

BOOK NOTICES

Eiby, G. A.: EARTHQUAKES 207 pp.

London: Frederick Muller, 2nd edition. 1967. 30s (U.K.)

Seismology has made considerable advances since the "University of Coimbra pronounced that the sight of a few people ceremonially burned alive before a slowfire was an infallible prescription for preventing earthquakes". The University of Coimbra is now equipped with seismographs. This book gives a simple account of the effects, and as far as they are known, of the causes of earthquakes. It contains also discussions of prediction and earthquake zoning, building codes and accounts of individual earthquakes. It is a simple introduction to the subject, by an active geophysicist, which will be particularly valued in New Zealand.

Bailey, E. B.: JAMES HUTTON — THE FOUNDER OF MODERN GEOLOGY 161 pp.

London: Elsevier, 1967, 50s (U.K.)

The late author, a former Director of the Geological Survey of Great Britain has presented in one small volume the most valuable geological sections of James Hutton's 'Theory of the Earth'. In Playfair's 'Illustrations' most of the essential ideas have been available for a long time, but the original words of Hutton have not been reprinted, and for most geologists the effort of reading through the mingled geology and religious 'design in nature' has proved unrewarding. This book, equipped with biographical notes and a commentary on Hutton's most important ideas, is of more value than a reprint of the original 'Theory of the Earth' for Hutton's personal contribution is singled out from those of his contemporaries and predecessors so that it is possible to assess his enormous contribution to geology. As a bachelor of independent means he was able to give nearly all his life to geology, although he also wrote on chemistry and agriculture. His field excursions formed the basis for his work, but he also read widely and had such an engaging personality that he had a wide and talented circle of friends, several of whom were notable scientists. It becomes evident in reading this book that Hutton, rather than Lyell, was the great Uniformitarian and that many of his ideas have been verified only in the last fifty years. This book will be a valuable addition to any geologist's library.

Clayton, K.: EARTH'S CRUST 155 pp.

London: Aldus Books, 1966. \$A5.00 (Distributed in Australia by Tudor Distributors).

This book is a volume in the 'Modern Knowledge' series. It seems intended to give the lay reader an understanding of basic geological concepts and especially of modern advances in understanding the earth's crust. Hence it includes not only accounts of major structure, volcanism and erosion but also rock magnetism, continental drift and convection currents. The text of the book is brief as at least half the page space is occupied by figures. The figures include many which are in colour and a notable feature is the inclusion of many illustrations which are new and unusual. The book will be of value not only to the general reader but at the levels intermediate between school and university.

Hunt, C. B.: PHYSIOGRAPHY OF THE UNITED STATES 480 pp.

San Francisco: W. H. Freeman, 1967. \$U.S. 7.50

This book grew out of a course, offered at John Hopkins University, for students not majoring in one of the earth sciences. The aim of the course was to describe the physical geography, geology, climate, soils, vegetation, resources and related phenomena in the natural regions of the United States. The first part of the book gives accounts of the natural regions, geology, landforms, climates, water, superficial deposits and soils, erosion, plant and animal geography and natural resources of U.S.A., including Alaska, Hawaii and Puerto Rico. The second part of the book describes, in eleven chapters, the major regions and gives an account of their features using the headings already mentioned in the first part. A feature of the book is the large number of line drawings and extracts from topographic maps. These are so clear and numerous that there is no need for half-tones — the absence of which is an unusual feature. The author is obviously widely read and travelled and has been able to use his personal observations to bring his text to life. In an otherwise notable book the absence of a bibliography is regrettable.

Miller, V. C.: PHOTOGEOLOGY 247 pp.

New York: McGraw-Hill, 1961.

The major purpose of this book is to demonstrate by the use of numerous examples the importance of interpretation in photogeology. Qualitative analysis is demonstrated by examples of stereograms which show topographic, lithologic, structural and geomorphic features. Each example is accompanied by its own self-contained specific text and many of them have exercises attached to them. As an introduction and as a manual of geologic interpretation this is a valuable book. It has a useful format with a spiral wire binding which makes it easy to open it out flat so that a stereoscope can be used.

Wegener, Alfred (translated by Biram, J.): THE ORIGIN OF CONTINENTS AND OCEANS 246 pp.

New York: Dover, 1966. \$U.S.2.00 (paperback).

This new translation is from the fourth revised German edition of 1929, the last that Wegener produced. It includes a brief account of Alfred's life by his brother Kurt. Wegener originally set out to provide a solution to a number of ancient problems such as the existence of isolated life forms like lemurs in Madagascar and India, parallel structural formations in Africa and South America, and the location of pre-Pleistocene glaciations. Before his account these phenomena were explained by individual hypotheses such as diffusion across lost land bridges and polar shifts. His theory had the great merit of bringing together under one explanation numerous isolated features.

The original book of 1915 met with much argument and disagreement but in more recent years some of his ideas have become once more acceptable even though they may not be regarded as defensible in detail. A translation of Wegener's own last words, on the subject with which his name will always be linked, is to be welcomed.

Gutenberg, B. (Editor): INTERNAL CONSTITUTION OF THE EARTH 438 pp.

New York: Dover, 1951. \$U.S.3.25 (paperback).

This is the second edition of a work which first appeared in 1939. The contributors — Adams, Benioff, Daly, Darling, Gutenberg, Richter, Orstrand, Washington, Jeffreys, Lambert and Macelwane — are now mostly retired and the volume in spite of the revision is of greatest value as an historical document. The contents include accounts of the origin of the solar system, the nature of the earth's crust, the cooling of the earth, the nature of the earth's interior and a summary chapter.

Twenhofel, W. H.: TREATISE ON SEDIMENTATION 2 vols. 920 pp. New York: Dover, 1961. \$U.S.2.50 each vol. (paperbacks)

This is a republication of a work first published in 1932. The sources and production of sediments, transport, deposition, diagenesis, and lithification; climate and sedimentary structures, textures, colours, environments and laboratory studies are all discussed.

Wilcoxson, K.: VOLCANOES 327 pp.

London: Cassell, 1967. \$N.Z.3.70.

An account which is both technically accurate and absorbing for the lay reader and specialist is a rarity, but this is such a book. The author takes the reader on a tour of about 40 of the world's active volcanic areas and illustrates his accounts by numerous quotations from eye-witness descriptions. The writing is always lively and the examples well chosen. An effort has been made to show the scale of volcanic activity and to suggest the impact it could have on human populations. The book would be improved by some location maps, but it is none-the-less a valuable text for geography and geology students as well as the general public.

Mather, K. F.: THE EARTH BENEATH US 320 pp.

London: Nelson, 1966. 84s (U.K.)

This companion volume to 'The Sea' by R. C. Miller (reviewed elsewhere in this journal) has all of the excellent features of the latter. It deals with the rocks of the earth, the agents of erosion and the resulting landforms, and finally earth movements and volcanism. Many of the examples used are different from those in traditional textbooks and the presentation throughout is first class. It is too good to be left on the coffee table even though it may look impressive there.

Stearns, H. T.: GEOLOGY OF THE STATE OF HAWAII. 266 pp.

Palo Alto, California: Pacific Books, 1966. \$U.S.8.50.

A comprehensive account of the shield-shaped basaltic domes that are the Hawaiian Islands is a welcome edition to any geologist's library. Because of the accessibility of the active areas the Hawaiian Islands have become not only a laboratory for volcanologists but also a major attraction for amateur geologists and tourists. This book, together with the road guide produced by the same author and publishers, provides a detailed account of the geography, climate, geomorphology and volcanism of the area. A general account of volcanic activity is followed by a description of the features and origin of each island and then short studies of the petrology of the lavas, and the mineral and water resources.

Adkin, G. L., and Collins, B. W.: A BIBLIOGRAPHY OF NEW ZEALAND GEOLOGY TO 1950. New Zealand Geological Survey Bulletin n.s. 65. 243 pp. Wellington: Government Printer, 1967. \$N.Z.4.50 (paperback).

This bibliography of 5,310 references is arranged in alphabetical order of author's names. There is no subject index. A twenty page introduction comments on earlier bibliographies and gives references to bibliographies concerned with the 2,000 publications on New Zealand geology issued between 1950 and 1964.

Tricart, J., and Cailleux, A.: TRAITE DE GEOMORPHOLOGIE. Tome I, Introduction à la géomorphologie climatique. 306 pp. Tome III, Le modèle glaciaire et nival. 508 pp. Tome V, Le modèle des régions chaudes, forêts et savanes. 322 pp. Paris: Société d'Édition d'Enseignement Supérieur (paperback).

Of the projected twelve volumes in this series, covering the field of geomorphology, five are concerned with climatic geomorphology, four with processes and three with structures. The three volumes published so far are all on aspects of climatic geomorphology. Tome I gives an introduction to the subject and an account of the effects of climate on weathering, soils and vegetation. The morphoclimatic zones of the earth are discussed and some of their features described. Past climates and their effects upon landforms, and especially those of the Quaternary, are accounted for, and a summary is given of man's activity as a geomorphic agent.

In Tome III accounts are given of the formation of ice bodies and glaciers, the types of glacier and the palaeogeography of glaciers with a discussion of correlation and chronology of glaciations. Glacial movement and theories of glacial erosion, lead into an account of landforms developed during glaciation and the nature of moraines and morainic deposits left after deglaciation.

Tome V deals with the climatic zonation of the humid tropics, weathering and erosive processes, climatic fluctuations, palaeosols and characteristic landforms.

These volumes are printed on much better paper and are better presented than the earlier editions of these works. There are still a number of errors in the text, although errata slips are included, and the quality of the illustrations is poor. They do however present one of the most accessible and comprehensive accounts of climatic geomorphology that is available, although some of the recent English-language work has not been included in the bibliographies.

Brouwer, A. (translated by Kaye, R. H.): GENERAL PALAEONTOLOGY 216 pp. Edinburgh: Oliver and Boyd, 1967. 35s (U.K.) (paperback)

This is a translation of a work originally published in Dutch in 1959. It attempts to give an account at the undergraduate level of a field which has been much neglected when compared with systematic palaeontology. The life and death of organisms, their fossilisation, their horizontal and vertical distribution as affected by ecological and geographical factors, and the nature of evolution, are all treated. There are many references to field examples and 72 figures to provide an interesting and useful introduction to the subject.

Hatherton, T. (Editor): ANTARCTICA 511 pp.
Wellington: A. H. & A. W. Reed, 1965. \$N.Z.10.50.

This book, published with the co-operation of the New Zealand Antarctic Society, surveys the state of knowledge of the Antarctic in about 1963. Antarctica is now widely recognized as a natural laboratory and the hundreds of scientific papers published about it each year are evidence of this. Because of the large number of nations involved in Antarctic research the literature is both scattered and in many languages; a review volume is therefore most valuable. Each chapter in this book is written by an acknowledged expert and has an extensive bibliography. The papers are grouped into four sections: the first deals with national interests, living problems and mapping, the second deals with the southern oceans, their flora, fauna and ice cover; the third section is the largest and deals with the ice, geology, topography, flora and fauna of the land areas; the fourth section is on the polar atmosphere and has chapters on meteorology, the Aurora Australis, ionosphere and geomagnetic field.

This book is well illustrated, printed on high quality paper and contains a new map at 1:16 million in an end pocket.

Shumskii, P. A. (translated by Kraus, D.): PRINCIPLES OF STRUCTURAL GLACIOLOGY 497 pp.
New York: Dover, 1964. \$U.S.3.00 (paperback).

The main work for this book was done during 1947-48 and the Russian manuscript completed in 1952. Much of the work by Russian glaciologists is still inaccessible, even to experts, in spite of the technical translations prepared by Canadian and United States agencies. This translation in such a cheap and accessible form is therefore most welcome. Ice is first treated as a rock and then an account given of its formation, metamorphism and flow.

The last section of the book deals with the geography of ice.

Miller, R. C.: THE SEA 316 pp.
London: Nelson, 1966. 84s (U.K.)

A number of glossy picture books and academic studies of the oceans have appeared in recent years. Few have as many of the virtues and so few of the vices of both types, as this book. It is written by a distinguished academic who has been able to write simply and clearly for both a lay and a professional audience. The book is illustrated with excellent plates many of which are in colour, and is printed on high quality large size paper. The topics discussed include marine biology, oceanography, meteorology, deep-sea exploration and fishing industries.

Meinzer, O. E. (Editor): HYDROLOGY 712 pp.
New York: Dover, 1949. \$U.S.3.75 (paperback).

This book was first published in 1942 and although its contributors were men of great distinction in their field it has now been superceded in many respects and many recent studies such as that of the relationships between drainage basin geometry and hydrology are not mentioned at all. At the price it is still good, and both well illustrated and written.

Sombroek, W. G.: AMAZON SOILS 292 pp.

Wageningen: Centre for Agricultural Publications and Documentation, 1966.

This book contains a great deal more than its title suggests. It opens with a very useful summary of the climate, geology and geomorphology of the Amazon Basin. This is followed by a discussion of the term 'laterite' and its rejection in favour of the two words 'plinthite' and 'latosol'. In the account of the soils latosols, soils with recent plinthite, and soils with fossil plinthite, are the primary units. A large part of the book is concerned with the relations between soils and the vegetation, especially in those areas where the savannas and savanna-forests are of edaphic origin. The conclusion is concerned with soils under various agricultural practices and with their productivity. The captions to tables and figures are printed in Portuguese as well as English. There is a large end pocket containing fold out maps and sections.

Ganssen, R. and Hädrich, F.: ATLAS ZUR BODENKUNDE 85 pp.

Bibliographisches Institut Mannheim, and London: Geo. Harrap, 1966. 38s (U.K.)

This soil atlas is the first in a series of eight which will cover soils, biogeography, geomorphology, weather, climatology, topography and oceanography. The text is in German but the key to the coloured maps of the world at scales of 1 : 25 million, and of the European countries at 1 : 5 million, is printed in five languages including English. Over-simplification and over-generalisation are guarded against by the use of many diagrams of soil profiles which also show the inter-relationships of soils, relief, hydrology and vegetation. For those who cannot read German much of the value of this publication is lost and its standard and usefulness are such that an English language version would be most welcome.

Yong, R. N., and Warkentin, B. P.: INTRODUCTION TO SOIL BEHAVIOUR 451 pp. Macmillan 1966.

This book is intended for senior undergraduate courses in soil engineering and soil science. The book is concerned with the properties of the soil components which influence soil behaviour and then with the engineering properties which are interpreted on the basis of the fundamental features. Methods of investigation and analysis are included. Much of the recent research work into clays is discussed and their physical chemistry, compressibility and effects on shear strength and soil water are described. The book is well illustrated, has questions at the end of each chapter, and a useful reference list for further reading.

McCraw, J. D.: SOILS OF IDA VALLEY, CENTRAL OTAGO, N.Z. 50 pp. Soil Bureau, D.S.I.R. New Zealand. Report 2/1966 (paperback).

This cyclostyled report gives a general account of the physical geography and geology of the Ida Valley and a classification of the soils of the area. It is accompanied by two map sheets in full colour at a scale of 1 : 31,680, showing the soils. Much of the valley is irrigated and because of excessive application of irrigation water large areas are waterlogged and 46% of the soils below the water races in the southern part are affected by salt derived from salt-bearing Tertiary sediments and weathered schist. Recommendations for the control of these factors are made.

Trewartha, G. T.; Robinson, A. H.; Hammond, E. H.: ELEMENTS OF GEOGRAPHY, 5th Edition 660 pp. New York: McGraw-Hill, 1967

The most obvious difference between this edition, of a new famous text book, and its predecessor is the use of green tints on the diagrams as well as the usual black and grey. The essential differences are much greater. Not only have many of the figures and statistics been brought up-to-date, although many production figures refer to 1960 or earlier and at the latest to 1962, but many of the chapters have been rewritten entirely. The section on climatic types has departed even further from Köppen's scheme, and although the use of the Fahrenheit scale will reduce the value to some people this section of the book is clearer for the change. Other attempts to include modern concepts are not so successful, for although the 7th Approximation terms are mentioned how can anyone do justice to tundra soils in less than 250 words? Other sections of the book also suffer from 'potted information', but if geographers still need this sort of text book then this must rank amongst the best available.

Lydolph, P. E.; Zakrzewska, B.: PHYSICAL GEOGRAPHY LABORATORY MANUAL 129 pp. New York: McGraw-Hill, 1967.

This laboratory manual is designed to accompany the *Elements of Geography* or *Physical Elements of Geography* by Trewartha, Robinson, and Hammond, 5th editions. The manual has been designed to provide four hours of laboratory work per week for a two-semester course in physical geography. At the beginning of the book a list is given of all the topographic maps, geologic maps and aerial photographs used in the course — all of these are from U.S.A. Sets of rocks, meteorological instruments and survey instruments are also specified.

The book has a card cover and is through punched so that the perforated pages can be torn out and handed to the instructor and then stored in a file. The exercises are related to chapters in the books mentioned above, but could be used in conjunction with other texts. Each exercise begins with a list of materials needed and a statement of its purpose. There follows a series of leading questions with space for the student to write his answer. All charts, and outline maps needed are provided.

Birot, P.: GEOGRAPHIE PHYSIQUE GENERALE DE LA ZONE INTERTROPICALE 290 pp. 1965.

Birot, P.: COURS DE BIOGEOGRAPHIE 171 pp. 1966.

Cailleux, A., and Verger, F.: GRAPHIQUES GRANULOMETRIQUES, TRAVAUX PRATIQUES 44 pp. 1961.

Centre de Documentation Universitaire, Paris (paperbacks)

These three books are cyclostyled lectures and courses given at the Sorbonne. Birot's course on the intertropical zone is concerned with climate, vegetation and geomorphology of the savannas and tropical rainforests. His course on biogeography includes a brief account of soil-vegetation relationships and then studies of zonal vegetation types. Cailleux and Verger's course is a handbook for particle size analyses accompanied by samples of the appropriate graph and recording sheets.

Riley, D.; Young, A: WORLD VEGETATION 96 pp.

London: Cambridge University Press, 1966. 11s 6d (U.K.) (Paperback)

The main feature of this book is the 122 half-tones illustrating types of plants and plant communities throughout the world. The text occupies about one third of the page space and gives a general account of vegetation discussed under the heading of deciduous woodlands, coniferous forests, rain forests, grasslands, savannas, vegetation of dry environments, tundra and mountain vegetation, and freshwater and coastal vegetation. There is a brief appendix on soils and four pages of coloured plates of soil profiles.

There are a few inaccuracies like the spelling *Rhizophera* for *Rhizophora* on page 89, but it is a most valuable book for introductory courses in plant geography.

Eyre, S. R.; Jones, G. R. J. (Editors): GEOGRAPHY AS HUMAN ECOLOGY—METHODOLOGY BY EXAMPLE 308 pp.

London: Edward Arnold, 1966. 45s (U.K.)

The opening essay by the editors is the key to this book of essays. The book is "intended as an affirmation of faith in an academic discipline". It is contended that: "An awareness of the intricate relationships between man and his environment is a major realm for scholarly investigation and informed concern on the part of all men who profess to be educated. A heightened understanding of such relationships can be gained only through a disciplined investigation of both sides of the fence, the natural environment, physical and biotic; and the human or cultural one. As a discipline only geography endeavours to maintain this perspective". In the opening essay a number of common contentions, such as those which define geography as being concerned with distributions, are examined and rejected. The definition which is put forward is that geography is human ecology with the study of the "interaction between human activity and natural circumstances" being its main concern.

Of the remaining essays in this book by Walton, Bird, Franzle, Palmer, Wright, Eyre, Brookfield, Jones, Aschmann, McCaskill and Planhol, six are concerned with aspects of the natural environment and demonstrate the implications of this environment in the realm of human affairs, and the following four are concerned with people and the natural environment is introduced where relevant. The editors hope that detailed studies of the type they present will avoid arguments of the environmentalist-possibilist kind and form the basis for a new and more fundamental geographical synthesis.

Mellanby, K.: PESTICIDES AND POLLUTION 221 pp.

London: Collins, 1967. 30s (U.K.)

A critical examination of the costs, causes and effects of pollution of the environment by the Director of the Monks Wood Experimental Station is a new addition to the New Naturalist Series. The contents of the book are wider than the title suggests as they include discussions

of air, and water pollution as well as that by herbicides, fungicides and insecticides. The author has no axe to grind and gives a balanced evaluation of pollution in Britain. He points out that man has always polluted his environment and that this has only become serious because of the recent population explosion. Water and air pollution have existed in the London district for several hundred years and even though it is said that "the water of the Thames when it reaches London has been drunk and passed through different sewage works at least five times", this situation is still better than that of the last century. A critical account is given of statements about 'safe' levels of radiation and doses of insecticides showing that what was considered 'safe' thirty years ago may now be considered unsafe with one-hundredth of the dose. This book, because of its simple language and clear presentation, is a valuable antidote to alarmist literature, but also a clear warning of dangers inherent in our use of the environment.

BOOK REVIEWS

Selby, M. J.: THE SURFACE OF THE EARTH 267 pp.
London: Cassell, Vol. 1, New Zealand edition, 1967. \$N.Z.4.75.

This book, which deals with the study of landforms, is designed primarily for the sixth-former and first-year university student, but it will also be of considerable value to anyone interested in Geomorphology. It is quite different from any other landform text of the same type published so far in this country.

Its point of view is essentially modern, the content is well ordered and is presented with a sound knowledge of the principles of learning. In fact one of the distinguishing features for the reader is the way the material is organised. The text is straight-forward and concise with the main points in the text frequently being summarized in charts and diagrams, or exemplified in large clear photographs. By its inclusion of six topographic maps and exercises the book also leads on to practical work. In other words, the author has made every effort to ensure that the points he makes are clear and comprehensible to his readers.

The first five chapters are concerned with establishing an appreciation of geological form. Basic information about the structure and composition of the earth are described and various hypotheses — isostasy, convection currents, continental drift — are presented in order to explain the nature of movement in the crust of the earth. The author then describes various types of crustal movement — folding, faulting, orogenesis, volcanism — and the landforms resulting from these movements.

In this book landform description and process analysis are considered from a new standpoint. The author considers the Davisian Cycle of Erosion out-of-date and has replaced it by a study of landforms based on morphogenetic regions. While the author recognizes the great contribution W. M. Davis and his theory have made to the development of Geomorphology, he points out that modern instruments and geomorphic method have shown that the Cycle of Erosion concept deals too simply with the complex series of processes that are now known to shape the surface features of the earth. Instead he has chosen the notion of morphogenetic regions in order to make clear the diversity and complexity of the processes which shape the earth's surface. He sees the study of landform evolution as being based on climatic variation on the understanding that a region of similar climatic conditions gives rise to a set of geomorphic processes which will so modify the landscape that it will be different from those landscapes evolved under different climates. In this book, then, landforms with their processes are ordered according to the main types of climate —

e.g. Landforms in Savanna and Humid Tropical Climates
Landforms in Semi-arid and Arid Climates

The book also contains detailed chapters on Rivers, Mass Wasting, Lakes, Landforms and Lithology and Landforms of the Coast. The inclusion of a sample study area is a new approach to landform description. This study uses some of the main criteria — orogenesis, glaciation, weathering — treated separately in the preceding chapters

in order to illustrate the complexity and continually changing nature of the geomorphic processes that shape surface features.

Finally, a detailed statistical record and an up-to-date glossary of geomorphic terms completes a fine book which is a considerable contribution to the academic study of landforms and earth processes. Since New Zealand examples are cited so prominently it should be very well received in this country. A book of this calibre and approach is long overdue.

J. G. S. Myles

King, L. C.: THE MORPHOLOGY OF THE EARTH, 2nd Edition. 726 pp. Edinburgh: Oliver and Boyd, 1967. £5. 5. 0. (U.K.)

The second edition of this monumental work incorporates much of the research which has been done in the five years since the publication of the first edition in 1962. The great majority of corrections and additions are in the sections on Antarctica, the Ocean Basins and the Upper Mantle. King's general thesis, that the morphology of the earth can be broadly interpreted by a set of cyclic denudations successively from the Mesozoic to the present, is unchanged.

The book is in six parts. The first part (A) describes the unity of Gondwanaland during late-Palaeozoic and Mesozoic eras and describes continental structure in relation to shields and mobile welts. Part B discusses the cycle of erosion, and especially the concepts of peneplanation and pediplanation. A few comments such as reference to the work of Schumm on the Badlands of Dakota have been added to this section although it still dismisses much recent climatic geomorphology with the assertion that "As a matter of direct observation all forms of hillslope occur in all geographic and climatic environments". Part C is devoted to a description of erosion cycles of the continental plainlands with special reference to the African erosion surfaces.

In Part D the 'Scenery of the mountain lands' the Palaeozoic, Mesozoic and Cainozoic chains and ranges are reviewed. The modern ranges are regarded as everywhere the result, not of orogenic crustal crumpling, but of cymatogenic upheaval beginning towards the close of the Cainozoic era and resulting in warping and uplift of a rolling Pliocene lowland surmounted by relics of an earlier mid-Cainozoic planation. Part E describes the forms and features of the oceanic basins and particular attention is paid to the sub-oceanic ridges. Much of the recent work in the Pacific and Indian oceans is referred to.

Part F reviews the earlier parts and attempts to establish a 'Model of the Earth'. The earth is regarded as a non-cooling, non-shrinking, non-expanding body, without omnipresent tangential compression in its outer layers. The large scale crustal phenomena are held to be caused by forces originating not in the crust but in that part of the mantle immediately below the 'Moho'.

A second edition of this book is to be welcomed, and one suspects that if future editions are to keep pace with the expansion of knowledge they will have to be written by a committee, and that pressure on space may cause publication in more than one volume.

M. J. Selby.

Dury, G. H. (Editor): ESSAYS IN GEOMORPHOLOGY 404 pp.
London: Heinemann, 1966. 75s (U.K.)

This is a collection of nine essays presented in an attractively printed and well illustrated book. In "Pleistocene shorelines" N. Stephens and F. M. Synge review the literature and, using examples from the British Isles, emphasise the complexity of sea level changes during the Pleistocene. R. Common in "Slope failure and morphogenetic regions" draws examples from Alberta, Macedonia and Britain to show that the cause of failure may be one or more of a whole range of factors. J. A. Mabbutt's essay "Landforms in the western Macdonell Ranges" is a good account of the role of inheritance and periodicity, and perhaps climate fluctuations, in developing the complex landforms of these arid Central Australian hills. "Landforms of low latitudes" by J. C. Pugh and "Stratigraphical geomorphology; a review of some East African Landforms" by W. W. Bishop both deal with slope retreat, pedimentation and correlation of erosional surfaces. A good paper by M. M. Sweeting entitled "The weathering of limestones with particular reference to the Carboniferous limestones of Northern England" gives information, backed by measurements, about the agents that weather limestone and the rate at which weathering takes place. G. H. Dury in "The concept of grade" reviews the classical concepts on this subject and suggests that they are invalid. "Morphometry from Maps" by J. I. Clark discusses and compares different techniques for analysing landforms by means of contour maps. The final essay is a long (110 pages including 12 pages of references) comprehensive review entitled "The application of statistical methods to geomorphology" by R. J. Chorley which demonstrates the new approach to geomorphology and the distance the discipline has come since the days of Davis.

Although the book at first glance seems to be a collection of unrelated essays, it is obvious that they have been chosen to point up the directions in which present day geomorphology is moving. For this reason the book should be read by anyone seriously interested in modern geomorphology.

J. D. McCraw.

Jennings, J. N., and Mabbutt, J. A. (Editors): LANDFORM STUDIES FROM AUSTRALIA AND NEW GUINEA 434 pp.
Canberra: Australian National University Press, 1967. \$A10.50.

Since 1950 there has been increasing interest in geomorphological investigations in Australia as geological surveys, CSIRO regional surveys and the expansion of Universities with geology and geography departments have taken place. This recent and rapid growth is reflected in the authorship of the seventeen essays in this handsome book, for only two are written by graduates of Australian Universities. The exploratory work is not yet sufficiently advanced for a complete coverage of Australia so the essays do not give a full regional account. They are however regionally based discussions of systematic themes which reflect the trends in modern geomorphic research and the peculiarities of the Australian continent.

Australia has a climate which, for the most part, is very different from that of Europe and North America where most modern ideas of

geomorphology have originated. The stability of much of the landsurface since at least the early Tertiary, reflected in the extent of the fossil soils, and the large number of rivers which suffer a decrease in water from their sources to their mouths, are other examples of uniqueness.

The three essays, by Bik, Simonett and Ruxton, concerned with the New Guinea uplands, provide a useful account of the significance of mass movement and the triggering effects of tectonic instability in a humid tropical environment. Bik discusses morphoclimatic zonation on mountain chains in low latitudes and in doing so uses a more traditional approach than the excellent and detailed account by Simonett of the relationships between earthquakes, lithology and mass movement as analysed by multiple correlations.

Twidale, Wopfner, Mabbutt, Hays and Mulcahy give accounts of landscapes in various parts of the arid and semiarid zones and demonstrate the extent of ancient erosion surfaces and their silcrete and lateritic caps. Galloway, Ollier and Gill discuss Tertiary volcanic landscapes and Gill, Bird and Fairbridge discuss coastal features. Bird's accounts of the Gippsland lakes are now almost too many, although they do provide an example of detailed work compared with the more extensive studies outlined in the other essays.

Butler has given a synthesis of the use of fossil and buried soils for dating land surfaces in Southeastern Australia. The existence of such soils suggests long periods of relative stability broken by periods of instability; each stable-unstable phase being called a 'K cycle'. The work outlined here might well represent one of the most fruitful techniques for unravelling Quaternary geomorphic history. Other papers, by Speight on spectral analysis of meanders and Jennings on Karst areas, complete the book.

This is a well produced and most valuable interim report on its subject. It makes clear the enormous amount that still has to be done, but also it indicates the considerable achievement of a short period of research which has not only produced an inventory of major features of the landsurface of Australia but also produced new and appropriate methods of research which may well have an application in other parts of the world. We are indebted to the editors and authors for a most welcome addition to the already considerable literature on this subject.

M. J. Selby.

Geikie, Sir Archibald: THE FOUNDERS OF GEOLOGY.
New York: Dover, 1962.

Adams, Frank Dawson: THE BIRTH AND DEVELOPMENT OF THE GEOLOGICAL SCIENCES. New York: Dover, 1954.

Dover Publications Inc. are to be commended for making available in paper cover editions these two classic works on the history of geology. *The Founders of Geology* is an "unaltered and unabridged republication" of the 2nd edition published by Macmillan & Co. London 1905 (A Shorter first edition was published in 1897). The Dover edition thus preserves

the original pagination and typography although it is curious that Sir Archibald of the title page become Sir Andrew Geikie on the new paper cover. Adam's book in the Dover edition is also an "unabridged republication" of the first edition published by Bailliere Tyndall and Cox, London, 1938, and William and Wilkin's Coy. Baltimore, 1938, although the original publishers are not acknowledged by Dover and a new title page provided. While the type has been changed to fit a smaller page size, the original pagination is preserved with the minor exceptions of some of the plates being reversed: e.g. Plate X now faces page 376 not 377; Plate XIV faces page 452 not 453 of the original.

The two books complement each other. Geikie says in his preface: "I have selected for fuller consideration chiefly the lives and work of some of the masters to whom we mainly owe the foundation and development of geological science." Geikie, writing at the end of the 19th century, was in no position to assess or predict the great strides made in the 20th century geology and geomorphology. Although his late 19th century view point must be realised while reading his work, this in no way detracts from enjoyment of this book which is still an invaluable source for the development of geology up to the mid 19th century. He summarises the main contributions by periods — Classical, Medieval — Renaissance (including Arab and European writers) although the later chapters are subdivided into topics, such as the scientific cosmogonists, volcanic geology, the doctrine of geological succession, stratigraphical geology. However, the emphasis throughout is on the men who contributed their ideas, particularly in the chapters on the Wernerian School, Hutton and Playfair, and Sir James Hall and the development of experimental geology. Geikie has not tried to produce an exhaustive study of all who contributed to the development of an idea but has concentrated on the most important figures of each period. Glacial geology is restricted to part of a chapter called Progress in Stratigraphical Geology which describes the work of Agassiz. Geomorphology is also summarily treated; Geikie does not even use the word. However one can not expect a 20th century perspective from a late 19th century writer.

Adams, writing more recently than Geikie, is mainly concerned with the development of geological science in classical, medieval and Renaissance times. Although his chapter on historical geology covers the 18th century he makes no attempt to discuss developments after 1825. His main sources are original classical and medieval texts, and his chief delight is in tracing the development of various ideas through these texts, from which he frequently quotes. Like Geikie, he begins with a chapter on geological science in classical times, followed by a valuable chapter on the medieval conception of the universe. He then concentrates on the development of ideas around such topics as the 'generation of stones' and the development of mineralogy; historical geology; 'figured stones' and the development of paleontology; ores and metals; the origin of mountains; earthquakes and the nature of the interior of the earth; the origin of springs and rivers; and finally, a chapter on quaint stories and beliefs, including fables of the lodestone or magnet, ants which dig for gold, and the marvellous, medicinal and magical properties of such 'stones' as rock crystal, asbestos, 'lac lunae' (moon's tears or selenite), amber, etc., derived from classical and medieval lapidaries. The book is illustrated throughout with diagrams and pictures taken from the texts quoted.

These two books should be read by all students of earth science in order to obtain a perspective on the historical development of their subject. In Aristotle's words, quoted by Adams, "He who sees things grow from the beginning will have the best view of them." These two books still provide the best accounts of how geology has grown "from the beginning".

E. M. Stokes.

Powell, J. W.: THE EXPLORATION OF THE COLORADO RIVER AND ITS CANYONS. New York: Dover, 1961.

The development of geological science owes much to the reports of nineteenth century explorers and surveyors of the American West. Of this intrepid band, John Wesley Powell, later first Director of the United States Geological Survey, was one of the most colourful characters, a one armed veteran of the Civil War, and Professor of Geology at Illinois Wesleyan University, Bloomington, when he set out with nine men on his exploration of the Colorado River in 1869. He had already had experience in leading two expeditions to the Pike's Peak area and to the Uinta Mountains and upper reaches of the Green River. This time he aimed to follow the Green River and Colorado downstream through the intricate maze of canyons of the Colorado Plateau as yet unexplored by Europeans. A further expedition led by Powell 1871-72 repeated much of the Colorado journey but included Surveys of the surrounding country in addition to observations made along the river itself.

Although the scientific reports, his journal, and several popular articles had been published during the 1870's, Powell wrote up a further account some years later, first published under the title *Canyons of the Colorado* by Flood and Vincent, 1895. It is this book which Dover Publications have reproduced as "an unaltered and unabridged republication". In his preface, Powell describes this book as "a popular account of the exploration and a description of that wonderful land . . . I have revised and enlarged the original journal of the exploration (in 1869) and have added several new chapters descriptive of the region and of the people who inhabit it." The whole book is amply illustrated with photographs and engravings of scenes in the Colorado River area, rock structures and lava flows, local Indians and their villages, various Indian artefacts, pueblo ruins, Zuni pottery, Navajo weaving and so on. To the geologist and geomorphologist, the chief interest in the book lies in Powell's descriptions of the land forms of the Colorado Plateau, the canyons deeply eroded into horizontal rock strata, interrupted here and there by lava flows and cinder cones, and his speculations on the geologic and geomorphic history of the region. However, there is also much of human interest too, both in the descriptions of Indian life and more particularly in the physical difficulties faced by the explorers themselves. These included negotiating numerous falls and rapids in their small boats, and shortage of food culminating in the tragic decision of three members of the party to leave the expedition and seek help overland, only to be killed by Indians en route, while the rest of the expedition successfully completed their journey through the canyons.

E. M. Stokes.

Fairbridge, R. W. (Editor): THE ENCYCLOPEDIA OF OCEANOGRAPHY. 1021 pp. New York: Reinhold, 1966. \$U.S.25.00.

The publishers report this book as being "Unprecedented in concept, brilliant in execution, absolute in authenticity . . .". Such a claim is too sweeping to be made of any book, but their more sober comment that it "offers a rich store of factual information, technical data, and learned speculation . . ." is certainly justified.

Of the 245 articles in the encyclopedia 58 were written by the editor and 22 by Ichijo. The other articles are by 133 authors, many of them of international repute. The articles cover most branches of oceanography with emphasis being given to marine geology and descriptive physical oceanography. More than 100 articles are on individual currents, seas, ocean basins and marine sediments. The articles are well illustrated and although many illustrations have been reproduced from original papers so that they are not uniform in style this does not detract from the book as the majority of them are still clear. Nearly all articles have a brief bibliography and a few, such as those on the Atlantic, Pacific and Indian Oceans, are long enough to be considerable essays.

Use of the long cross-referencing index is necessary, to locate some accounts, as items like 'atolls' are not easily located, and the index excludes a number of items such as algae, luminescence, isostasy, and the linear magnetic anomalies which flank midoceanic ridges. As chief author Fairbridge has expressed his opinions most fully so that we are told that midoceanic ridges are produced by global expansion and that continental drift and sea floor spreading are mutually exclusive processes. Not everyone will agree with such opinions and their controversial nature could have been made clearer.

The volume is a valuable compilation which will be of considerable use to students and workers in allied fields. The length, and hence thoroughness, of many of the articles is particularly welcome and the good quality of the paper and binding make it a very good, if expensive, acquisition.

M. J. Selby.

Ritchie, G. S.: THE ADMIRALTY CHART, BRITISH NAVAL HYDROGRAPHY IN THE NINETEENTH CENTURY.
London: Hollis and Carter, 1967.

Rear Admiral Ritchie, Hydrographer of the Navy, has, in effect, written a history of his job, and the people who have held it, up to the end of the 19th century. However, this is more than just a narrative of one man's job, for it not only includes a history of the characters and idiosyncrasies of Naval Hydrographers, beginning with Alexander Dalrymple, appointed in 1795, and the ups and downs of the Admiralty Hydrographic Department and Surveying Services, but also the history of the development of the Admiralty Chart and particularly the Royal Navy's major contribution to the development of the science of oceanography during the nineteenth century. The author has had full

access to all naval records in the Admiralty, as well as making use of other sources. He has been able to use these records with the full appreciation of a man of great experience of the practical problems of the marine surveyor and a genuine love of his life's work.

The book begins with an account of the sad state of British marine cartography in comparison with that of other maritime nations of Western Europe in the 18th century and quickly moves to Cook's voyages to the Pacific, the rivalry between Cook and Dalrymple, and the appointment of the latter as first Hydrographer of the Navy. After a chapter on methods of hydrographic surveying at the end of the eighteenth century, the author recounts the progress of Admiralty surveys in various regions of the world: the north Pacific, Flinders' circumnavigation of Australia, the African Survey, Arctic and Antarctic surveys, Magellan's Straits, the Northwest Passage, and the Antipodes each area illustrated by a map showing areas surveyed. These regional accounts are interspersed with chapters on each of the eight Hydrographers of the Navy, from Dalrymple to Wharton, and accounts of the great oceanographic voyages of the *Beagle* and the *Challenger*. Ritchie emphasises the importance of James Cook who trained surveyors such as Vancouver and Bligh who in turn passed on Cook's high standards of accurate and meticulous survey procedures to others such as Flinders and Broughton. While detailing developments in survey methods and equipment, Ritchie also makes it clear that naval hydrography is more than just mapping; it is also zoology, botany and oceanography. Ever since Cook "scientists have sailed as a matter of course in Her Majesty's surveying ships." It is a pity that for space reasons, the author could not go into the surveys sponsored by such other agencies as the East India Company, or the work of 'amateur' surveyors such as Admiral John Moresby, and the hydrographic achievements of other nations, particularly the U.S.A., during the nineteenth century.

A great deal of factual information on the numerous hydrographic surveys of the nineteenth century is contained in this book which makes it an invaluable reference but it also makes enjoyable reading. Here are genuine adventure stories in all the cause of advancing scientific knowledge: encounters between the crew of the *Beagle* and the people of Tierra del Fuego, the rigours of surveying in the Canadian Arctic, skirmishes between a survey party from the *Barracouta* and natives in the Congo River, the *Samarang*'s difficulties with Borneo pirates, the narrow escape from destruction by pack ice and high seas of the *Erebus* and *Terror* on the Ross Antarctic Expedition, and so on. The narrative is full of anecdotes about the lives and characters of the captains of nineteenth century survey ships, their relations with their crews and the Hydrographic Dept. of the Admiralty. Ritchie has a real appreciation of the importance of a man's character in understanding his work and achievements. He recounts how he came to understand Alexander Dalrymple whose "querulous works" he read while commander of the survey ship *Dalrymple*, with his portrait hanging on the cabin wall overhead — "a portly man, bald with a fringe of hair hanging to his collar, a long nose and a sad determined expression". One can also sympathise to some extent with the turbulent Sir Edward Belcher, captain of the *Samarang*, already unpopular with his crew who thought he worked them too hard, who was unable to persuade the current Hydrographer of the Navy, Rear Admiral Sir Francis Beaufort, that his "diplomatic enterprises" with Borneo pirates and local chiefs were necessary to ensure continuation

of his survey work. "Your last letter", wrote Beaufort, "is really all Hebrew to me; Ransoms and dollars; queens; treaties and negotiations? What have I to do with these awful things; they far transcend my limited chart making facilities, however well suited they may be to Admiralty Lords, to Commanders-in-Chief, to Governors of Colonies and to you; with them, my very good friend, you must arrange your diplomatic enterprises, and to them you must look for applause".

E. M. Stokes.

Hindmarsh, W. R.; Lowes, F. J.; Roberts, P. H. Runcorn, S.K. (Editors): MAGNETISM AND THE COSMOS.

N.A.T.O. Advanced Study Institute on Planetary and Stellar Magnetism in the Departments of Physics and Mathematics, University of Newcastle upon Tyne, 1965.

Edinburgh: Oliver and Boyd, 1965. £7. 7. 0. U.K.

The physical mechanism which produces the Earth's magnetic field has long been one of the most intriguing geophysical problems, but during the past fifteen years research in geomagnetism has greatly intensified. One of the reasons for this is the increasing awareness of the *apparent* internal mobility of the earth, revealed by palaeomagnetic field directions, ocean spreading and major transcurrent faults.

The most generally accepted theory, at present, of the magnetism of astronomical bodies, is the dynamo theory which requires the interaction of moving conducting fluids and magnetic fields. Thus if the physical model of the geomagnetic field, the outward and visible symbol of internal mobility, can be defined it should be possible to determine the reactions at greater radii and achieve a true model of the Earth. The converse is also true of course, and it may be that in spite of the confidence of present day workers (and what generation doesn't think it has all the answers) a battle of attrition will be necessary to carry our physical observations down to that inner part of the earth where the field is generated.

With increased activity in geomagnetic studies accompanying the contemporaneous development of direct space research and radio-astronomy it is not surprising that there has developed an interest in the magnetic fields of planets and stars. For the existence of these fields reveals processes occurring in the interiors of these bodies and by contributing to the general body of observation and theory cosmic magnetism may help to solve our major geomagnetic problems.

Magnetism and the Cosmos gives us a series of disconnected glances, but not a review for the stage is too early, at the subject of "cosmic magnetism." The thirty-nine papers (by 44 contributors) are grouped into five sections: Geomagnetism, Stellar Magnetism, Solar Magnetism, Planetary Magnetism, and Solar System Magnetic Fields. The papers vary in nature, length and quality. Some papers are reviews and of moderate length, others research notes of the length of a letter to *Nature*. However, what most of the papers have in common, is a stimulative content which probably arises from an original verbal presentation and which has not been totally disguised in the written form. In spite of the

generally untidy effect which these symposia publications achieve, to have the finger of person to person dialectic poked into one's midriff is a refreshing change from normal reportage in journals. Another consequence of a verbal presentation to a presumably mixed interest audience is that the theoretical giants are forced to make concessions to those of lesser understanding. Thus I found papers by Ferraro (Magnetohydro-dynamics of Liquids) and Alfven (Solar Magnetic Fields) much easier to read than their normal writings.

This is an interesting volume to me, and to any geophysicist of broad interests. I came to this book having just taught a course on The Geomagnetic Field and Rock Magnetism. This not a text book by design but it would have added immeasurably to the strength of the course if the book had been available for me. And its strength is that it is not a text book; it discloses so many uncertainties, proposes so many take-off points. It is ideal for post-graduate discussion and teaching when the text book should be kept at home. That it is not a text book is its weakness too for its uncertainties will be cleared up and its take-off points become outmoded. However, scientific libraries must invest in transient books of a stimulative nature as well as blue-chip texts.

T. Hatherton.

Küchler, A. W.: VEGETATION MAPPING. 472 pp.
New York: Ronald Press, 1967. \$15.00 (U.S.)

Less than a century ago vegetation maps were largely unknown and relatively restricted in their application. However, over recent decades tremendous advances have been achieved in vegetation mapping, particularly by European and U.S.S.R. workers. American workers have contributed much less although Cain and Castro's (1959) *Manual of Vegetation Analysis* has clarified concepts and Küchler and Dansereau have demonstrated certain mapping techniques, that have universal application.

The appearance, in 1967, of Küchler's book on vegetation mapping is very timely: its importance cannot be overemphasised. He states that "... the whole field of vegetation mapping is in flux, evolving rapidly." The recent proliferation of mapping techniques, the increased use of vegetation maps and widely recognised utility of these, as well as new ideas, new methods and techniques resulting in cartographic refinements undreamed of earlier are competently and authoritatively discussed, along with many other facets of theoretical and applied vegetation mapping, in 35 main chapters grouped into six major divisions — Historical Sketch, Basic Considerations, Technical Aspects, Mapping Methods, Application of Vegetation Maps, Conclusion.

The brief yet very useful introductory chapter outlining developments in vegetation cartography over the last five centuries shows that increasing cartographic possibilities for current vegetation mapping justify the optimism that the volume of published vegetation maps will continue to grow and to keep pace with advances in knowledge and technology.

In the second section of the book five chapters are devoted to a lucid exposition of basic principles in vegetation mapping.

The third section discusses technical — particularly planning, drafting and reproduction — and aesthetic properties of vegetation maps. Much

of the information contained in these seven chapters has considerably wider application than just to vegetation maps and could be read with advantage by all geographers.

Chapters 14-23 inclusive form the fourth section which collects together, organises, and clearly presents a wealth of information about vegetation mapping methods. The book would be valuable for this section alone, even without the other excellent sections, because much about which Kuchler writes so authoritatively will be new to readers unfamiliar with the work of European plant geographers.

The final two sections discuss the great variety of uses to which vegetation maps are put to today and the needs of the future.

The book is well organised with a good index and frequent cross-references. Technical terms are explained when they are first used. Diagrams are clear and instructive and the numerous tables are particularly useful summaries.

Although of greatest use to practising vegetation mappers and to graduate students, the book should prove useful as an important text to undergraduate geographers. It will long remain an important reference work to graduates and all vegetation mappers in many disciplines because of its valuable bibliography of over 500 references. The author states in his preface that he hopes "... that this book will help vegetation mappers keep their bearings ... even ... into regions yet unexplored." He achieves his aim: the work is thorough and comprehensive, yet it clearly portrays the intricacies and dynamic state of vegetation mapping today, and offers guides to tackling new problems.

G. R. Cochrane.

Lewis F. Richardson: WEATHER PREDICTION BY NUMERICAL PROCESS xvi + 236 pp.

Dover Publications, Inc., New York, 1965. \$2.00 (U.S.)

This unaltered republication of the original 1922 Cambridge University Press edition has an introduction by Sydney Chapman containing a short biographical sketch on the author and a quick resumé of some more recent developments in weather forecasting techniques using numerical methods.

The author's work is well known by students of dynamical meteorology and by now his name is firmly attached to the measure of atmospheric turbulence known as Richardson's number. This book which embodies his theory, includes chapters on differential equations expressing the dynamics of the atmosphere; Richardson's division of the atmosphere into layers; his "chequer" system of mapping the earth, as well as an explanation of his arithmetic method.

The book may be recommended, as in the past, as a classroom text for students studying dynamical meteorology. As well as being of great value as a reference work it may also suggest avenues for future research to those working with computers.

N. Cameron.

CURRENT GEOMORPHIC RESEARCH IN
NEW ZEALAND

R. J. BLONG and M. J. SELBY
University of Waikato

INTRODUCTION

There are few professional geomorphologists in New Zealand, but a considerable number of workers in allied fields, such as pedology, geology and hydrology, whose research is wholly or partly geomorphological. One hundred and fifty circulars asking for details were sent out and from the replies notes have been prepared listing the interests of 54 workers. The table below shows the main fields of interest and reflects the strong influence of the large amount of research being done by government institutions, on the soil pattern and upon the geology of New Zealand. The strong interests in tephrochronology in the North Island and in glacial and periglacial forms and processes in the South Island are also noteworthy.

TABLE 1: MAIN SUBJECTS OF RESEARCH IN 1967

Subject	Research Workers
Pleistocene and tephrochronology.	16
Soils and vegetation	14
Hydrology and drainage basin morphometry	9
Coastal processes and morphology	8
Weathering and slopes	8
Fluvial processes, erosion and deposits	6
Structural	6
Volcanism	4
Periglacial	4
Glacial	3
Antarctic	3

REGISTER

- Blake, G. J.*, Soil and Water Division, Ministry of Works, P.O. Box 12041, Wellington North.
Coastal Geomorphology
Relations between hydrological and geomorphological characteristics of drainage basins.
- Blong, R. J.*, University of Waikato, Private Bag, Hamilton. (After August, 1967, Department of Geography, The University of Sydney.)
Gully erosion and slope development in the pumice lands with special reference to the Mangakino Basin. Present processes and interpretation of recent geomorphic history.
The role of mass movement in slope evolution; a comparative study of selected areas in N.S.W., Australia, and the greywacke hill country, North Island, New Zealand.
Techniques: Detailed levelling of selected gullies.
Correlation analysis of selected slope and mass movement parameters.
Field and laboratory studies of soil physical properties. Air photo interpretation.

- Brockie, W. J.*, Geography Department, University of Otago, P.O. Box 56, Dunedin.
 Glacial landforms: Whakatipu, Ohau and Te Anau areas.
 Contemporary Nivation and Periglacial processes.
 Microclimate, vegetation and slope processes related to land management practices.
 Techniques: Direct measurement, statistical and quantitative analyses.
- Bruce, J. G.*, Soil Survey Office, C/- Grasslands Division, P.O. Box 112, Gore.
 Soil associations in relation to topography.
- Cameron, S.*, Department of Geography, University of Otago, P.O. Box 56, Dunedin.
 Relationships between landforms and soil formation and properties, vegetation, microclimate and runoff, etc., particularly in terms of total watershed systems.
- Campbell, I. B.*, Soil Bureau, P.O. Box 58, Wanganui.
 Interest in Antarctic soils and allied processes with application to the chronology of Antarctic glacial deposits and raised beaches.
 Pleistocene Stratigraphy.
- Carr, M. J.*, Department of Geology, University of Canterbury, P.B., Christchurch.
 Coastal geomorphology.
 Techniques: Field mapping, photogrammetry, sedimentology.
- Cochrane, G. R.*, Department of Geography, University of Auckland, P.O. Box 2175, Auckland.
 Catchment ecology; interrelationships between biota, microclimate, soils and geomorphology.
- Cotton, Sir Charles A.*, 2 Manuka Avenue, Lower Hutt.
 Explanatory description of all categories of landforms.
 Climatic geomorphology.
 Morphology of volcanoes.
 Quaternary glacio-eustatism and its effects.
 Chronology of Quaternary events.
 Geomorphology of bold coasts and coastal classification.
 Application of Davisian methodology (inductive and deductive).
- Cowie, J. D.*, Soil Survey Office, D.S.I.R., Private Bag, Palmerston North.
 Studies on formation and chronology of dune complexes. Soil development on sand soils with special reference to effects of time and relief. Relationships of surface deposits in the Manawatu district to Pleistocene and Recent terraces and their correlations to Pleistocene events (e.g. climatic changes and volcanic eruptions). Establishment of a chronological sequence of deposits in the district.
 Techniques: Detailed field examination.
- Cox, J. E.*, Soil Bureau, D.S.I.R., P.O. Box 1005, Whangarei.
 Interest in geomorphology is incidental to studies of the chronological setting of soils — especially those formed on Quaternary alluvial, loessial, and volcanic materials.
 Techniques: Soil morphological, physical, chemical and mineralogical aspects are considered. Use of ^{14}C on wood samples to establish vegetational sequences involved in soil formation.
- Crozier, M. J.*, Geography Department, University of Otago, P.O. Box 56, Dunedin.
 Research into mass movement on the Otago Peninsula. Correlation of climatic data and other possible causative factors with movement of loess, soil, slump — earthflows.
 Techniques: Various forms of climate and movement gauging, soil water tracking, etc.
- Dixie, R. C.*, Soil Conservation Division, Ministry of Works, P.O. Box 12041, Wellington.
 Soil conservation in general.
 Techniques: Small catchment studies, 1/100-acre plots, infiltration studies, etc.
- Drost, H.*, Ministry of Works, Private Bag, Hamilton.
 Catchment hydrology in relation to land use.
- Fair, Miss E.*, Department of Geography, Massey University, Palmerston North.
 Geomorphology of terraces of the Manawatu River, from Manawatu Gorge to the sea. Project includes work on the marine terraces (or remnants?) on the western slopes of the Ruahine Ranges.
- Fitzharris, B. B.*, Geography Department, University of Otago, P.O. Box 56, Dunedin.
 Pleistocene events and morphology in the Waiau and Monowai Valleys.
 Scree movement, rainfall and temperature in the high country, Southland.
 Techniques: Valley profiles, correlation of outwash surfaces, airphotos, use of stakes, painted stones, rods and washers, runoff plots.

- Gage, M.*, Department of Geology, University of Canterbury, Private Bag, Christchurch.
 Glacial landforms and geology.
 Periglacial processes and mass movement of debris.
 Techniques: Field mapping.
- Grant, P. J.*, Ministry of Works, P.O. Box 143, Napier.
 Changes during the last millennium of vegetation, climate, river regimes, erosion and sedimentation rates, chiefly on the East Coast of the North Island.
 Techniques: Field mapping, climatological time series analyses and dendrochronology, study of river terraces.
- Grant-Taylor, T. L.*, Geological Survey, P.O. Box 30368, Lower Hutt.
 Fossil soil chronology, Pleistocene climates, deposits, chronology, palaeogeography, volcanic geomorphology, Quaternary tectonics.
- Grindley, G. W.*, Geological Survey, P.O. Box 30360, Lower Hutt.
 Quaternary tectonics and volcanism.
 Glacial geomorphology and history, Antarctica.
 Techniques: field survey, airphotos.
- Healy, T. R.*, Department of Geography, University of Auckland, P.O. Box 2175, Auckland.
 Coastal geomorphology with special emphasis on coastal platforms; their morphology and processes active in formation. Investigation of the water level weathering concept, salt spray weathering and cliff recession.
 Techniques: Levelling, thin section analysis, measurement of per cent pore space saturation, wave pressure in caves and crevices, grain size analysis.
- Heerdegen, R. G.*, Department of Geography, Massey University, Palmerston North.
 Topographic expression of faults with particular reference to the Manawatu and Wairarapa.
 Nick points and graded reaches of streams in relation to structure and runoff.
 Old shoreline in the Manawatu.
 Terraces and terrace correlation.
- Hutchinson, P.*, Geography Department, University of Otago, P.O. Box 56, Dunedin.
 Hydrogeomorphology, hydrology.
- Jackson, R. J.*, Soil Bureau, Private Bag, Lower Hutt.
 Soil moisture regimes and their relation to the evolution of soils and landforms.
 Techniques: Hydrological studies in small catchments. Measurements of soil moisture and rates of mass movement.
- Johns, R.*, Department of Geography, University of Auckland, P.O. Box 2175, Auckland.
 Detailed relationships between natural vegetation and associated soils.
 Comparison of slope development under natural forest and induced grassland.
 Applications of tephrochronology.
 Techniques: Thin section studies of leaf breakdown. Soil morphology.
- Kirk, R. M.*, Geography Department, University of Canterbury, Private Bag, Christchurch.
 Antarctic beaches — sediment types and distribution as related to ablation processes.
 Canterbury beaches — the beach sediments of the Canterbury Bight. Distribution of sediments, changes with distance and time. Depth of disturbance of gravel by waves on a shingle beach.
 Techniques: Profile surveying, sediment sampling and analysis (including trend surface analysis). Airphoto analysis; wave dynamometer under construction.
- Leamy, M. L.*, Soil Survey Office, P.O. Box 67, Alexandra.
 General interest in pedology, geomorphology and Pleistocene chronology. Correlation of soils and landforms; reconstruction of Pleistocene and recent events from pedological and geomorphological evidence.
 Tropical soils and landforms.
 Techniques: Pedological techniques, soil survey, etc.
- Lensen, G. J.*, Geological Survey, P.O. Box 30368, Lower Hutt.
 Quaternary tectonics and stratigraphy. Contemporary deformations.
- McCraw, J. D.*, Soil Survey Office, P.O. Box 1193, Hamilton.
 Interpretation of recent geomorphic history by means of the soil pattern.
 Development of landscapes in Central Otago. Antarctic soils and landforms.
 Tephrochronology.
- McKellar, I. C.*, Geological Survey Office, P.O. Box 79, Dunedin.
 Quaternary geology in the southern South Island. Quaternary deposits in the Te Anau and Manapouri Basins.

McLean, R. F., Geography Department, University of Canterbury, Private Bag, Christchurch.
Coastal studies. Current beach forms and processes with special reference to source, transportation and deposition of beach sediments along East Coast, South Island. Plan curvature and orientation of beaches in relation to geometric models. Forms, processes and rates of shore platform development with special attention to spatial variation in wave abrasion and biological erosion.

Milne, J. D. G., Department of Geology, Victoria University, P.O. Box 196, Wellington.
Late Quaternary history of the Rangitikei Valley.
Techniques: Geological and pedological field methods, mineralogical and chemical investigations.

McKenzie, D. W., Department of Geography, Victoria University, P.O. Box 196, Wellington.
The use of airphotos in teaching geomorphology.

O'Loughlin, C. J., Forest and Range Exp. Station, P.O. Box 106, Rangiora.
Determination of erosion types and processes in greywacke mountain country.
Experimental work on slope stabilization using introduced tree and shrub samples.
Hydrological studies including rainfall — runoff relations, snowpack accumulation and melt, water yield and sediment yield from catchments, and changes in stream bed morphology.
Techniques: Field mapping, stream gauging, sediment analysis, colorimetry.

Orbell, G. E., Soil Survey Office, D.S.I.R., P.O. Box 234, Pukekohe.
Soil survey and pedogenetic factors in general. Special interests in geology/soil relationships and with chronosequences of soils associated with different groundsurfaces.
Effects of man on soils.
Techniques: Soil survey techniques in field supported by comprehensive laboratory services from Wellington.

Pain, C. F., Department of Geography, University of Auckland, P.O. Box 2175, Auckland.
Relationships between slopes, mass movement and vegetation.
Mechanisms of slope development under different vegetation types in Orere Catchment, S.E. of Auckland.
Application of tephrochronology to geomorphology.
Techniques: Detailed slope measurements in order 1 and 2 valleys. Quadrat analysis. Field and laboratory tests of soil physical properties.

Pittams, R. J., Ministry of Works, Private Bag, Hamilton.
Relationships between morphometric characteristics and runoff.
Effects of changes in vegetation on catchment hydrology.
Equilibrium and grade in rivers.
Water balances.
Bed load and movement; particle size distribution.
Specific effects of land development on areas of pumice soils.

Pollock, J. A., Massey University, Palmerston North.
The origin, natural properties, distribution and classification of soils. Comparative study of New Zealand and German soils derived from loess.
Techniques: Standard techniques of profile description and of chemical analysis. X-ray, D.T.A. and electronmicroscope techniques of clay analysis.

Pullar, W. A., Soil Survey Office, P.O. Box 114, Whakatane.
Soil survey in Gisborne and Bay of Plenty districts.
Identification and mapping of air-fall ash beds in order to elucidate facets of geomorphology and pedology. Unravelling ash bed stratigraphy and establishment or chronology using ^{14}C dates.

Raeside, J., Soil Bureau Office, P.O. Box 1273, Christchurch.
Quaternary studies using loess deposits. Solifluction.
Urban land use and soil types.

Schofield, J. C., N.Z. Geological Survey, Otara Road, Papatoetoe.
Coastal progradation and retrogradation.
Constructional landforms.
Geomorphology as a mapping tool in geology.
Techniques: Systematic levelling at a number of sections across beaches.

Selby, M. J., University of Waikato, Private Bag, Hamilton.

Mass movement and other processes of rapid erosion in areas of greywacke lithology in the South Auckland area. A study of the relationship between accelerated erosion and land development in areas of pumice lithology in the Central North Island.

Techniques: Detailed mapping and survey of erosion features; laboratory study of soil physical characteristics; instrumented field plots measuring precipitation, runoff, soil moisture, soil temperature, soil creep, etc., laboratory plots (similar to above) but with controlled environment.

Sneddon, G. I. M., Southland Catchment Board, P.O. Box 408, Invercargill.

Relationship of rock type to erosion; high country climates; mass movement.

Soons, Jane M., Department of Geography, University of Canterbury, Private Bag, Christchurch.

Glacial geomorphology.

Soil erosion processes.

Techniques: Field work, airphoto interpretation, regular observations of soil erosion and micro-climate instrumented plots.

Stroud, T. M., C/- P.O., Cromwell, Central Otago.

Geomorphology of Kawarau Gorge. Geomorphological mapping and Pleistocene geology of Kawarau area.

Techniques: Detailed morphological mapping from field checks and air photos. Slope measurements using altimeter and levelling techniques.

Suggate, R. P., N.Z. Geological Survey, P.O. Box 1471, Christchurch.

Quaternary stratigraphy and tectonics.

Taylor, C. H., Department of Geography, University of Canterbury, Private Bag, Christchurch.

Attempted correlation of hydrologic parameters of fifteen New Zealand river catchments (mean annual discharge, flood peaks, low flows, sediment yield) with morphometric properties (drainage density, relief ratio, etc).

Techniques: Basic hydrologic data from M.O.W.; morphometric data from maps and air photos. Statistical analysis using correlation, multiple regression and factor analyses.

Thompson, B. H., N.Z. Geological Survey, Otara Road, Papatoetoe.

The distribution and morphology of volcanic domes and flows.

Techniques: Air photo and ground examination.

Toebes, C., Ministry of Works, P.O. Box 12041, Wellington.

Relationships between hydrological and geomorphological characteristics of drainage basins.

Techniques: Initially the development of linear normal (regression, multivariate, and factor analyses) and graphical models between flow characteristics and morphometry. Later the possibility of using non-linear analysis will be investigated.

Tonkin, P., Soil Bureau, P.O. Box 1193, Hamilton.

Rates of soil-forming processes.

Quaternary history as reflected by the soil pattern.

Soil - landform relationships.

Vuceticich, C. G., Geology Department, Victoria University of Wellington, P.O. Box 196, Wellington.

Late Pleistocene history with special reference to stratigraphy of cover beds — both volcanic ash and loess. This is a basic study aimed at establishing parent materials and their provenance and soil genesis. Involves necessarily the history of climate, vegetation and landsurfaces.

Techniques: Field studies in stratigraphy, using, where necessary, portable "earth drill" for core collection.

Mineralogical work for both identification, using key minerals, and for weathering studies.

Wellman, H., Department of Geology, Victoria University of Wellington, P.O. Box 196, Wellington.

Holocene and Pleistocene stratigraphy, New Zealand and Antarctica.

Marine benches.

Tephrogeology.

Quaternary tectonics.

Techniques: Air photos; surveying.

Wood, B. L., N.Z. Geological Survey, P.O. Box 79, Dunedin.

Development of New Zealand landscape during late Tertiary tectonism, warping.
Periglacial landforms and processes. Origins and deposition of New Zealand loesses.
Tropical landforms of Pacific volcanic islands.

Techniques: Field observations in conjunction with regional geologic surveys.

Wright, L. W., Department of Geography, University of Auckland, P.O. Box 2175, Auckland.
(After December 1967, Queen Mary College, London.)

Coastal geomorphology, Quaternary studies — sea level changes; slope development in South Auckland and Northland with special reference to Hunua Ranges and Kaipara North Head.

NOTES FOR CONTRIBUTORS TO THE EARTH SCIENCE JOURNAL

Aims of the Journal

Articles and communications submitted for publication should be either reports of research or other original contributions of wide interest to those concerned with geology, geomorphology, pedology, climatology, oceanography and physical geography. Reviews and summaries of the present state of knowledge in the various branches of the earth sciences, and papers which explore the interrelations of these sciences and the borders of traditional disciplines will also be welcomed. The journal will accept long articles but authors should consult the editor before submitting them.

Typescripts

Contributions should be typed on good heavy-grade quarto paper, double spaced, with wide margins all round. The top copy and the top carbon copy should be sent to the editor and a third copy retained by the author. All matter to be printed in italic type (e.g. generic and specific names) must be underlined. Style and layout should follow 'Selby, M. J., 1967: Aspects of the geomorphology of the greywacke ranges bordering the lower and middle Waikato Basins. *Earth Sci. Jnl.* Vol. 1, No. 1.'

Abstract

A brief summary indicating the scope of the paper and its principal conclusions should be included at the beginning of all articles exceeding 1,000 words in length. Contributions in languages other than English must have an English language abstract.

Units

These should be consistent throughout the paper.

Footnotes

These should be avoided.

Tables

These are expensive to reproduce and must be kept to a minimum. Each table should have a heading and be numbered in arabic numerals. Units of measurement should be placed in parentheses at the head of the column and not in the body of the table.

Figures

These are to be numbered consecutively in arabic numerals regardless of whether they are half-tones (photographs) or line blocks (graphs, etc.). Each must be referred to in the text and only such figures as are essential to elucidate the text can be published. Figures must be submitted ready for reproduction with all lettering and shading finished in Indian ink, and lettering done by stencil or Letraset in a simple style. The originals should be prepared on high quality dense white paper or on stable tracing materials with a good surface and need not be more than twice the size of the printed figure which cannot exceed $8\frac{1}{2} \times 6$ inches (21.5 x 16 cms.). Figure numbers should not be on the figure itself, only in the caption.

The legend should be included within the figure but captions for all figures should be grouped together at the end of the paper. The author's name and the figure number should be written lightly in soft pencil on the back of each figure.

Authors who require a large number of illustrations may be charged for whole or part of the cost of reproduction.

Plates

Photographic prints should be on glossy paper. Components of a composite figure should be firmly mounted on white card and lettered as required — A, B, C, etc. In general no more than two plates will be permitted per article, unless special arrangements are made with the editor. The place at which each figure and table is to appear should be indicated in the margin of the text.

References

In the text references are by author's name and year, e.g. '(Smith, 1960)' or '... as stated by Smith (1960)'. The list of references at the end of the paper is to be arranged in alphabetical order of authors' names.

Examples:

Cotton, C. A., 1942: *Geomorphology: An Introduction to the Study of Landforms*. Christchurch, 505 pp.

———1958: The Rim of the Pacific. *Geogr.J.* 124 (2): pp. 223-31.

Two or more publications by the same author in the same year should be distinguished by a, b, c, etc., after the year. Any abbreviations used should conform with those in the *World List of Scientific Periodicals*, 4th ed., 1964.

The manuscript should be arranged in the following order: title page, abstract, text, references, tables, illustrations, captions. Each page of the manuscript must have a number in the upper right-hand corner, beginning 1 on the title page and continuing in sequence to the last page of copy.

Proofs

Only minor corrections in wording can be accepted at proof stage and the author will be charged for any alterations.

Offprints

The total number of offprints required should be stated when returning the proof. They will be charged for at the current rate.

Correspondence should be addressed to:

The Editor,
Earth Science Journal,
C/o University of Waikato,
Private Bag,
Hamilton,
New Zealand.

P. G. EVANS & ASSOCIATES

TOPOGRAPHICAL MODELLERS

We Make Molehills out of
Mountains

MODELS CONSTRUCTED FOR:

- Land Subdivisions
- River Control Schemes
- Highway Construction
- Research and Teaching
- Forestry Projects
- Public Relations Promotion
- Scenic areas

Latest Methods and Materials

Contact us for Quotations

**P.O. BOX 1253 PHONE 31-706
HAMILTON, NEW ZEALAND**

MONTEITH & PARKER LTD.

BARTON STREET, HAMILTON

Specialists in:

- Smash Repairs
- Chassis Straightening
- Wheel Aligning
- Waikato Specialised Brake Service
- 24-Hour Salvage Service

PHONE 30-061

Gem Making as a Hobby



A Fascinating Craft anyone can learn. Visit our shop and see our fine collection of rock specimens.

LARGE SELECTION
OF BOOKS
ON IDENTIFICATION
AND ROCKCRAFT

Complete Range of Gem
Making Equipment

TUMBLING — CUTTING — GRINDING — POLISHING — GRINDING WHEELS
DIAMOND BLADES — TEMPLATES, ETC.

JEWELLERY FINDINGS, BELL CAPS, BROOCHES, CHAINS, EPOXY GLUE, PLIERS, ETC.

THAMES LAPIDARY SUPPLIES LTD.

Box 229

474 Pollen Street, Thames

Phone 1878

Open Saturday Mornings

::

Catalogues and Price Lists Available

BOOKS

Cotton, Sir C. A. GEOMORPHOLOGY, 7th ed.
W. & T. 32/6

— LANDSCAPE as developed by the processes of normal erosion, 2nd ed. W. & T. 47/6

— N.Z. GEOMORPHOLOGY, reprint of selected papers, 1912-25. W. & T. 42/-

— VOLCANES AS LANDSCAPE FORMS, 2nd ed. W. & T. 35/-

Fleming, C. A. & Kear, D. THE JURASSIC SEQUENCE AT KAWHIA HARBOUR. (Bulletin 67). Govt. Pr. 14/-, q. bd. 20/-

Garnier, B. J. THE CLIMATE OF N.Z. Arnold 93/6

Grindley, G. W. & Ors. THE GEOLOGICAL MAP OF N.Z. 1:2,000,000 (Bulletin No. 66). Govt. Pr. 27/6, q. bd. 32/6. Map only 10/6.

— THE GEOLOGY, STRUCTURE & EXPLOITATION OF THE WAIRAKEI GEOTHERMAL FIELD, TAUPO. Govt. Pr. ppr. 40/-, q. bd. 45/-

Hochstetter, F. von. GEOLOGY OF N.Z., Govt. Pr. 60/-

Ministry of Works. NATIONAL RESOURCES SURVEY, Pt. 1, West Coast Region. Govt. Pr. 35/-

— NATIONAL RESOURCES SURVEY, Pt. 2, Bay of Plenty Region. Govt. Pr. 65/-

— NATIONAL RESOURCES SURVEY, Pt. 3, Northland Region. Govt. Pr. 45/-

— NATIONAL RESOURCES SURVEY, Pt. 4, Nelson Region. Govt. Pr. 45/-

Searle, E. J. CITY OF VOLCANOES: A GEOLOGY OF AUCKLAND. Paul 21/6

Thompson, Kermode & Ewart, N.Z. VOLCANOLOGY, Central Volcanic Region. D.S.I.R. 20/- ppr.

Williams, ECONOMIC GEOLOGY OF N.Z., Austin Institute of Mining & Metallurgy. Govt. Pri. 84/-

Cooper, L. & R. NEW ZEALAND GEMSTONES. Reed 25/-

PAUL'S BOOK

211 Victoria St., HAMILTON
49 High St., AUCKLAND

ARCADE LTD.

P.O. Box 928 Ph. 40-916
P.O. Box 3576 Ph. 22-203

AN ACCOUNT FOR **EVERYONE . . .**

YOUR SAVINGS ARE OUR SPECIALTY

PERSONAL SAVINGS ACCOUNTS
TRUST ACCOUNTS
CHILDRENS ACCOUNTS
ESTATE ACCOUNTS
SOCIETY CHEQUE ACCOUNTS
SPECIAL PURPOSE ACCOUNTS
CHRISTMAS CLUB ACCOUNTS
THRIFT ACCOUNTS

ALL EARN

3%
INTEREST

**POSTAL FACILITIES — ENQUIRE NOW AT YOUR NEAREST
BRANCH OF THE**

WAIKATO SAVINGS BANK

Waikato, King Country, Thames Valley Areas

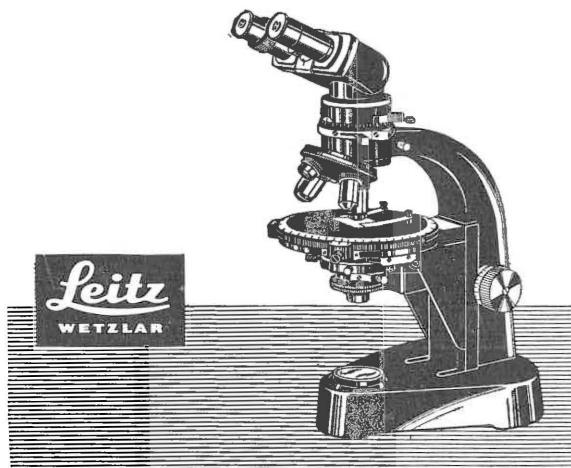
LEITZ

A PRECISION INSTRUMENT TO SUIT YOUR NEED

Microscopes:

Petrological—stereo microscopes for ore examination—biological—metallurgical microscopes for examination of radioactive material—incident light or transmitted light interference microscopes.

Heating stages—dilatometers—special heating microscope—microscope photometers—spectographs—optical measuring and hardness testing instruments.



LEITZ LABORLUX — POL

The Leica Camera and its large range of accessories

Projectors — Episcopes — Diascriptors

TECHNICON

Automation in Analytical Chemistry

Biochemical Analysis

Air and Water Pollution

Metallurgical Analysis

Soil Analysis

Plant Analysis

Amino Acids

You let us know your requirements and we have methods to enable you to have complete results recorded on paper at the rate of up to 80 samples per hour continuously.

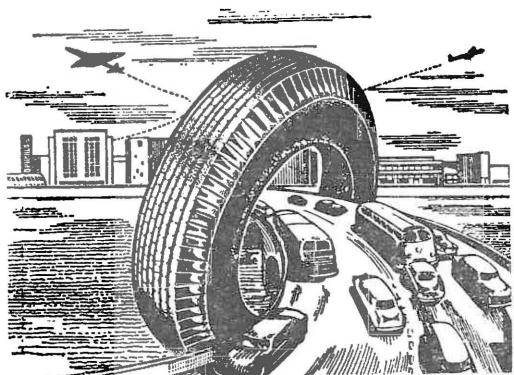
For further information please write or phone:

E. C. LACKLAND & CO. LTD.

P.O. Box 5284
AUCKLAND 1

Phones: 20-135, 20-136

We Challenge
You to a
Better



TYRE DEAL HAMILTON TYRE & BATTERY SERVICE

NEW TYRES ————— RECAPS

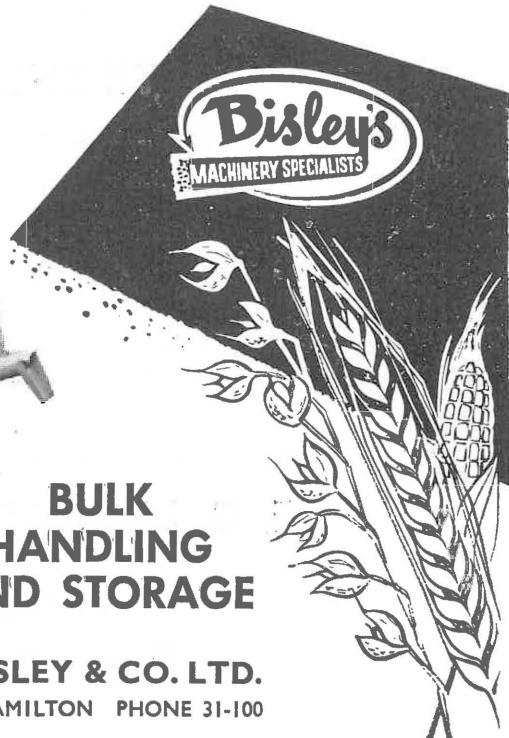
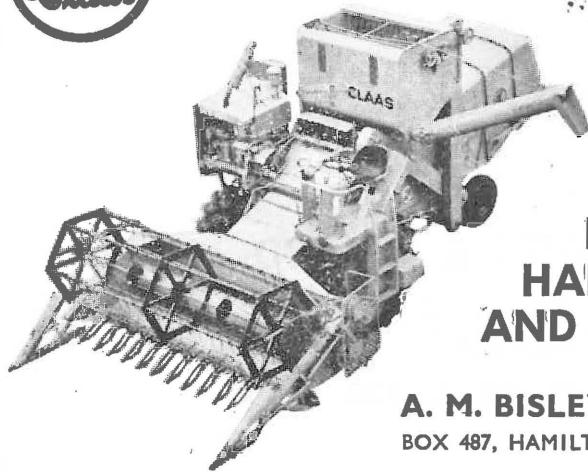
For Personal attention on all your Tyre Problems
enquire about our 10 MINUTE RECAP SERVICE.

PHONE 82-791

::

WARD STREET

KNOW HOW IN
GRAIN PRODUCTION
HARVESTING WITH
COMBINE
HARVESTERS



BULK
HANDLING
AND STORAGE

A. M. BISLEY & CO. LTD.
BOX 487, HAMILTON PHONE 31-100

EARTH SCIENCE JOURNAL, Vol. 1, No. 2, 1967

CONTENTS

	Page
Papers: A Systems Approach to the Description and Interpretation of the Landsurface of the Northern Half of the North Island, New Zealand	118 —A. J. Conacher
Recent Aggradation Within The Waikato River	124 —J. C. Schofield
Fifteenth Century Earth Science	130 —Evelyn Stokes
Tidal Hydrology in Pegasus Bay	149 —G. J. Blake
Erosion By High Intensity Rainfalls In the Lower Waikato	153 —M. J. Selby
Aeolian Activity In A Urewera Catchment	157 —G. Ross Cochrane
Uses of Volcanic Ash Beds in Geomorphology	164 —W. A. Pullar
Book Notices	178
Book Reviews	187
Current Geomorphic Research In New Zealand	198 —R. J. Blong and M. J. Selby
Notes For Contributors	204

Published at the press of

A. O. RICE LTD.

by the Waikato Geological Society (Incorporated)

Editorial Office: C/o University of Waikato

Private Bag

Hamilton

New Zealand

Copyright © 1967: Waikato Geological Society

Except for short quotations for review purposes, material must not be reproduced without permission.
The Society is not responsible for the opinions or statements of writers in this Journal.