothers will be absent on leave during 1960.

Our new building will be adequate for at least eight years unless enrolments increase very sharply. We occupy two floors in this building, the lower floor being entirely used for undergraduate teaching and the upper floor for library, museum, staff and advanced students.

Conditions are much better than in the old building. We have planned as much as possible for flexibility, the rooms for advanced research students being adaptable for the teaching of small classes of four to six in some specialised fields. New laboratories added to the department include a small optics lab, chemical laboratory and a draughting room. A standard size of tray and cabinets for specimens is used throughout the department. As in the old building, all the geological literature is housed within the department and the collection of separates is fully catalogued by author and by subject. We welcome additions to this collection, particularly of papers that do not appear in the better known journals. We also like to have several copies of any paper on New Zealand geology for teaching purposes.

The department continues to serve as a meeting place for geologists in the Auckland Province and we welcome the arrival of Survey colleagues at Otara. Meetings of the Geological Society of New Zealand are held informally once a month with an average attendance of twenty members.

The department also continues to serve as a centre for information on the geology of Auckland. A large amount of detailed information on the geology of the city was collected by Professor Bartrum, and members of the department, particularly Mr Searle, have added considerably to these records which have proved to be very valuable in recent large scale engineering operations.

Most of the city and its surrounds have now been mapped on a scale of 10 chains to the inch and the department hopes to finish a memoir on the local geology within a few years.

FOURTH TRIENNIAL MINERAL CONFERENCE, DUNEDIN.

1 - 3 September, 1959

The conference was attended by some 200 delegates; and 70 papers were presented - a larger programme than had been anticipated. The organisation of the Conference by Dr G.J. Williams and the staff of the Otago University Faculty of Technology was excellent. The registration appeared to run smoothly and all but a few of the papers were ready printed in full before the opening and presented to members. Discussions of papers, recorded by stenographers or on tape recorders, will be included in the published Proceedings of the Conference.

The Hon. F. Hackett, Minister of Mines, opened the conference briefly and the Mayor (Sir Leonard Wright), Dr Williams, and Mr C.H. Benney, Under-Secretary for Mines, also spoke at the first session. Mr Benney, who was attending his last Mineral Conference as Under-Secretary of Mines, struck the first serious note in his opening speech, and with typical forthrightness called for new thinking and reorganisation of New Zealand's non-metal mining within the next decade. He considered there was no foreseeable way of overcoming overproduction in the coal industry. Later in the morning he elaborated his ideas in the Mineral Economics session while presenting his paper on "A Suggested Policy for the Mining Industry of New Zealand" which suggested reorganisation from Ministerial level downwards. There seemed tacit agreement with his recommendation that the State Coal Mines be run by a separate Corporation. His view that the Geological Survey should be incorporated in Mines Department passed with little comment. Mr Benney maintained that New Zealand coal could be most efficiently won by a system of small cooperative mines. This view was strongly contested by labour representatives and the Geology Lecture Theatre rang strangely to political-type speeches from Union leaders.

In the same session, Mr T.J. McKee called for more prospecting and mapping, particularly in granite areas, and throughout the conference, suggested more encouragement for the private prospector who was willing to get out and look for minerals. Mr R.W. Willett outlined the present Geological Survey mapping programme, and Mr Dickinson (Rio Tinto, Australia) in his paper urged that exploration expenditure should be fully deductible from income before taxation.

The Coal Utilisation Session continued steadily for two days with Mines Department, Mining School and D.S.I.R. staff contributing fifteen papers in all; so there was no shortage of ideas.

In the Aggregate Production Session, Mr D.S. Nicholson gave important information on the production of light weight aggregate for concrete, and described experiments using kiln expanded argillites from near Petone.

Dr Swindale's paper in the Iron, Steel and Aluminium Session, "Bauxite in the Red-Brown Loam Soils of New Zealand", was well received. He presented the results of his careful work to date on North Auckland soils and gave brief comparisons of possible processes for treating the ore. There was general cheerfulness about the prospects of an indigenous aluminium industry and many congratulatory remarks.

Unfortunately, Mr Turner, Engineer-in-Chief, Ministry of Works, was delayed in Southland and could not attend the meeting. Mr R. Simpson, M.O.W., presented Mr Turner's paper "New Zealand's Potential for the Development of Industry". The main theme of the paper was that it was essential to provide cheap power for industry in order to attract overseas capital. A remarkable example was given of the snowball growth of one industrial concern in Tasmania resulting from the availability of cheap bulk-rate power. In the discussion Mr Benney asked why coal-fired power stations should have such a high capital cost when compared with hydro-electric stations.

Mr D.S. Nicholson, in the session on Electrometallurgy, discussed the economics of production of steel from iron sands, and Mr T. Marshall described the merits of the direct-reduction R - N process, recently developed in the United States. Mr Nicholson laid emphasis on Auckland deposits and went so far as to suggest a steelworks site on Auckland Harbour, thereby raising great headlines in the Otago Daily Times. In the same session, Mr R. Coulton, Assistant Manager, B.H.P., Newcastle, gave a masterly and rather alarming picture of the vast scale of operations in a steelworks of economic size. His was one of the few papers illustrated with colour slides. He mentioned in passing the serious problem of obtaining enough space round the works for waste disposal and stacking of materials.

Other sessions covered recent developments in quarrying and blasting techniques, and in the investigation of ceramics and pozzolans in New Zealand. Non-metallic and metallic mineral deposits, including among others the uranium-bearing rocks of the West Coast; manganese ores; economic minerals at Stewart Island and at Canaan, N.W. Nelson; the Takaka asbestos deposits; and the New Zealand perlite industry were described.

At a special session on Pacific Islands Geology Dr N.J. Guest and Mr R.E. Houtz of the Geological Survey of Fiji contributed papers on iron sands, bauxite, and base metal mineralisation in Fiji. Surveys for phosphate in Samoa and the lower Cook Group were briefly described by D. Kear and B.L. Wood of the N.Z. Geological Survey.

At the final session Prof. F.T.M. White of the University of Queensland gave a very interesting description of the Australian beach sand industry. Since the last war, sands along the New South Wales and Queensland coasts have become an important world source of rutile and zircon. The talk was illustrated by photographs of several of the deposits and the equipment used in working and concentrating the minerals. Professor White described the high order of efficiency that this industry had reached, but stressed that with the working out of the higher grade deposits even cheaper methods of up-grading and mineral dressing must be sought if the industry is to remain vigorous.

If the Conference does not shape future mining policy in the country, it at least made the ideas and opinions of the leaders in the mining world more widely known, both amongst conference members themselves, and, through a good press coverage, to the general public. It will have a unifying effect at a critical period in New Zealand's industrial development.

I.C. McKellar.

McKAY HAMMER AWARD

At the Annual General Meeting in New Plymouth it was announced that the recipient of the McKay Hammer Award for 1958 was Dr Maxwell Gage, University of Canterbury. In making the award the committee had in mind his recent paper "Late Pleistocene Glaciations of the Waimakariri Valley, Canterbury, New Zealand" (N.Z. Journ. Geol. Geophysics, vol.1, pp.123-55). We wish to congratulate Dr Gage on receiving the Award.

At the same meeting Dr C.A. Fleming, recipient of the 1957 Award, was presented with his engraved hammer and certificate.

JOHN HENDERSON, C.B.E., D.Sc., B.E. (mining), A.O.S.M. (1880-1959).

Formal obituary notices of Dr Henderson have already been published in the press, and in *Nature*, vol. 183, May 30, 1959. Another, accompanied by a bibliography, will appear in the Proceedings of the Royal Society of New Zealand. The present note is a more or less informal attempt to sketch the history of the Geological Survey during Dr Henderson's 34 years of service.

Following P.G. Morgan's promotion to Director, Dr Henderson joined the N.Z. Geological Survey as Mining Geologist in 1911. For the previous eight years he had been Director of the School of Mines at Reefton, then the centre of a flourishing mining industry in gold-bearing quartz reefs.

The method of carrying out the work of the Survey at this time was that introduced by J.M. Bell for the re-constituted Survey of 1905. (For a brief outline of previous Geological Survey history, see Morgan, 1927, 21st Ann. Rep. N.Z.G.S.: 1). A field party to carry out the geological survey of a Subdivision consisted generally of a senior and where possible a junior geologist, several field hands (who might be local handy-men or University students on "vacation"), often a topographer and, not the least important, a cook. Camps were sited according to convenience of access, water, fuel, etc., and from this central camp, "fly camps" of several days' duration, often regretfully expanded, were swagged into (and out of) the peripheral and more inaccessible districts. The method, of course, still has to be used in some areas. As salaries were modest, there was generally an urge to live within the somewhat meagre camp allowance, so that the life was a fairly tough one.

The field season lasted from early October until the end of May, when the party was disbanded and the geologists returned to Wellington for the winter. The next four months were spent in writing up the geology and in preparing the maps for and with the draughtsman. The system certainly had advantages in the facilities that were available at headquarters, an excellent library and draughting department, geological specimens for comparison (though few enough) and the opportunity of frequent discussion not only with other geologists but also with other scientists. Some aspects of the procedure, however, were not so good. Accommodation was always liable to cause headaches, not only to the family-men with their problem of 8 months compulsory grass-widowhood, but also to the flat hunters, either single or newly-wed. Wellington never was an easy place for accommodation. Then also the tradition of no leave during the field season even over the Christmas was rather rigidly applied and brought its hardships.

One memorable institution of the twenties should be put on record - the annual dinner provided by Mrs Henderson for all the geologists, not forgetting the paleontologist, on their return for the hibernation. The six or eight active men, fined down by 8 months of strenuous field work, greatly appreciated and efficiently disposed of the sumptuous meal so generously provided.

With the transfer of the Geological Survey from the Mines Department to the newly-formed D.S.I.R. in 1926, conditions did not materially change for several years. P.G. Morgan died suddenly "in harness" in 1928, and just as the new Department was getting properly under way, along came the great economic depression with a crop of administrative troubles. It certainly was a depression. The greatly depleted Government income had to be eked out by severe pruning of departmental votes and there was great pressure on Public Service retrenchment. Nevertheless by unremitting care in expenditure, backed by the resourcefulness of Dr. E. Marsden, Secretary of D.S.I.R., the staff of geologists was maintained and a glance at the Annual Reports of the period shows that regional mapping proceeded much at the usual rate. The strength of field parties was cut down and some subdivisions were worked from boarding houses, shearers' quarters, and musters' huts, personal transport often depending on the local storekeeper or butcher, but the work went on. There was no money for bulletin publication, but the condensed reports and black-and-white geological maps crammed into the Annual Reports have proved most useful.

Subsequently the Geological Survey, under Dr Henderson, greatly increased the scope of its activities. Soil, geophysical and volcanological work was undertaken, leading ultimately to the establishment of separate divisions - Soil Bureau and Geophysical Survey. A petrological and mineralogical laboratory was set up and the draughting, library, and office staff greatly expanded.

With the coming of the second World War, calls for geological advice increased greatly, not only from the Army for such things as water supply for camps, or selection of radar installation sites, but also from Works and other Government departments and from Public Bodies.

Meanwhile, D.S.I.R. had found it necessary with their greatly expanded activities to set up District Offices, and the example was soon followed by Dr Henderson for the Survey. Actually the Volcanological and Coal Survey branches had been virtually District Offices for some time so this step did not greatly change the routine.

Dr Henderson always showed a kindly personal interest in the members of the staff, and at all times was happy to help with advice on geological or, indeed, any problems from his exceptionally wide field of knowledge.

J. Marwick

THE SEQUENCE OF MOLLUSCAN AND BRACHIOPOD LIFE
IN NEW ZEALAND

INTRODUCTION

A symposium on the above topic, convened by Dr J.B. Waterhouse and chaired by Dr J. Marwick, was presented at a meeting of the Geology Section of the Wellington Branch of the Royal Society of New Zealand on the evening of the 10th of August, 1959. Five speakers discussed the changes of faunas and their affinities during intervals with which they are familiar; and two written reports contributed by workers unable to be present were, in one case, read by the chairman, and in the other, incorporated in the formation on the relevant interval.

The following is a brief report of the major points as presented at the meeting and is based on notes taken for the minutes. The contributor of each section is noted in brackets following the heading.

Dr J. Marwick, in introducing the symposium, indicated some of the dangers of overseas correlations and mentioned that although the aspect of palaeontology to be presented was only too infrequently attempted, the improvement of facilities in recent years, especially in communication and library facilities, allows readier compilation of data.

PALAEOZOIC

(Dr J.B. Waterhouse)

In New Zealand, faunas containing molluscs and brachiopods are known from only two Palaeozoic periods, the Devonian and Permian, both of which are of Upper Palaeozoic age. Lamelli-branchs, the molluscan constituent, are relatively unimportant during both of these periods, and brachiopods are supreme as affinity indicators. Two areas of Devonian rocks, both Lower Devonian, are known, one near Reefton, the other at Baton River, North-West Nelson.

DEVONIAN

Dr Waterhouse showed the existence of an interesting history of investigation, the affinities of the fauna depending largely upon where the worker completed his study. In the first examination, Allan (1935), working in Europe (England), indicated that some 50% of the fauna had affinities to European species with

lesser affinities to Eastern North American, Tasmanian, and South African forms; then Shirley (1938), also studying in England, showed that the affinities were mostly (c. 60%) to Europe and North America (20%); subsequently when re-examining the fauna in the United States of America, Allan (1947) suggested that the resemblances were less strong to Europe and closer to North American forms; and, in the most recent report, Gill (1952), an Australian, recorded that the strongest affinities were with East Australia, a result thought to be the most probable by Dr Waterhouse. The Reefton shallow water fauna has about 50% East Australian affinities, while some 50% of the deeper water Baton River species are also related to East Australian species.

PERMIAN

The strong New Zealand - East Australian relationship is still apparent during this period, two thirds of the New Zealand fauna being specifically similar to the cold water fauna of East Australia. Generally the brachiopods of the Takitimu Beds are cosmopolitan; those of *Productus* Creek have a closer Australian relationship, about 90% in the upper part; while the deeper water fauna at Arthurton on the north-east flank of the Southland Syncline has few Australian relationships and more to Tethyan forms.

MESOZOIC

(Mr I.G. Speden, with a written contribution on the brachiopods by Mr J.D. Campbell, Otago University.)

A recent discovery of major importance is that by Mr A.R. Mutch of Scythian (Meekoceras Zone) ammonites (see Kummel, 1959) with Indonesian affinities at Wairaki, Southland. This discovery completes the sequence of world Triassic Stages in New Zealand. Throughout this period the lamellibranchs show closest affinities to Indo-Pacific forms, particularly to New Caledonian in the Triassic and Lower Jurassic, and to Indonesia and the Himalayas in the Upper Jurassic. Ammonoids also show strong affinities to Indonesian-Himalayan species, except at three intervals, namely the Etalian (Anisian), Upper Temaikan (Callovian) and Heterian (Lower Kimeridgian), when the affinities are respectively mostly boreal, Alaskan and Mexican. In each case an Indonesian affinity still remains. Marked bursts of incoming of genera occur in the Oretian-Otamitan, Aratauran and Temaikan. The Triassic and Lower Jurassic is notable for an endemic element, which is significantly large (c. 20%) in Oretian - Otamitan times and apparently is much greater than in the faunas of other circum-Pacific countries.

The brachiopods have very strong affinities to New Caledonia

in the Triassic and Lower Jurassic, but the Middle and Upper Jurassic species are little known. Mr Campbell considers that the New Zealand pre-Kaihikuan fauna contains all the elements necessary for the development of subsequent faunas.

A contribution by Mr G.R. Stevens on the Mesozoic belemnites was then presented by Dr Marwick. Lower and Middle Jurassic affinities are to Europe, Upper Jurassic to Indonesia, and Cretaceous to Australia.

CRETACEOUS (Drs C.A. Fleming and H.W. Wellman)

Dr Fleming commented on the break between the Jurassic and Cretaceous faunas and on the lack of recent detailed palaeontological work on Cretaceous collections. He then discussed the affinities of Cretaceous genera on which he and Dr Waterhouse had been working. The New Zealand Maccovellas show both Australian derivation and local evolution; Aucellina has endemic, Australian (Queensland) and possible but doubtful Eurasian elements. At various intervals, Trigoniid genera show endemic elements, South American, Australian, Indian and boreal affinities.

Dr Wellman briefly contributed on the Cretaceous Inocerami and ammonites. The former are a variable group, widely distributed, and most New Zealand species are comparable with those in other countries. The ammonites also have a worldwide distribution and are closely related to English species. There is a strong suggestion of a relationship to South American in the Haumurian (Maestrichtian).

TERTIARY AND RECENT

(Mrs A.U.E. Scott)

Of our 800 genera of marine molluscs (about 240 Pelecypods, 570 Gastropods) described from the Tertiary and Quaternary, only a small number (about 30 genera) are also known from the Cretaceous. The fauna at Wangaloa represents a transition between Cretaceous and Tertiary. Continuing the late Cretaceous trend, there is a distinct South American affinity in the early Tertiary. Indo-Pacific and Australian elements are found throughout the Tertiary and Quaternary, and there are marked peaks of immigration and several periods, including Recent. Over one-third the total Tertiary and Quaternary molluscan fauna is ostensibly peculiar to New Zealand, but these figures are undoubtedly exaggerated. Pliocene and Pleistocene history is dominated by successive periods of cooling, causing extinction of warm-water forms and allowing incoming of southern cool-water forms, although northern and Australian elements continued to arrive.

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- GILL, E.D., 1952: Palaeogeography of the Australian - New Zealand Region in Devonian Time. Trans. roy. Soc. N.Z. 80: 171-85
- KUMMEL, B., 1959: Lower Triassic Ammonoids from Western Southland New Zealand. N.Z. J. Geol. Geophys. 2: 429-47.
- SHIRLEY, J., 1938: The Fauna of the Baton River Beds (Devonian), New Zealand. Quart. J. Geol. Soc. 94: 459-506.

- I.G. Speden

A Geological Society committee member after the last Annual General Meeting hotfooted it to the offices of a New Plymouth newspaper to give a reporter a careful account of the evening's proceedings, including the announcement of the McKay Hammer Award for the year. Next morning, when sipping an early-morning cup of tea in his hotel bedroom, the committee member saw in the paper that Dr Maxwell Gage had been awarded the McKay Hammer for his paper on plasticine glaciation in the Waimakariri Valley! The paper printed a correction next day.

LETTER TO THE EDITORS

Sirs,

The 1958 edition of Geological Map of New Zealand (1:2,000,000) is an excellent production, and in almost all respects greatly superior to previous versions, but I would like to draw the attention of members to some features in the undermass mapping in North-east Otago which I believe to be incorrect.

The area between the lower Waitaki Valley and the Shag Valley, occupied mostly by the Kakanui Range, is shown as a central belt of "Undifferentiated Jurassic - Permian" sedimentary rocks flanked on both sides by "Permian-Carboniferous" sediments. My first objection is to the age allotted to these rocks, as I know of no evidence requiring the basement rocks between the Waitaki River and the summit of the Kakanui Range to be older than Triassic. Secondly but perhaps more seriously, the mapping ignores the existence of extensive tracts of Chlorite 2-3 metamorphic rocks in the same area. Thirdly, the distribution of rock ages implies the existence of broad anticlinal and synclinal structures for which real evidence is lacking, and which appear contrary to Wellman's interpretation (P.S.I.R. Bull. 121, Fig.2, 1956). Finally, this map suppresses a contrast in lithology and metamorphic rank across the lower Waitaki Valley which was brought out by the 1947 16-mile map, and which gives a different tectonic significance to the Waitaki depression.

Geology Department,
University of Canterbury,
CHRISTCHURCH. 27 August 1959.

(Sgd.) Maxwell Gage

This letter was referred to the Director of the N.Z. Geological Survey who states:

"The points referred to by Dr Gage have been previously noted and correction and reference has been made in the text and map corrigenda of a forthcoming bulletin by G.W. Grindley, H.J. Harrington and B.L. Wood - "The Geological Map of New Zealand", N.Z. Geol. Survey Bulletin No. 66.

NEW MEMBERS

A welcome is extended to the following new members who have joined the Society since the last Annual Meeting.

Barret, P.J., Trinity College, Grafton Road, AUCKLAND.

Cooper, R., 20 Pukatea Street, EASTBOURNE.

Laird, M., C/o Geology Department, University of Auckland, AUCKLAND.

Lawry, D.C., C/o Geology Dept., University of Auckland, AUCKLAND

Legget, Dr R.F., Director, Division of Building Research, National Research Council, OTTAWA, CANADA.

Librarian, Geological Survey of Canada, C/o Geological Survey Building, 601 Booth Street, OTTAWA, CANADA.

McGregor, V.R., C/o Geology Department, University of Auckland, AUCKLAND.

Maddock, A., 31 Truman Street, Bryndwr, CHRISTCHURCH.

Mallahoff, A., 2 Dorking Road, WELLINGTON.

Taylor, R., C/o Geology Department, University of Auckland, AUCKLAND

Todd Motors Ltd., Courtenay Place, WELLINGTON.

Waterhouse, Dr J.B., C/o N.Z. Geological Survey, P.O. Box 368, LOWER HUTT.

The total membership of the Society is now about 260 (of whom a number are unfinancial!). Overseas members, including New Zealand research students, total 50, as follows:

United States (12), Australia (11), England (8), Canada (5), Venezuela (5), Holland (2), and one each in Fiji, Guatemala, Italy, Malaya, The Philippines, Scotland, and Tasmania.
