NEWSLETTER

GEOLOGICAL SOCIETY OF NEW ZEALAND

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Member Body of the Royal Society of New Zealand

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EUROPEAN HIGHER EDUCATION IN RETROSPECT

by P.N. Webb
N.Z. Geological Survey
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Introductory Remarks

Until only a few years ago most New Zealand geologists having doctorates had gained them in New Zealand or the United Kingdom universities. More recently they have tended to study in United States and European institutions as well. With my stay in Europe still fairly clear in the mind I think that this is an opportune time to offer both observations and opinions on the more important aspects of European higher education. It is only fair to state, though, that my views are based mainly on experience in Departments of Geology and most readers would agree that these are hardly representative of either the other sciences or the humanities.

Higher degrees

The most startling feature of the European scene is the wide variation of standards between countries, within countries, and even within the same university and department. Direct comparison of the various European degrees with those of the Anglo-Saxon world is hazardous. An equivalent of the B.Sc.-M.Sc.-Ph.D.-D.Sc. hierarchy exists but precise correlation is often difficult. Degrees equivalent to our "bachelor" degree (i.e. diploma, candadaat, baccalaureate, etc.) vary enormously in standard, but like the New Zealand degree are based almost entirely on theory alone. Degrees equivalent to our "master" degree (i.e. magister, doctorandus, licentiate) are based on theory and some original research. Just how much of each again is open to wide variation and would encompass a range from about B.Sc. (Hons.) to M.Sc. (Hons.). The European doctorate, like those in the Anglo-Saxon world, is based primarily on original research work (the thesis). The size and worth of such theses ranges from a New Zealand B.Sc. (Hons.) to Ph.D. Higher doctorates (habilitation) are awarded in many European countries; these being awarded on a second thesis or on a series of published papers, amongst which is a major work. Naturally enough these higher doctorates go to senior scientists with a considerable amount of experience. This latter degree would be about equivalent to the New Zealand D.Sc.

I have noted, though, that in some countries ambitious university folk equate their initial doctorate (Ph.D.) with the Anglo-Saxon D.Sc.

The time required for a doctorate can range between three and ten years. This depends both on the energy of the candidate and the policy of the professor (promotor) under whose guidance the study is carried out. In Holland three to five years is an average time, in Sweden or Denmark a longer period is common. It must be pointed out that the actual time involved has nothing to do with the eventual standard attained. The pace of many departments is incredibly slow.

Choice of country, university, and professor

The subject matter of the research to be undertaken would obviously influence the choice of country and institution. I would certainly recommend a germanic university (Holland, Germany, Sweden, Denmark, Switzerland) in preference to a southern European university (France, Belgium, Italy) for higher studies in geology. Not the least important consideration is the choice of professor. Most European professors run their departments or institutes with Machiavellian power and enjoy life-long tenure (until 75-80 years) in office. They are usually in total control of curriculum and funds and are accountable to practically no-one. One prominent European politician has commented that "even in these modern times the universities and their professors behave like successors to medieval monasteries".

The thesis, and graduation

I would strongly advise anyone contemplating doctoral studies in Europe to prepare study material before leaving New Zealand. If you undertake a European research subject it could

cost a year or eighteen months in fieldwork and preparation. There are some who would consider this time well spent. In my opinion this valuable time is much better spent consulting museum collections, visiting other workers, visiting important geological localities, and so on. The actual thesis topic must, however, be of personal interest to the professor and fit into the department's research programme.

Most European universities insist on the thesis being published prior to the degree being conferred. Up until recently publication costs had to be borne entirely by the candidates, and usually amounted to between £400 and £500. More recently, regulations have been altered and it is in many cases possible to present the thesis in manuscript form on the undertaking that it will be published soon after. As paleontological and other specialist manuscripts involve high printing costs many universities allow the thesis to be published in a periodical. It is best to iron out this aspect of a European visit well in advance.

Whereas the actual obtaining of a doctoral degree in New Zealand is accomplished with a minimum of fuss and bother, the European graduation can be a large affair and horribly expensive. The thesis is usually defended in public, that is, before the senate, invited examiners, and the general public. Doctoral examinations are exacting affairs, and may last from one to four hours. They are usually followed by a large formal reception to which up to 300 guests may be invited. This is usually followed by a formal dinner for the examiners. The actual graduation can cost several hundred pounds, a lot of money to a foreign student at the end of his stay abroad.

Higher education in the Netherlands and the Foreign Student

For several centuries contacts between the Dutch universities and the various parts of the Dutch kingdom were very close, with educational exchanges between the East Indies, the Antilles, Surinam, and South Africa. These bonds resulted in the development, in the Netherlands, of research centres devoted to Arabic and Asian culture, history and language (in Leyden), schools of tropical agriculture, breeding, and animal husbandry (at Wageningen).

Before the first world war the number of foreign students (from outside the Dutch empire) in the Netherlands was small by comparison with Britain, France, Spain, Switzerland and Austria. This has been attributed to language barriers. French, German and Spanish were major languages, Dutch a minority language. Following the second world war the Netherlands reviewed its attitude to international education. It was decided that specialist post-graduate international courses would be offered in preference to large numbers of foreign students being accepted for the normal Dutch degree curriculum. As the period for such courses is short there is little point in conducting them in Dutch, and so English, French and German became the standard course languages. Many of these courses, planned by "The Netherlands Foundation for International Co-operation", are attended by participants from undeveloped countries. These courses often culminate in a diploma and more rarely in a degree. Since 1950, 252 courses have been offered to 11,000 participants from 100 countries. Course subjects include such topics as aerial surveying, map interpretation, hydrological engineering, social welfare, business administration. Scholarships are offered for these courses by the Dutch government. Three are available for Australians, but none for New Zealanders. This is surprising in view of close ties between New Zealand and the Netherlands. It is interesting to record that in the 1962/63 academic year (the last year for which I have figures) a total of 37,700 students attended Dutch universities. Of these 1,515 were from outside the Netherlands. One hundred of these were in the Netherlands studying various branches of science. The many international courses mentioned above have nothing to do with the normal Dutch degree curriculum. There are no special provisions for the foreigner studying for a Dutch degree, and of the relatively few foreigners in the Dutch universities the greatest percentage would probably be medical students from Norway.

The Dutch university staff hierarchy

The Dutch university teaching hierarchy possesses many firmly defined categories. This is the pattern throughout most European countries. The following are the main divisions in the Dutch system:

Hoogleraar	gewoon hoogleraar (ordinary professor)
	buitengewoon hoogleraar (extra-ordinary professor)
	bizonder hoogleraar (special professor)
	gaast hoogleraar (guest or visiting professor)
	hoogleraar beheerder (professor-manager of institute, etc.)
Lector	gewoon lector
	buitengewoon lector
	bizonder lector
Docent	docent (teacher)
	bizonder docent (special teacher)
Wetenschappelijke medewerker	(scientific co-operator)
Wetenschappelijke assistent	(scientific assistant)

Appointments and duties are decided by the Crown at the higher levels, by the Minister at Middle levels, and by professors at the lower levels. The gewoon hoogleraar is a member of the senate and faculty, the other professors have only an advisory function. The bizonder hoogleraar may examine his students only with the consent of the faculty. He is usually nominated by a private institution or foundation and gives lectures on certain subjects for one year. His appointment is authorised by the Crown. A Lector is usually junior to a hoogleraar but with the Minister's consent may be as independent as a professor. The Docent category is a part-time teaching post at senior, middle or junior level. He is appointed by the Minister, and may teach to the professorial level. The Wetenschappelijke medewerker and assistent are categories for teachers and researchers working under the professors' direction. The assistant category usually includes senior students who are preparing for the doctorate degree.

Personal views

Since I have had the opportunity to work in several Dutch university departments I shall offer a few observations pertinent to the present discussion. The average department consists of the professor, his trusted student assistants, and the students. Associate professors and senior lecturers are uncommon. Most professors like to be seen as father figures and thrive on the absolute loyalty of their students. As staff replacements become necessary there is a strong tendency for the new recruit to come from the same department or another Dutch university. Foreign staff are rarely engaged on a permanent basis. Foreign speakers deliver several lectures from time to time. Course work (especially laboratory work) is not well organised and teaching standards are frequently lower than those in New Zealand. On the other hand, the Dutch geology undergraduate participates in a much more comprehensive series of field courses than his New Zealand counterpart. Research facilities are often poor. The acquisition of new equipment and technical facilities depends, as everywhere, largely on the energy and foresight of the professor. Library facilities are generally excellent, particularly where older literature is concerned. Segregation into the various branches of geology occurs at quite an early stage of the student's education. As each department is almost completely autonomous, younger students tend to become attached to one department (mineralogy, micropaleontology, etc.) and social and academic contacts with the other departments become more remote as each year passes. This is the basic difference between the New Zealand system and that in Holland. Whereas our concept of a department of geology is a single department containing a number of inter-dependent sections, the Dutch system consists of an institute made up of a number of separate and quite independent departments. Another feature, which in my eyes had little to praise it, was the difficulty in making academic or social contact with other institutes (botany, zoology, paleobotany, geo-physics, soil science, etc.).

This separation is largely brought about by having institutes scattered throughout the town.

The existing Dutch system of higher education possesses many antiquated features. The older educationalists would probably deny this. On the other hand, the younger teachers (including professors) and administrators with whom I have spoken are striving for a more progressive system of higher education. At one university the geology students went so far as to prepare a revised curriculum in the hope of raising study efficiency, so bringing about earlier graduation. One of the more serious aspects of the present Dutch system is that graduation at the level equivalent to the masterate and doctorate level occurs later, often much later, than in Anglo-Saxon institutions. Provided Dutch graduates obtain employment in a Dutch concern this is probably not a great disadvantage. Where the Dutch graduate obtains employment in the Anglo-Saxon world this later start can be a distinct disadvantage.

The success of the European system depends on the ability of the individual student to maintain close contact with his professor, picking up what crumbs of information the professor cares to drop. Under this system the student must at all times be humble, tolerant, patient and eager. The more enthusiastic and intelligent student will attract the professor's attention and is likely to move faster through his studies. The slower student may be overlooked and is doomed to wait for years for his turn. This is the classical system of learning and it takes time. The American way of learning would (from what I read) represent the opposite extreme, with large classes, a highly organised curriculum, and less contact with the staff. Both systems have advantages and disadvantages.

It is well to remember, though, that the European system is basically different from what we are used to and the success of a New Zealander in a European institution depends largely on his ability to acclimatise quickly to these different circumstances.

U.N.E.S.C.O. ITEMS

Dr N. de B. Hornibrook (President) and Dr D. Graham Jenkins (Secretary) attended the National Commission for UNESCO Conference of Co-operating Bodies at Wellington on October 30, 1967. As far as the Society is concerned it was established at the meeting that in future the National Commission will seek the advice of the Society on geological problems. This was confirmed in a letter from Miss Krystyna D. Kolydynska, dated November 8, 1967.

> "I confirm what I said to you and Dr Hornibrook - i.e. that when appropriate, the National Commission will refer to the Society and seek its advice on any geological projects that may be included in UNESCO's programme. All co-operating bodies of the National Commission have equal status and their duties and responsibilities are referred to in the Commission's Constitution, a copy of which I enclose."

The N.Z. National Commission for UNESCO has recently announced the publication of the 2nd Edition of the UNESCO Handbook of International Exchanges. This is intended as a reference book for all those interested in international exchange programmes between different countries and regions in the fields of education, science, culture and mass communication. Enquiries for the Handbook may be made through the Government bookshops in Auckland, Hamilton, Wellington, Christchurch and Dunedin.

- D.G.J.

DEUXIÈME COLLOQUE INTERNATIONAL DU JURASSIQUE

15 July - 29 July

by G. R. Stevens
New Zealand Geological Survey

Eighty-five people attended the Colloquium from the following countries:

Algeria (1), Argentina (1), Belgium (2), Canada (2), Czechoslovakia (2), France (28), Germany (11), Hungary (1), Israel (3), Italy (4), Luxembourg (2), Morocco (1), The Netherlands (2), New Zealand (1), Poland (2), Rumania (1), Switzerland (1), United Kingdom (8), U.S.A. (3), U.S.S.R. (9).

The Colloquium was fully representative and with only one or two exceptions, all the "big names" in Jurassic stratigraphy and palaeontology were present. The small size of the Colloquium meant that there was opportunity to meet and talk to every member. This aspect of the Colloquium - the personal contacts made - was perhaps the most valuable.

The Colloquium took the form of two sessions, one held in Luxembourg and one in Nancy. The Luxembourg programme consisted of four working sessions (held in the meeting chamber of the E.E.C.) and four excursions out into the Grand-Duchy and into neighbouring Lorraine and S. Belgium. The Nancy programme consisted entirely of excursions to Jurassic localities in Lorraine.

The working sessions were extremely busy. Some 70 papers were submitted to the Colloquium and as well as discussing these, general problems were also examined, such as the Lower-Middle and Middle-Upper Jurassic boundaries, the Jurassic-Cretaceous boundary and international divisions for the Jurassic.

I presented two papers:

(i) "Biogeographic Changes in the Upper Jurassic of the South West Pacific"
(ii) "The Jurassic System in New Zealand"

The Colloquium made the following decisions:

1. The Aalenian stage is retained and the Lower-Middle Jurassic boundary is drawn between Aalenian and Bajocian.
2. The Middle-Upper Jurassic boundary is drawn between Callovian and Oxfordian.
3. The uppermost zone of the Kimmeridgian is recognised as the gravesia zone.

The question of the international divisions of the uppermost Jurassic and the Jurassic-Cretaceous boundary was deferred until 1970. By then European geologists will have had a chance to see the British Jurassic sequences (a field conference is to be organised in 1969 for this purpose) and the Tethyan Jurassic sequences (the Hungarian Geological Survey is to arrange a symposium on the Tethyan Jurassic in 1969 as part of its centennial celebrations). Many of the leading European Jurassic specialists attended a conference in Moscow in April 1967 which gave them the opportunity to see and discuss the divisions of the Russian Upper Jurassic. Therefore by 1970 people should be adequately prepared to discuss intelligently (I hope!!), the problems involved in correlating the Portlandian, Volgian and Tithonian and establishing the Jurassic-Cretaceous boundary. The 1970 meeting is proposed to be held in Zürich.

European politics were unfortunately allowed to dominate the discussions on boundary problems and international divisions. A lot of time was wasted by national groups setting out at great length why their particular usage should be adopted in preference to those of other countries. The French were particularly bad in this respect. Also, the Russians presented at great length a case for recognition of the Volgian as the international unit for the uppermost Jurassic.

Two meetings of the Jurassic Sub-Commission (Commission on Stratigraphy, I.U.G.S.) were held in Luxembourg and I attended these meetings as Australasian delegate. Amongst the proposals considered was one from UNESCO for a series of studies of stratotypes of the world.

The excursions were arranged to show participants the entire Jurassic column in this part of the world (Rhaetian/Hettangian boundary right through to the Portlandian/Neocomian boundary).

The Paris Basin is encircled to the east by a broad band of Jurassic. The Jurassic forms the northern border of the Aquitane Basin and then swings northwards in an arc across France, through Cote d'Or to the Ardennes. The Jurassic-Cretaceous boundary approximates to the eastern boundary of the Champagne region of France, at about the junction between the provinces of Marne and Meuse.

Against the Palaeozoic horsts of the Massif Central, Morvan, Vosges and Ardennes the various units of the Jurassic change facies or wedge out, overlapped by higher members or by the Cretaceous. The base of the Jurassic swings around parallel to the margins of these Palaeozoic horsts and in Eastern France coincides approximately with the boundary between Alsace and Lorraine.

For the most part the region is sparsely wooded and consists of a series of cuestas, reflecting the underlying stratigraphy. The chief cuesta-forming units are the Upper Hettangian (sandstones), Aalenian-Bajocian (ironstones), Upper Oxfordian (coralline oolites and limestones), Middle and Upper Kimmeridgian ("Calcaire du Barrois") and the Portlandian (sandy limestones). The only extensive lowland is the marshy Woevre plain, between Thionville and Verdun, where the Callovian and Upper Oxfordian are developed as in England and Normandy as "Oxford Clay".

The contact between the Hettangian and Rhaetian was seen on excursions N.E. of Luxembourg and south of Nancy.

The Moselle River, forming the eastern frontier of Luxembourg, is cut into the Triassic Muschelkalk and good exposures are present on both the Luxembourg and German side. Transitions from the Muschelkalk to Keuper and Keuper to Hettangian were seen in Southern Luxembourg.

The stratotype of the Hettangian was examined at Hettange Grande, in Lorraine, just south of the Maginot Line. The type section is exposed in a large quarry, now disused and somewhat overgrown. The section has two major defects:

(i) the base of the section is nowhere exposed;
(ii) contact with the overlying Sinemurian is disconformable.

Northwards from Hettange Grande the Hettangian thickens and coarsens and in Southern Luxembourg a thick sandstone, the Luxembourg Sandstone, is developed in the Upper Hettangian. In the neighbourhood of Luxembourg City the Luxembourg Sandstone forms a prominent surface, the Rham Plateau. The River Alzette, a tributary of the Moselle, has developed an incised course across the Rham Plateau and Luxembourg City is situated on the flanks of a prominent incised meander. There on the steep cliffs of the meander loop the heavily fortified castle, the "Bock", of the Counts of Luxembourg was built (963 AD). The fortress-capital became the pivot-point of Europe and was known as "The Gibraltar of the North". Because of this Luxembourg suffered repeated foreign occupations: Burgundy (1443-1506), Spain (1506-1684), France (1684-1697), Spain (1697-1714), Austria (1714-1794), France (1794-1815), Prussia (1815-1867).

Under the provisions of the Treaty of London, signed in 1867, the Bock Castle was dismantled (it took 16 years!) and Luxembourg adopted a policy of Neutrality. Luxembourg City grew up around the Bock Castle and spread along the Alzette and over the surrounding Rham Plateau.

The Luxemburgeois now regret the dismantling of the Bock Castle - it was the largest in

Europe and would have now made a marvellous tourist attraction. After all, they say, its dismantling didn't guarantee Luxembourg's neutrality in both World Wars!

Ironstones characterise the Aalenian and Bajocian of Southern Belgium, Southern Luxembourg, and Northern Lorraine. Exploitation of these ironstones has led to the establishment of steel works at Esch-sur-Alzette (Luxembourg), Musson (Belgium), and Longwy (Lorraine). Similar beds occuring in Northamptonshire and Lincolnshire form the basis of the steel industry in that part of England.

The ironstones, both in the Luxembourg region and in England, were derived from a deeply weathered and probably lateritized, Palaeozoic landmass (the "Anglo-Belgic Island" of Wills; the "London-Brabant Massif" of Van der Gracht and Kent), extending in Jurassic times over much of present-day Belgium and on to Southern England. Because of their economic importance, the Aalenian and Bajocian sequences in the Luxembourg region have been intensively studied. Also, the extensive open cast mining operations have provided many first class exposures. Visits to various quarries in the neighbourhood of Esch-sur-Alzette, Musson and Longwy were included in the four excursions from Luxembourg.

The Callovian and Lower Oxfordian, developed as "Oxford Clay", were examined in the Woevre Plain, between Verdun and Thionville.

The Upper Oxfordian is characterised by the development of coralline limestones, and these form prominent cuestas, particularly flanking the Meuse Valley. Many quarries have been opened up along the cuesta faces and these supply building stone, cement, and fluxing materials for the steel works at Longwy, Musson and Esch-sur-Alzette. A number of these quarries were visited.

Kimmeridgian limestones and Portlandian sandy limestones form prominent cuestas in the Marne Valley. The junction between Portlandian and Neocomian was examined in road cuttings alongside the Paris-Nancy road.

The daily programme for the excursions was pretty strenuous. The usual day started at 8 a.m. and then at about 9 p.m. we arrived back at our hotels and would then have to change and go out for a meal. The one factor that contributed to the undue length of the working day was the custom of the elaborate Continental luncheon. On each excursion day we had either a banquet, provided by a municipality or local company, or a pre-arranged luncheon at an inn or restaurant. These functions usually took up most of the afternoon (1.30 p.m.-4.30 p.m.) At the receptions there were speeches before and after the banquet, and champagne was freely available. At both the receptions and luncheons 5-6 courses and 2 or 3 table wines were served. Needless to say, it was an effort to get back to the geology!

Before and after the Colloquium I paid visits to geological surveys and museums in Greece, United Kingdom, U.S.S.R., Pakistan, India and Thailand, for the purpose of examining Mesozoic fossil collections.

THE POWER OF ADVERTISING?

"The Circum-Pacific Mobil Belt....."

(Stage I paper)

- M.G.

GEOLOGICAL SURVEY CONFERENCE, 1968

The next conference of the N.Z. Geological Survey is planned to be held in Blenheim during April 1968. The following letter concerning the Conference has been sent to the President of the Geological Society from the Director, Geological Survey:

N.Z. Geological Survey,
P.O. Box 30-368,
Lower Hutt

30 August, 1967

Mr N. de B. Hornibrook,
President, Geological Society of New Zealand,
P.O. Box 30-368,
Lower Hutt

Dear Mr Hornibrook,

The Geological Survey Conference has been an annual event of considerable importance to the Survey itself. The Conference allowed the whole staff to get together and to discuss scientific and administrative problems freely for a week, and was a most useful method of in-service training, both for young geologists in their scientific work and also for everyone in the art of public speaking and paper presentation. The Conference was particularly valuable to new recruits in that they could talk freely once a year to every senior member of the Survey, whose work they might otherwise know only through their reading.

In the early days the small Survey numbers made it possible to choose centres throughout New Zealand such that all staff became familiar with the geology of the whole country. Over recent years, the Geological Society has attended most Survey Conferences, and this has brought new benefits to the Survey in giving its staff a wider appreciation of many aspects of geology and allowing them invaluable discussions with geologists other than those employed by Government. However, this has been to some extent at the expense of both in-service training of young geologists and of our being able to visit small centres that are suitably placed for seeing the geology of all areas.

Because of these latter points, and after discussions with senior members of Geological Survey, I have decided that the 1968 Conference of Geological Survey, at least, should be held in a small centre, actually Blenheim, with a minimum of invitations to non-Survey staff. This will ensure that the original reasons for holding Survey Conferences are fully upheld, but will inevitably mean that the traditional invitation to Geological Society members cannot be issued.

I have not made this decision lightly, because I am sure that all Geological Survey staff have gained from the participation of the Society in the past. I have been greatly influenced, however, by the overwhelming success of the Society's Conference that was held this year in Hamilton. It was clearly shown that the Society is able to run a successful and stimulating Conference, and I therefore feel that I can safely leave the organisation of its Conferences to the Society itself.

I hope to see the excellent relationships between the Survey and the Society continue in the future, and I intend to do everything I can to assist the Society in its aims and objects.

Yours sincerely,

(Sgd.) David Kear
Director

NOTES FROM GEOLOGY DEPARTMENT, UNIVERSITY OF AUCKLAND

Staff:

Dr P. F. Ballance, who spent 1966 in the U.K. mostly in the new university at Keele working on sedimentational problems, arrived back in mid-February.

Professor R. N. Brothers left early in the year for sabbatical leave in the U.S.A. After travelling across the U.S. visiting many university departments, he arrived at Berkeley in mid-April and returns to N.Z. from there in mid-December.

Professor A. R. Lillie left in August for the University of Grenoble, France, via the U.K., and will return next May.

Mr K. A. Rodgers, junior lecturer since 1964, becomes the new lecturer in geochemistry, and this side of our work has been further expanded by the installation of an ultra-violet and an atomic absorption spectrophotometer.

Another junior lecturer, Mr M. R. Gregory, left at the end of 1966 for Dalhousie University, Nova Scotia, to undertake doctoral work in oceanography.

Petrology curator, Miss Philippa Black, having completed her doctoral study of Cuvier Island, left last September for two years post-doctoral work in the U.S. financed by a Fellowship from the Federation of University Women. Dr Black will spend a year at Harvard and another with the U.S. Geological Survey. Her place as Curator has been filled by one of the current M.Sc. students, Mr R. H. A. Cochrane.

Students:

Around the beginning of the year, 8 students completed Masters theses and most have gone overseas to study for Ph.D.

Mr B. G. Jones (whose Master's study was the stratigraphy and paleoecology of the classical Waitemata area of Pakaurangi Pt) took up an Australian National University scholarship in late February and has now done much of his field work for a sedimentological and stratigraphic study of mid-Paleozoic rocks near Alice Springs.

Mr K. R. Martin (stratigraphy of the Te Maika-Albatross Pt area, Kawhia) has been appointed Demonstrator at the University of Queensland and will study recent sediments in Moreton Bay.

Mr J. C. Hopkins, after a spell with the Ministry of Works testing laboratory, Auckland, where he was working on the petrology and weathering of "greywackes", left in August for the University of New Brunswick.

Three graduates have joined the doctoral school of the University of British Columbia: Messrs L. Carter (geology of Puketotara Peninsula, Kaipara - mainly an area of Waitemata sediments), P. C. Lecouteur (geology of the area on the north of Whangaroa Harbour), and C.H. Pharo (Mesozoic and Tertiary stratigraphy of some islands in the Baie de St Vincent, New Caledonia). N.Z.'s influence with the U.B.C. geology department should be quite strong, with 3 Aucklanders in a post-grad. school of 12-14.

Mr J. D. Elliot (geology of the coastal region N.E. of Whangarei) in August joined the staff of International Nickel Southern Exploration Ltd, in Kalgoorlie, W.A.

Three students who had been mapping in the Coromandel Peninsula have remained in N.Z. jobs. Mr C. H. Harvey (volcanics and derived clays in the Whitianga-Tairua area) has joined the Amalgamated Brick and Pipe Co., Auckland, and is currently in the U.S. studying clay mineralogy; Mr W. L. Cornwell (basement and volcanics near Tapu) is in charge of the materials testing

lab of the Ministry of Works in Auckland; and Mr D. N. B. Skinner has completed his Ph.D (economic geology in the Coromandel region) and is stationed in the Otara office of the Geological Surwey.

Student numbers this year jumped again, maintaining the trends of recent years and necessitating alterations in junior laboratories and an increase in the number of lab streams. Enrolments were as follows: Stage I - 180 (153 in 1966); Stage II - 32 (24); Stage III - 18 (13); M.Sc. 17 (16), of whom 8 (6) are first-year post-graduates.

Increase in staff and student numbers over the last 2 years, plus the establishment this year of a sedimentational and micropal. lab, have so strained the capacity of the building we occupy (built only 8 years ago!) that now all M.Sc students and two junior staff have rooms in 3 old houses (one actually a converted stable) a considerable distance away. Rock collections are largely in a fourth building.

B.Sc (Hons):

The Science Faculty here has now made the necessary course alterations to enable this degree to be undertaken. In line with this our previous Stage III A and B courses, with 4 papers, have been altered and 5 papers have been offered this year (General and Structural Geology; Stratigraphy and Sedimentation; Igneous and Metamorphic Petrology; Palenontology; Economic and Engineering Geology and Mineragraphy), this constituting the 3rd year course for B.Sc. (Hons). The 4th year will consist of 3 papers and a thesis, and this will allow entry to a Ph.D. school the following year, thus by-passing M.Sc. The bulk of students will continue to go through the ordinary B.Sc., to M.Sc. and Ph.D., and this year only one of the 3rd-year students was allowed entry into the B.Sc.(Hons) school. The ordinary B.Sc. student will do 4 of the 5 3rd-year courses, with the general course compulsory.

Visitors:

Mr Peter Wood arrived from the University of Leeds early in the year and has used the department as a base for a geochemical study of Cook Island basalts; he returns early next year.

Other overseas geologists have passed through on briefer visits. Dr Don Squires, Smithsonian Institution, spent a few days re-examining coral collections and left for Australia after making his usual stimulating impact; Dr Robert Dietz, U.S. Coast and Geodetic Survey, gave two talks on geotectonics and meteorite-impact structures; Professor Jack Lerbekmo (University of Alberta), Dr Brian Mason (Smithsonian Institution), and Dr Hermann Jaeger (graptolite worker, Humboldt University, Berlin) each spent a couple of days here on their way between Australia and North America; and Professor I. C. S. Carmichael, Berkeley, arrived and went off with Kerry Rodgers, Peter Wood and others to collect tuhualite on Mayor Island - very successfully, we are told.

J. A. Grant-Mackie

NOTES FROM THE GEOLOGY DEPARTMENT, UNIVERSITY OF OTAGO

Dr Z. P. Bowen, Associate-Professor of Geological Sciences, University of Rochester, arrived in New Zealand in April on a National Science Foundation Fellowship. He is jointly stationed in the Geology Department and at Portobello Marine Biological Station. His interest is primarily in ecology of living brachiopods of the New Zealand region but he has also begun a revision of the systematics of some Tertiary groups. His published research is mostly in the field of mid-Palaeozoic palaeontology but he has had experience in recent marine ecology off Puerto Rico. Dr Bowen will be in New Zealand until April, 1968.

Yosuke Kawachi, holder of a Japanese Government Fellowship, has begun work on metamorphic rocks in the area between Mt Earnslaw and the Hollyford River, West Otago. He will spend

3 years at Otago, the later 2 with support from the Nuffield Foundation. Mr Kawachi has worked for a number of years for the Geological Survey of Japan as Petrologist. He is an experienced climber.

Eric and Lucy Force, graduate students from Lehigh University, Bethlehem, Pennsylvania, have arrived to work on New Zealand geosyncline projects for Ph.D degrees. Lucy is studying carbonate production during the Permian, especially in the Atomodesma limestones. Eric is making a detailed comparison of Alpine and Hokonui sequences of rocks of Kaihikuan age.

Recent visitors to the Geology Department included:-

Dr S. Banno, University of Tokyo, who paid a one-week visit to Otago. During his stay he discussed some problems and current research in metamorphic petrology. He visited areas of low-grade metamorphism in Otago, Southland and Fiordland with members of the Geology Department.

Professor O.M.B. Bulman spent the last part of his New Zealand stay here. Within a short time of his arrival he set about examining the N.Z. graptolite collections in the Department and in the Otago Museum. He gave three memorably stimulating lectures on graptolite evolution and an outstanding public lecture on early Palaeozoic life.

Dr Robert Dietz lectured on aspects of geology relating to continental drift, geosynclines and astroblemes. A field trip was arranged for Dr Dietz to see rocks and structures of the New Zealand Geosyncline in the southern South Island.

Dr Richard Young, New York State University at Genesseo, discussed some recent advances in Lunar photography and geology.

Dr Hermann Jaeger, Humboldt University, East Berlin, spent two days in the Department examining graptolite collections.

Dunedin section, Geological Society of New Zealand:

The Dunedin Section of the Geological Society met regularly during the 1967 Academic Year. The programme for the year included the following:-

R. J. Ryburn - The Geology of the Upper Beardmore Glacier area, Antarctica.

W. A. Hodgson - Metastable carbonates and concretionary rocks.

I. C. McKellar and B. L. Wood - Discussion of new geological maps: Sheets 24 and 25 Dunedin and Invercargill.

S. Banno (University of Tokyo) - Sanbagawa Metamorphic Belt of Japan.

J. Aronson (California Institute of Technology) - Geochronology of New Zealand Metamorphic and Plutonic Rocks.

D. G. Bishop - The geometric relationships of certain structural features associated with major strike-slip faults in New Zealand.

Z. P. Bowen (University of Rochester) - Paleoenvironmental study of the Upper Devonian Sonyea Group, New York State.

J. L. Talbot (University of Adelaide) - Interaction of basement and Adelaide System rocks during Paleozoic orogeny.

A. F. Cooper - Wales and the Welsh borderlands during Lower Paleozoic time.

R. S. Dietz - Astroblemes.

Geology Department, University of Otago - Reports on Third Year student projects.

J. H. Lowery - Mineragraphy of the Waitahuna River copper ore body.

C. A. Landis - Metamorphism of Upper Permian Rocks of the South Island.

Mrs J. K. Campbell - The Alpine and Akatore Faults: a comparative study of Pleistocene chronology and Kaikoura orogenesis in southwest Nelson and southeast Otago.

L. Harvey - A look at deep drilling.

P. N. Webb - The Cretaceous-Tertiary Boundary in Dunedin district.

- J. D. C.

NOTES FROM THE GEOLOGY DEPARTMENT, UNIVERSITY OF CANTERBURY

There have been no staff changes since the last set of notes published in October, 1966, (Newsletter 21).

Antarctica:

1966-67 - Mr Simon Nathan, Mr Bruce Riddolls and Mr Frank Schulte were appointed to the N.Z. Antarctic Research Programme. Professor Gage paid a brief visit to the dry valleys area.

1967-68 - Mr John A. S. Dow has joined the N.Z.A.R.P. and is working in the Lower Renwick Glacier area, Northern Victoria Land.

Student Departures:

Mr Frank Schulte returned to the Geology Department, University of North Dakota, in July 1967, after completing his M.Sc. fieldwork on the geomorphology of the Cass River area.

Mr H.S. Gair completed his Ph.D. project and left on November 12, 1967, to join the Utah Development Company at Melbourne. It is believed that he will be working near Roebourne, Western Australia.

Mr Bruce Riddolls left in July 1967 to take up a research post on the staff of the Geology Department, University of Exeter: he will undertake a research project involving 1 mile mapping in the Exeter area.

Mr Mauri McSaveney has an assistantship at Ohio State University to study a Ph.D. in Glaciology. He spent 2 months on the Sherman Glacier, Alaska, with the Institute of Polar Studies in July-August 1967.

Dr Geritt Neef was appointed lecturer in Geology at the University of New South Wales, Broken Hill Division, and took up the post in July 1967.

Research Students:

Ph.D. Miss Alexa Cameron is continuing her work on the microfaunas of the Eocene Bortonian Stage.

Mr Martin J. Carr is studying the late Pleistocene geology of North Canterbury coastal region.

M.Sc. Mr C. O'Loughlin is studying the geomorphology and hydrology of the Avoca River area.

Visitors to the Department

Professor O.M.B. Bulman (Cambridge), Dr R. Dietz (Institute of Oceanography, Maryland), Dr C. Wahrhaftig (Berkeley, California), Dr J. Aronson (California), Professor A. F. Richards (Illinois), Mr Tas McKee (Nelson), Mr R. C. Sprigg (Adelaide), and Dr Richard Young (State College of New York at Geneseo).

* * *

We always end the academic year with a few laughs from Stage I howlers:-

These were the Ordovician rocks in whales.

Of course a lithographic understanding is first necessary.....

An organism, flagella, was also believed to exist, but is and was still in doubt in the palaeontologists minds.

- D.G.J.

GEOLOGY DEPARTMENT, VICTORIA UNIVERSITY OF WELLINGTON

Petrology and vulcanology: Miss Nancy Cozad is an astrogeologist from the University of Arizona who arrived out early in the year on a Fulbright Scholarship. She has been investigating lateral changes in the Whakamaru Ignimbrite. We were extremely fortunate to have from her a particularly well prepared and informative outline of recent progress on lunar geology.

Andy Duncan, from the University of Capetown, has made good progress on his study of Bay of Plenty volcanoes, and has gone to Canberra for several months to do some necessary geochemistry. He has a short paper in press on the petrology of some sea mounts in the Bay of Plenty. Professor Clark and Professor Wellman have both visited White Island with Mr Duncan several times during its recent eruption and have made two successive surveys of the crater floor to detect changes in levels.

Dr Jim Cole who previously worked here on the petrology and geological history of Mount Tarawera, and in Antarctica with Tony Ewart on McMurdo Sound volcanics, has been appointed to a lectureship, replacing Dr E. Ghent, and is expected to arrive back in N.Z. early next year.

Paleontology, sedimentology, oceanography: Bob Henderson completed his work on Cretaceous ammonites early in the year, and is now at the Museum of Comparative Zoology, Harvard, intending to work under Dr H. B. Fell on New Zealand fossil echinoderms. Alan Beu (Tertiary and Recent Cymatiids) and Bill Briggs are both at the writing-up stage. Keith Lewis of the N.Z. Oceanographic Institute recently commenced working in the Department for a Ph.D. on sedimentation and distribution of foraminifera (living and dead) on the sea floor off Castlepoint.

Now working in the department as paleontology technician is Stephen Eagar, already well known to the ostracode world as the author of several publications in English and European journals.

Roger Cooper continues to make good progress on the Ordovician graptolites, working out the relationship of the Aorere and Mount Arthur successions. He has been extremely lucky in the visits of three graptolite specialists, including Professor Bulman, to New Zealand during this year. Meanwhile Tony Wright, with the assistance of Duncan Wilkinson, has discovered quite rich Conodont faunas in the Ordovician (and possibly Silurian) at a number of places in North-West Nelson, and is very hopeful of using them for overseas correlations.

Geological mapping: Mike Johnston is making excellent progress in the Tinui-Castlepoint district, Wairarapa. Perhaps the most interesting development from his work so far is the recognition of the Coverian Stage with its typical ammonites identified by Bob Henderson, and also its typical Inoceramus species. Peter Wellman has gone to A.N.U. Canberra to work on paleomagnetism of Australian rocks, but before leaving he assembled the existing data on the Ngahape area, central Wairarapa, including a good deal of his own field observations, and produced a geological map and description for publication. In August the student Geological Society spent a week working in the largely unmapped area between Ngahape and Tinui. When Mike Johnston finishes his job the geology of the East Coast Ranges will be fairly well known from Pahaoa River to Mataikona.

T. E. Bates, now at Mt Isa, Queensland, recently completed mapping the northern end of the Aorangi Range, his most significant discovery being lower Cretaceous fossils (including Maccoyella), identified by Ian Speden, in the so-called "low rank greywackes" of Wellman and Brodie.

Pedology and Quaternary Geology: Colin Vucetich now has viable and well attended undergraduate and honours courses in Pedology, with good laboratory facilities. At the same time he manages to keep up his research in volcanic ash chronology. Under him Derek Milne is working for Ph.D. on the late Quaternary history of the Rangitikei Basin. Worth mention here is a study of two ash deposits and their relation to red weathering made at Tawa and presented as a B.Sc. honours project by M. Turbott.

Oxygen Isotope studies: Ian Devereux, working between the University and Nuclear Sciences Institute, has produced a curve of temperature changes in New Zealand during the Tertiary which will appear in the New Zealand Journal of Science in January. Mr Devereux would be the first to agree that more detailed work is needed, and his curve may be modified in the future, but already he has brought new perspective to paleotemperature studies, as was amply shown by the highly successful paleotemperature conference which he organised at Wellington last August.

At present he is using the oxygen isotope technique to investigate metamorphism temperatures in the Otago Schist and is obtaining interesting results. For the immediate future an examination of isotopic temperatures in Plio-Pleistocene sections, and of sinistrally and dextrally coiled Globigerina pachyderma is projected.

- P.V.

ANNUAL GENERAL MEETING, 1968

It is probable that the next Annual General Meeting will be held sometime in May of next year, in Wellington. A full day meeting is envisaged, and a formal notice will be sent out later to members. At the meeting consideration will be given to the possibility of the Society's annual subscription being increased.

MUSEUM GEOLOGIST ABROAD

by D.R. Gregg

When I left the Geological Survey in 1964 and joined the Canterbury Museum I obviously had an interest in museums but I had no training in museum work (I hesitate to use the word museology). Between March and September 1967 I spent five months looking at museums and talking with museum people and feel that I have now served my apprenticeship. In my travels I visited the rather incredible total of 150 institutions and to do this I was on the move most of the time; so much so that I have calculated that I slept in 45 different beds. I took 1,300 colour slides.

Few museums make a serious attempt to present geology as an integrated subject. Many have impressive halls of fossils and minerals but other aspects of geology are neglected. Two of the largest museums, the Natural History Museum of the Smithsonian Institution and the American Museum of Natural History, are only now preparing halls dealing more generally with geology although they have had mineral and fossil halls for many years.

Existing displays on geology range widely from the laboured, text-book approach of Chicago's Field Museum to the light-hearted, random displays at the Hancock Museum, Newcastle upon Tyne (see Curator 7: 39-50, 1964). These latter displays, housed in shallow wall cases lining a cramped gallery, are arranged in alphabetical order of subjects. Each display is self-contained and unrelated to its neighbours, and this deliberately random arrangement was the most stimulating approach to geology I saw.

During my tour I visited many of the most famous natural history museums, but it soon became clear to me that the museums which showed a liveliness and brilliance in display were often the smaller ones. In large institutions the minute detail in which every stage of a display has to be planned well in advance stifles spontaneity. Most English provincial museums I visited were lively places often with a high standard of design in displays, publications and furnishings. This elegance of design was due to the employment of young and vigorous designers with professional qualifications.

I saw a great variety of geology on my tour, but my outstanding memory is of the Grand Canyon. I arrived there by plane about the same time as a snow storm and first saw the Canyon partly masked by dark and threatening clouds. The huge gorge looked strangely unreal (rather like a museum diorama) and it was not till a mule took me 3,500 feet down into the Canyon that I realised its tremendous size. The simple geology with its easily recognised formations, and the rapid ecological change from pine forest on the rim down to desert in the Canyon, make it an ideal National Park. Also in Arizona, I made a somewhat sentimental journey to Meteor Crater where the Canterbury Museum's 1074 lb Canyon Diablo meteorite was found in the 1890s.

On Easter Saturday I visited the famous Almaden-Cienega winery, near Hollister, south of San Francisco, where buildings, built astride the San Andreas Fault in the 1940s, are slowly being torn apart by creep on the fault.

In June I spent a delightful week in Ireland and by hiring a rental car was able to see the beautiful, if damp, countryside and spectacular coastal geology of County Clare.

I saw many geologists with New Zealand connections, including:

Dick Blank, U.S.G.S., Menlo Park (Victoria University, 1959-61);
Helen Foster, U.S.G.S., Menlo Park (visited N.Z. from Japan 1955);
Bob Norris, University of California, Santa Barbara (N.Z. Oceanographic Institute, 1962);
Jim Kennett, University of Southern California, Los Angeles, (Victoria University);
Ross Taylor, University of California, San Diego (Australian National University);
Bill Breed, Museum of Northern Arizona, Flagstaff (University of Canterbury, 1957-8);

Bill Powers, North-western University, Evanston (N.Z.G.S., Christchurch, 1961);
Elmer Nelson, Milwaukee Public Museum (visited New Zealand 1955);
Bill Parsons, Wayne State University, Detroit (N.Z.G.S., Papatoetoe; University of Canterbury, 1965-6);
Helen McCammon, University of Pittsburgh (visited New Zealand 1966-67);
Don Squires and Brian Mason, Smithsonian Institution, Washington;
Derek Batchelor and Geoff. Norris, University of Toronto (N.Z.G.S.);
Edwin Colbert, American Museum of Natural History, New York (visited New Zealand 1964);
Bert Quennell, temporarily at United Nations, New York;
Hugh Battey, University of Newcastle upon Tyne (N.Z.G.S. and Auckland Museum);
Douglas Hamilton, University of Bristol (Universities of Canterbury and Otago);
Michael Frost, British Museum (Natural History) (University of Canterbury);
Tony Collins, Commonwealth Geological Liaison Officer, London;
Geoff. Shaw, Western Australian Museum, Perth (N.Z.G.S. and Dominion Museum);
David Brown and Ross Taylor, Australian National University, Canberra.

Most of these people told me to give their best wishes to New Zealand friends.

My tour was financed by travel grants from the Winston Churchill Memorial Trust, the Art Galleries and Museums Association of New Zealand, and the Canterbury Museum Trust Board.

AN EARLY ATTEMPT TO CONSERVE GEOLOGICAL FEATURES

In recent years the Geological Society of New Zealand has initiated approaches to the N.Z. Historic Places Trust and other authorities to conserve if possible such "geological monuments" as active fault traces, the Target Gully Shell Bed (Oamaru) and the unique suite of raised beaches between the Orongorongo River and Cape Turakirae.

An early advocate of the protection of geological features was the late B.C. Aston, chemist to the Department of Agriculture, and a keen amateur botanist. In his address as President of the New Zealand Institute in 1928, Aston devoted a section to Preservation of Natural Monuments (Trans. N.Z. Inst. 59: 29), and mentioned the Waikawa Bay fossil forest, the Moeraki Boulders, the Sandymount basaltic pillars, the lava fields and volcanic cones of Auckland City, and the "truly wonderful raised beaches at Turakirae".

- C.A.F.

From an exam. paper:

> Turbidity currents have been recognised in Lake Mead where high specific gravity waters burrowed underneath and travelled accross the lake underground.

REVIEWS

SHEET 3, AUCKLAND

GEOLOGICAL MAP OF NEW ZEALAND 1:250,000

It has long been recognised that the main non-volcanic topographic elements in the Auckland district are horst and graben, produced during the Kaikoura Orogeny. Mr J. C. Schofield's compilation of Sheet 3, which recently made an overdue, but nonetheless welcome, appearance, is the first relatively detailed map of the whole region to be published, and hence this is the first occasion on which the major faults have been shown, in their entirety, in anything other than a very generalised form. The resulting map is therefore of especial interest to Auckland geologists, and the eye instinctively dwells first, and longest, on the faults. Mr Schofield has been bold and imaginative in their portrayal, and has thus given us much food for thought.

Three aspects of the faults invite comment. Firstly, all the faults shown in the cross sections are depicted as reversed, which was a surprise. The basis for this interpretation is the finding at three widely separated localities, one on each of the principal NNW-SSE faults, of exposures of associated shear planes and crush zones - not the fault planes - which dip beneath the adjacent horst. It is not made clear in the text to what extent Mr Schofield believes the other faults to be reversed, as he only discusses the three specific examples, but from the portrayal of all the faults in the cross sections as reversed the amateur geologist and student could be excused for assuming that all the faults on the map are thought to be reversed. In fact, the only two exposures of actual fault planes that have been reported are both apparently normal (a branch of the Waikato Fault - not the main Waikato Fault as Sheet 3, following B.H. Purser, would have us believe, because the throw is too small - exposed at Waikato South Head, and the Wairoa Fault described by A. D. Mead at the junction of Cossey's Creek and Wairoa River). The Motutapu Fault, linked by Mr Schofield with the allegedly reversed Drury Fault, was described in a thesis by W. Mayer as very steeply dipping and apparently normal. Thus my feeling about the major faults of the district is that they are more or less vertical and normal, and that the exposures of associated shears etc. showing an apparently reversed movement should be explained as the result of undulations on near-vertical fault planes. It should be pointed that in showing as reversed two NE trending faults on cross section D-E, Mr Schofield appears to be contradicting his assertion in the text that the NE-SW crustal compression, indicated by the reversed movement on the major NW trending faults, is supported by the NEerly trend of the majority of the dilational quartz and mineral lodes in Coromandel.

The second point concerns the ways in which Mr Schofield has linked the various faults across ground where they are concealed. On Sheet 4, to the south, D. Kear maps a major fault, the Waipa Fault, which at the present day separates the "Hokonui Facies" of the Mesozoic strata from the "marginal facies". He interprets this fault as the expression of the Triassic and Jurassic continental slope (Economic Geology of the Waikato, Earth Science Journal, 1967, fig.2). The northwards continuation of the Waipa Fault onto Sheet 3 is shown as the Wairoa Fault, which in its exposed portion in the Hunua Ranges is a subsidiary fault separating two blocks of "axial facies" Mesozoic rocks. The Drury Fault, on the other hand, occupies the same position relative to the palaeogeography as does the Waipa Fault to the south, and hence, my feeling would have been to join these two faults, by way of a concealed fault running from Lake Waikare through Meremere and Pokeno. The southern extension of the Wairoa Fault as far as Lake Waikare is clearly necessary, as shown on Sheet 3, and hence on my hypothesis it would branch off from the Waipa-Drury Fault in Lake Waikare. This is highly speculative, but it is relevant to the situation northwards from the Hunua Ranges, where Mr Schofield infers a 20-mile concealed extension of the Drury Fault to join the pre-Tertiary Motutapu Fault on Motutapu Island. The Motutapu Fault, like the Wairoa Fault, separates two blocks of "axial facies" greywackes and argillites, and in fact the two lie more or less in line, with the Clevedon-Waikopua Fault forming part of the same line. It would seem more logical, therefore, (if these long-distance extensions of faults are justified) to have linked the Motutapu Fault with the Clevedon-Waikopua Fault and the Wairoa Fault, and to have taken the Drury

Fault farther to the west, perhaps below the Pleistocene volcanoes of Pigeon Mountain and Rangitoto Island, or alternatively of East Tamaki, Glendowie, St Heliers and Rangitoto.

An interesting consequence of the mapping of concealed connections between exposed portions of faults is the emphasis thus placed on the occurrence of major fault movements, either during the Rangitata Orogeny or in subsequent pre-Pareora movements. Mr Schofield is known to regard some of the fault-line scarps as pre-Tertiary scarps, covered by the Waitemata Group, and subsequently re-exhumed without further movement. Evidence for pre-Landon strike faulting, in the Hokonui strata at Port Waikato, has been found recently during student mapping exercises.

The third point about faults is that some of the important ones are not shown. Those that one misses immediately are the Manukau Fault, which is always invoked to explain the abrupt southern termination of the Waitakere Hills, and the Papakura-Clevedon and Clevedon-Lower Wairoa Faults of C.W. Firth. North of Auckland the Rewiti-Huapai-Riverhead and the Greenhithe-Kauri Point Faults of R.H. Clark's thesis, although unpublished, make good topographic sense, and one would have liked to see them included. One can appreciate Mr Schofield's desire to keep the map uncluttered, and in the case of the Manukau Fault one can sympathise with him in the dilemma of deciding exactly where to put it, but on the other hand what does one say to the discerning first year student who, on being told that the Papakura-Clevedon valley is a fault-angle depression, observes that there is no fault on the map?

This long discussion of faults is an indication of the stimulus that Mr Schofield's compilation of the Auckland sheet has already given, and will continue to give for some time, to Auckland geologists. We may not agree with all of his interpretations, but he makes us think about our own pre-conceptions and unwitting assumptions, and this is a valuable service. There is no room here for an extended appraisal of all the aspects of the map, and in any case there are large areas that I am not familiar with. I would like to raise one point concerning the stratigraphy of the Waitemata Group. In the legend, the Manukau Breccia is shown to overlie the Waitemata beds, and in discussing the point in the text Mr Schofield refers to R.N. Brothers' description of lateral interdigitations of Manukau Breccia and Waitemata beds in the northern Waitakere Hills as "at present lacking support." Being descriptions of exposures, it is not clear in what way Brothers' work needs supporting, but it is worth recording that the impression of lateral equivalence of at least part of the Manukau Breccia with the Waitemata beds is being continually strengthened as more work is done to the north of Auckland. The section exposed on the north shore of the Manukau Harbour, which is a kind of type section of the contact between Waitemata beds and Manukau Breccia, therefore seems to be unusual in showing Manukau Breccia clearly overlying Waitemata sandstones, and even here it should be noted that there is andesitic material in the underlying sandstones. My plea, therefore, for future editions is an indication, in the legend, of the overlap in time between Manukau Breccia and Waitemata sandstone sedimentation.

A pleasing feature of the map is the portrayal of relatively simple large-scale structures in the greywackes and argillites of the Waiheke Group. One hopes that Mr Schofield's work will help to dispel the illusion, which tends to be created in students by their first glimpses of these heavily sheared and jointed rocks, that structural work on them is impossible.

Just as the influence of the late Professor W. N. Benson is felt in the four-mile maps of the Dunedin area, reviewed recently by Professor D. S. Coombs (Newsletter No. 23), so the work of the late Professor J. A. Bartrum is evident in the Auckland sheet. Of the Auckland University theses listed among the source material for this map, 11 were prepared under Bartrum's direct supervision, while the remaining 9 were largely supervised by Bartrum's students R. N. Brothers and E. J. Searle.

There are, unfortunately, a considerable number of printing errors on the map. The difficulty of proof reading through the complex printing operations has evidently been a source of trouble throughout the 4-mile mapping programme, and it is good to know that steps are being taken to improve the system. It should perhaps be pointed out here that the fault passing through Onerahi chaos breccia to the mouth of the Orewa River, which is marked as a

firm line, is intended to be a concealed fault, and that in the legend the Castlecliffian and Nukumaruan stages of the Wanganui Series should be embraced by the Pleistocene, not the Pliocene, bracket. The printing errors, however, are only minor blemishes on an otherwise admirable, useful and stimulating map.

- P. F. Ballance.

SHEET 12, WELLINGTON

GEOLOGICAL MAP OF NEW ZEALAND 1:250,000

The compilation of the geology of the Wellington region was a brave undertaking and few geologists could have done it better than Dr J.T. Kingma. Only sketchy information was available for the great area of Wellington Greywacke forming the western half of the region. The position was not much better for Wairarapa to the east. Relatively few published papers, and a number of M.Sc. theses of varying quality, gave a patchy covering with many gaps where the geology was unknown. Dr Kingma was able to spend only a limited amount of time in the field checking previous work and filling in gaps.

Inevitably therefore the map is inaccurate at many places, as is becoming apparent from recent geological field work. For example this year T.E. Bates mapped the Dry River Fault in the western part of the Aorangi Range as a major active transcurrent fault following a different line from that shown on Dr Kingma's map, emerging on the coast south of Putangirua Stream. Furthermore outliers of Pliocene strata were discovered by Bates on the eastern side of this fault in the Aorangi Range. Many other corrections could be mentioned which have been shown by field work carried out since the map went to press, but the one instance mentioned serves to illustrate the degree of inaccuracy of some parts of the map. Of course the compiler of the map is not to be blamed for this. His task, as he has clearly seen, was to make a coherent geological map from existing records, and he has succeeded in doing it. The errors are mentioned solely to warn people using the map not to accept all of it at face value.

One feature of the map's content deserves severer criticism. The extent of Holocene deposits shown in Wairarapa Valley and Hutt Valley is excessive. This is difficult to understand because the boundaries of these deposits are fairly easily mapped. A large part of the Waiohine Gravel in Wairarapa is shown as Holocene even though it had been attributed to the Pleistocene (Last Glaciation) in a previous publication.

Filling in gaps where geology is little known gives a compiler great scope for individuality of style, and here, as might be expected, the style is recognisably Dr Kingma's. It is legitimate to criticise this aspect of the map separately from its content. The mapping of three belts in the greywacke, successively decreasing in age to the east is controversial and provocative, especially as fairly definite ages have been attributed to each belt on very slim fossil evidence. I doubt that the rocks near Eketahuna containing Buchia can be correlated with those forming the eastern part of the main range. Furthermore the assertion in the map explanation that the flysch-type facies of the main range changes to a shelf facies towards the east is unwarranted. First it has not been shown that the strata said to represent the two facies are the same age, and secondly most strata below the Upper Cretaceous in the eastern part of the region are of flysch type; they contain much conglomerate but they mostly have the features of turbidites or fluxoturbidites.

The over-riding factor controlling the style of the map is the manner in which the faults are drawn. They are mostly shown as broadly arcuate discontinuous or intersecting features, essentially uniform in character. In fact the region contains at least two different ages of faults, and at least two and probably several different orders of faults. The first order faults are the active dextral faults of which the most important are the

Wellington, Wairarapa and Dry River faults. When traced on the ground these are normally straight or irregularly slightly sinuous and continuous for long distances. Lesser order faults have a different trend and meet them obliquely. Non-active old faults cutting the Cretaceous and early Tertiary rocks in the East Coast ranges tend to be very sinuous in an irregular though not necessarily unsystematic way. The map fails to show any of these differences between different kinds of faults, and the sweeping curves shown give a false impression of the structure.

The drawing of the map is such as to give an immediate impression of the general geological pattern. The three main groups of rocks (lower-middle Mesozoic; Cretaceous-early Tertiary; late Tertiary-Holocene) can be distinguished almost at a glance, and colour differences are distinct enough to allow the geological series divisions to be traced with ease. The map fits well on the bottom of the Dannevirke Sheet (Sheet 11), although there are some discrepancies in the colour shading. In spite of its errors the map is very useful as a first attempt to show the geology of the region on this or a larger scale, and it is received with much appreciation by professional, student, and amateur geologists.

- P.V.

The following comments on Professor Vella's review have been received from Dr Kingma:

"The points I would like to answer are mainly those dealing with the rocks near Eketahuna (para. 4 of the review). The Eketahuna greywackes contain Buchia and are therefore Upper Jurassic. The eastern part of the main ranges, south-west of Eketahuna, can be correlated with the Wakarara greywackes (see 1:250,000 sheet 11, Dannevirke) on spore evidence and the presence of Buchia. Hence the assumption is not difficult to make that the entire eastern flank of the greywackes, from Hawkes Bay in the north to Tirakirae Head in the south is Upper Jurassic. The facies is flysch over most of this area.

"The shelf facies farther east is Upper Jurassic on fossil evidence (presence of Buchia) and on the fact that it occurs in many localities immediately below Lower Cretaceous Taitai Series, the latter comprising sandy siltstone and sandstone with Inoceramus warakius. Thus at the same time that flysch was deposited in the area now occupied by the Eketahuna-Wakarara greywackes, massive siltstone and sandstone, admittedly with patchy flysch-like strata, were laid down farther east.

"Strata below the Upper Cretaceous in the eastern region are only sporadically of flysch type, and even then not true flysch. The flysch is almost entirely absent lower in the Cretaceous.

"I must protest against the assertion that the strata in the eastern region, admittedly containing much conglomerate, '.....mostly have the features of turbidites or fluxo-turbidites'. This is placing an unwarranted, extremely debatable, genetic origin on these deposits. The term turbidite should at all costs be avoided."

From an exam. paper:

> Much of our knowledge of the Graptolites is due to the work of that well-known authority Emma Biggs.

PERSONAL NOTES

The Society's congratulations are extended to Dr D. **KEAR** who was appointed Director of the N.Z. Geological Survey in August in succession to Dr R. W. Willett (see Newsletter 23). Dr Kear joined the Geological Survey from England in 1948 (he had previously visited New Zealand during the Second World War on H.M.N.Z.S. Achilles) and was at first in the Greymouth office before transferring to the Ngaruawahia office, where in particular he was engaged in mapping the Waikato coal-field. He later established the Auckland District Office of the Survey in its present buildings at Otahuhu, and from there, in 1965, moved to Lower Hutt to take charge of the newly instituted Economic Section. The best wishes of all in the Society are expressed to Dr Kear for his Directorship of the Survey.

Congratulations are also extended to Dr N. de B. **HORNIBROOK**, N. Z. Geological Survey, Lower Hutt, and currently President of the Society, who was recently awarded the degree of D.Sc. from Victoria University of Wellington.

Professor D. S. COOMBS, during his sabbatical leave from Otago, has taken up a visiting Professorship at Yale University. On his way there he attended the Kingston, Ontario, meeting of the Canadian and American Mineralogical Societies.

Dr P. BLATTNER recently joined the Petrology Section, N.Z. Geological Survey, Lower Hutt. A graduate of the University of Basel, Switzerland, he is particularly interested in rock chemistry. After graduating, he spent two years with the Canadian Geological Survey. He then worked for six months with the Chemistry Division, D.S.I.R., Lower Hutt, before joining the Geological Survey.

Recent departures overseas from the Geological Survey, Lower Hutt, and the Oceanographic Institute, Wellington, are those of Dr A. EWART, Dr K. R. GILL, Dr J. B. WATERHOUSE, Dr H. M. PANTIN and Mr C. P. SUMMERHAYES. From the Geology Department, Brisbane, where he has been appointed to a senior lectureship, Dr Ewart looks back nostalgically to Wellington's bracing climate. Dr Gill is now at the Grant Institute of Geology, Edinburgh University, where he is helping to set up a Geochemical Unit. Dr Waterhouse has returned to the University of Toronto. Dr Pantin is with the Institute of Geological Sciences (formerly U.K. Geological Survey) in Leeds and is working on recent sediments of the Humber estuary. Mr Summerhayes has been appointed to a lectureship at Imperial College, London.

Professor H. W. WELLMAN, Victoria University of Wellington, has just visited Paris briefly to attend a meeting of the UNESCO Neotectonic Map Committee.

Mr D. G. BISHOP is at present on leave from the Geological Survey and is doing post-graduate work for a Ph.D. in the Geology Department, Otago University, on an area around Dansey Pass, North Otago.

Professor J. BRADLEY, Victoria University of Wellington, attended the recent symposia on Gondwana stratigraphy and continental drift in Buenos Aires and Montevideo. Other New Zealanders present were Dr H. J. HARRINGTON (from Australia), Mr B. W. COLLINS (From London, representing Tanzania), and Dr J. B. WATERHOUSE (from Canada).

Dr J. ARONSON spent two months in New Zealand earlier in the year, collecting samples for radiometric dating. Because of his interest in the nature and extent of possible Precambrian source rocks in the region adjacent to eastern Australia and New Zealand, he spent two months in New Caledonia and a period in New Guinea before returning to California.

Mr R. G. ADAMSON is now with Conzinc-Rio Tinto of Australia and is at present working in North Auckland on mineral surveys for his company.

Mr M. R. JOHNSTON has recently joined the Geological Survey and will be stationed with the Wellington District Office, Lower Hutt.

SEISMOLOGICAL SOCIETY OF THE SOUTH-WEST PACIFIC

There is at present no society or journal that devotes its main attention to the earthquakes of South East Asia, Australasia, and Oceania, and seismologists, engineers, and others interested in the earthquake problems of this region receive little regular news of each others activities. An attempt is therefore being made to organise a society that will publish a regular News Sheet, and eventually, it is hoped, arrange meetings. The organising committee consists of Mr G. A. Eiby, Seismological Observatory, Wellington, New Zealand (Convener), Dr C. Charoen-Rajapark, Meteorological Department, Bangkok, M. Jacques Dubois, Centre ORSTOM, Noumea, and Dr J. P. Webb, University of Queensland.

Subscriptions ($NZ2.00) and inquiries should be sent to the Convener, Seismological Society of the South-West Pacific, P.O. Box 8005, Wellington, New Zealand.

ANZAAS, CHRISTCHURCH, JANUARY 1968

Registrations have now (6.12.67) passed 1,650 and are still coming in steadily. It appears likely that the geology section will have about 60 attending from Australia, and about 10 from further afield. Over 60 papers are set down for presentation to Section C, and there will be joint sessions with Zoology, Marine Geology and Oceanography, and Engineering. On the first evening, Dr Hornibrook will give his Presidential Address to the Geological Society of New Zealand, and we will then adjourn to a buffet supper with suitable refreshments at which the Society will be host to our overseas colleagues. There is every prospect of this function being one of the highlights of the Congress. - G.W.

NEW MEMBERS

The following new members have been elected since the last list was published in Newsletter 22 (April 1967):

Mr P. R. L. Browne, N.Z. Geological Survey, Lower Hutt
Dr P. Blattner, N.Z. Geological Survey, Lower Hutt
Mr R. F. Jeune, 33 North Street, Morrinsville
Mr B. Murrell, 91 Kelvin Parade, Wellington
Mr H. W. R. Maehl, 41a Captain Springs Road, Te Papapa, Auckland
Mr D. J. Mossman, Geology Department, University of Otago
Mr R. J. Cavaney, 151 Hill Street, Richmond
Mr J. D. Elliot, Akau, Bay of Islands, Northland
Mr Y. Kawachi, Geology Department, University of Otago
Mrs E. Tiller, N.Z. Geological Survey, Lower Hutt
Mr R. M. Briggs, Geology Department, University of Auckland
Mr G. C. H. Chaproniere, Geology Department, University of Auckland
Mr W. G. R. Gifford, Geology Department, University of Auckland
Mr C. P. Gulliver, 163 The Drive, Auckland
Mrs A. E. Young, Waitawheta, R.D.2, Waihi

At 30 November 1967, the Society had 328 members.