GEOLOGICAL SOCIETY OF NEW ZEALAND

NEWSLETTER

No. 14

AUGUST 1963

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University of Canterbury Geology Department

Dr A.E. Cockbain has been appointed to replace Dr H.S. Edgell, who left last year to join the Geological Survey of Western Australia. The staff establishment was increased by the appointment of Mr S. Macdonald, who is dealing mainly with courses in applied geology and geophysics for both science and civil engineering degrees. Dr Cockbain, a graduate of Nottingham University, formerly worked as micropalaeontologist for the Geological Survey in Cyprus, and more recently for the Department of Oceanography in the University of British Columbia. Mr MacDonald, who hails from Edinburgh, was engaged in mineral search, mining and engineering geology, and regional surveys in Malaya for ten years before coming to New Zealand. Professor R.S. Allan returned from his sabbatical leave last August, having spent some months at the Sedgwick Museum, Cambridge. Mrs A.C. Beck (Dawn Rodley) left us in February of this year.

Mr Lee S. Clayton, a Fulbright Scholar who arrived last year in September from the University of North Dakota, has been mapping the glacial deposits of the Hope, Waiau and upper Clarence rivers. Mrs Dawn Seed is studying various aspects of New Zealand glauconites. Masters theses in the concluding stages include those of Jocelyn K. Adamson (Lake Rotoiti area), K.A. Liggett (Banks Peninsula volcanics), and T.D. Phillips (Inangahua); those begun last summer are by S.J. Carryer (alluvial fans in the Rakaia valley), P.A. Maxwell (Kaiwhara valley) and J.R. Reid (Hurunui valley, with special emphasis on engineering requirements of potential dam sites).

It was necessary to encroach upon existing laboratory space in order to install a Philips X-ray diffractometer, and differential thermal analysis equipment, and to provide a (reasonably) constant temperature room. Such inroads are likely to conflict with future demands for student space, in view of a sharp rise on first year enrolments this year from 74 to 97, and it will be difficult to house additional bulky equipment before the Department moves to Riccarton at the end of 1965. All classes in engineering geology, including practical work, have already been transferred to the School of Engineering at Riccarton.

- M.G.

Geology Department, University of Otago

During the year Mr J.D. Campbell was on refresher leave in Cambridge and returned to Dunedin in June. B.M. Gunn has completed his Ph. D. degree and, following a further visit to Antarctica in December 1962, is continuing his work on the Ferrar Dolerites at the Australian National University in Canberra.

Three senior students have left to work at universities overseas, namely C.T. Harper, who is working at the Department of Geology and Mineralogy, Oxford, on the application of potassium-argon dating methods

to low-grade Dalradian schists; D.G. Bishop, who is a Teaching Fellow at the University of Sydney; and E.H. Brown, who has returned to the United States and is studying at the University of California. Jean Armfield, secretary in the department for five years, has left us to be married.

Mr J.B. Wright has come to us from the Kenya Geological Survey to expand the mineragraphy course and is working on varicus opaque minerals from New Zealand, including those responsible for the magnetism of the Dunedin Volcanic Complex. During the summer he visited the Auckland Islands with the joint D.S.I.R. - Museums expedition. Dr Means attended a conference on structure analysis at the Australian National University in February 1962, and Dr Hodgson was in Australia for the ANZAAS meeting in Sydney last August.

Mr A.E. Grady, a graduate of Sydney University, is working for a Ph. D. in the department and has joined the staff as a temporary assistant lecturer for 1963. Miss C. Travis from the University of Colorado is completing an M.Sc. degree, and Miss K.K. Williams from Imperial College, London, is working for a Ph.D. degree in geochemistry within the Chemistry Department. Mr E. MacKenzie has joined our staff as a technician.

Dr J. Whetten, a research fellow under the Fulbright scheme, arrived from Armidale, N.S.W., in January 1963 and spent three months in the department, working on zeolites before returning to the United States.

During the year the research discussion group has continued to meet. Among the list of speakers and topics were:

Mr D.G. Bishop	The geology of the Clinton district.
Dr R.N. Brothers	Petrofabric studies of layered intrusions.
Dr R.G. Coleman	Glaucophane schists and serpentinites.
Dr T. Hatherton	Regional geophysical surveys in Otago and Southland.
Mr J.T. Linzey	Ceramic materials.
Mr I.C. McKellar	The geology of Lituya Bay area, S.E. Alaska.
Mr J.D. Raeside	South Island loesses.
Dr J. Rogers	Experiments in the metamorphism of lignite.
Dr D. Squires	Evolution of the genus Lithomyces.

In the second term Dr Squires also spoke to the department on deep water coral reefs, and Dr Hatherton gave a series of lectures on geophysical methods. Dr Coleman joined the third year students on an excursion to the Bluff area during the third term.

Until the advent of the proposed new science buildings there is little room left for expansion of the department. Already our senior practical classes are somewhat cramped for space, and the numbers of intermediate students now exceeds the capacity of the main lecture theatre. The main

problem at present is space for senior laboratories and expansion of research activities. In the basement we have acquired a workshop and one more research room. The laboratory for mineral separation and sedimentation has been in use throughout the year and we are planning on fitting out a small new mineragraphy laboratory and a dark room in the near future.

-W.A.H.

"The Geology of New Zealand"

The 1:250,000 mapping programme of the Geological Survey is planned to be completed about the end of 1964, field work being now almost finished. It has been far more than a compilation of results available from past surveys, and has taken geologists to areas never previously examined. No such comprehensive coverage of New Zealand within a short period of time has been attempted before, nor can it be envisaged again in the foreseeable future. The opportunity for a balanced review of the geology of the country - a stocktaking of stratigraphic, palaeontological and petrological information and ideas - would not recur for a long time.

The proposal to write a "Geology of New Zealand" was made at the 1958 meeting of Geological Survey staff engaged on the 1:250,000 mapping. It was decided that individual sections should be written by those of the Survey who were best qualified to deal with particular topics. Because of the consequent large number of authors, this decision has put a heavy responsibility on the Editor in attempting to get a substantial degree of uniformity in the text as a whole. The initial layout and list of contents has inevitably undergone many changes in detail, though the basic pattern decided on in 1959 has remained, and it is hoped that there will be little need to modify it further. To accompany and illustrate the publication, it is intended to provide new 1:1,000,000 maps, one each of the North and South Islands. Text figures and the incorporation of as much as possible of the basic information into tables are encouraged. In all it is expected to amount to about 350 pages of text.

The "Geology of New Zealand" is not intended for the layman: it is the absence of a modern authoritative description for the geologist, both in New Zealand and overseas, that is the first gap to fill. Nevertheless it is hoped that not only the basic information will be summarised, but also that some picture of the geological history of the country will be given. The present plans are for publication in 1965.

-R.P. Suggate.

Members of the Society may purchase maps from the Department of Lands and Survey at a discount of $33\frac{1}{3}$ per cent. This concession, which does not apply to mosaic maps and aerial photos, was granted to the Society in 1958.

Victoria University of Wellington Geology Department

Dr Tamio Kotaka from Sendai, Japan, a palaeontologist who has specialised on Tertiary molluscs, took up duties as a lecturer in November last year. Mr W.R. Lauder, still on sabbatical leave, is due back in September after visiting many ultrabasic masses overseas. Dr M.H. Briggs resigned early this year, while Mr N.H. Taylor has taken up a temporary position lecturing in pedology.

Professor D. Kupfer has returned to Louisiana after working for a year on the Alpine Fault. Unfortunately his stay was marred at the end by the sudden need for a medical operation, but happily he was well on the road to recovery when he left. In February Professor M. Carman from Houston, Texas, arrived on a U.S. National Science Foundation grant and is studying ultrabasics and other rocks along the Alpine Fault, particularly in the Olivine Range, West Otago.

Two British Commonwealth Scholars arrived at the beginning of the year to do post-graduate work, namely M.S. (Chino) Srinivasan from the Hindu University of Banaras, India, who is working on upper Eocene and Oligocene foraminifera, mainly from the West Coast; and Jim Cole from the University of Leicester, who is particularly interested in volcanics and is to be working on Mt Tarawera.

Of our own graduates Dick Walcott is working on rocks of the Red Hills, Nelson, at the northern end of the Alpine Fault. Jim Kennett is continuing with his work on the Kapitean Stage. Ian Willis has gone to Imperial College, London, with a possible field mapping project in Greece.

Tony Allen is now at the Geological Survey of Western Australia; Roger Cooper has joined the N.Z. Geological Survey, but at present is working on a UNESCO appointment in North Borneo; Jim Eade has joined the N.Z. Oceanographic Institute to work on Recent foraminifera; and Graham Gibson has taken up an appointment with the Shell Oil Co. at New Plymouth as micropalaeontologist. Present M.Sc. students are Bob Brathwaite, who is working on the mapping and petrology of the Boulder Lake area, N.W. Nelson; Tom Haskell, who is working on Cretaceous spores and pollens; and Mike Hall, working on the Cretaceous rocks of Coverham, Marlborough.

Last season VUWAE No. 6 had a successful summer's mapping in Antarctica, working in the Darwin Glacier and Taylor Valley areas. The leader was Ian Willis, the deputy leader Dr Charles Rich (of Bowling Green State University, Ohio), and the other members of the party were Jim Kennett, Tom Haskell, Warwick Prebble and Gill Smith.

During the year, to cope with increasing student numbers, the department has expanded into a house at 2 Clermont Terrace. This is known as the Geology Annexe and contains the palaeontology research collections and a foram laboratory.

-P.V.

Royal Society of New Zealand Annual Meeting

by B.W. Collins
(G.S.N.Z. Representative on Council)

The Geological Society remains the only national scientific society that is a member body of the Royal Society of N.Z. (and hence with a representative on its Council), but the N.Z. Institute of Chemistry is apparently considering following in our footsteps. The Royal Society has in recent years shown itself anxious to co-operate with other societies; and this year's President (Dr C.A. Fleming, one of our members) in his Presidential Address again made it clear that the Royal Society would be strengthened in its many activities if its Council contained representatives of the major scientific disciplines as well as of the regional branches.

The Council's Annual Meeting, on May 23 last, was as usual a busy one and put through a great deal of business. The President's task was made even more difficult by his having to give his Presidential address the same evening - at a meeting of the Wellington Branch in the Dominion Museum. He spoke on "Promotion of Science in a Commonwealth Democracy", reviewing the history of the Royal Society (previously the New Zealand Institute) and indicating its probable future growth. Incidentally he pointed out how relatively large a part geologists had played, especially in the composition of the Council and its Fellowship.

The meeting itself was notable not only for the amount of business transacted - the agenda contained some 87 items and sub-items - but also for the large attendance of representatives - only two out of 26 were absent, and they were overseas. The Society's Patron, Sir Bernard Fergusson, the Governor-General, attended the meeting for part of the time, gave a short address, and met Council members over morning tea. Much of the business could be described as formal and routine, and only a selection of matters of special interest to geologists will be mentioned here.

New Fellows and Honorary Member.

Among the ten new Fellows elected were Mr N. de B. Hornibrook, Dr E.I. Robertson, and Dr R.P. Suggate; and the Geological Society's nominee, Prof. K.E. Bullen, Professor of Applied Mathematics at the University of Sydney, was elected to the vacancy in the Honorary Membership for his work on New Zealand and World seismology. Our congratulations to these earth scientists for their well deserved honours.

Hector Medal and Prize.

This award, which is made annually, but to a geologist only once in six years, went this year to Dr C.A. Fleming.

Previous recent Hector medallists in geology have been: Dr H.W. Wellman (1957), Dr F.J. Turner (1951), Dr J. Henderson (1945), Prof. J.A. Bartrum (1939), Prof. W.N. Benson (1933), and Prof. C.A. Cotton (1927). In 1941 the award was given to Dr H.J. Finlay (zoology) and in 1952 to Dr K.E. Bullen (physics).

Our congratulations also to Dr Fleming on his joining this illustrious band.

The Royal Society Library.

The Society's library, built up over almost a century largely by way of exchange for the Transactions, has been for some time a matter of concern to the Council. It is inadequately housed (at Victoria University), has large arrears of binding, and is not properly catalogued or completely listed in the "Union List of Serials in New Zealand Libraries." It was this year the subject of a report by two members of the N.Z. Library Association (Messrs A.G. Bagnall and E.H. Leathem). The report emphasised the value of the Library: "many of the runs are unique in New Zealand", "series of great value both intrinsically and to the research needs of the country"; and recommended as follows: "----the importance of the collection merits its vigorous development", "----more should be done in developing exchanges". "-----the Society should itself continue to accept responsibility", at least "----in the short term". (There have been suggestions that the Society should "endeavour to shed the responsibility and necessity of maintaining a library".) The need for a trained librarian to be employed for a period of two to three years to catalogue the library and supervise its re-arrangement on removal to new quarters when possible was also stressed. These recommendations were approved in principle and the report, and that of the Library Committee of the Society itself, referred to the Standing Committee.

Publication of Transactions.

The present system of issuing separate papers in four series (Botany, Geology, Zoology, General) came in for a good deal of criticism and was discussed at some length. Its advantages in some ways were recognised, but many members seemed to regret the passing of the bound volumes or parts. There was also disappointment at some of the long delays in distribution to the members generally (as distinct from distribution to authors). Eventually a resolution was passed calling on the Standing Committee to investigate the possibility of a scheme whereby papers would be published separately for author distribution but issued to subscribers in half-yearly bound parts, in sections as at present.

International Relations.

The Royal Society is taking an active part in maintaining and extending New Zealand participation in international organisations. During the past year it has set up a N.Z. National Committee for Geology and has been accepted as a member of the International Union of Geological Sciences. The National Committee consists of:

The Director of the N.Z. Geological Survey (Mr R.W. Willett)
The President of the Geological Society of N.Z. (at present Mr J. Healy)
The six members of the Royal Society's Sectional Committee on Geology and Geophysics (at present: R.S. Allan, D.S. Coombs (chairman), D. Kear, E.I. Robertson, R.P. Suggate, and H.W. Wellman).

An ICSU (International Council of Scientific Unions) Committee was also reconstituted during the year, with Dr M.A.F. Barnett as Convenor, and consisting of representatives from the various national organisations or committees of the disciplines in which New Zealand is affiliated with international unions. Dr E.I. Robertson is, for example, the representative for Geodesy and Geophysics, and Dr R.P. Williams for Crystallography. The Geology representative had not been chosen at the time of the Annual Meeting.

Mr R.W. Willett was appointed the Society's representative on the N.Z. National Committee of the World Power Conference.

Report of Earthquake Risk Committee.

An important report received was that of the Earthquake Risk Committee appointed in 1956 as a result of a recommendation from the Geology Section of the Wellington Branch of the Royal Society. The final composition of the committee was: R.W. Willett (convenor), F.F. Evison, G. Eiby, R.R. Dibble, R.I. Skinner, R.P. Suggate, H.E. Fyfe, G.J. Lensen, R.H. Clark, R.M. Williams, and J.A. Johnston as observer.

As Willett states in his introductory report, discussion made it clear that a completely unanimous report would not emerge from this committee. Hence three separate reports (in addition to the introduction) were presented over the signatures of those members responsible for their preparation.

Evison, as a geophysicist, considers that there is at present inadequate evidence to generalise much. Clark, Dibble, Fyfe, Lensen, and Suggate, regarding fault traces and other deformation as the surface expression of earthquakes, suggest the division of New Zealand into four zones of differing "earthquake risk" of destruction or damage.

To quote Willett, however, "While the geologists suggest that there are areas in New Zealand less likely to be affected by earthquakes than others, and while the geophysicists cannot but treat the country as a whole, this does not in any way modify the view that New Zealand as a whole is subject to destructive earthquakes and that there should be no relaxation of building codes or standards whatsoever."

The mapping and study of foundation conditions by geologists and soil physicists are also recommended. Earthquake study is a branch of knowledge "which New Zealand as a natural seismological laboratory has a duty" to promote, as a contribution to "world seismological understanding."

The report is to be circulated immediately to interested bodies, and will be later published in the Proceedings of the Royal Society of N.Z.

Constitution of the Royal Society.

This was not again raised specifically, but a change in the rules was made to restrict the choice of the President and the two Vice-Presidents to Fellows. This accords with a general feeling that the Fellows should play a more important role in the Society and that the Council would be strengthened by having more Fellows. Under the new rule at least three members of the Council will necessarily be Fellows. There are also two Fellows' representatives, who of course will usually be Fellows. Of the present Council of 26, actually 16 are Fellows.

A few years ago the Society raised the number of Fellows from 50 to 100. In 1961 twenty-one were elected, in 1962 ten, and this year ten. Next year ten more will be elected besides one to replace a vacancy caused by death. This will bring the Fellows up to the full number allowed by the rules.

Conclusion.

For the Geological Society it is good to see the Royal Society (traditionally and actually the senior and most important scientific body in New Zealand) actively pursuing its object - the promotion of science. By its annual and half-yearly meetings of Council, its monthly Standing Committee meetings in Wellington, the meetings and discussions of its numerous committees, its representation on many national bodies, the organisation of science congresses, its hard-working secretary and library assistant - in these and other ways it is playing a full part in the national life and in international scientific affairs. It is of interest to note that the President in his address expressed pleasure at the part the Geological Society (the Royal Society's newest member body) was playing in Royal Society affairs, and indicated that he hoped other national bodies of scientists would follow suit. Finally, members of the Geological Society can contribute by bringing to the attention of the committee any matters they would like raised in the Royal Society by their representative on the Council.

Recent Fossil Discoveries in North-west Nelson.

Members of the Society may be interested in the following fossil discoveries made recently in north-west Nelson. During the last May vacation Mr G. Smith examined the Aorangi Mine area and found graptolites further south than had been previously known. Later, in July, the V.U.W. Geological Society found graptolites (including Isograptus) in the Aorere Valley about ten miles south of Aorangi Mine. Finally, Professor Clark and Mr P. Vella, with second and third year students, found fairly abundant fossils in boulders in Pariwhakaoho Stream, which drains Parapara Peak and enters the Takaka Valley a little south of Onekaka. The fossils are spirifers, a productid, other brachiopods, fenestellid bryozoans (very abundant), parts of crinoids, and a few molluscans. The fauna was recognised by Dr J.B. Waterhouse, N.Z. Geological Survey, as Artinskian (Permian) in age.

-P. Vella

Antarctic Field Work:

Summary of the Geology of the area surveyed by the Northern Geological & Survey Field Party, 1962-63

by H.S. Gair

The party, consisting of H.S. Gair, Geologist and Leader; K. Pain, Deputy Leader; J.A. Tobin, Surveyor; and M. Sheehan, Field Assistant, surveyed an area of the plateau of about 10,000 sq. miles at the head of the Rennick, Aviator and Campbell Glaciers, and was in the field for 80 days, sledging ove over 600 miles with dogs.

After a brief 4-day training trip to Black Island we were flown in to the head of the Rennick Glacier on 3 November 1962 with food for 55 days, and were picked up finally from the Campbell Glacier about 20 miles west of Mt Melbourne on 21 January 1963. We received a re-supply of 35 days' food on 27 December near the head of the Aviator Glacier.

The Rennick is a huge glacier over 200 miles long flowing into Rennick Bay and saddling with three major east-flowing glaciers - the Campbell, the Aviator, and the Mariner. In this region the plateau ranges from 7000 to 10,000 ft, and we climbed to 11,000 ft to the top of an extinct volcano on the north side of the Aviator Glacier, taking the dogs to a height of about 10,000 ft.

From 3 to 11 November we geologised around the head of the Rennick while Pain and Tobin surveyed a base-line. After depoting some food we then moved off on the first of our 20-day traverses down the west side of the Rennick and back along the east side to our depot, arriving there on 29 November. We then shifted our depot to near the upper Aviator Glacier anf on 5 December we set off on the second traverse, across the neve of the Aviator and on to the plateau country to the north, returning to the upper Aviator on 20 December where we were re-supplied. From here we sledged south to the head of the Campbell Glacier and thence down this glacier to a point 20 miles up-valley from Mt Melbourne.

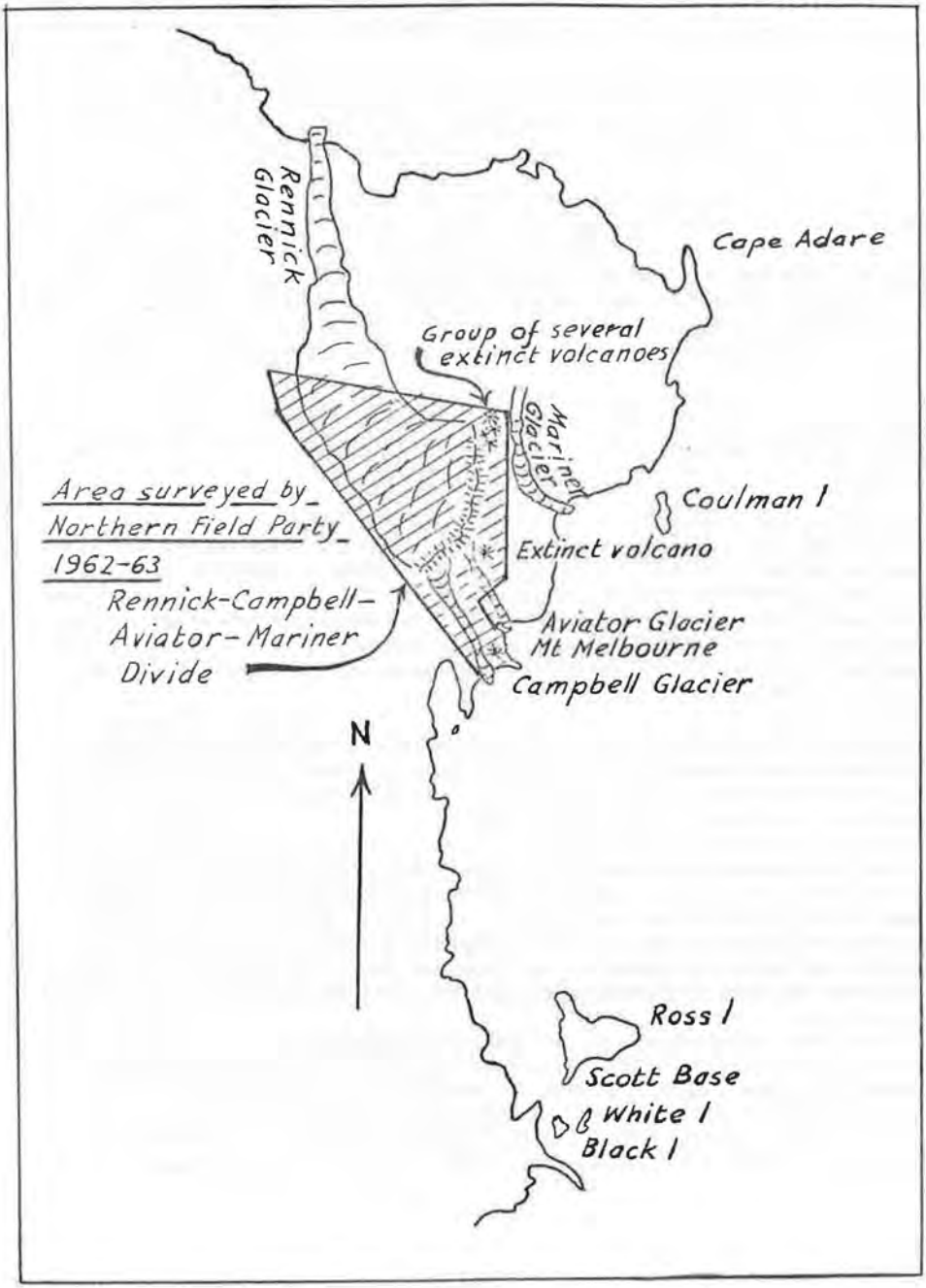
Geological Summary.

As was to be expected of a continental region the geology was "painted with a broad brush" and continued essentially the same for considerable distances. Four major groups of rocks were distinguished and mapped:

1. Volcanics of Tertiary and recent ages.
2. Volcanics of Jurassic age.

Basement Rocks
3. Granite and gneissic granite of Precambrian age.
4. Schist and marble of Precambrian age.

Most of the basement rocks consist of granite and gneissic granite intruded by pegmatites, commonly strongly zoned. Marble was found in


Rennick Glacier
Cape Adare
Group of several extinct volcanoes
Mariner Glacier
Area surveyed by Northern Field Party 1962-63
Rennick-Campbell-Aviator-Mariner Divide
Coulman I
Extinct volcano
Aviator Glacier
Mt Melbourne
Campbell Glacier
N
Ross I
Scott Base
White I
Black I

only one locality, where it is associated with schist; the latter is more widespread, however, though mostly "digested" by the granite and pegmatites. Both the granite and the pegmatites, and especially the latter, contain abundant garnet. The basement rocks are exposed on the western side of the Rennick and on both sides of the Campbell Glacier. The schist is predominantly a dark biotite-bearing siliceous rock, strongly drag-folded in places, and is apparently in sequence with the marble.

The granite is mostly lineated, and all gradations can be found between the faintest of lineations and very strong ones. At the head of the Rennick the granite is the most massive; from the head of the Rennick and down the Campbell the granite becomes progressively more lineated. Within the valley of the Rennick schist xenoliths, from a few feet to several hundred feet across, become more abundant, and outcrops show an anastomosing network of pegmatite and granite intruding dark biotite schist.

The marble is finely stratified and in places strongly intraformationally contorted. It is at least several hundred feet thick, and appears either to lens out or be faulted off from the schist at one end of its outcrop.

The Jurassic volcanics consist mainly of amygdaloidal porphyritic basalts with frequent zeolite, chalcedony, and calcite. No intrusive sills or dykes were seen. The lavas, which total at least 4,500 ft in thickness, occur along the eastern margin of the Rennick where they form large mesas commonly 3,500 ft high and up to several miles across. In lithology they are almost identical with the Drakensburg and Batoka basalts of Africa, which the writer has seen, and are probably the extrusive equivalents of the Ferrar Dolerites.

Within the lavas occur several beds of Beacon Sandstone (including mudstone and siltstone) up to 100 ft thick in which carbonaceous remains and silicified tree trunks were found. It is hoped to obtain age determinations from these carbonaceous beds.

The lavas overlie the basement rocks with marked angular unconformity and at the base of the lavas is a fairly persistent bed of Beacon Sandstone 30 to 50 ft thick, carbonaceous in parts. This basal sandstone and those within the lavas are all strongly arkosic, and the lowermost few feet of the basal sandstone is very difficult in places to distinguish from the very weathered uppermost few feet of the underlying granite.

Along the west side of the Rennick the escarpment of lavas immediately above the granite has retreated several miles along the lava-granite contact to leave a level bench - somewhat dissected in places - extending out from its present base, showing that the lavas were extruded on to a very flat eroded surface of the granite. There is no evidence whether the lower and middle parts of the Beacon Sandstone sequence were

ever deposited in this area and were subsequently removed by erosion before eruption of the lavas. An age determination from the carbonaceous remains in the basal Beacon Sandstone may solve this problem.

The Tertiary and younger volcanics are all young enough to form conspicuous landscape features - mainly volcanoes. The rocks collected include kenyte and related rock-types. The volcanoes occur on a line running northwards from Mt Melbourne (itself a volcano) to at least as far as the head of the Mariner Glacier, and the same line probably continues to Erebus and Terror in the south.

Structure.

The basement rocks strike NW parallel to the western wall of the Rennick and dip to the west at 60° to 80°. Major folds were seen in the distance in the schist at Barren Peak, but nowhere else. The Ferrar Lavas are flat-lying but have a very slight regional dip to the north-west.

There seems little doubt that the valley of the Rennick Glacier is structurally controlled. The field relationships of the basement rocks along the western wall of the Rennick to the thick sequence (3500 ft) of Ferrar Volcanics forming the large mesas in the centre and eastern margin of the Rennick require a large fault or monocline upthrown on the the west along or near the western side of the Rennick. The throw of this fault (or fold) increases down the Rennick. There does not appear to be any corresponding structure along the eastern side of the Rennick, and the relationship of the lavas to the basement rocks at the head of the Campbell and Aviator glaciers is such that this valley has apparently been eroded along a fault-angle depression.

One final point of interest is the presence of a white surface efflorescence on practically all outcrops, whether granite, schist, marble, or volcanics. Several collections were made for analysis.

Flora and Fauna.

Lichens were collected from three localities, all on granite - one on the Rennick Glacier at about 7,000 ft and two on the Campbell at heights of 5,000 ft and 3,000 ft respectively.

White petrel-like birds were seen on several occasions on the Rennick and near the head of the Aviator, as far as 150 miles inland. Twice lone birds swooped down to investigate us and flights of up to twenty were seen usually flying high to the north. We received a visit from two skuas at our final camp near Mt Melbourne when we were within 20 miles of the coast.-

Volcano Problems on Tour

by J. Healy

Two trips in one year to regions of spectacular volcanism is something which does not happen often to a New Zealand volcanologist. A visit to Japan was made in May 1961 to attend the International Association of Volcanology Symposium at Tokyo, and while there I was given the chance to visit some of the areas of geothermal interest, this additional stay being financed by the Yawata Iron and Steel Company, so that altogether six weeks were spent in Japan with the chance to travel considerably throughout the country. In December and January last a visit was made to El Salvador at the request of the Comision Ejecutiva del Rio Lempa, which financed the trip. Three weeks were spent there and the opportunity was taken also to visit Guatemala, Mexico, California and Hawaii.

Japan of course is world famous for its volcanoes but little has been known about Central America until Howell Williams published several papers on the volcanic geology of a number of countries there, and brought to attention many spectacular volcanic features.

Much could be said about the visits from many angles but on the principle that everyone can learn something from somebody else it is perhaps more fitting to record some of the more vivid and interesting features which were new to me and which shed new light on approaches to New Zealand volcanology. This, after all, is the main advantage of overseas travel for any scientist.

The first technical meeting at the Japan symposium began with an informal discussion on the nomenclature of ignimbrites. It was opened by Dr R.L. Smith who recounted his efforts to obtain definitions from workers in various countries of what they mean by the term ignimbrite; these were so varied that he felt he really could do little at present beyond expound the differences. So, after elaborating the complexity of the subject, he passed it over to the Chairman for discussion. This was sparked by Professor Gevers of South Africa, who moved (tongue-in-cheek) that the word "ignimbrite" be expunged from the literature. This had the desired effect. I felt I must take the bait and explain the original use of the term as coined by the late Dr P. Marshall in New Zealand, and also the present views of New Zealand geologists on the term and the types of rocks they would include in it. At least I hoped I was speaking for other New Zealanders. After this the discussion took wings, but during this session the term "welded tuff" came in for comment, and I outlined my ideas on its use, for I have never been happy about its application to what we call ignimbrites.

At the time the term "tuff" was originally proposed it was considered that tuffs were laid down as air-fall deposits by explosive eruptions.

The term, though a descriptive one, is also obviously genetic, and the use of the qualified term "welded tuff" arose at a time when the mode of formation of these rocks was not understood. The first writers regarded these deposits as formed of ash which had been sprayed or "ducoed" on to pre-existing topography, and in that sense they were correctly called welded tuffs. This is an entirely different process from that of the emplacement of an ignimbrite, which flows into position, but unfortunately the name was retained for ash-flow units.

In Japan I was able to see several deposits which could truly be called welded tuffs, including one at Towada. Here there is a large caldera, now occupied by a lake, within which a later smaller caldera had developed in a young, central volcanic complex. One side of this is now open and forms part of Towada lake, leaving the remaining part of the rim projecting into the lake in the form of a horse-shoe. The basal pyroclastic consists of bright-red scoria, but high on the wall is a deposit of air-fall pumice which includes about 15-20 ft of welded material containing flattened glassy lenses, some of which reach one ft in length. This deposit closely resembles coarse-grained ignimbrite of the lenticulite type, and possibly would be called a rheo-ignimbrite by some Italian geologists, though none were present at the time of the visit to Towada.

That this is an air-fall deposit is quite clearly shown by the pumice above and below the welded band. This is quite loose and shows typical air-fall bedding which mantles the topography. At the lower and upper contacts of this with the welded part there is a gradational change through incipient welding to complete welding and flattening of the component fragments. Incidentally, this deposit was traced for several miles and must have been the product of extremely high-temperature fire-fountaining.

Other interesting examples of this were seen at O-Sima Island, at the entrance to Tokyo Bay. This is a large basaltic volcano with a long and complex history, and is now crowned by a caldera within which rises the active cone of Mihara-Yama. The cone is covered by a highly welded sheath of air-fall material which was ejected at high temperature from the crater. Similar material is found also on the slopes outside the central caldera, but here the deposit consists of pumice which in places is merely part-welded but was obviously very hot at the time of eruption.

The most interesting occurrence, however, was at Imasaki, where there is a young tuff cone and extensive breccias of pyroclastic and phreatic origin. Cliff action has here exposed part of a fissure filled by lava which fed the eruptive centre, and the dyke is well exposed. On one side the basalt passes laterally from the dyke into a thin flow which extends with decreasing thickness for several hundred yards to the north-east. On the other side accumulation of pyroclastic material apparently prevented the flow from spreading, although some of the lava moved a short distance in this direction. There is a complete gradation laterally from lava into loose unwelded grey basaltic pumice. The solid basalt

has no visible coarse texture near the dyke, but away from this it gradually develops what appears to be flow-banding, but which on close inspection proves to be extremely elongated lenticular texture. This elongation gradually decreases until the rock resembles a coarse-grained lenticulite. Farther away, the flattening becomes less and less marked and the rock more vesicular, until the material is almost entirely pumice, though still welded. Finally the welding disappears. This all occurs within a distance of about 100 yards.

Japanese volcanologists have in recent years paid considerable attention to the details of texture and deposition of volcanic rocks generally and have added considerably to the knowledge of eruptive processes in operation at volcanoes. Except for ignimbrites little attention has so far been paid to this in New Zealand, where the emphasis has been on the broad grouping of lava types. On a recent visit to Tongariro I noticed welded material similar to some of that seen in Japan, capping scarps and slopes in the vicinity of Blue Lake crater on Tongariro. There are also here sporadic deposits of black scoriaceous pyroclastic material which was presumably erupted by nuees ardentes. It seems likely that the Tongariro volcanoes have exhibited many types of eruptive processes, and the time has come when detailed re-mapping of this area can now pay attention to these features and their implications.

No volcanologist could travel in Japan without encountering the caldera problem. We were introduced to this first by Professor Kuno at Hakone, but on post-sessional tours went also to Toya and Towada. Later I was fortunate in getting south to Kyusyu and visiting four huge calderas with Dr R.L. Smith, Roy Bailey and Dr Peterson of the U.S.G.S., Shigeo Aramaki and Kasuaki Nakamura of Tokyo University, and Naoki Isshiki and Koji Ono from the Geological Survey of Japan. The last-mentioned had recently been mapping around Aso caldera, the most striking of all. This huge basin is 15 miles in diameter, with precipitous walls ranging in height from 1000 ft to 3000 ft. Across the floor extends an east-west line of large volcanoes which are successively younger from west to east. Surrounding ignimbrites were originally called "Aso lavas" by Matsumoto, who recognised them as some kind of flow. He has now retired but much credit must go to him for his early work. His ideas, not being at that time acceptable to his superior professors, had to be published with private financial assistance.

Although it was recognised that the widespread ignimbrites surrounding Aso caldera were erupted from it, and its formation was associated with these eruptions, it has not previously been recognised just how complicated the relationships are. Ono's recent mapping has shown that there are at least three ignimbrite sheets, separated by erosional breaks and accompanied by differential ground movements. In addition there is an older ignimbrite whose relationship to the caldera is not known. Considerable detailed mapping is required here to work out the evolution of the caldera. In fact caldera development is one of the major problems of

volcanology about which very little is known. Smith, Bailey and others have now spent seven years on the Valles caldera in New Mexico, and expect to work another three years to complete a study of the stratigraphy, structure, petrography and volcanic processes. Much is expected to come out of this. In their terminology, Valles is a "resurgent cauldron", and there seem to be many similarities to the much younger cauldron thought to lie within the Mokai ring complex (including Maroa Volcanic Centre) in the Taupo Volcanic Zone.

I had the opportunity also to see calderas in Guatemala and El Salvador recently described by Howell Williams. All are believed to be associated with the eruption of ignimbrites and pumice, though here also much detailed work remains to be done. In El Salvador in particular are the calderas of Coatapeque and Ilopango, where Howell Williams and Meyer-Abich describe late caldera formation accompanying the eruption of dacitic pumice of a smaller volume than the estimated collapse. A similar relationship has been claimed by various writers for many calderas, and this is a problem requiring close attention.

Estimates of discrepancies between the volumes of erupted material and associated caldera collapse depend on two important factors. One is the shape of the area before collapse, and the other is the relation in time between eruption and collapse. Sakurajima volcano is located on the rim fracture of Aira Caldera, which occupies the entire head of Kagoshima Bay. After the eruption of 1914 the entire shore-line of the bay, which is 20 km across, was found to have sunk by 10 cm. This shows how magma movements associated with a large caldera can have appreciable areal effects and, in this case, were related to volcanism which would not normally be connected with caldera development. It is unwise to assume that calderas in their present form were produced by a single subsidence, which may in fact have been progressive.

The Taupo eruptions of about 120 A.D. culminated in the eruption of much pumice which was spread by huge nuees ardentes over a wide area, without seriously modifying Lake Taupo itself. Large quantities of pumice can be erupted from a pre-existing or gradually developing caldera and still leave it much as it was before; yet the collapse might be attributed entirely to the eruptions. Had a recent eruption of pumice taken place from Western Bay, for example, it would be likely that its formation would be related to the eruption.

It would seem wise therefore to take such factors into account in the elucidation of caldera formation. Detailed geophysical and drill-hole investigations are required in several calderas the floors of which are virtually unknown. Detailed mapping in the Okataina Volcanic Centre, now commencing, aims at tackling some of the above problems. It must also be remembered that calderas are developed under widely differing magmatic and volcanic conditions. Like geysers they probably develop along similar general principles, but the exact mechanism and sequence of events differ greatly.

Terraces and Fans in the Bay of Plenty and Gisborne Districts

by W.A. Pullar

In my letter to the Editor, New Zealand Science Review - "The Late Quaternary - Recent/Hawera Boundary" (Vol. 20, no. 3, pp. 55-6) - I suggested that we try to identify the ash-fall beds covering superficial alluvial deposits. In the meantime we have examined a number of fans and terraces in the Tarawera, Rangitaiki, Waioeka, and Lower Waipaoa (Gisborne) valleys as well as coastal terraces along the Bay of Plenty and at Mahia, and this note is in the nature of a progress report. Only the basal ash-fall bed of the cover will be mentioned, as the age of the bed will indicate a minimum age for the surface of the terrace or fan.

Observations

Tarawera Valley.

There has been little probing as yet. At Kawerau twwn Tarawera Ash occurs on alluvium, but in a small valley nearby Kaharoa Ash is sandwiched in alluvium at four feet from the surface. On the 100-ft terrace above the shopping area and recreation reserve Whakatane Ash is found. A 20-ft bank in the middle reaches of the valley at Duffy's farm shows no Kaharoa Ash in the alluvium, and is capped by Tarawera Ash.

Rangitaiki Valley.

(1) Murupara: the highest terrace on the valley floor (Rangitahi College) shows Whakatane Ash.

(2) Galatea Basin: the highest parts of the valley floor (low terraces) now beyond flood-reach show Kaharoa Ash, thus confirming C.G. Vucetich ("Soils, Forestry and Agriculture of the Northern Part, Kaingaroa State Forest, and the Galatea Basin", 1960, Fig. 7, p. 16).

(3) Drywash Fan: Waiohau Ash, with a fan-building interval between Whakatane Ash and Taupo Pumice.

(4) Fan between Drywash and Horomanga: Whakatane Ash. Vigorous fan-building at the present time.

(5) Low hills at Kopuriki Stream: column unbottomed, but below pinkish-brown beds.

(6) Snake Hill, Kopuriki dam site: this shows Hamilton Beds on ignimbrite (almost a complete column as for the Bay of Plenty coast at Whakatane.

(7) Waiohau Basin, Mangamutu Stream near Maori school: here is a series of four terraces, the lower two covered with greywacke gravels and forming the present flood-plain of the Rangitaiki River. Terrace No. 3 shows Rotoma Ash. On terrace No. 4 the column is unbottomed below Rerewhakaaitu Ash.

(8) Rangitaiki Plains: fan at head of Rangitaiki River at Awakeri, where river entrenched, Kaharoa Ash; elsewhere Tarawera Ash. Most surface alluvium (soil) post-Kaharoa. The whole of the plains is being examined in great detail and is to be published as a separate report.

Waiocka Gorge.
Boulder terraces at Oponae, Waiohau: this bed was recognised during the Holocene reconnaissance survey but not identified because of scarcity of good columns east of Nukuhou. On the Tarapounamu and Taupuke saddles between Murupara and Waikaremoana a similar bed in the same stratigraphic position is now identified as Rerewhakaaitu.

Gisborne.
On low hills bordering the Gisborne plains, a "grey banded bed" is tentatively correlated with Rotoiti rhyolite breccia.

Tarndale.
A gravel terrace remnant at Tawhiti Station in the upper reaches of the Waipaoa River is "grey banded bed"; it is set amidst spectacular accelerated erosion.

Ruatahuna and Maungapohatu.
Boulder fans with "pinkish-brown and mauve beds". These are a group between the Rerewhakaaitu Ash and the "yellow and white block beds". On the Tarapounamu saddle seven pinkish-brown and mauve beds have been recognised but only three at Ruatahuna and Maungapohatu.

Te Kaha.
The gravel terrace near the school shows "grey banded bed" (Rotoiti rhyolitic breccia.

Mahia.
The highest terrace is Hamilton.

Bay of Plenty.
Coastal terraces as low as 100 ft are Hamilton.

Comment

The purpose of this work is to find the major time breaks, and from scattered observations these would appear to be Hamilton, "grey banded bed" (Rotoiti rhyolite breccia), and "pinkish-brown and mauve beds". As the latter would seem to be associated with deposits of the last glaciation their mapping and eventual identification are now being undertaken in greater detail; they are more like ash-flows than ash-falls and are similar to beds at Putaruru. It is tempting to think that one of them could be equated with J.D. Cowie's "Aokautere Ash" at Palmerston North; his isopachs point to a similar source, and the age is of about the right order, say 15,000 years.

The broad ash stratigraphy has now been established and in about a year or so mapping should yield sufficient information to prepare a definitive account of volcanic ash remnants mantling landscapes on the Bay of Plenty and Gisborne districts.

Geological Observations in New Zealand by Joseph Banks, 1769-70

(Extracts from "The Endeavour Journal of Joseph Banks", edited by J.C. Beaglehole. 2 vols. Angus & Robertson, Sydney, 1962).

Contributed by B.D. Webby

The famous voyage of the "Endeavour" around the world, with naturalist Joseph Banks on board, preceded the birth of geology as a science, the foundations of which were laid by Werner, Hutton, von Buch, William Smith, Cuvier and others in the late eighteenth and early nineteenth centuries. Unlike Charles Darwin, who sailed on the "Beagle" in 1831 after lectures from Jameson and field work with Sedgwick, and carried with him the first volume of Lyell's Principles of Geology, Banks received little or any stimulus from geological science. In the mid-eighteenth century, geology was mainly confined to observations such as "-----how the beds of earth lie in this cliff; in what manner the rocks rise on yonder hill; or how the glittering crystals are dispersed in the crevices of that stone" (Edward Owen, "Observations on the Earths, Rocks, Stones and Minerals, for some miles about Bristol", 1754, p. iii). It is scarcely surprising, therefore, that Joseph Banks made little more than a few rudimentary geological observations on the voyage.

The "Endeavour" reached New Zealand in October 1769 and circumnavigated the North and South Islands during the following six months. On their arrival at Poverty Bay, Banks briefly reported: "land very near us makes in many white cliffs like chalk; the hills are in general clothd with trees, in the valleys some appear to be very large"(Vol. I, 399). They "------pickd up a large pumice stone floating in the bay ------- a sure sign that there either is or has been a Volcano in this neighbourhood" (I, 403), and also observed the Maori greenstone weapons. Near Cape Turnagain coastal cliffs were again referred to: "-------we were abreast of another cape which made in a bluff rock, the upper part of a reddish colourd stone or clay the lower white; beyond this the Countrey appeard pleasant with little smooth hills like downs" (I, 413). Another point of interest on the East Coast was the description of a natural archway at Tolaga Bay (I, 419).

In the remainder of the North Island two observations are of interest, both referring to recent sediments. From an anchorage at the southern end of the Hauraki Gulf they set out to examine the coast-line in the boats. "A fresh breeze of wind carried us to the bottom of the bay", Banks wrote, "where we found a very fine river broad as the Thames at Greenwich tho not quite so deep, there was however water enough for vessels of more than a midling size and a bottom of mud so soft that nothing could possibly take damage by running ashore. About a mile up this was an Indian town built upon a small bank of Dry sand but totaly surrounded by Deep mud -------- Above this the banks of the river were compleatly cloathd with the finest

timber my Eyes ever beheld -------- As far as this the river has kept its depth and very little decreased even in breadth" (I, 435-6). Later, as they approached North Cape, his journal reads: "This morn we were near the land which was as barren as it is possible to conceive: hills within hills and ridges even far inland were coverd with white sand on which no kind of vegetable was to be seen, it was conjectured by some the wind blow/s/ the sand quite across it" (I, 447). A similar observation was made off the west coast of Northland (I, 450).

Banks's geological observations in the South Island and Stewart Island refer mainly to veins and minerals. Near South Cape, on 9 March, he described the view of the southern part of Stewart Island: "By noon we were pretty near the land which was uncommonly barren; the few flat places we saw seemingly produc'd little or nothing and the rest was all bare rocks, which were amazingly full of Large Veins and patches of some mineral that shone as if it had been polishd or rather look'd as if they were realy pavd with glass; what it was I could not at all guess but it certainly was some mineral and seemd to argue by its immense abundance a countrey abounding in minerals" (I, 472). And near the entrance to Dusky Sound he mentioned "-----veins in the rocks, very large, filld with a whiteish appearance different from what we saw on the 9th" (I, 473). Two hills that "------were quite bare of trees or any kind of Vegetables and seemd to consist of a mouldering soft stone of the colour of Brick or light red ocre" (I, 474) were observed farther north, presumably part of the Red Hills Range.

After virtually circumnavigating the South Island the "Endeavour" put in at D'Urville Island. Banks wrote: "I examind the stones which lay on the beach. They shewd evident signs of mineral tendency being full of Veins but I had not the fortune to discover any ore of metal (at least that I knew to be so) in them. As the place we lay in had no bare rocks in its neighbourhood this was the only method I had of even Conjecturing" (I, 476). His concluding remark on minerals in New Zealand is as follows: "The South part, which is much more hilly and barren than the North, I firmly belive to Abound with minerals in a very high degree. This however is only conjecture; I had not, to my great regret, an opportunity of landing in any place where the signs of them were promising except the last" (II, 4).

The Upper Mantle Project

Under the co-ordination of a committee appointed by the International Union of Geodesy and Geophysics (I.U.G.G.) a project entitled "The Upper Mantle and its Influence on the Development of the Earth's Crust" was inaugurated. The chief aim of the project is to stimulate interest in the outer 1000 km of the earth. This involves seismic studies of the various layers in different parts of the crust and upper mantle, and the geological processes which are affected by changes in this. These studies are considered a necessary basis for the understanding of the causes of tectonic and magmatic processes.

Reference was made in an earlier number of this Newsletter (No. 11, Dec. 1961, p. 15) to some of the problems which are of interest to geologists. A meeting of the working committee of I.U.G.G. was held in Paris in March 1962 toconsider the project and its implications in more detail, and a full report of this is to appear shortly in I.U.G.G. Monograph No. 22.

New Zealand's programme for the project includes seismic investigations of crustal structure, the study of deep-focus earthquakes, the distribution of shallow intermediate and deep earthquakes in relation to other geophysical phenomena, and the role of plastic flow as a factor in the growth of land masses. It includes also studies of geothermal activity and volcanism by geophysical methods, gravity and magnetic surveys, and studies of rock magnetism. In the geological field it includes studies on the origin of magmas, high-pressure and high-temperature minerals, and caldera development. Of particular interest to geologists will be the world-wide studies on the origin of magma types and the relation between magmatic and tectonic evolution in regions of different crustal structure.

The project commenced operation at the beginning of 1962 and will be completed by 31 December 1964. No information is available at this stage on the intentions of the committee regarding meetings or publication at the end of the project. In the meantime it is stated that information collected is not for circulation to World Data Centres but for publication through the normal channels. It would seem advisable for a bibliography of publications concerned with the project in New Zealand to be compiled at the end of the period mentioned above.

-J. Healy

The next issue of the Newsletter will be in December of this year. Please send contributions, which may include line drawings, to the Editor, C/o N.Z. Geological Survey, P.O. Box 368, LOWER HUTT, New Zealand.

I. U. G. G. News

First International Symposium on Recent Crustal Movements

A symposium on the above subject was held in Leipzig, East Germany, from 21 to 26 May 1962. Papers were presented under the following headings:

(1) General questions and the task of the commission on recent crustal movements.

(2) Geodetic problems concerning recent movements of the Earth's crust.

World-wide problems and mathematical problems.

Regional and local problems.

Water-level observations concerning recent movements of the crust.

Earth-tide instruments for the study of crustal movements.

Recent movements of the Earth's crust related with earthquakes.

(3) Geological and geomorphological problems concerning recent movements of the Earth's crust.

General problems.

Regional problems.

Recent movements of the Earth's crust and continual drift in connection with deep structure.

Problems of practical interest.

The participants in the symposium expressed their satisfaction with the creation of a permanent Commission on Recent Crustal Movements, under the chairmanship of the International Association of Geology, and with the relations which had been established with the new International Union of Geological Sciences. Support was given for a continuation of work on the project, and it was suggested that further work be done as follows:

(a) Preparation of maps of recent crustal movements from geodetic, geophysical, geological, oceanographic and geomorphological evidence.

(b) The establishment of international co-operation in the measurement of crustal movements.

(c) Establishment of co-operation between the I.U.G.G. and the International Astronomical Union for the study of continental drift.

It was recommended that working groups be organised in member countries under the various National Committees of I.U.G.G. This project will be

further discussed at the 13th General Assembly of the I.U.G.G. in August of this year at Berkeley, California. It is proposed to establish certain specific study groups, three of which are of interest to New Zealand geologists:

(1) Recent crustal movements in the Pacific area.

(2) Horizontal movements of the crust (continual drift).

(3) Local polygons for the study of recent crustal movements and the standardization of observations.

It is hoped to bring about exchange of information on the project by means of the World Data Centres, and the German Academy of Sciences in Berlin expects to have the papers of the symposium prepared for publication by the 13th General Assembly at Berkeley. It is intended to ask the I.A.G. to sponsor another symposium in 1965.

The Correspondent for the I.A.G. on the New Zealand Committee of I.U.G.G. is the Surveyor-General, Department of Lands and Survey.

International Union for Quaternary Research (INQUA)

This union, originally embracing European countries, has gradually attracted interest farther afield, notably in North America. It serves to help find common ground between those interested in the Quaternary, in particular geologists, archaeologists, and thosesbotanists and zoologists who have been interested in the changes in vegetation and in animal populations caused by the climatic fluctuations of the Quaternary. It holds congresses every four years, and between congresses commissions have worked on such problems as sea-level changes, European loess stratigraphy, the Pleistocene/Holocene boundary, stratigraphic nomenclature, etc. New Zealand was represented at the last three congresses, in 1953 by R.W. Willett, in 1957 by R.P. Suggate, and in 1961 by N.T. Moar. The next congress, the first to be held outside Europe, will be held at Boulder, Colorado, in 1965.

At the last congress a Committee was set up to prepare draft statutes and to pave the way for adherence of INQUA to the International Council of Scientific Unions. The objective is that INQUA should have a permanent secretariat to carry on between congresses, so that the work of its commissions and the organisation of congresses can be assisted; no doubt, too, the publication of papers on the Quaternary, as in "Quaternaria", will be facilitated. I have received a copy of the proposals, which envisage (in line with other unions adhering to ICSU) adherence of countries to INQUA through National Academies of Science or the like, the setting-up of national committees, and the payment of contributions, with a minimum of $ 150. There is also provision for

associate membership by countries with very few people particularly interested in the Quaternary, but (though this is not quite clear) this would not appear to avoid payment of contributions altogether.

I have written to the secretary of the INQUA committee expressing interest in the proposals put forward, intimating that there are comparatively few in New Zealand especially interested in the Quaternary, and requesting that we should be kept in touch with further developments. It would help me if all those who are interested in the Quaternary would let me know their attitudes towards INQUA and its proposals to adhere to ICSU. If requested I can send copies of rough translateions of the proposed statutes and of the letter from the secretary of the INQUA committee.

-R.P. Suggate

Third World Conference on Earthquake Engineering

The International Association for Earthquake Engineering will hold its Third World Conference in New Zealand from 22 January to 1 February 1965. It is being organized by the N.Z. National Committee on Earthquake Engineering which comprises representatives of the N.Z. Institution of Engineers, the N.Z. Institute of Architects, the Royal Society of New Zealand, and the Earthquake and War Damage Commission. Meetings will be held at Auckland (22-26 January) and Wellington (29-30 January). Papers will be grouped under five broad headings:

(1) Soil and foundation conditions related to earthquake problems.

(2) Analysis of structural response, and instruments.

(3) Seismicity and earthquake ground-motion.

(4) Earthquake-resistant design, construction and regulations.

(5) Recent strong-motion earthquakes and resulting damage.

Copies of the first circular are available from:

The Administrative Secretary,
Conference Organizing Committee,
Third World Conference on Earthquake Engineering,
P.O. Box 5180,
WELLINGTON, New Zealand.

Geological Society of New Zealand

Centennial 1963 ?

Contributed by B.W. Collins

The following evidence that the Society was founded at least as early as 1863 seems to imply that this year should be celebrated in some way as the 100th anniversary of the Society.

Unfortunately confirmatory evidence of the founding of the Society is lacking, as the early records appear to have been lost. However, the following statement, found recently in a book published in England in 1863, definitely suggests that a society with exactly the same name as ours was then, if not actually in existence, at least under consideration.

The statement is also interesting for its contributions to the theories of mountain-building, volcanism, and fossilisation, especially for the implication that magma originates at a depth of 60,000 ft.

"Now as soon as Tom had left Peacepool, he came [p. 284] to the white lap of the great sea-mother ten thousand fathoms deep; where she makes world-pap all day long, for the steam giants to bake, till it has risen and hardened into mountain-loaves and island-cakes.

"And Tom was very near being kneaded up in the world-pap, and turned into a fossil water-baby; which would have astonished the Geological Society of New Zealand some thousands of years hence."

-Charles Kingsley.
"The Water-Babies: A fairy Tale for a Land-Baby", first published 1863. Quoted from 4th edition, reprinted 1895, Macmillan & Co., London, pp. 283-4.

Christchurch Section, 1962

Eight meetings were held in the Geology Department, University of Canterbury, on Monday evenings at irregular intervals throughout the year, with attendances of 25 to 30 on each occasion. Since the section has neither a constitution nor a continuing chairman, nor even a definable membership, its meetings involve a minimum of formality and a maximum of presentation and discussion of geological facts and ideas. Supper is organised after each meeting in the Geology Department lib-

rary by senior students. Speakers during the year were:

Dr H.S. Edgell	- Geological Exploration in southern Arabia.
Mr I.C. McKellar	- Pleistocene Geology in Glacier Bay, Alaska.
Dr D.F. Squires	- Studies in the Evolution of a Coral.
Mr A.C. Beck	- Geological Geophysics.
Mr D.J. Young	- describing thesis work on the North Otago Loess.
Mr M.G. Laird	- " " " on the geology of the Whatawhata district, S. Auckland.
Mr L.E. Oborn	- Engineering Geology in the Waitaki Catchment.
Mr J.E. Cox	- Soil Evidence relating to post-Glacial Climate on the Canterbury Plains.

-D.R.G.

Eighth Annual General Meeting

The 8th Annual General Meeting of the Society was held in Whangarei on 17 May 1963 during the N.Z. Geological Survey conference. About 70 members were present, with the President, Dr R.P. Suggate, in the chair. The following were elected:

President:	Mr J. Healy, Rotorua
Vice-President:	Mr B.N. Thompson, Otahuhu
Secretary:	Mr D.R. Gregg } P.O. Box 2110, Christchurch
Treasurer:	Mr G. Warren }
Committee:	Dr M. Gage, Christchurch
	Mr J.A. Grant-Mackie, Auckland
	Dr E.I. Robertson, Wellington
	Dr W.A. Watters, Lower Hutt
	Mr J.B. Wright, Dunedin
	Dr R.P. Suggate, Christchurch (immediate past-President)
	Mr B.W. Collins, Wellington (Representative on Royal Society of N.Z. Council)
Auditor:	Mr D.J. Daly, Christchurch

Two minor alterations to the rules were made. The words "a Vice-President" were added after the word "President" in Rule 5. This rule lists the officers of the Society, and the Vice-President had been inadvertently omitted, although provision had been made for his election. In rule 7 (f) the words "annual revenue" were replaced by "revenue from annual subscriptions".

During the meeting the McKay Hammer Award for 1962 was presented to Mr Guyon Warren; the joint recipient, Dr B.L. Gunn, was unable to be present. After the Annual Meeting Mr J. Healy gave an address on various geological implications of his recent visits to Japan and Central America.

-D.R.G.

Retirement of Mr H.E. Fyfe

Representatives of Head Office, D.S.I.R., Mines Department, Ministry of Works, and Victoria University of Wellington were among guests at a farewell afternoon tea held on June 28 last in Lower Hutt for Mr H.E. Fyfe, Chief Geologist of the New Zealand Geological Survey, who retired after 37 years' service.

Mr Fyfe was born in Dunedin and educated at Otago Boys' High School and the School of Mines, University of Otago, where he gained the degrees of B.Sc. and A.O.S.M. He joined the Geological Survey as a field geologist in 1926, in the Waikato district under the late Dr H.T. Ferrar. Much of the work of that time was basic field mapping, which laid the foundations for the present series of 1:250,000 regional geological maps and the 1958 1:2,000,000 national geological map. Field geology in those days was handicapped by shortage of funds, and the geologists normally spent six months of the year in the field, often under canvas in remote parts of the country: winters were spent in Wellington writing reports and producing geological maps for publication. Mr Fyfe's chief work was in the Murchison and Kaikoura districts, and the soundness of his mapping is shown by the fact that his sheets were adopted without major change for the 1:250,000 regional maps thirty years later.

In later years Mr Fyfe has been closely concerned with economic and engineering geology, working closely with Mines Department and Ministry of Works engineers. His main contributions have been in the re-survey of the Grey Coalfield, foundation and other siting problems in the Roxburgh and Benmore dams, the proposed Motu and Wanganui River dams, the Upper Wanganui diversion scheme, and tunneling problems in the Rimutaka and other tunnels on the Main Trunk and East Coast railways. To all these and many other problems Mr Fyfe brought wide experience, balanced views, and constant good humour and patience which brought him many friends both within the Department and outside. His services to New Zealand geology were honoured in 1956 by his appointment as New Zealand delegate to the International Geological Congress in Mexico. Following this he toured extensively in North America visiting projects and areas of economic interest.

Mr Fyfe's retirement will be spent in Wellington, where his invaluable services to his profession will no doubt continue to be in demand.

-G.W.G.

Letters to the Editor

Sir,

Soil Classification

In the article on the International Soil Conference in Newsletter No. 13, February 1963, pp. 10-11, is the comment "Another interesting aspect is the obviously chaotic state of soil classification throughout the world -------" which, though fair and true, may be misleading as it tends to put the soil scientists in somewhat poor light. L.D. Baver, in summing up the sessions on soil classification, put the matter in perspective by saying that as world agreement is at present unattainable, it is good that each country should have its own system. Indeed, it is barely two years ago that the New Zealand Soil Bureau was faced with the problem of either establishing its own classification or jumping on somebody else's bandwagon, and I think that as a transitory measure until we all agree the decision adopted will prove to be the correct one. For the moment soil science is very much tied to agriculture, and in those countries where this industry is important soil classification must necessarily be biased towards the pragmatical.

The next advance in classification is likely to come from soil genesis and experimental pedology, when we will try to produce in the laboratory what we see in the field. There is a danger now of classification being angled too much from the field, and so we arrive at a situation where enthusiasts and crusaders tend to to adopt the attitude of who is right instead of what is right.

(Sgd) W.A. Pullar

114 James Street,
Whakatane.

Sir,

New Zealand Code of Stratigraphic Nomenclature

New Zealand does not possess a Code of Stratigraphic Nomenclature. Attempts have been made in the past to erect one suitable for the needs of New Zealand geologists, but all these were still-born.

A student of geology in New Zealand has the choice of many Codes, ranging from the Stratigraphic Classification and Terminology (Int. Geol. Congress, Copenhagen, 1960) to the American (1961) and Australian (1950) Codes. Unfortunately New Zealand geolcgists having been given this choice of Codes follow whichever Code suits them. Thus there is no uniformity in the literature regarding the stratigraphic

terms used in New Zealand. One man's Zone is another man's Stage, etc.

The time has now come to produce a New Zealand Code or else formally accept one of the already existing Codes.

(Sgd) D. Graham Jenkins
G.R. Stevens
G. Norris
W.D.M. Hall
Anne Scott
G.W. Grindley
V.R. McGregor
R.I. Walcott
A. Ewart
J. Cole
A. Steiner

N.Z. Geological Survey,
Lower Hutt.

Geology Department,
Victoria University of
Wellington.

Sir,

We do not consider that unqualified acceptance of any one of the Codes of Stratigraphic Nomenclature will materially assist New Zealand geologists, and therefore dissent from the letter by Dr Jenkins and his colleagues. The Australian Code is too brief, the interim "International" (i.e. European) Code is far from complete, is unsystematically arranged and offers a perplexing series of alternative names, and we will have to wait an unknown time for it to be finalized. The American Code is by far the best, but requires a few emendations, and some definitions need to be expanded. We would therefore prefer to see a New Zealand Code drawn up, at least until the final "International" Code is produced for our approval or rejection.

(Sgd) J.B. Waterhouse
G.J. Lensen

N.Z. Geological Survey,
Lower Hutt.

Personal Notes

Congratulations are extended from the Society to Dr C.A. FLEMING, who has been awarded the Hector Medal for 1963 by the Royal Society of New Zealand.

Mr J.D. McCRAW, N.Z. Soil Bureau, formerly stationed at Alexandra, is now at the Hamilton office of the bureau.

Dr H.M. PANTIN, N.Z. Oceanographic Institute, Wellington, will leave shortly to spend a year in England. He will be working on certain aspects of recent marine sediments at the University of Bristol.

Mr R.W. WILLETT, Director, N.Z. Geological Survey, will leave at the end of the month for South Africa where he is to represent New Zealand at the conference of the Special Committee on Antarctic Research being held in Cape Town.

Mr L.S. JONES, formerly Inspector of Mines, Greymouth, is now Chief Inspector of Metalliferous Mines and Quarries, stationed in Wellington.

Mr G.C. SHAW, N.Z. Geological Survey, Lower Hutt, leaves at the end of August for the United States and will spend ten months lecturing at the University of California at Santa Barbara. Towards the end of next year he is to work for several months with Dr Brian Mason at the American Museum of Natural History before returning to New Zealand.

Mr I.W. KEYES, N.Z. Geological Survey, Lower Hutt, left at the end of June for Washington, D.C., where he will work for a year under Dr D. Squires at the Smithsonian Institution.

Mr P.N. WEBB, N.Z. Geological Survey, Lower Hutt, left during June for the University of Utrecht where he will be studying on a National Research Scholarship. On his way to Holland he spent several weeks in Australia and has recently visited parts of Yugoslavia.

New Members

The following people have joined the Society since the last list of new members was published, in Newsletter No. 13 (February 1963).

Mr R.G. Adamson, Geology Dept, University of Canterbury, CHRISTCHURCH.
Mr L. Boielle, N.Z. Geological Survey, ROTORUA.
Mr B. Conlon, 93a Whiturangi Rd, Green Lane, AUCKLAND.
Prof. J.C. Craddock, Dept of Geology, University of Minnesota, MINNEAPOLIS, U.S.A.
Mrs W.A. Craddock, Marine Parade, Carters Beach, WESTPORT.
Mr J.V. Eade, N.Z. Oceanographic Institute, WELLINGTON.
Mr B.T. Callavin, 52 Moreland Ave, CHRISTCHURCH 5.
Mr T.D. Phillips, Geology Department, University of Canterbury, CHRISTCHURCH.
Mr A.H. Pickmere, 4 Hatea St, WHANGAREI.
Mr G.T. Railton, P.O. Box 11, STOKE.
Mr M.F. Ridd, C/o BP, Shell, Todd Oil Services Ltd, GISBORNE.
Mr J.S. Shimmin, 61 Dallington Tce, CHRISTCHURCH 6.
Miss X.K. Williams, Chemistry Department, University of Otago, DUNEDIN.
