NEWSLETTER

GEOLOGICAL SOCIETY OF NEW ZEALAND

No.27

MAY 1969

GEOLOGICAL SOCIETY OF NEW ZEALAND

The Newsletter is published twice yearly for distribution to members. Membership is open to all those interested in the earth sciences. The annual subscription is $2.00.

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

CONTRIBUTIONS: The Editor welcomes correspondence, reviews of recent publications, interim reports of current work, and other articles.

NEWSLETTER

GEOLOGICAL SOCIETY OF NEW ZEALAND

Member Body of the Royal Society of New Zealand

No. 27 May 1969

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EDITORIAL

The rush to produce NEWSLETTER 26 in time to satisfy the legal requirements of the notice of the Special General Meeting induced severe agitation in the editor and the printer. This agitation resulted in the displacement of the page numbers from the pages although they seemed to be more securely fixed in their place on the list of contents.

One day these 30 missing numbers may be found in the archives of the Society, perhaps nestling beside R.P.S.'s asterisk (see NEWSLETTER 19, pp. 6-7). I am reluctant to inflict myself on members in my capacity as Editor but feel I owe it to the future to provide this note of explanation.

D.R. Gregg

GEOLOGICAL SOCIETY OF NEW ZEALAND CONFERENCE

DUNEDIN

28 NOVEMBER - 3 DECEMBER 1969

As announced in Newsletter No. 26, this conference will be held at Dunedin from 28 November (Friday) to 3 December (Wednesday), in the Chemistry-Geology Block of the University of Otago where a large theatre and other space has been made available by the University. Normal lecture theatre facilities will be available. Morning and afternoon teas will be provided in the Geology Department.

Accommodation has provisionally been arranged at University College directly across Leith Street from the Geology Department. This has accommodation for over 300 people in single rooms only; full meals are provided if required. A Society dinner and/or sherry party can be held there if there is sufficient support, and liquor will be permitted for social occasions. Prices of accommodation are not yet finalized but are expected to be reasonable, within the rage of $3.50 - $4.50. It is hoped that most delegates will avail themselves of this opportunity for close contact and informal discussions with others in the very fine surroundings of this new residential hall which was first occupied by students in February 1969. Small conference rooms will also be available for special meetings in the evenings or at other times when required.

Excursions as set out in the First Circular are proving popular, although there are still seats available. A number of papers will be included in Conference proceedings describing the geology to be seen on the excursions.

FULL-DAY EXCURSIONS

F.1. Port Chalmers-North Head. Dunedin Volcano. Volcanic stratigraphy, phonolitic lava domes, sub-volcanic sediments and structure.

F.2. Fairfield-Chain Hills. Cretaceous-Tertiary sedimentary sequence.

F.3. Boulder Hill, Wangaloa. Wangaloan Stage. (Of special interest to Cretaceous-Tertiary stratigraphers and paleontologists).

F.4. Brighton-Akatore. Schist-greywacke transition, meta-volcanic rocks and cherts; and tube-fossil localities, Quaternary strand lines and their deformation.

F.5. Kaka Point-Nugget Point. Coastal section, Lower and Middle Triassic sequence, stratigraphy, sedimentary structures, sedimentary zeolite beds, volcanogenic sediments.

F.6. Shag Valley-Kyeburn. Cretaceous-Tertiary stratigraphy, marine transgression. (Possibly restricted to a small group).

F.7. Middlemarch-Macraes. Otago schist, scheelite deposits, landforms.

HALF-DAY EXCURSIONS

H.8. Portobello-Sandymount. Dike swarm cutting initial phase trachyte, Sandymount sedimentary inlier, volcanic geology of Otago Peninsula. There will be an opportunity to visit the Portobello Marine Biological Station.

H.9. Abbotsford and/or Kilmog. Highway engineering geology, landslides. Some Pleistocene surficial geology, loess.

H.10. Brighton-Ocean View. Fossiliferous Cretaceous stratigraphy, Brighton Formation, Cretaceous topographic high.

H.11. This is an additional excursion to those listed in the 1st Circular. Otago Peninsula - slope instability, mass movement, and surficial geology.

Post-sessional excursion: limited response appears to favour a general 3-4 day trip for 1 bus-load to Southland. Further enrolments are invited.

A good range of papers has been offered as follows, and others are invited, particularly in the field of Engineering Geology: Palaeontology 6, Structure and Tectonics 7, Stratigraphy 3, Sedimentation 3, Volcanic Geology 2, Engineering 2, Geophysics and Isotopes 2.

Those members who have not yet done so may still file a late Notice of Intention up to June 6, using the form enclosed. If you know of someone, or a department or organisation who might wish to attend, please pass the form on if you do not require it, or advise the Conference Committee, P.O. Box 5342, Dunedin.

TRESPASSERS WILL BE PERSECUTED

(Editor's Note: The Society has retained at great expense Sir Glorpington Wett, QC, to advise its members of the current state of the law regarding trespassing, one of the more obvious occupational hazards associated with the practice of geology. Below we print his conclusions, for the correctness of which neither he nor the Society offer any guarantee whatsoever.)

The Trespass Act 1968 became effective on 1 January, 1969 and made substantial changes to the previous law on trespass on private land, i.e. all land other than unoccupied Crown land. The present offences can be grouped in two categories:

1. Acts that one might describe as wilful trespass. These include refusing to leave private land when warned to do so; returning (within 6 months) after having been personally warned off; failing to shut a gate; and shooting on or across private land. But it may be noted that merely being on private land does not by itself constitute trespass; nor does the carrying, as distinct from the discharging, of a firearm.

A further section that might be included here makes it an offence to fail to give correct name and address when these are demanded by the occupier (or his agent) of private land on which a person is found.

Penalties of up to 3 months' imprisonment or $200 fine are provided for the more serious acts of wilful trespass.

2. Acts in which the trespass may be inadvertent or even unwilling. These are set out in Section 5, and are important in that many reasonably law-abiding geologists may be unaware of their new responsibilities under this section. It provides, among other things, that "every person commits an offence.....who goes on to any private land without .....lawful authority, and by means of... vehicle disturbs any domestic animal thereon..." "Domestic animal" includes "cattle, sheep .....when not in a wild state"; this is not further defined, but is perhaps intended to exclude from "domestic" only those animals over which no-one could show he had ownership or control. "Disturb" includes "to disturb the animal to an extent which is likely to cause ..... inconvenience to the person who ..... is in charge of it, " and circumstances can readily be thought of in which the mere movement of grazing stock away from an area in which a vehicle is driven could be a genuine inconvenience to the farmer. During lambing, the likelihood of an "inconvenient disturbance" would be particularly high.

An offence under this section may result in a fine of up to $100. But again it is worth noting that no offence seems to be committed if the animal is disturbed (other than wilfully) by a person, as distinct from a vehicle or dog).

A final note provides that nothing in the Trespass Act negates rights of entry that are authorized in other acts, such as the Mining Act.

G.W. (Q.C.)

GEOLOGICAL SOCIETY OF NEW ZEALAND (INC.)

Annual report for the year ended 31 March 1969, to be presented at the Fourteenth Annual General Meeting at Dunedin.

COMMITTEE

Officers and committee members elected at the Thirteenth Annual General Meeting at Wellington on 16 May, 1968 were:

PRESIDENT:	Mr. D.R. Gregg (Christchurch)
VICE-PRESIDENT:	Mr. B.L. Wood (Dunedin)
SECRETARY:	Dr. D.G. Jenkins (Resigned November, 1968) Miss Alexa A. Cameron, (Geology Department, University of Canterbury, Christchurch) (appointed November 1968)
TREASURER:	Mr. Guyon Warren (N.Z. Geological Survey, P.O. Box 1471, Christchurch)
COMMITTEE:	Dr. P.F. Ballance (Auckland) Prof. J.D. Campbell (Dunedin) Dr. T. Hatherton (Wellington) Dr. I.G. Speden (Lower Hutt) Prof. P. Vella (Wellington)
AUDITOR:	Mr. D.J. Daly
Additional Committee Members:	
PAST PRESIDENT:	Dr. N. de B. Hornibrook (Lower Hutt)
REPRESENTATIVE ON R.S.N.Z. MEMBER BODIES' COMMITTEE:	Dr. G.R. Stevens (Lower Hutt)
EDITOR:	Mr. D.R. Gregg
CO-OPTED MEMBER:	Mr. J.V. Eade (Wellington)

The Committee met four times.

MEMBERSHIP

The number of members at 31 March 1969 was 341, a net increase of 11 during the year. It has subsequently been necessary, in accordance with rule 3 (c), to remove 3 names from the list of members.

FINANCE

The Society's income was again substantially overspent during the year, despite considerable savings on a number of items (RSNZ building fund, ANZAAS, travelling) compared with the previous year. Rises in the costs of preparing and printing the Newsletter mean that this alone absorbed almost our total income. It is expected that the increase in subscription to $2, decided at a special general meeting in December, will prove adequate for the Society's needs for some years.

SUB-COMMITTEES

Fossil Record Data Retrieval Sub-committee: The report and recommendations of the sub-committee on the storage and retrieval of biostratigraphic data in New Zealand, convened by Dr. I.G. Speden, have not yet been submitted to the Committee.

Constitution Sub-committee: At the 1968 Annual General Meeting it was decided to appoint a sub-committee "to examine the present constitution of the Society particularly with regard to the present rules for membership, and make recommendations for such changes as it deems to be desirable".

The Sub-committee, consisting of Professor M. Gage, Mr. D.R. Gregg, and Drs. N. de B. Hornibrook and D.G. Jenkins, reported to the Committee in September 1968. They recommended

(a) that there be no changes in the rules for membership,
(b) a reframing of the objects of the Society,
(c) that the Committee be renamed the Council.

SECOND NATIONAL CONFERENCE

The second National Conference of the Society is to be held in Dunedin from 28 November to 3 December, 1969.

An organising committee has been set up in Dunedin, with Mr. B.L. Wood as chairman. Meetings will be held at the University of Otago with accommodation at the University College. The first circular was distributed to members in March, 1969.

NEWSLETTER

Mr. D.R. Gregg has continued editing the Newsletter this past year. Two issues were distributed, No. 25 in May, and No. 26 in November 1968.

SECTIONS

The Auckland Section (Secretary, Mr. F.E. Bowen) held 10 meetings.

18 April	Dr. R.P. Suggate - "Reflections on the Rangitata Orogeny."
26 April	Mr. W.B. Fortune - "The Tangihua Volcanics of the Angiangi Range, Northland," and Mr. R.S. Cooper - "The Geology of the Berghan Point Area, Northland."
30 May	Mr. L.O. Kermode - "Karsts and Caves."
14 June	Mr. R.J. Jeune - "Quaternary Ash Showers in the Waikato." and Mr. B.N. Thompson - "Dam Geology."
28 June	Two films - "Flow in Alluvial Channels" and "Experimental Turbidity Currents."
18 July	Dr. R.N. Brothers - "Geological Exploration Excursions in America."
2 August	Mr. R.C. Selkirk - "Economic Geology of New Caledonia."
6 September	Dr. J. Rogers - "Geology and Mineralogy of the Christmas Island Phosphate Deposits."
20 September	Mr. P.H. Barker - "Acoustic Reflection Profiling in the Hauraki Gulf."
4 October	Dr. H. Kobe - "Aspects of the Geology of Central Peru in general, and of some Ore Deposits in particular."

The new Chairman and Secretary for 1969 are Dr. D.N.B. Skinner and Dr. G.W. Gibson.

The Christchurch Section (Secretary, Dr. J.D. Bradshaw) held two meetings.

Professor J.N. Jennings - "The Limestone Ranges of West Kimberley, a Devonian Reef Complex."

Dr. M.S. Krishnan - "The Geological Evolution of the Himalayas."

The Dunedin Section (Secretary, Mr. C.A. Landis) held regular meetings throughout the academic year.

Professor Z.P. Bowen, University of Rochester:
"Brachiopods and Me-Reminiscences on a year's work with living and fossil brachiopods."

Dr. R.M. Carr, Department of Chemistry, Otago University:
"Experimental studies of minerals in the system Al_2O_3-SiO_2-H_2O."

Dr. P.B. Read:
"Metamorphism and deformation in part of south-eastern British Columbia."

Mr. I.C. McKellar, N.Z.G.S., Dunedin:
"Quaternary sequence in the Te Anau Basin."

Mr. B.L. Wood, N.Z.G.S., Dunedin:
"Metamorphic Ultrabasic rocks at Anita Bay, Milford Sound."

Messrs T.J. Bremner and J. Williams, senior students:
"South-western Resolution Island."

Mr. A.W. McOnie, senior student:
"Geology in the vicinity of the supply depot, eastern Lake Manapouri."

Mr. S.J. Waddell, senior student:
"Geology of the Pahia Point area, Southland."

Mr. D. Barraclough, senior student:
"Geology of Mt. Cargill."

Mr. N.G. Corner, senior student:
"Geology of the Blue River area, Makarora."

Miss A.E. Murray, senior student:
"The biotite isograd in East Otago."

Mr. S.D. Bain, senior student:
"Geology of the Boulder Hill area, Dunedin district."

Mr. T.W. Gulliver, senior student:
"Geology of the Mt. Pleasant area, North Otago."

Miss J.I. Sutherland, senior student:
"Geology of the Station Peak area, Waitaki Valley."

Mr. I.M. Turnbull, senior student:
"Geology of the Scout Hill area, Kakanui Mountains."

Mr. A.R. Mutch, N.Z.G.S., Dunedin:
"Glenorchy scheelite."

Mr. J.M. Allen, Honours student:
"The Port Chalmers Braccia."

Mr. D.G. Bishop and Dr. P.B. Read:
"Structural analysis, metamorphism, and Tertiary deformation in parts of the Haast Schist Group, Otago."

Mr. A.F. Cooper:
"Metamorphism and structure of the Haast River area."

Mr. D.J. Mossman:
"Greenhills Ultramafic Complex."

Mr. E.R. Force, Ph.D. student:
"Source rocks and source directions in Kaihikuan greywackes."

Mrs. L.M. Force, Ph.D. student:
"Calcium carbonate production and distribution in the Mid-Permian of the South Island."

Professor D.S. Combs:
"Low Grade Metamorphism in the western Alps."

(Speakers are from the Geology Department, Otago University, unless otherwise stated.)

In Wellington meetings of geological interest are organised by the Geology Section of the Wellington Branch of the Royal Society of New Zealand (Chairman, Dr. G.A. Challis, Secretary: Dr. A.J. Wright.)

31 March	Field trip to Kapiti Island.
4 April	Reports on recent field work. Professor H.W. Wellman - "Soil layers in Relation to Antarctic Glacial Advances." P.R.L. Browne - "Hydrothermal Alteration in Broadlands BR7" Professor R. Clark - "White Island Eruption 1967-8." Dr. I.G. Speden - "Current Lower Cretaceous Field Work."
2 May	Quaternary Questions: H.S. Gibbs - "Soils of Tongatapu." J.D.G. Milne - "Quaternary Terraces of the Manawatu Area."
6 June	Professor J. Bradley - "Geological Evolution of New Zealand."
4 July	"New Zealand - Continent?" Speakers Professor P. Vella, Dr. W.J.M. van der Linden, Professor F.F. Evison, Dr. T. Hatherton.
8 August	Joint meeting of Geology Section with V.U.W. Geological Society, preceded by wine and cheese. Dr. H.R. Katz - "Petroleum Exploration, Prospects and Success in Australasia." Dr. A. Wodzicki - "Mineralisation in N.W. Nelson."
5 September	Cretaceous of N. Island, chaired by Professor H.W. Wellman who introduced the subject. Dr. I.G. Speden - "Subdivision of Lower and Early Upper Cretaceous." Dr. P.N. Webb - "N.Z. Cretaceous Planktonic Foraminifera."
3 October	Annual General Meeting and Chairman's address, Dr. G.A. Challis - "Petrology and the Structure of New Zealand."

ROYAL SOCIETY OF NEW ZEALAND

Member Bodies' Committee

Substantial progress has been made in the following three projects initiated by the Member Bodies' Committee:

(i) The Centennial Awards for the encouragement of science in secondary schools have been widely advertised throughout New Zealand. Entries for the first of the awards have now been received and are being evaluated.

(ii) A Committee to examine the application of science to industry is actively planning a symposium to be held on this subject.

(iii) A science publicity committee has been examining the possibilities of science programmes on radio and television. This has resulted in a decision by the N.Z. B.C. to produce a monthly science programme on television in collaboration with the Royal Society and its member bodies.

Other items considered by the Member Bodies' Committee have been ANZAAS relations, and planning of the Royal Society Science Centre.

R.S.N.Z. Officers

The following members of the Geological Society are actively concerned in Royal Society affairs for 1968-69.

Mr. J.W. Brodie (Honorary Librarian; Cook Bicentenary Committee; National Committee for Antarctic Research, and Oceanic Research)

Professor R.N. Brothers (National Committee for Geological Sciences)

Professor J.D. Campbell (National Committee for Geological Sciences)

Professor R.H. Clark (National Committees for Antarctic Research, and Crystallography)

Professor D.S. Coombs (National Committee for Crystallography)

Professor F.F. Evison (National Committee for Geodesy and Geophysics)

Dr. C.A. Fleming (Fellowship Selection Committee; Research Grants Committee; Hector Award Committee; National Committee for International Biological Programme)

Professor M. Gage (Fellows' Councillor; Conservation Committee; National Committee for Geological Sciences)

Mr. D.R. Gregg (Canterbury Branch Representative on Member Bodies' Committee)

Dr. T. Hatherton (National Committees for Antarctic Research, and Geological Sciences)

Mr. J. Healy (National Committee for Geodesy and Geophysics)

Dr. N. de B. Hornibrook (National Committee for Geological Sciences)

Dr. D. Kear (Conservation Committee; Scientific Committee on Water Resources; National Committees for Antarctic Research, and Geological Sciences)

Dr. J.D. McCraw (Waikato Branch Representative on Member Bodies' Committee)

Professor J.B. Mackie (Otago Branch Representative on Member Bodies' Committee)

Dr. J. Marwick (Hector Award Committee)

Dr. E.I. Robertson (International Secretary; E.R. Cooper Award Committee; Cook Bicentenary Committee; National Committees for Antarctic Research, and Geodesy and Geophysics)

Dr. G.R. Stevens (Geological Society Representative on Member Bodies' Committee)

Dr. R.P. Suggate (National Committee for Geological Sciences)

Dr. W.A. Watters (National Committee for Crystallography)

Professor H.W. Wellman (Hector Award Committee; National Committee for Geological Sciences)

Dr. R. W. Willett (Home Secretary; Hamilton Award Committee; National Committee on Science and Industry; National Committee for Geological Sciences)

Awards To Geological Society Members

Professor F.F. Evison, Victoria University of Wellington, and Mr. G.W. Grindley, N.Z. Geological Survey, have been elected Fellows of the Royal Society of New Zealand.

Dr. N. de B. Hornibrook has been awarded the Hutton Memorial Medal of the Royal Society of New Zealand for his contributions to the New Zealand micropalaeontology.

UNESCO

Mr. D.R. Gregg, the Society's representative on the Sub-Commission on Natural Sciences, has attended three meetings during the year.

In July 1968, the Sub-Commission considered the draft programme and budget for UNESCO for 1969-70. This included 7 pages devoted to the earth sciences (excluding hydrology and oceanography) and a budget of $U.S.1,593,000. An International Geological Correlation Programme, a co-operative project with the International Union of Geological Sciences, was allocated $119,000. It is hoped that a New Zealand geologist will be invited to a preparatory meeting for the programme to be held in 1969.

In September 1968, a special meeting of the Sub-Commission supported the establishment of an international centre for training and research in geothermal energy at Victoria University of Wellington. The establishment of such centres was advocated in the 1969-70 programme.

The programme and budget for 1969-70 was adopted at the 15th Session of the General Conference of UNESCO held in Paris in October and November, 1968. The New Zealand delegation was led by the Minister of Education, Mr. A.E. Kinsella, and included Dr. C.A. Fleming. An existing centre for training in geothermal energy at Pisa, Italy, is to be expanded, with help from UNESCO and the Italian Government, into an international training centre. The proposal for such a centre in New Zealand lapsed.

A meeting of the Sub-Commission in March, 1969, considered the reports from the Paris meetings, and suggestions for the 1971-72 programme and budget.

Members with specific projects considered suitable for UNESCO support should submit these to the Committee.

SUPPLEMENT TO N.Z. STRATIGRAPHIC LEXICON

Approximately two-thirds of the contributions for the revised Stratigraphic Lexicon have been submitted and processed. The Editors (Drs. G.R. Stevens and I.G. Speden, and Mr. I.W. Keyes) intend to circulate to the remaining contributors a memorandum requesting that their urgent attention be given to the project. Recently proposed stratigraphic units are being incorporated. It is worth noting that several geologists have used the masterfile index to check the availability of names.

PRESERVATION OF GEOLOGICAL FEATURES

Strenuous efforts have been made by the Society to save at least part of the sequence of raised beaches at Cape Turakirae. The Committee is indebted to Drs. N. de B. Hornibrook and G.R. Stevens for the dedicated effort they have made to preserve these important geological features. Negotiations between the landowner and the Commissioner of Crown Lands are proceeding. Fuller details are given by Dr. Hornibrook in the Society's Newsletter No. 27.

Negotiations for the preservation of the Waiohine faulted terraces are still proceeding.

McKAY HAMMER AWARD

The McKay Hammer for 1967-68 has been awarded to Dr. Robert Stoneley for his paper "The Lower Tertiary Décollement on the East Coast, North Island, New Zealand." published in Vol. 11, No. 1 of the New Zealand Journal of Geology and Geophysics, (March 1968)

30 April, 1969

D.R. GREGG, PRESIDENT
ALEXA A. CAMERON, SECRETARY

GEOLOGICAL SOCIETY OF NEW ZEALAND (INC.)

RECEIPTS and PAYMENTS ACCOUNT for year ended 31/3/69

RECEIPTS			1968	PAYMENTS				1968
Balance 1/4/68 - cash at bank		$219.26	430	Royal Society - annual contribution	20.00			20
Subscriptions		345.07	276	- travelling quota	5.90			4
Receipts for "Transactions"		96.50	69	- "Transactions"	74.00			69
Interest		7.40	10			99.90		93
Sales of "Guide to Strat. Nomenclature"		3.50	23	Stationery and postage		41.90		32
Donations		4.25	-	Newsletters		324.10		220
				Audit fee		10.00		4
Surplus from Hamilton conference		-	49	"Transactions" postage		19.96		23
ANZAAS supper receipts		-	225	Committee travelling expenses		20.00		66
				Sundry payments		9.50		3
				Donations to RSNZ building fund appeal		-		101
				ANZAAS supper		-		320
				Balance 31/3/69 - cash at bank		150.62		219
		675.98	1082			675.98		1082

INCOME and EXPENDITURE ACCOUNT for year ended 31/3/69

EXPENDITURE			1968	INCOME				1968
Royal Society - annual contribution		20.00	20	Subscriptions	341.00			330
- travelling quota		5.90	4	Add bad debt recovered	2.75			2
		10.00	4		343.75			332
Audit fee		41.90	32	Deduct bad debts written off 31/3/69	7.25			11
Stationery and postage		324.10	164			336.50		321
Newsletters		2.46	11	Interest		7.40		10
Cost of "Transactions"		20.00	66	Sales of "Guide to Stratigraphic Nomenclature"		2.40		23
Committee travelling expenses		5.15	3	Donations		4.25		-
Miscellaneous expenses		-	101	Surplus from Hamilton conference		-		49
Donations to RSNZ building fund appeal		-	96	Excess of expenditure over income		78.96		97
ANZAAS supper		429.51	501			429.51		501

BALANCE SHEET at 31/3/69

LIABILITIES			1968	ASSETS			1968
Payments in advance		74.38	58	Cash at Bank of New South Wales, Christchurch		150.62	219
Debt outstanding		-	2	Payments in arrears		44.15	40
Accumulated Fund							
Balance at 1/4/68	199.35		297				
Excess expenditure over income	78.96	120.39	- 97				
		$194.77	259			$194.77	$259

CERTIFICATE:

I have audited the accounts and vouchers of the Geological Society of New Zealand (Inc.) for the year ended 31 March, 1969, and in my opinion the Accounts and Balance Sheet show correctly the affairs of the Society as at that date.

Nelson, N.Z.
23 April, 1969

(Signed): D.J. Daly, A.P.A.N.Z.
Auditor

Guyon Warren
HONORARY TREASURER

GEOLOGICAL MAP OF NEW ZEALAND AT 1:250,000

Some comments and a comparison with
the Geologic Map of California
at the same scale*

By

Arthur Grantz, U.S. Geological Survey
Menlo Park, California

The successful completion of the new Geological Map of New Zealand in 28 sheets at a scale of 1:250,000 must be a source of great satisfaction to New Zealand and its geologic community. The New Zealand Geological Survey, in particular, can be justly proud of having produced and brought to publication 28 four-mile-to-the-inch geologic maps of largely mountainous country in 13 years. By providing a moderately detailed statement of the geology of New Zealand and describing the relationship of the mineral and land resources to this geology, these maps will repay many times the effort that was required to produce them.

I have welcomed this opportunity to review the new geologic map because of the many fundamental advances in geologic concepts and techniques that have been developed in New Zealand. Selective study of its map sheets would serve as an excellent introduction to problems of circum-Pacific geology.

The potential value of the new geologic map may be gauged in part from our experience with the new 1:250,000-scale maps of California. The California maps are in demand by economic and engineering geologists, geophysicists, hydrologists, highway engineers, agriculturalists, state and country planners and others concerned with environmental analysis and land use, and by geology teachers and students. The maps have disclosed gaps in our knowledge of the regional geology of California and have pinpointed areas where detailed economic or regional geologic studies might be rewarding. They have proved particularly useful for the study of geologic features of regional extent and for relating geophysical and geochemical data and the occurrence of mineral and water resources to surface geology. The maps are invaluable "tools of the trade", providing both a moderately detailed summary of the geology of California and an index to sources of more detailed regional geologic information. Welcome bonuses have been the important topical problems that have come to light during the preparation of these maps and the interest in the land and its geology that they have generated.

Comparative status of four mile mapping in
New Zealand and California

Area	No. of four mile sheets	Published modern four mile geologic map sheets	Percent published	Duration of four mile mapping program
New Zealand	28	28	100	13 years (1956-68)
California as of December 1967	27	25	93	16 years (1952-67)
California, after publication of 27th map in 1969	27	27	100	18 years (1952-69)

Comparison of the new Geologic Map of New Zealand (103,736 square miles) with that of California (156,573 square miles) is of interest, not only because of similarities in geology and topography, but also because these regions have experienced surprisingly similar histories of settlement and mineral development.

* Publication authorized by the Director, U.S. Geological Survey.

Both were first colonized by Europeans during the last third of the 18th century and developed early economies based on herding, farming, whaling, and similar enterprises; both experienced major gold rushes and related immigrations in the mid-19th century; both saw gold mining decline and yield primary economic rank to agriculture and lumbering well before the close of that century; and both saw organic mineral fuels (coal in New Zealand, petroleum and natural gas in California) become the leading mineral resource during the 20th century.

The four-mile-to-the-inch mapping program in California closely resembles that of New Zealand in concept and scope, but there are important differences. The 27 California map sheets were produced and published by the California Divison of Mines and Geology, a State agency which traces its history (albeit with a few gaps) back to 1853. This work included some new mapping by the Division (about 15%-20% of the total), but probably the New Zealand maps contain a greater proportion of mapping done specifically for the four-mile-to-the-inch program. More than half of the California mapping was compiled from data by other governmental agencies, private companies, and individuals that was unpublished at the time of compiling.

The New Zealand and California maps share many attributes in addition to scale, number of map sheets, and the usual marginal data. They are attractive, full-colour maps with well-executed linework and generally very good colour registry. Drafting and printing errors can be found, but these certainly minimal for projects of this magnitude and complexity. These maps were obviously drafted, edited, and printed with care. Minor distractions were the marked variation in certain colours from sheet to sheet in both maps and a tendency to overcrowding of geology in a few places on the New Zealand maps. Both maps are printed on substantial paper and are folded into attractive and convenient folders or envelopes.

The California maps have topographic bases with unobtrusive brown-line contours at 200-foot intervals and supplementary contours at 100-foot intervals. These bases not only display the geology to best advantage, but serve as charts for back-country travel and even as bases for limited reconnaissance work. The New Zealand maps are planimetric, which somewhat limits their usefulness as field maps and makes it more difficult to visualize the relation between topography and structure. The physiographic diagrams on many of the map sheets are a help, but more detailed physiographic diagrams for each geologic map would be welcomed by those unfamiliar with New Zealand geography. The stylized representation of roads, particularly the main routes, is incongruous with the intricately drawn stream courses. Users of these planimetric maps might find a detailed representation of the road net helpful. The absence of contours may explain why moderately dipping contacts in certain parts of the New Zealand maps are drawn across valleys in hilly country without the usual wiggle.

Comparison between map sheets within each series is facilitated by the use of standardized formats, and each map sheet in both series contains a list of references to previous work and an index to the topographic mapping. Both map series show hydrographic features in blue and physiographic names and cultural features in screened gray; both have submarine contours. The sponsors of both maps hope to revise them as they become outdated; it is good to see this intention clearly indicated on the New Zealand maps by labelling each of them 1st Edition.

Differences between the New Zealand and California maps are greater than one might suppose at first glance. Indeed, these differences place definite limitations upon the uses to which the maps can be put. The New Zealand map sheets show greater individuality. The map units, geological symbols, and text of each are varied to best portray the local geology, and individual sheets reflect to a striking degree the personal interests of their author-compilers. These maps are superior for representing local geologic conditions, presenting new mapping, and communicating the scientific, economic, and social implications of the local geology. Individuality, however, may have been carried too far on some of the sheets. The Alpine Fault on the Buller sheet, for example, becomes the Wairau Fault on the Kaikoura sheet and Wairau (Alpine) Fault on the Marlborough Sounds sheet; and "Legend" of Auckland become "Geological reference" on Kaikoura, "Geological legend" on Rotorua, and nothing at all on Buller'. Their

individuality also leads to a mismatching of contacts, faults, and map units between many of the map sheets. Some of the mismatches are the result of continued progress in geologic mapping, but others must be due to differences of opinion or editorial lapses. The matching of Quaternary map units from sheet to sheet was especially erratic because of their complexity and the detailed local nomenclature that is used for these deposits on some of the map sheets.

In contrast, the California maps are a more carefully homogenized lot with a standard explanation (or legend) that makes them superior to the New Zealand maps for some kinds of regional analysis. There are fewer differences from map to map in California; but these maps are, in consequence, less suitable for showing local geology or new mapping.

The difference in degree of uniformity between the New Zealand and California maps reflects different solutions to the dilemma that faces all compilers of unified intermediate-scale geologic maps of large and geologically diverse terranes. If each map sheet is to represent local geology to best advantage, the total number of map units for the entire series is too large to combine in a single workable legend. On the other hand, a unified legend of manageable proportions must "lump" units that could be shown to advantage locally.

The New Zealand maps follow the first alternative. They use a hybrid and commonly complex scheme of map units based on a detailed provincial biostratigraphy for the fossiliferous rocks and on lithologic character for the unfossiliferous rocks. In the fossiliferous rocks, a degree of unity is obtained by using characteristic colours and an identifying upper-case letter symbol for the strata of each provincial series and an identifying lower-case letter symbol for the strata of each provincial stage that is mapped. Rocks for which such relatively narrow age assignments cannot be made-such as the igneous and metamorphic rocks of Fiordland or the volcanic rocks of Northland - are differentiated on lithology alone and fall outside of the unifying scheme. Poorly fossiliferous sedimentary rocks which cannot be relegated to provincial stages, or even series, are also troublesome. They are accommodated in ad hoc "lump units" with age spans that encompass the range of possibilities for each. As a result, the legend for each New Zealand map sheet is entirely relevant only to that map. The map sheets do not form a geologic map of New Zealand in the narrow sense that one can paste them together and have a unified map of the country with a single legend. In this respect the New Zealand map sheets resemble the four-mile-to-the-inch maps that are being prepared of Alaska, British Columbia, and Oregon. The latter, however, show lithologic units, rather than a mixture of biostratigraphic and lithologic units, and probably contain a larger proportion of new mapping.

The California maps follow the second alternative. A master set of initially 79 and later 83 map units with 41 subdivisions is used. If the maps were ever pasted together the composite could, indeed, be served by a single legend. The complete legend is printed with each map sheet, with the units actually present on the individual sheet specially marked. The California map units are differentiated on the basis of time and environment for the sedimentary rocks and on the basis of time and gross character (metavolcanic rocks, ultrabasic intrusive rocks, etc.) for the igneous and metamorphic rocks. The time units, however, are mainly much longer than on the New Zealand maps - periods for the Triassic and older rocks, series in the Jurassic to Oligocene rocks, provincial subdivisions of series in the Miocene and Pliocene. In practice, most of the 83 map units consist of lithologically or ecologically distinctive packets of rocks made up of one or more mappable formations; only a few contain rocks that are assigned on the basis of age alone. Some "lump units" are used to accommodate the more difficult rocks, such as pre-Cretaceous metamorphic rocks, Jura-Triassic metavolcanic rocks, or Precambrian igneous and metamorpic rocks. Unlike the New Zealand map, however, these apply to all sheets of the California map. Only two formation names are used - the Late Jurassic Knoxville and the Jurassic and Cretaceous Franciscan. The general petrographic type for individual bodies of igneous and metamorphic rock is shown on the map by superscripts and subscripts after the identifying map letter symbols - Ev^{a}

Eocene volcanic, andesite; gr^{g} Mesozoic granitic rocks, granodiorite; pEg undivided Precambrian metamorphic rocks, gneiss.

The California maps are very useful for regional analysis and planning because comparable rocks are similarly mapped throughout the State. Their concomitant lack of local stratigraphy and insensitivity to local stratigraphic problems such as time-transgressive units is partially remedied by accompanying charts that indicate the local stratigraphic content of each map unit.

A second basic difference between the New Zealand and California maps is the manner in which the fossiliferous rocks are subdivided - a difference presumably rooted in divergent views as to what constitutes a formation. In the British view (Himus, 1954), a formation is "A stratigraphical term applied to a set of strata possessing a common suite of lithological and/or faunal characteristics." In the North American view (American Commission on Stratigraphic Nomenclature, 1961), "A formation is a body of rock characterized by lithologic homogeneity; ..... and is mappable at the earth's surface or traceable in the sub-surface." Accordingly, the New Zealand map units for the fossiliferous Mesozoic to lower Quaternary rocks will seem strange to North American geologists - a strangeness that is, unfortunately, intensified by the practice of designating map units in these rocks according to a detailed provincial biostratigraphy. Hence, I may well be expressing an acquired bias rather than objective criticism in viewing this aspect of the New Zealand maps negatively.

Discerning areal extent, disposition of facies, and stratigraphic and structural relationships for many of the fossiliferous rocks is difficult, and in places quite impossible, on the basis of the map sheets alone. The vagaries of exposure and fossil occurrence have resulted in the apparent assignment of the beds of some stages to as many as five different biostratigraphic map units of overlapping age-range. Such overlapping units also make it difficult or impossible to determine with precision the regional distribution and lithologic character of the provincial series and stages. On the other hand, several kinds of rocks of quite contrasting lithology are, in places, lumped within a single provinical series. One such series is itself divided into seven mapped stages or combinations of stages. The map reveals neither the areal distribution of particular rock types within this series nor the precise relationship of the constituent rock types to the stages. In other map units, fossils are sparse or absent and assignment to series is admittedly only by inference; and some stages or stage boundaries are mapped on the basis of lithology.

Thus, the biostratigraphic system of mapping obscures the extent of rock units and field (map) relationships between them that give geologic maps their chief usefulness. In return, it provides little that cannot be determined from a properly constructed geologic map legend supplemented with biostratigraphic horizons in the thicker rock units. Map units that directly and precisely indicate the distribution of rocks have many practical as well as scientific applications; their reality can be examined and verified or disputed in every outcrop.

Map units that show mainly the distribution of age-diagnostic fossil assemblages are largely abstraction. They commonly defy verification in outcrop, particularly where zonal indices are sparse or consist of microfossils. Such units are further subject to paleontologic reinterpretation, contradictory new fossil discoveries, and stratigraphic and structural reinterpretation of type sequences. In short, I found that the system for mapping the fossiliferous rocks in New Zealand was an obstacle rather than an aid to my perception of their distribution and interrelationships. The rocks that were easiest to interpret were those that were devoid of fossils and were, in consequence, mapped on the basis of their lithology.

The text that accompanies each New Zealand map sheet provides both the professional and lay user with important supplementary data that are sorely missed on the California maps. The brief descriptions of geologic features of particular scientific, economic, or social significance I find to be among the highlights of the New Zealand maps. Discussions such as those about the evidence for 300 miles of right slip on the Alpine Fault (Marlborough Sounds sheet), the relation between

volcanism and structure in the Taupo-White Island depression (Rotorua sheet), the synthesis of Raukumara to Wanganui stratigraphy (Oamaru sheet), and the geologic controls for ground water (Invercargill sheet) would add materially to the usefulness and interest of the California maps. So also would the synoptic statements on economic geology that appear on all of the New Zealand sheets and notes on such topics as the relationship between deforestation and accelerated erosion, and volcanic, earthquake, and tsunami hazards. The stratigraphy, which is presented with little or no sugar coating on many of the New Zealand sheets, might be made more palatable by placing most of the detail in tables, diagrams, and expanded legends. This might permit a more general and lucid stratigraphic statement in the text, as was done on the Oamaru sheet.

Source data for the New Zealand maps are given in a list of references and selected bibliography that is restricted to published sources. The California map sources are indexed on a map which shows rather precisely the areal extent of all sources of regional geologic data, published or unpublished. This is an invaluable reference tool and time saver for California geologists, especially as many, perhaps most, of the sources are private surveys, unpublished theses, and work in progress. The California maps, however, lack a selected bibliography that would bring relevant topical papers to the attention of the map user.

The use of cross sections, numerous geologic symbols, and somewhat expanded legends on the New Zealand maps gives them an important advantage over their California counterparts. The sections force the map compiler to interpret his map, and they provide a succinct statement of the geologic structure. In places, however, the dip of the bedding and foliation on some of the New Zealand cross sections corresponds only approximately with the map; the horizontal and vertical scales of the cross sections commonly differ by 3% to 5%; and the cross sections on the Dannevirke sheet have an unstated vertical exaggeration of almost 1.4. An indication of the sense of transcurrent movement on faults in the cross sections would be helpful, perhaps the letters "T" and "A" could be used on opposite sides of the faults to designate movement toward and away from the observer.

The numerous geological map symbols used on the New Zealand map sheets, in contrast to a maximum of five used on the California maps, make the former more suitable for the publication of new geologic mapping. The distribution of these symbols also enables the reader to evaluate whether the basic field data are sufficient to support the geologic interpretations shown on the map. These symbols were well chosen to meet the requirements of individual map sheets and add a wealth of economic as well as structural data. Symbols for important fossil localities, late Quaternary fault traces, and the face of bedding are especially useful and should be more widely utilized on North American maps. The use of special symbols (A*, D*, M*) to indicate the age of rocks such as the Onerahi Sedimentary Breccia that are out of sequence because of ancient slumping might also prove useful elsewhere.

The legends of the New Zealand maps provide brief lithologic summaries and, in some cases, give thickness and paleontologic data. These are especially helpful in the unfossiliferous rocks where there is a direct correspondence between lithology and map units. In the fossiliferous Mesozoic and Cenozoic rocks, the correspondence between the map units and lithology was, for many units, obscure or could be determined only by very careful study of both text and legend.

The importance of recently active faults and their attendant seismic hazard in New Zealand is apparent from their occurrence in and near population centers and on at least 18 of the New Zealand map sheets. Their importance is appropriately emphasized by brown lines on the map sheets and sections. These faults and the work that is being done along them by New Zealand geologists are receiving widespread attention. It would be desirable, therefore, for the maps to state precisely the criteria that distinguish these faults. Are these criteria the same for all map sheets? On some they are labelled "Late Quaternary fault trace," on others "Recently active fault" or simply "Active fault." Along some of these faults active and inactive segments (some only 1,000 to 1,500 feet long) are interspersed. Presumably the brown segments are those portions

where recent slip can be demonstrated, but can the intervening 1,000 - to 1,500 - foot segments really be inactive? Puzzling also is one cross section which shows several active faults overlapped by unfaulted late Tertiary and early Quaternary sedimentary rocks.

The new Geological Map of New Zealand is such an ambitious undertaking that detailed remarks and discusssions of alternative systems of mapping by outsiders may seem ungracious. I offer them, however, only in hope that perhaps a few of my suggestions may prove useful to the compilers of the 2nd Edition of this eminently successful map.

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NEW MEMBERS

The following new members have been elected since the last list was published in Newsletter 24 (December 1967).

Mr. G.H. Scott, N.Z Geological Survey, Lower Hutt.
Mr. R.F.B. de Caen, Box 725, Napier.
Mr. J.A.S. Dow, N.Z. Geological Survey, Lower Hutt.
Mr. V.E. Neall, Geology Department, Victoria University, Wellington.
Mr. M.J. Carr, Geology Department, University of Canterbury, Christchurch.
Mr. J. Hogan, Mines Department, Box 6342, Wellington.
Mr. J.D.G. Milne, Geology Department, Victoria University, Wellington.
Mr. D.C. Mildenhall, N.Z. Geological Survey, Lower Hutt.
Mr. A.R. Duncan, Geology Department, Victoria University, Wellington.
Mr. F.A. Bodley, Information Service, D.S.I.R., Private Bag, Wellington.
Mr. G.J. Wilson, Geology Department, University of Nottingham, University Park, Nottingham NG7, U.K.
Mr. W.M. Mourant, 1 Waikowhai Road, Auckland. 4.
Mr. J.L. Hunt, N.Z. Geological Survey, Lower Hutt.
Mr. A.J. Pearce, Geology Dept., University of Canterbury, Christchurch.
Mr. L. Carter, Geology Dept., University British Columbia, Vancouver, B.C. Canada.
Miss A.E. Collins, 58 Nelson Street, Forbury, Dunedin.
Mr. E.R. Force, Geology Dept., Otago University, Dunedin.
Mr. B.P. Kohn, Geology Dept., Victoria University, Wellington.
Mr. S.N. Beatus, N.Z. Geological Survey, Lower Hutt.
Mr. L.A. Barrett, Box 3833, Auckland.
Mr. W.H.B. Sawyers, 62 Corson Ave., Christchurch. 2.
Mrs. H.M. Newham, Snodgrass Road, Te Puna, Tauranga.
Mr. D.N. Williams, N.Z. Geological Survey, Lower Hutt,
Mr. R.D. Nimmo, Box 28, Coalgate.
Mr. D.A. Russell, 9 Kilmarnock St., Christchurch. 1.

THE CAPE TURAKIRAE RAISED BEACHES: An unfinished case history in conservation of a gelogical site

by N. de B. Hornibrook
N.Z. Geological Survey, Lower Hutt

Cape Turakirae lies on the South Wellington coast twelve miles east of Wellington at the southern tip of the Rimutaka Range, about half way between Pencarrow Head and the mouth of the Wairarapa Valley. A spectacular 20 chain wide flat coastal strip, stepped by 6 old beach ridges (including the one presently forming) and bordered by cliffs over 1000 ft. high, runs from the Orongorongo River eastwards to beyond Barney's Creek, a distance of three miles. The penultimate beach ridge was raised during the severe earthquake in 1855 when the Wellington coastline was uplifted 9 ft. Attack by the sea, cutting fresh rock platforms, has isolated the more resistant greywacke, leaving them strewn with spectacular boulder fields.

B.C. Aston first drew attention to their importance in 1911 and, as president of the N.Z. Institute in 1928, made a strong plea for their preservation. Professor H.W. Wellman (1967) presented a paper at the 11th Pacific Science Congress in Tokyo, on a study based on accurate levelling of the beach ridges in which he concluded that: (1) the oldest, 25 m above sea level, is 6,500 years old; (2) the third oldest contains pumice erupted from Taupo in AD 200; (3) each uplift was sudden; (4) the axis of the Rimutaka Range is rising at a rate of 4 m per 1000 years; (5) the next uplift is expected 500 years hence; (6) the flank of the Rimutaka anticline is tilting at a rate of 0.03 deg. per 1000 years.

The geological importance of the beach ridges is essentially that they provide evidence of the trend, periodicity and sudden nature of movements of the block bounded on the east by the Wairarapa Fault and on the west by the Wellington Fault. Most of metropolitan Wellington is within this area.

For ecologists and soil scientists the rates of colonization of newly exposed rock platforms is of special interest and in 1965 the N.Z. Ecological Society made a submission to the Nature Conservation Council to have part of the coast as a reserve.

In 1965, when the seaward reclamation of the Hutt Motorway was under way, the Ministry of Works let a contract for a large quantity of Turakirae boulders for rip rap. A considerable sum in royalties was paid to the landowner. Observing that the heavy machinery used to remove the boulders from the area between the Cape and the Orongorongo River was destroying the beach ridges, Professor R.H. Clark and Professor J.T. Salmon appealed to the landowner but received only an assurance that the outer part of the Cape itself, containing a seal colony, would be left untouched by future contracts.

In the closing stages of the M.O.W. contract in July 1966, Dr. G.R. Stevens and I took the matter up on behalf of the Geological Society and I arranged a meeting with the landowner at which Professor H.W. Wellman was also present. Although sympathetic and interested the landowner made it clear that he needed to capitalise on the potential value of the land for rip rap. He did suggest, however, that he would be prepared to sell part of the land for a figure substantially below what it might bring later in royalties (25c. per ton at that time) if there were future demands for rip rap.

The Society made a submission to the District Commissioner of Crown Lands, Wellington, in September 1966, requesting that the Crown acquire a part of the coast as a scientific reserve. In 1967 and 1968 we were told on a number of occasions that negotiations with the owner were preceeding.

In May 1968, Mr. G.C. Kelly of Botany Division, D.S.I.R., submitted a full report on the need for urgent action to preserve the Turakirae beach ridges, to the National Parks Authority and the Nature Conservation Council, and I particularly wish to acknowledge his initiative and energy in keeping the issue alive.

When heavy trucks appeared in July 1968 carrying boulders to the Wellington

Harbour Board's new Taranaki Street container terminal, it was evident that a contract had been let for a large quantity of boulders which would be required for the breast-work. Initial enquiries led us to believe that the operations were being confined to cleaning up the remaining boulders in the previously worked area, west of the Cape, but in mid-September it was found that operations had reached the area behind the Cape itself and were spreading eastwards. Only urgent action could save the remaining ridges.

The Minister of Lands, the District Commissioner of Crown Lands and the Nature Conservation Council were appraised of the situation and a spectacular aerial photo obtained by Lloyd Homer, N.Z.G.S. photographer, was published with an article in the Evening Post on September 28. This drew a public reply from the Harbour Board that the contract was for 15,000 tons of rip rap and had been three-quarters filled.

The newspaper article drew no other response until a Wainuiomata correspondent, Mr. H.T. White, who had attended one of the Adult Education courses in geology organised by the N.Z.G.S., wrote a series of critical letters to the Post asking why there had been no official action.

The next three weeks were intensely frustrating. We were unable to see any evidence of progress. Boulders were coming out at an increasing rate and it seemed as if our efforts would be a complete failure unless we were able to bring some more effective pressure to bear.

At this point, accompanied by Mr. White, we approached Mr. Fraser Coleman, M.P. for Petone electorate, which takes in Turakirae, and he arranged a meeting with Mr. MacIntyre, the Minister of Lands.

On October 25 Dr. Stevens and I inspected Cape Turakirae with two senior officers of the Lands and Survey, the chairman of the Nature Conservation Council (Dr. R.A. Falla) and Mr. Kelly, and defined a 120 chain long strip of coast east of the Cape. This area would (1) preserve all six beach ridges; (2) leave a sufficiently long strip to measure the low westward tilt; (3) preserve an adequate (30 acre) boulder field at the west end while leaving a fair area for further exploitation. It was considered that the excavations of the ridges around the Cape itself had reached the point at which the large amount of compensation (based on a royalty of $1 per ton) now being asked by the owner was out of proportion to their diminished scientific value.

On the same day Dr. Stevens and I gave a filmed interview to WNTV1 Town and Around, which was shown a few days later.

Our meeting with the Minister took place at Parliament House on November 6. We had been able to raise a strong delegation of interested societies and individuals, including Mr. Coleman, Mr. R.C. Nelson, President Royal Forest and Bird Society, Mr. K. Miers, President Ecological Society of N.Z., Mr. E.B.J. Mathews, Chairman Hutt County Council, Mr. A. Struthers, Wainuiomata County Town Representative, and Professor D. McKenzie, Victoria University of Wellington, Mr. H.T. White, and other private Wainuiomata citizens. Mr. MacIntyre gave us a sympathetic hearing; he appreciated the urgency and undertook to have the Lands and Survey Department thoroughly investigate the possibilities of coming to some agreement with the landowner. After the meeting Dr. Stevens and I were asked to give a recorded interview to Station 2ZB, which was broadcast the following Sunday morning.

The sequence of subsequent events to date is briefly:

November 6: Geological Society sends letter to Royal Society N.Z. Conservation Committee requesting support.

November 29: Royal Society Council writes to Minister of Science adding strong support for Geological Society's representation.

December 20: Wairarapa Catchment Board publicly states it has no intention of using Turakirae rip rap.

January 1969: Hutt County Council unanimously resolves that Cape Turakirae be proclaimed a place of scientific interest to be protected.

March 1969: Wellington Regional Authority resolves that Turakirae be designated as a protected place of scientific interest in the next revision of the regional plan.

April 1969: Inspection of the area by the Historic Places Trust, led by Dr. Stevens.

Present Situation:

The contractors have restricted operations to west of the proposed reserve. Negotiations between the Commissioner of Crown Lands and the landowner, including a quantity survey of the rip rap, are going ahead.

Lessons for the Future:

One outcome of the Turakirae affair is that we have learned:

(1) Conservation of geological sites needs to be anticipated well in advance of a foreseeable rise in the value of the land. Had action been taken to make Turakirae a reserve when we requested it in 1966, it could have been achieved for one quarter of the amount now being asked by the landowner. We should be taking stock of localities now.

(2) Although a number of bodies are set up for the purpose of conservation it is simply not enough to make polite representations to the appropriate authorities. There are usually conflicting interests regarding the utilization of a piece of land and the conservationist must have a sound case and be prepared to go all out with a sustained effort after what he wants. To be effective it is necessary to know the local scene and especially where to turn to for support. I foresee the most vigorous efforts for conservation coming from people who feel strongly about the issues in their own district.

(3) It is essential to enlist the support of public opinion. T.V. is the most effective medium.

(4) We cannot expect the public to support the spending of their money to protect geological features they have never heard of. The Turakirae beaches are a particularly unfortunate example. None of the spectacular aerial photos have appeared in publications and there is no popular handbook of the Wellington area through which interested members of the public can learn of important geological localities. Perhaps the production of such handbooks is an activity that the Geological Society should consider.

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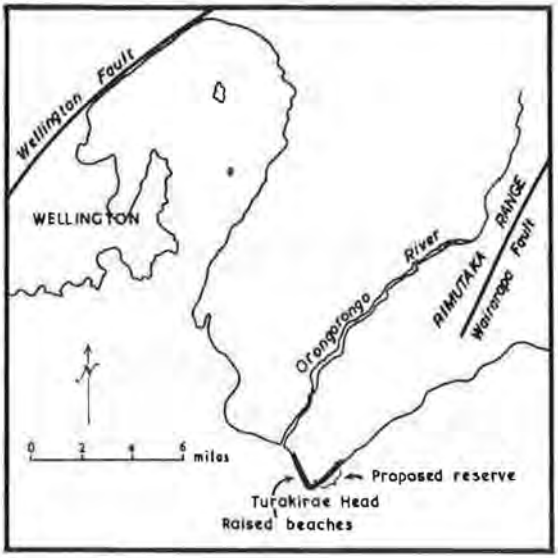

NEWS FROM THE GEOLOGY DEPARTMENT

OTAGO UNIVERSITY

Professor D.S. COOMBS has returned from sabbatical leave, which he spent in North America and Europe. Contrary to press reports at the time he did not attend the International Gelogical Congress in Prague.

J.R. BOLES, from the University of Wyoming arrived in November and has commenced work on zeolite facies metamorphism in the northern Hokonui Hills.

Dr. W.A. HODGSON has left to take up a position with R.S.T. Technical Services, Zambia.

Dr. R.M. CARTER returned to the Department last May as lecturer. He returned from Cambridge via Spain, North Africa, Sicily, Turkey and Pakistan collecting fossils en route.

Eric and Lucy FORCE have completed their field work on the Kaihikuan and Permian respectively and are returning to Lehigh University, Pennsylvania, via India, the Middle East, and Europe.

B.R. PATERSON resigned from the position of curator and has joined the Engineering Geology Section of the West Australian Geological Survey. His replacement is Miss Robyn BOOTH.

Professor COOMBS and Dr. A. REAY recently attended a conference on the upper mantle at Canberra and Dr. P.B. READ has also been to Canberra for a structural geology conference.

Recent visitors to the Department included Professor Peter ROBINSON (University of Massachusetts) who spent several weeks in the Department after a spell of field work on the Chatham Islands, and Dr. M.S. KRISHNAN, retired Director of the Indian Geological Survey.

D.G. Bishop

NEW FELLOWS R.S.N.Z.

Five Fellows of the Royal Society of New Zealand were elected on 21st May 1969. Included were Dr. A.J. Ellis, Chemistry Division, D.S.I.R., and Dr. Trevor Hatherton, Geophysics Division, D.S.I.R.

HONOUR TO F.J. TURNER

The Lyell Medal of the Geological Society of London has been awarded to Professor Francis J. Turner, University of California at Berkeley, for his contributions to the study of metamorphic rocks.

GUESS WHO?

These faces appeared on the N.Z. Geological Survey's 1968 Christmas card with the following comment:

> "The 1:250,000 map of New Zealand, in 28 sheets, was completed in 1968. Twenty geologists were involved in the authorship of these maps. Cartoons by Ron Brazier."

The original drawings were prepared by Ron Brazier for the McKay Mapping Party held in Wellington in July, 1968. Ron, who is better known for his superlative drawings of fossils, has provided the Editor with the following notes.

"Not being a cartoonist in any sense of the word I thought I had bitten off more than I could chew when first putting pencil to paper. The NZGS photographic section very kindly sorted out photographs of the "victims" to be "done". Mainly the 1965 Centennial Staff Photograph taken in Lower Hutt. George Grindley, Pat Suggate, and Bill Watters were "naturals", but how do you capture the characteristics and features of three or four chaps with receding hair? I found that by turning the photos upside down, their features, eyes, eyebrows, nose, mouth, shape of head, etc., fair hit me in the eye. All these were sketched and finally enlarged in our Zeiss "Epidiascope" to the 12" x 10" size, inked in and finished by felt pen. The most elusive person photographic-wise was one Bob Hay. He was eventually tracked down at the N.Z. Geological Survey Conference at Takaka in May 1964." (see page 45)

UNIVERSITY OF CANTERBURY SYMPOSIUM ON NEW ZEALAND CRETACEOUS AND CAINOZOIC STAGES

A Symposium on New Zealand Upper Cretaceous and Cainozoic Stages, organized by Mr. P.A. Maxwell, was held in the Geology Department, University of Canterbury, on December 10 and 11, 1968.

About 35 members of the N.Z. Geological Survey, and University Geology Departments attended the symposium, and nine papers were presented covering various aspects of the N.Z. stage classification.

The final session of the symposium was a discussion of points raised by the various papers, and the suitability of the New Zealand stage classification. The meeting decided that it would be worthwhile including a summary of the discussion in the Newsletter.

After general discussion, Dr. R.P. Suggate put forward the following statements which were discussed at length, and then voted on.

(1) New Zealand Cretaceous and Tertiary Stages are homotaxial units, based on fossil criteria.
FOR 22. AGAINST 4. ABSTAIN 4.

(2) This classification is used as the best current approximation to a time-stratigraphic classification. The time-equivalence has not been tested.
FOR 22. AGAINST 1. ABSTAIN 5.

(3) The criteria are based on deductions made by palaeontologists.
FOR 19. AGAINST 3. ABSTAIN 8.

(4) If based on fossil criteria, the criteria for each stage boundary should be defined by a single taxon.
FOR 2. AGAINST 23. ABSTAIN 5.

There was much discussion, and several amendments were made to this statement, before it was finally put to the vote.

(5) There is no need to define stages in the terms of specified horizons in single or multiple sections.
FOR 13. AGAINST 9. ABSTAIN 6.

Mr. D.R. Gregg, who was chairing the final session, put forward another series of statements which were discussed at length.

(1) A locality is needed as a namebearer for a stage.
FOR 25. AGAINST 2. ABSTAIN 3.

(2) A stratotype (or type section) is required for a stage.
FOR 15. AGAINST 10. ABSTAIN 5.

(3) A parastratotype may be required to define the boundary between contiguous stages.
FOR 16. AGAINST 7. ABSTAIN 3.

(4) A marker is required in that section.
FOR 4. AGAINST 12. ABSTAIN 9.

More discussion followed until the symposium was closed by Professor M. Gage.

Alexa A. Cameron

REPORT OF THE MINERALS COMMITTEE

by Walter Oldershaw, Geology Department,
University of Canterbury

The report of the Minerals Committee to the second plenary session of the National Development Conference does not actually devote much space to mineral deposits and prospects in New Zealand. The major part of the report examines the difficulties of encouraging the development of the mineral industries and discusses legislation, finance and manpower. Nearly half of the recommendations deal with finance.

It is obvious that a country with mines which produced 35 million ounces of gold (Waihi), 2 million ounces of gold (Reefton) and possesses millions of tons of titanohematite and ilmenite sands, large deposits of clay, and a long list of indigenous minerals, is not devoid of mineral prospects. So the report correctly emphasises the measures needed to develop the known mineral deposits, estimates the import savings which would ensue, and explores the possibilities of establishing mineral processing industries and discusses the chances of finding large new mineral deposits.

New Zealand currently imports $56m worth of petroleum, $62m of iron and steel $6m of sulphur, $1.4m of salt, and $2m of titanium dioxide. The committee shows how the new steel works at Glenbrook, the gas condensate from Kapuni and the possibility of oil from Maui, the new sulphur deposits of Rotokawa and the development of the Grassmere saltworks will greatly reduce this bill.

The Committee notes that half the rugged inaccessible areas of New Zealand, and which are the most likely geologically to contain undiscovered mineral deposits, are national Parks or reserves and are thus forbidden to prospectors. It recommends that, subject to adequate safeguards, permission should be granted to suitable applicants to prospect in National Parks. The Committee recommends that maps of prospecting leases be kept up-to-date and that the conditions under which the licenses are granted be strictly enforced.

The committee notes that New Zealanders have $38m invested in Australian mining ventures (exclusive of B.H.P.) and suggests that they be encouraged with new company legislation, tax relief, etc. to invest in local concerns. Overseas firms should be encouraged to supply capital and knowhow but some local participation is desirable, (the Australian Government is concerned that there is so little Australian capital and shareholding in the great mineral boom over there).

The report describes the advantages and possible earnings of electro-metallurgical industries based on known mineral deposits i.e.: titanium sponge, magnesium, aluminium, ferro manganese, ferrochrome, etc., and recommends increased investigation and research into these possibilities.

The committee notes that New Zealand Universities are training people in geology, exploration, engineering, mineral processing, etc, but that most of them go overseas (where they greatly contribute to the Australian Mineral boom). It recommends that some of these graduates be recruited and retained in the appropriate Government Departments and local industries. This implies that higher salaries will have to be paid to retain such men in New Zealand and that "margins for skill" will need to be increased.

The report is a very interesting and stimulating document (and good value at 25 cents). If many of the recommendations are implemented, then the New Zealand Mining industry is in for some invigorating development.

GEOPHYSICS DIVISION CONFERENCE

GREYMOUTH, 14-18 APRIL, 1969

What is now a triennial Conference of Geophysics Division, D.S.I.R., was held in Greymouth from 14-18 April.

Two features were given special prominence.

(a) GEOPHYSICAL AID PROGRAMMES

In view of the current argument about the "1% aid" it seemed appropriate to allow our geophysicists, who during the past year had given technical assistance to Pakistan (R.D. Adams on seismic effects near Mangla Dam, for UNESCO), South-east Asia (G.A. Eiby advising on seismological networks for UNESCO), and Chile (M.P. Hochstein supervising geophysical work on geothermal projects for UNDP) to illustrate their work and problems. As two other senior geophysicists are away on geothermal projects at present (C.J. Banwell and W.J.P. Macdonald) and another one leaves for the Chile project in the near future (G.F. Risk), our geophysical "aid" is substantial, if not in money, at least in experienced personnel.

(b) THE INANGAHUA EARTHQUAKE

The location of the conference was chosen to allow a field trip to the epicentral region of the Inangahua earthquake. A full day of papers was devoted to this earthquake, starting with detail of the location of the main shock, for which three epicentres separated by several kilometres can be derived, through felt effects, geological and engineering results, after-shocks (over 400 of these computed so far), mechanisms, seismic zones (not zoning), to the relationship between seismicity and gravity anomalies.

The field trip on the following day was guided by Pat Suggate and Gerry Lensen and included a return trip by the Lower Buller, where some of the geophysicists began to appreciate the significance of the Hawks Crag Breccia for the first time, and down the west coast. The status of geophysicists in the sight of the gods was confirmed by the magnificent weather provided for this, the only sunny day of the conference.

A major item of interest was dramatically injected into the conference at the end of the third day. Geophysics division has had the South Island, north of Hokitika - Christchurch, flown aeromagnetically during the past summer. It was suggested to the contractors (N.Z. Aerial Mapping, Ltd.) that it would be desirable to have the magnetic maps at the conference. The maps arrived in Hastings from London, where the reduction had been done, at the beginning of the conference, and were flown by Piet van Asch to Greymouth where they were displayed and formed a talking point at the succeeding tea breaks.

On the last evening Robin Adams gave a public lecture entitled "Why Inangahua" which, despite the counter-attraction of a "noted Irish tenor", attracted an audience of 200, contingents coming from as far away as Westport. Extra-mural sessions were vigorous and well-attended and the geophysicists were shown the corner of the (old) Albion bar where the Alpine Fault was created (?), in the days when the West Coast beer was stronger. Most people slept in the plane home, having made up the SG deficiency by volume intake.

Trevor Hatherton

REPORT AND RECOMMENDATIONS OF THE SUBCOMMITTEE ON THE STORAGE AND RETRIEVAL OF BIOSTRATIGRAPHIC DATA

EDITORAL NOTE

This report was received by the Committee at a meeting on 7 May, 1969. It is published for the information of members and will be discussed at the Dunedin Conference of the Society.

INTRODUCTION

The Committee of the Geological Society of New Zealand constituted on 10 May, 1967, the following subcommittee of Dr. I.G. Speden (Convener), Prof. J.D. Campbell, Mr. J.A. Grant-Mackie, Dr. D.G. Jenkins, Mr. G.H. Scott (co-opted) and Prof. Paul Vella to "report to the committee on the data storage and retrieval of data on the New Zealand Fossil Record Form as proposed by Mr. Scott and Dr. Speden." This action was taken because of suggestions made in a letter dated 22 April, 1967, sent to the Committee by Scott and Speden. As this letter provides the basis for the following discussions and recommendations it is reproduced here for the information of members of the Society -

"N.Z. FOSSIL RECORD FILE

Difficulty in relocating data has led to a joint investigation by N.Z. Geological Survey and Applied Mathematics Division, D.S.I.R., into the feasibility of machine retrieval of data from the N.Z. Fossil Record file. This pilot project will soon be completed and it is hoped to issue a report that will illustrate some of the advantages expected to result from adaptation of the entire file to a computer storage-retrieval system. Experience gained from the study has been incorporated into the latest re-issue of the Fossil Record Form which is designed to facilitate preparation of the data for such a system.

A proposal to institute a storage retrieval system raises problems concerning the organisation of the file that your society may wish to consider.

Background

(i) The Fossil Record Form file was initiated by Geological Survey staff about 1964.
(ii) It was "adopted by Section E, Seventh N.Z. Science Congress 1951, which set up two organising committees (Anon., 1953). These are now either in recess or disbanded.
(iii) Since the 1951 meeting minimal administration of the file has been required. N.Z. Geological Survey has arranged for reprintings and has made modifications to the format of the form largely on its own initiative.

Present Status

(i) The file is regarded as a national biostratigraphic file; it includes data gathered by most biostratigraphic laboratories in New Zealand. It is ascessible to all geologists, and is a valuable permanent record of major importance to the country.
(ii) It has no formal sponsor or administering body. This situation reflects great credit on the original organisers, and the willingness of interested organisations to house master-files and provide stationery. However, it is unlikely that this laissez faire approach will lead to advances in standards of data collection or in applications of the file.

8

Conversion of file

Proposal: that the storage-retrieval system be applied to all units of file.

Problems: In conversion of the file to a computer storage-retrieval system there are several physical problems:

(i) size of backlog; over 20,000 forms;
(ii) regional location of holdings;
(iii) very poor legibility of many forms, variations in format between various editions of form, and incomplete entries;
(iv) updating of file which will be necessary to ensure all new or emended forms are recorded on the machine file before they are permanently filed.

We anticipate that these problems can be overcome if the following support is available:

Manpower: (i) Taxonomist - about 5 minutes per form to edit for operator; to be done by relevant specialists in Universities and N.Z.G.S.

(ii) Punch operator-clerk - minimum of 3 years' work by competent person to integrate files and prepare data tapes from existing forms: about 100-200 hours/year to update files.

Equipment: Fulltime availability of Flexowriter and accessories for 3-year period.

Discussion

N.Z. Geological Survey is able to do the following:-

(i) Convert files held by Paleontology Section, Lower Hutt.

(ii) Possibily undertake the continuing task of updating the entire file, once converted.

(iii) Provide a special programming package, at present in preparation by Applied Mathematics Division, D.S.I.R., that will greatly simplify development of individual retrieval programmes.

Conversion of the Lower Hutt records, while meeting the immediate needs of N.Z. Geological Survey palaeontologists, contradicts major aims of a national file; that its facilities should be -

(i) available to all users;

(ii) able to be applied to the entire file.

We believe that every attempt should be made to maintain uniform development of the file. As the Society's membership embraces all non-commercial institutions involved in biostratigraphic research in this country, we make the following suggestions:

1. That the Society assume responsibility for the N.Z. Fossil Record File.

2. That it appoint members to examine the forthcoming N.Z.G.S. - A.M.D. report on data retrieval from the file. That if they report favourably, the Society then -
   (i) consider methods to finance conversion of the existing file (commerical exploration firms, Golden Kiwi, and private foundations);
   (ii) arrange with a participating institution to organise updating of machine files, retrieval requests and preparation

of standard data catalogues for distribution to the major contributing institutions. Examples will be given in the report.

3. That irrespective of its attitude to the storage-retrieval proposal it should consider appointing members to -

(i) periodically review the layout of the Fossil Record Form;
(ii) suggest ways to improve standard of data recorded on the form;
(iii) ensure that all relevant biostratigraphic data is deposited in the file."

PROCEDURES

Mr. Scott's report on "Storage and retrieval of biostratigraphic data in New Zealand" became available in July, 1967, and was distributed to members of the subcommittee, together with other publications relevant to the electronic storage and retrieval of data (see Bibliography). A second report by Newman and Scott (1968), presenting one form of data retrieval was produced later. Counts of the masterfile holdings proved that the number of fossil record forms totalled about 36,500, almost double the number thought to be present. Consequently, incorporation of the backlog would require about five years.

Two meetings of the Subcommittee were held; one at the Geology Department, Victoria University of Wellington on 5 December 1967, and one at the Geology Department, University of Canterbury, on 12 December 1968.

The first meeting was largely introductory. A wide range of topics was discussed and areas of agreement and disagreement were delimited. Nevertheless, the report of this meeting provides much information of value and should be referred to the Standing Subcommittee and Working Parties which we recommend be established.

RECOMMENDATIONS

1. The New Zealand Fossil Record File (see item 6) should continue to operate at a national level and be available to all geologists.

2. The primary purpose of the file is to record fossil localities.

The Subcommittee were unanimous that the important secondary purpose of the file is to record as much biostratigraphic data as possible. This data documents the age determination indicated by the fossils.

3. That the Geological Society of New Zealand establish a Standing Subcommittee to supervise the organization and administration of the file, format of the fossil record form, and promotion of standards.

The Standing Subcommittee shall consist of an appointee of each participating institution plus an appointee of the Society and the sub-committee should appoint its own chairman.

4. The name of the Subcommittee should be the Standing Subcommittee on the New Zealand Fossil Record File.

5. That the Standing Subcommittee have the power to appoint Working Parties to review, amongst others, the following:-

a) The design and content of the fossil record form.

Because of the desirability of initiating an examination of the existing form the present sub-committee recommended the establishment of a Working Party consisting of Mr. Guyon Warren (Convenor), Dr.P. Ballance and Mr. G.H. Scott, to commence deliberations immediately. With permission of the President of the Geological Society of New Zealand, and acceptance from the nominees this Working Party, held its first meeting at the Geology Department, University of Canterbury, on 12 December 1968.

b) To improve the standard of data recorded on the form.

c) To consider possible mechanisms for facilitating the inclusion on the file of all relevant biostratigraphic data relating to the geology of New Zealand.

d) To consider the desirability and possibility of preserving for future studies portions of all micropalaeontological samples processed, whether or not they yielded fossils.

e) To undertake other investigations as thought necessary by the Standing Committee.

6. The name of the national system of records of fossil localities be "The New Zealand Fossil Record File".

7. We recommend that the one-mile map sheets be redistributed amongst the master-file offices under the scheme presented by Dr. Speden in the attached proposal.

   This should facilitiate use of the file and also provide a flexible basis for analysis of data once the file is computerized.

8. As Mr. G.H. Scott's (1967; Newman & Scott, 1968) project on the computerized storage and retrieval of biostratigraphic data in S68 (Waipara) is workable this Subcommittee considers that the Society should promote the application of the system to the entire New Zealand Fossil Record File at the national level.

   The two major problems related to this recommendation are covered in the following:-

9. The Standing Subcommittee should examine ways and means of processing the increments of fossil record forms from institutions outside the New Zealand Geological Survey.

10. That this Subcommittee considers that the incorporation of the backlog into the computerized system is an independent problem requiring separate treatment and which should be investigated thoroughly and quickly by the Standing Sub-committee.

11. We recommend that this report be published in the Newsletter of the Society.

DISCUSSION

General

The Subcommittee is unanimous that the New Zealand Fossil Record File is an extremely valuable source of biostratigraphic data. However, there is general concern over the variation in degree of completeness of data on forms and we consider it desirable that the entry of as much data as possible be encouraged. How this can be done is at present an open question., but the advantages to individuals, institutions and geology as a science, of complete entry of data seem to outweigh the disadvantages especially if the return is bolstered by a wide range of computerized retrieval output in the form of catalogues, dictionaries, tabulations and numerical and graphical compilations.

Administration of the File

Since initiated about 1946 and adopted at the national level in 1951 (see Fleming, 1958), the file has been operated with a minimum of supervision. Geologists of the Geological Survey have, at irregular intervals, arranged for reprinting of the form and have modified its format largely on their own initiative and without recourse to the advice of geologists of other institutions.

While valuable, this is not the best procedure for a national system. Nor is this individualistic approach likely to lead to advances in standards of data collection or in the use of data held in the file. Consequently, we recommend that the file be administered by a permanent organisation and urge that the Geological Society of New Zealand, as a national body, accept the responsibility.

Several aspects that warrant examination are listed under Recommendation 5.

Redistribution of the one-mile map sheets

The present distribution of the one-mile map sheets amongst the nine masterfiles was decided largely on a geographic basis, proximity to a masterfile and access to sheets as defined by the main watersheds. Occasionally sheets have been transferred to other masterfiles at the convenience of individual geologists, and the boundaries of the masterfile holdings have no relationship to the four-mile sheets as established later.

The four-mile sheets provide a much more simple and convenient subdivision and if the file is computerized it will also provide a flexible basis for handling and analysis of data. A proposal to redistribute the one-mile sheets among the existing masterfiles is recommended.

Computerization of the File

Staff of the N.Z. Geological Survey and Applied Mathematics Division, D.S.I.R., have completed a pilot project on the computerized storage and retrieval of biostratigraphic data in S68 (Waipara) (Scott, 1967; Newman and Scott, 1968). The scheme has been shown to be feasible and the N.Z. Geological Survey intends to apply it to its holdings of fossil record forms, initially by catering for the increments of new forms and later by coping with the backlog.

Although the scheme involves geologists in more rigorous selection, input, and completeness of data, and so involves more time, computerization of the file facilitates the storage, retrieval and treatment of data, reduces the time involved in compiling data and administering the masterfiles, and gives wider distribution of more complete geological information. This last point is extremely important as the distribution of output, in the form of catalogues, etc. to all institutions and offices would give individual geologists ready access to a much greater range of data than at present.

The Subcommittee makes recommendation 8 and wishes to stress the immediate and potential benefits of the application of a computerized system at a national level.

There are two major problems relating to recommendation 8 as covered by recommendations 9 and 10. These must be resolved and acted upon firmly and quickly if a computerized system is to be established to the optimum benefit of all geologists:

1. The need to process the increments of fossil record forms from organizations outside the N.Z. Geological Survey.

A major aim of the computerized schemes is to provide tabulations at six-monthly or annual intervals for as much data as possible. This objective is seriously impaired if the data of all institutions are not incorporated. We urge that steps be taken to ensure that this is done to the satisfaction of all organizations.

2. A separate and very large problem is the incorporation of the backlog of some 36,500 forms held in the nine masterfiles.

This should be treated as a separate problem which may take up to five years to complete. It requires the provision of manpower and facilities, possibly to be provided wholely or in part under a research grant. The following sources of funds should be considered by the Standing Subcommittee: the Golden Kiwi, the Nuffield Foundation.

ACKNOWLEDGEMENTS

The Subcommittee acknowledges the benefit of discussions with many geologists and wishes to acknowledge the co-operation of Mr. J.M. Randal and Miss M. Newman, Applied Mathematics Division, D.S.I.R.

I.G. SPEDEN, Convener
J.D. CAMPBELL
J.A. GRANT-MACKIE
D.G. JENKINS
G.H. SCOTT
Paul VELLA

30th April 1969

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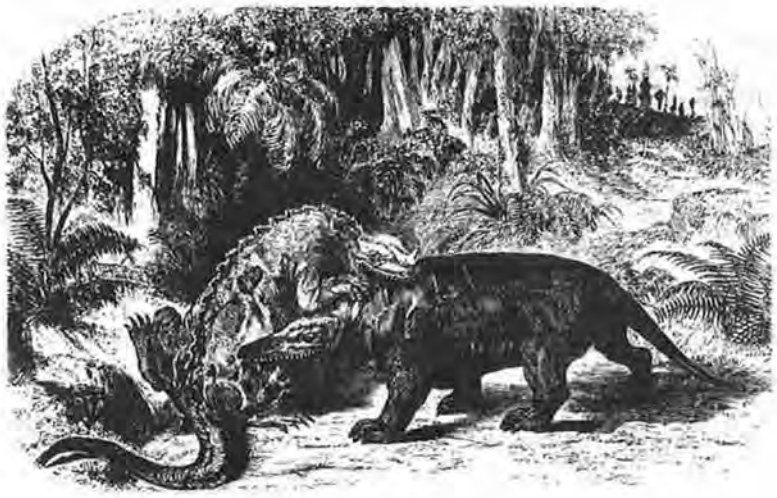

"Oh Ronald, we can't go on meeting like this."

Plate XII from "Moses and Geology" by Samuel Kinns, 1882.
"Ideal fight between Megalosaurus and an Iguanodon."

THE NEW ZEALAND FOSSIL RECORD FILE

A proposal to base the holdings of the masterfiles on the four-mile sheet subdivision

by I.G. Speden

N.Z. Geological Survey, Lower Hutt

PROPOSAL

It is proposed to regroup the distribution of one-mile sheets so that the holdings of the masterfiles match the four-mile sheet maps. This will assist collectors to locate the appropriate masterfile, assist the interpretation and revision of four-mile sheets and facilitiate storage and retrieval of data by computer.

INTRODUCTION

The New Zealand Fossil Record File is based on one-mile sheets of the N.Z. Mapping Series 1, and fossil localities in these one-mile sheets, together with associated biostratigraphical data, are recorded on standard forms and held in masterfiles. The procedures used were outlined by Fleming (1958). The operation of the file has remained essentially the same for the past 18 years, although the basic data sheet, the fossil record form, has undergone intermittent revisions and the one-mile sheet content of some masterfiles has changed slightly because of mapping requirements.

With the proposal by a Subcommittee of the Geological Society of New Zealand to upgrade the administration of the file and to convert the file to a computerized system of data storage and retrieval, it is opportune to consider redistribution of the one-mile sheets amongst the masterfiles.

PRESENT DISTRIBUTION AND CONTENT

Present distribution of the one-mile sheets amongst the nine masterfile offices is shown on Figures 1 and 2, and the holdings are summarized on Table 1. The masterfile offices include the four University Geology Departments and five offices of the N.Z. Geological Survey.

The coverage of the masterfile apparently depended on the following factors -

1. Location of the masterfile.
2. Geological interests of geologists at the various offices - i.e. mapping.
3. Accessibility - as indicated by the location of masterfile boundaries along the main divides.
4. The fact that in a national system it is desirable if every participating institution is responsible for a masterfile.

These principles also apply today, although with modern means and speeds of communication the factor of accessibility has declined in importance.

The number of fossil record forms per one-mile sheet held by each masterfile is given in Table 2. The following qualifications should be noted -

1. The holdings are at the date given. In most cases more than one year has passed. Additional forms have been incorporated and, consequently, the totals for each masterfile will be greater than indicated.
2. In some cases a block of numbers has been allocated to a geologist. These may not have been fully utilized and the data may not have been returned to the masterfile. These forms have not been included in the total but could add about 600 to 800 to the total.
3. In one case approximately 680 palynological samples from different stratigraphic horizons in water wells are recorded under one fossil locality. These could also be treated as separate samples and added to the total.

4. In addition, the New Zealand Geological Survey, Lower Hutt, holds a masterfile for fossil localities recorded from out-lying islands adjacent to New Zealand, the Pacific Dependencies and Antarctica.

5. Blocks of numbers have been allocated to oil companies prospecting in New Zealand. Most of these have not been incorporated into the respective masterfiles.

At the time of compilation of Table 2, the total holdings of the masterfile were -

New Zealand	32,098
Oil Companies	4,000
Outlying islands, etc.	400
	36,498
Plus 2 and 3 above, approx.	1,400
Approximate total	37,898

(Plus additions since early 1968.)

PROPOSED REDISTRIBUTION OF ONE-MILE SHEETS UNDER FOUR-MILE SHEETS

A redistribution of one-mile sheets under four-mile sheets is here proposed. The reasons for this proposal are -

1. Easy location of the masterfile responsible for a given one-mile sheet.
2. To a small degree, the changes in the location of institutional offices and changing patterns of geological work.
3. Four-mile sheet districts provide a convenient basis for compilation by computer of the data recorded in the masterfiles.

The compilations will summarize biostratigraphical data - including stage determinations, stratigraphic indices to collections, taxonomic check lists and ranges. These data will provide a supplement to each four-mile map and should assist its interpretation and revision. A four-mile sheet basis should also permit ready adaptation to individual and small-scale geological projects.

A possible allocation of four-mile sheets to each of the nine masterfiles is shown on Figure 3. This distribution takes into account -

a) The retention by each major institution of a masterfile containing one or more four-mile sheets.
b) Reasonable geographic compatibility and accessibility between the masterfile and its four-mile sheets.
c) The previous content of the masterfile, i.e., where possible no drastic changes are introduced.
d) Consideration of the future location of Geological Survey offices and the scope of their duties; in particular, the possibility that the Greymouth office will transfer to Nelson.

The distribution of the four-mile sheets as recommended, and shown on Fig. 3, assumes that the Greymouth office is closed in the near future and its holdings transferred to Christchurch and a new Nelson office. The Nelson office becomes responsible for much of the northern part of the South Island which forms an entity with reasonable accessibility and geological continuity. If a Nelson office is not established then I recommend that the holdings of 4-mile sheet 15 (Buller) be transferred to the Christchurch office and those of sheets 13 (Golden Bay) and 14 (Marlborough Sounds) to the Lower Hutt office of the N.Z. Geological Survey. These offices should hold the contents of the respective sheets up to the establishment of a Nelson office.

Table 1 shows the changes in the holdings of one-mile sheets and fossil record forms per masterfile if this proposal is adopted. Except in one case the changes are

minor. The masterfiles based on the Geology Departments of the universities all increase their holdings of one-mile sheets and fossil record forms. The holdings of the N.Z. Geological Survey, Lower Hutt, undergo the most drastic reduction but in practice its present South Island holdings have been transferred to the proposed Nelson office.

CONCLUDING STATEMENT

If the principle to base the holdings of the masterfiles on the four-mile sheet subdivision is accepted, then this detailed proposal should be circulated to all interested institutions for comment. After comments are collated and where necessary acted upon, the proposal may then be implemented by a mutually agreed upon date.

ACKNOWLEDGEMENTS

The work of the curators of the masterfiles in providing the basic data for this proposal is gratefully acknowledged.

TABLE 1 - New Zealand Fossil Record File - masterfile holdings of one-mile sheets and fossil record forms.

	PRESENT		PROPOSED	
	One-mile sheets	Fossil Record Forms	One-mile sheets	Fossil Record Forms
1. Auckland University	17	1,018	23	1,338
2. N.Z.G.S. Papatoetoe	46	4,756	39	4,113
3. N.Z.G.S. Rotorua	30	664	32	884
4. N.Z.G.S. Lower Hutt	88	8,721	59	7,168
5. Victoria University of Wellington	22	3,821	27	4,443
6a N.Z.G.S. Greymouth	31	2,532	(Closed)	
6b N.Z.G.S. Nelson	-(New)		38	3,038
7. Canterbury University - N.Z.G.S., Christchurch	42	4,604	62	4,978
8. Otago University, Dunedin	17	2,367	25	2,919
9. N.Z.G.S., Dunedin	67	3,615	55	3,217

TABLE 2. Masterfile holdings - number of fossil record forms per one-mile sheet.

1) New Zealand Geological Survey, Papatoetoe: 15.3.68

N1	-	18	N13	-	12	N26	-	0
2	-	111	14	-	246	40	-	30
3	-	1	15	-	221	44	-	11
4	-	24	16	-	8	45	-	0
5	-	0	17	-	0	46	-	0
6	-	3	18	-	102	47	-	119
7	-	105	19	-	145	48	-	114
8	-	18	20	-	250	49	-	11
9	-	10	21	-	0	50	-	0
10	-	282	22	-	0	51	-	413
11	-	135	23	-	75	52	-	172
12	-	0	24	-	160	53	-	14

N55 - 235
56 - 199
64 - 96
65 - 148
73 - 515
74 - 89
82 - 275
83 - 64
91 - 264
92 - 61

TOTAL = 4,756 Fossil Record Forms

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2) Geological Department, University of Auckland: 18.7.68.

N25 - 0	N31 - 7	N35 - 13	N39 - 51
27 - 30	32 - 0	36 - 2	41 - 33
28 - 425	33 - 64	37 - 32	42 -183
29 - 8	34 - 39	38 - 100	43 23
30 - 8			

TOTAL = 1, 018 fossil record forms

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3) New Zealand Geological Survey, Rotorua: 24.1.68

N54 - 2	N66 - 4	N77 - 49	N93 - 1
57 - 18	67 - 7	78 - 40	94 - 88
58 - 7	68 - 16	79 - 70	95 - 6
59 - 0	69 - 18	84 - 6	102 - 18
60 - 6	70 - 4	85 - 23	103 - 4
61 - 7	75 - 9	86 - 8	112 - 26
62 -103	76 - 5	87 - 73	113 - 1
63 - 20			122 - 25

TOTAL - 664 fossil record forms

4) New Zealand Geological Survey, Lower Hutt: 16.1.68

N71 - 120	N115 - 81	N140 - 24	S14 - 7
72 - 38	116 - 20	141 - 573	15 - 13
80 - 153	117 - 16	142 - 62	16 - 0
81 - 12	118 - 0	145 - 147	19 - 155
88 - 97	119 - 107	146 - 191	20 - 288
89 - 161	120 - 78	147 - 0	21 - 3
90 - 10	121 - 45	150 - 542	22 - 6
96 - 38	123 - 31	151 - 150	26 - 83
97 - 82	124 - 108	154 - 278	27 - 1
98 - 80	125 - 3	155 - 11	28 - 101
99 - 67	126 - 1		29 - 165
100 - 190	127 - 0	S 1 - 28	33 - 26
101 - 181	128 - 1	2 - 146	34 - 11
104 - 10	129 - 84	3 - 50	35 - 883
105 - 126	130 - 34	4 - 0	36 - 808
106 - 163	131 - 14	5 - 0	40 - 2
107 - 6	133 - 61	6 - 3	41 - 88
108 - 5	134 - 160	7 - 26	42 - 212
109 - 46	135 - 98	8 - 103	43 - 6
110 - 58	136 - 4	9 - 0	47 - 0
111 - 150	137 - 383	10 - 7	48 - 62
114 - 29	138 - 173	11 - 0	49 - 48
		13 - 88	

TOTAL = 8,721 fossil record forms

5) Geology Department, Victoria University of Wellington: 4.12.68

N132 - 14				
139 - 65	N148 - 6	N158 - 371	N164 - 112b
143 - 29	149 - 185	159 - 498a	165 - 704
144 - 96	152 - 8	160 - 132	166 - 413
	153 - 380a	161 - 51	167 - all 88a
	156 - 9	162 - 524	168 - 109
	157 - 59	163 - 19	169 - 37

TOTAL = 3,821 fossil record forms

a. Forms allotted to geologists, and in part used, not included in the total.

b. 678 samples, mostly palynological, from water well cores, are not included.

(6) New Zealand Geological Survey, Greymouth: 15.1.68

S12	50	S32	218	S52	8	S77	78
17	7	37	231	57	65	78	16
18	115	38	141	58	8	86	0
23	72	39	29	63	0	87	40
24	61	44	539	64	17	88	7
25	171	45	41	70	0	96	2
30	109	46	13	71	11	97	16
31	207	50-51	260			98	0

TOTAL = 2,532 fossil record forms

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(7) New Zealand Geological Survey and Geology Department, University of Canterbury, Christchurch: Jan. 1968

S53	4	S67	91	S80	24	S 94	1
54	98	68	956	81	66	100	11
55	553	69	119	82	30	101	162
56	83	72	19	83	12	102	22
59	42	73	80	84	73	103	0
60	69	74	165	85	0	109	6
61	323	75	32	88	7	110	118
62	660	76	16	89	11	111	222
64	13	77	3	90	39	118	132
65	8	78	13	91	45	119	36
66	223	79	14	92	2		
				93	1		

TOTAL = 4,604 fossil record forms

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(8) Geology Department, University of Otago, Dunedin: 21.2.68

S 99	4	S126	13	S135	79	S146	255
108	0	127	426	136	768	155	60
116	2	128	76	137	148	163	171
117	276	134	2	145	4	164	78
125	5						

TOTAL = 2,367 fossil record forms

(9) New Zealand Geological Survey, Dunedin: 51.1.68

S104	0	S138	0	S158	83	S176	31
105	5	139	0	159	615	177	64
106	0	140	17	160	65	178	106
107	5	141	14	161	9	179	246
112	0	142	0	162	4	180	58
113	10	143	2	165	36	181	0
114	3	144	0	166	22	182	42
115	24	147	0	167	337	183	78
120	0	148	2	168	217	184	347
121	0	149	23	169	527	185	0
122	14	150	57	170	183	186	1
123	13	151	1	171	11	187	0
124	2	152	8	172	62	188	0
129	0	153	0	173	19	189	0
130	2	154	7	174	56	190	0
131	26	156	1	175	132	191	0
132	11	157	0				
133	17						

TOTAL = 3,615 fossil record forms

FIG. 1. PRESENT DISTRIBUTION of ONE MILE SHEETS ACCORDING to MASTERFILES and FOUR MILE SHEETS. NORTH ISLAND.

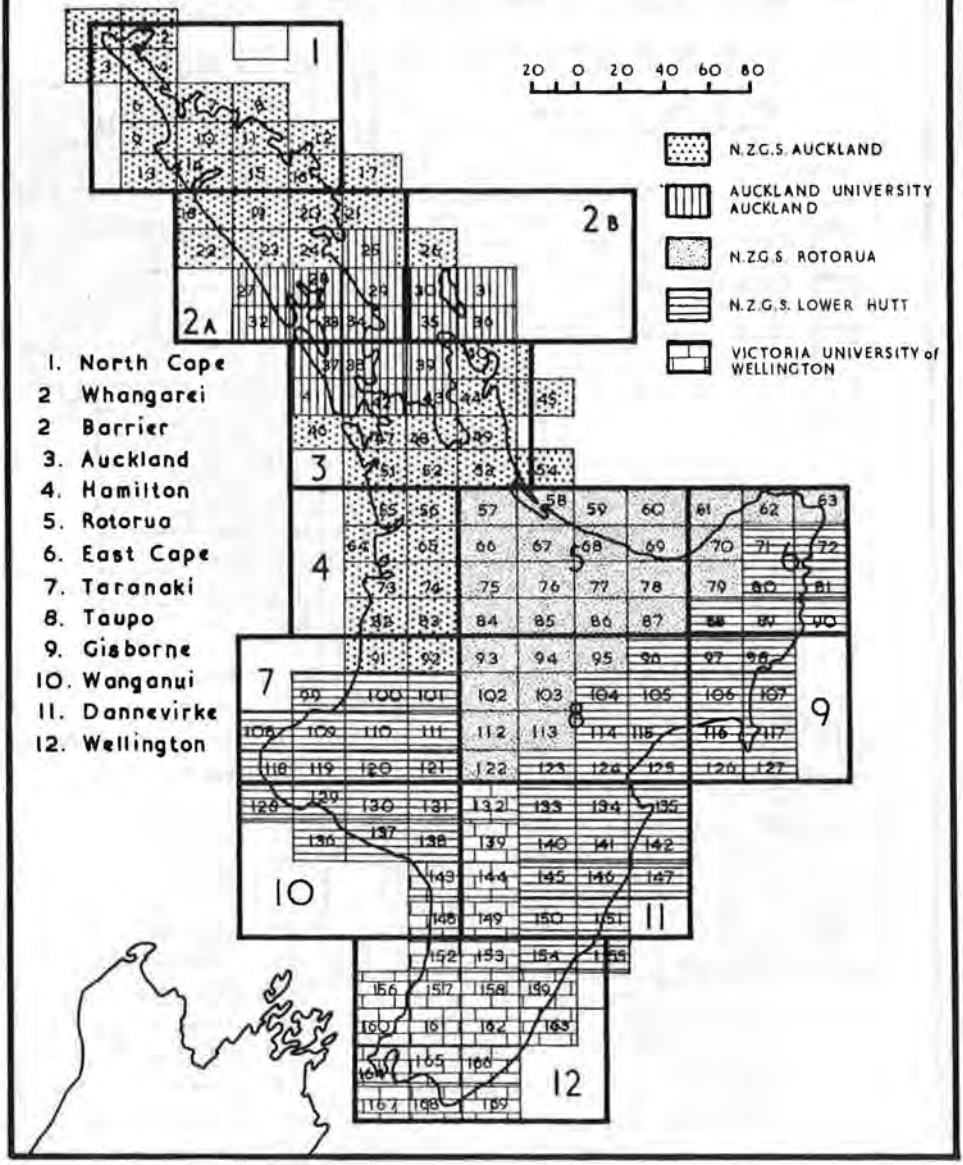


FIG. 2. PRESENT DISTRIBUTION of ONE MILE SHEETS ACCORDING to MASTERFILES and FOUR MILE SHEETS. SOUTH ISLAND.

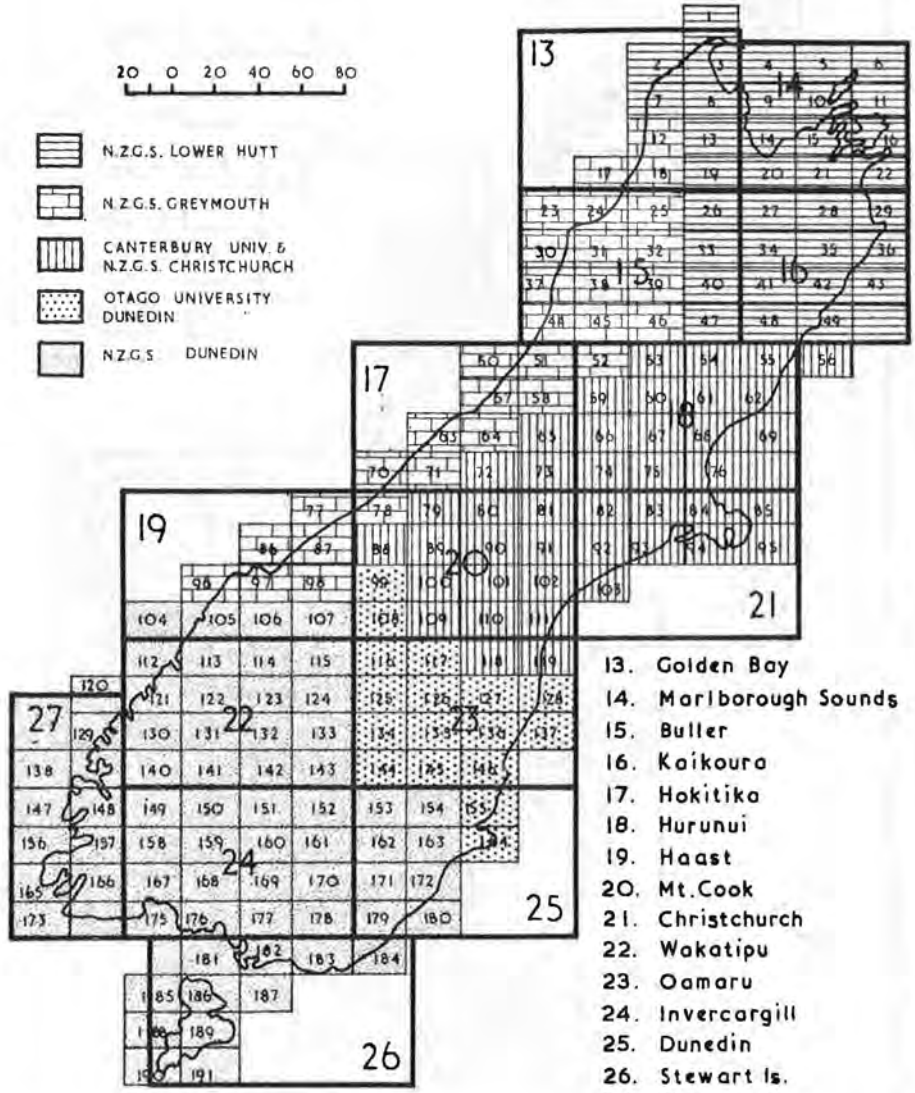
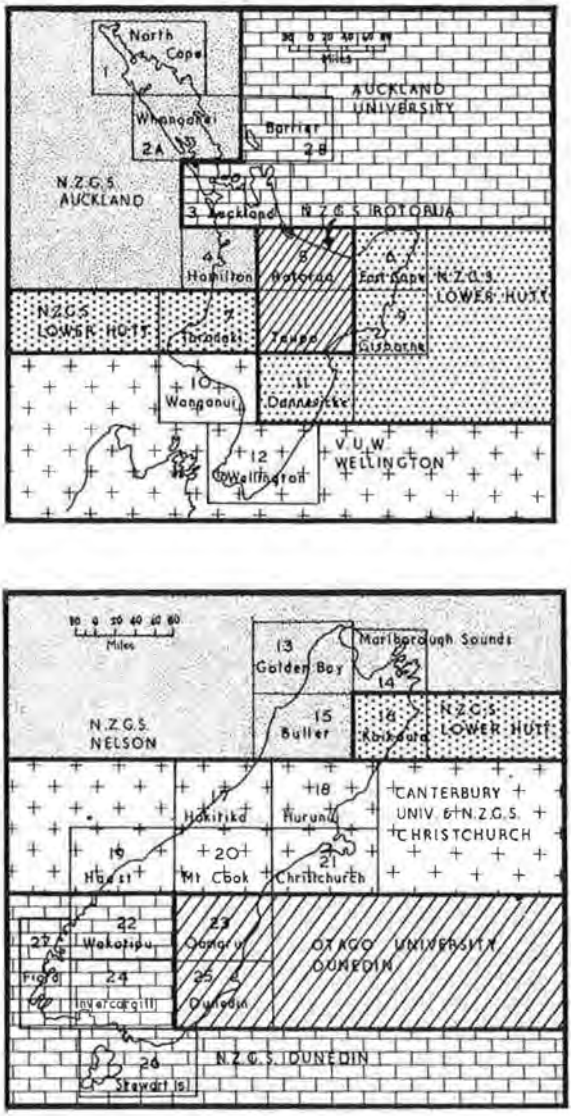


FIG. 3. Proposed distribution of four mile sheets amongst the masterfiles.



FOSSIL COLLECTIONS AT CANTERBURY MUSEUM

The collection of New Zealand fossils at the Canterbury Museum is reasonably well known to palaeontologists and frequently consulted.

The Museum also has a large collection of foreign fossils which probably includes over 5,000 specimens. These were acquired largely by Julius Haast and are mainly from Europe.

Those who remember the Canterbury Museum of the 1940 s and before, may recall that many of these specimens were on display. With the reorganization of exhibits all the foreign fossils were put in storage.

The foreign fossil collection has recently been sorted through and has once more become accessible. It is a potentially useful collection and has been consulted by several New Zealand palaeontologists during the last year. It is rich in topotypes and specimens of the type species of genera, and most specimens are well localized.

The collection is arranged largely in families following in the main the "Treatise on Invertebrate Paleontology". Fossil plants and gastropods are arranged stratigraphically and by locality.

Inquiries from palaeontologists about the collection are welcomed.

D.R. Gregg

NO OIL, NO MOA

Sir, -

I'll dare to go out on a limb and prophesy that the oil discovery will be a damp squib. Rotorua has burnt it all up over millions of years. Like the moa, it is no more.

J.C.R.
"Evening Post", Wellington, 25 March, 1969.

ARE N.Z. STAGES REALLY STAGES?

An irrelevant reply in doggerel.

There is a young fellow from Wales,
Who quotes from Arkellian tales,
To the zones he has matched,
So fondly attached.
Rejoice when Lillburnian fails!

Anon.

Moral

Don't put your daughter on the stage Mrs. Worthington.

- Coward.

HISTORY OF GEOLOGY IN NEW ZEALAND

Members may be interested to know of the existence of a dissertation presented in 1967 for the degree of M.Sc. in the History and Philosophy of Science at the University of London entitled "Geology in New Zealand prior to 1900". The Author is Mr. D.R. Oldroyd, until recently a teacher at Christ's College, Christchurch.

The dissertation gives a detailed account of the work of the early explorers and settlers prior to Hochstetter, and in particular, the contributions of the Forsters, Mantell and Crawford. The work of Hochstetter, Haast, Hector and Hutton is described, and there is a discussion of the personal relationships of the colony's scientists.

There are reproductions of Hochstetter's manuscript map of the Auckland district (held at the Auckland Institute and Museum) and the manuscript maps of Nelson Province by Hochstetter and Haast (held at the Department of Lands and Survey, Nelson).

Two copies of the dissertation are held in the library of University College, London. The only copy in New Zealand is in the library of the Geology Department of the University of Canterbury.

Mr. Oldroyd is now on the staff of the University of New South Wales, Sydney.

OBITUARY

Lorry Newnham

Mr. L. Newnham of Tauranga died suddenly at Green Lane Hospital, Auckland, on 19 March, 1969.

Mr. Newnham, a retired farmer, and his wife Hilary were enthusiastic members of the Auckland Geological and Lapidary Society, the Waikato Geological Society, and the Geological Society of New Zealand (since 1964). They were regular attenders at the meetings of the Auckland Section of the Society, and attended meetings and excursions during the International Symposium on Volcanology (1965) and the ANZAAS Congress in Christchurch (1968).

Mrs. Newnham is continuing her membership of the Society, and we look forward to seeing her at the meetings as before.

P.F. Ballance

F.R.S. FOR W.S. FYFE

Dr. William Sefton Fyfe, Royal Society Professor at the University of Manchester has been elected a fellow of the Royal Society of London.

Dr. Fyfe was born at Lauriston, on the Canterbury Plains near Methven, in 1925. He attended Waitaki Boys' High School and then went on to the University of Otago where he graduated in chemistry and geology. He gained his Ph.D. in geochemistry while working as a lecturer in the Chemistry Department.

Then he went to the University of California at Berkeley to work with Professor Frank Turner and returned to Otago in 1955 as Reader. He returned to Berkeley, in 1959 as Professor of Geochemistry, and subsequently moved to his present appointment.

The Royal Society's citation states that Dr. Fyfe is "distinguished for his contributions to the physical chemistry of rock metamorphism and the equilibrium relations of alumino-silicates under high temperatures and pressures."

GEOLOGY AND T.V.

Approaches made to N.Z.B.C. by the Member Bodies' Committee of the Royal Society to ensure better publicity for New Zealand science have been very favourably received and N.Z.B.C. are now planning a monthly 30-minute programme entitled "Science in New Zealand" fronted by Peter Read (of "Night Sky" and WNTV "Town and Around" fame).

The programme will probably consist of a 20-minute documentary item on a particular subject and 10 minutes of topical items on science in general. David Pumphrey has been appointed producer, and the series will begin in mid-year.

Meanwhile, the individual scientific societies have been asked to provide lists of possible topics, to assist in the final selection of programmes, and to arrange for lab. and field facilities and personnel to be available. It must be emphasized that no one will be committeed to script writing - this will be done by N.Z.B.C. staff, in consultation with the scientists involved.

As these science programmes may soon be a reality the Geological Society must make a start on the drawing up of lists of possible topics and it would be appreciated if members of the Society could give some thought to this matter and forward suggestions to G.R. Stevens, N.Z. Geological Survey, P.O. Box 30368, Lower Hutt.

G.R. Stevens,
Geological Society Representative,
Member Bodies' Committee, Royal
Society of New Zealand.

BRYCE WOOD TO LEAVE SURVEY

After 22 years with the New Zealand Geological Survey, Bryce L. Wood has resigned and will start as Exploration Manager of N.Z. Petroleum Exploration Co. Ltd., (P.O. Box 2194, Wellington) on 1 June, 1969.

Mr. Wood is Vice-President of the Society and Chairman of the Organizing Committee for the Dunedin Conference. Mr. I.C. McKellar, also of the Survey's Dunedin office, will take over as chairman of the Organizing Committee.

SUBSCRIPTIONS PLEASE

The collecting of subscriptions from 350 members is a considerable task, and it would be a great help if as many members as possible would send in their subs (now $2) without having to be prompted to do so. Please be sure to get in touch promptly with the Treasurer or Secretary if your receipt does not appear within a reasonable time (i.e. surface mail). Any payment in excess of what is currently due will be held to your credit, and the amount noted on the receipt. No 3c. bank fee is necessary on cheques.

Guyon Warren,
Treasurer,
C/o N.Z. Geological Survey,
P.O. Box 1471,
CHRISTCHURCH.

LETTER TO THE EDITOR

Greywackes and Sandstones

Sir,

A study of the various replies to the questionnaire circulated by the Greywacke Subcommittee (NEWSLETTER 26) suggests that there is little agreement amongst New Zealand geologists concerning the classification of sandstones in general. This disagreement is not surprising; there is little agreement even amongst sedimentary petrologists around the world. However, the recommendations of the subcommittee, and also the viewpoints of a growing group of sedimentary petrologists, suggest that while the term "greywacke" itself may be useful in certain generalized field connotations, it has no value in detailed lithological descriptions.

With the end of the Four-Mile regional mapping programme by the Survey and the intensification of detailed lithostratigraphic analysis, it is no longer reasonable to gloss over the significant possible variations in sedimentary sequences as is done by using unqualified terms such as sandstone, limestone, or "greywacke". Insofar as sedimentary petrologists concern themselves with such rocks, it behoves them to suggest ways in which these rocks can most usefully be described, while realizing that their suggestions must fill the needs of those who do not specialize in the same fields. Should a general classification be provided that meets with approval by both specialists and non-specialists, its adoption throughout New Zealand would greatly facilitate communication and avoid confusion.

The purposes and general types of classificatory systems have been detailed extremely well by John Rodgers in his 1950 essay on "The Nomenclature and Classification of Sedimentary Rocks" (Am. Jour. Sci, 248, pp. 297-311). The perfect classification does not now and probably never will exist, since one cannot take all local pecularities into account nor suit all purposes. However, there is growing accord amongst sedimentary petrologists concerning some of themost important general aspects of sedimentary rocks. At the Dunedin Conference of the Geological Society, Dr. P. Andrews (N.Z. Geological Survey, Christchurch) and I will recommend schemes that classify respectively the textures of detrital sedimentary rocks and the compositions of sandstones. The classificatory systems we shall present are not essentially new, but they represent what we believe are the most useful and most promising approaches. We hope to publish them in the New Zealand Journal of Geology and Geophysics, where you will have the opportunity of cold-blooded deliberation on their merits. We hope that, if not these schemes, then some derivative of them will prove of general acceptance in New Zealand. Would those who consider the ultimate goal of some type of N.Z.-wide unanimity in sedimentary rock terminology come prepared for a hot-blooded discussion at the Conference?

10th April, 1969

D. W. Lewis,
Geology Department,
University of Canterbury,
CHRISTCHURCH.

GUESS WHO?

(see page 21)

Top row: Bill Watters, Bruce Thompson, Alan Beck, George Grindley, Don Gregg

Second row: Pat Suggate, Les Oborn, David Kear, Fred Bowen, Ian McKellar

Third row: Jim Healy, Ian Speden, Harry Gair, Ko Kingma, Gerald Lensen

Bottom row: Bryce Wood, Bob Hay, Guy Warren, Jim Schofield, Alex Mutch

NOTES

CONFERENCES TO COME

1969

July 2-4. Conference to study the findings of the National Development Conference. N.Z. Association of Scientists. Wellington.

Aug. 14-21. Eighth International Congress of Crystallography. Stony Brook, New York.

Aug. 18-22. ANZAAS Congress. Adelaide.

Aug. 28 - Sept.3. Colloquium on the Geochronology of Phanerozoic Orogenic Belts. Bern. Switzerland.

Aug. 30 - Sept.5. Eighth INQUA Congress. Paris.

Sept. 5-10. International Clay Conference. Tokyo.

Sept. 7-13. Symposium on Volcanoes and their Roots. Oxford, England.

Sept. 7-13. Symposium on the Hydrology of Glaciers. Cambridge, England.

Sept.11-16. Preparatory Meeting for the International Geological Correlation Programme. Budapest.

Sept.17-22. Symposium on Land Subsidence. Tokyo.

Nov. 12-14. Symposium on Petrology of Igneous and Metamorphic Rocks from the Ocean Floor. London.

Nov. 28- Dec.3. Geological Society of New Zealand. Dunedin.

1970

Feb.10-18. International Symposium on Recent Crustal Movements and associated Seismicity. Wellington.

Apr.16-18. International Geochemical Exploration Symposium. Toronto.

Aug. International Symposium on Antarctic Geology and Geophysics. Oslo.

Aug.28 - Sept.2. International Mineralogical Association - International Association on the Genesis of Ore Deposits. Tokyo and Kyoto.