

entitled "Random Eigenvalue Problems", "Wave Propagation in Random Media" and "Branching Processes in Neutron Transport Theory". Each is accompanied by a comprehensive specialized set of references to further literature. The authors of these articles have all made original contributions to their subject, so the exposition is authoritative and leads naturally to the consideration of unsolved problems.

The branches of mathematics most involved in the book are stochastic processes, functional analysis and numerical analysis; and these fields are entered at a relatively advanced level, so that the book is not for the beginner in research but more for the established mathematician who is trying to become up to date in the areas of research under discussion.

L. S. GODDARD

## MARKOV PROCESSES

### Markov Processes and Potential Theory

By R. M. Blumenthal and R. K. Gettoor. Pp. x+313. (Academic Press: New York and London, 1968.) 140s.

THE study of the relationship between Markov processes and potential theory began in the mid-1920s, but the fact that this relationship has a deep probabilistic basis emerged only gradually. The purpose of this book is to give a modern exposition of the subject, much of which is inevitably based on the famous papers (1957-58) by Hunt. The general theme is that various potential-theoretic notions (superharmonic functions, balayage, equilibrium potential, capacity) arise naturally when one investigates Markov processes, and thus have illuminating probabilistic interpretations. To carry out this programme one needs extensive measure-theoretic preliminaries, covered in chapter one. Chapter two deals with excessive functions and exceptional sets, and ends with a brief discussion of how these probabilistic notions are related to those of classical potential theory when the Markov process is Brownian motion; here the reader is expected to be familiar with classical potential theory. Chapters three to five, highly technical, deal with multiplicative and additive functionals, and chapter six includes the relations between capacity and equilibrium potential on the one hand, and hitting probabilities on the other.

This is a specialist monograph which can probably be tackled only by readers who have some previous experience in probability and stochastic processes as well as a good grasp of measure theory, and who are prepared to work through some of the many non-trivial exercises. Its appearance will also certainly be welcomed by workers in this field, who have been referring to its forthcoming appearance for several years.

G. E. H. REUTER

## GLACIAL GEOMORPHOLOGY

### Glacial and Periglacial Geomorphology

By Clifford Embleton and Cuchlaine A. M. King. Pp. xv+608. (Arnold: London, 1968.) 70s.

LANDFORMS have been modified directly or indirectly by the Pleistocene glaciations over a great part of the globe, and the present interplay of erosional and depositional forces is intimately related in its pattern of incidence to that of ice distribution, which is necessarily impermanent. This must never be forgotten during the analysis of existing landforms and the assessment of the nature and rates of operation of the forces currently modifying them. Progress in glaciology is necessarily of interest to the geomorphologist.

During the past twenty years a sustained growth of interest in glaciological research in both field and laboratory has been reflected in the healthy development of the literature. Until now no summary or assessment has

been available in English to workers in related fields. Charlesworth's monumental *Quaternary Era* and Flint's *Glacial and Pleistocene Geology* were published in 1957 and both had a central emphasis on Pleistocene geology and stratigraphy rather than on the nature of the processes at work in glacial erosion and deposition, and the relationships of these to the basic characteristics of glacier ice. *Le Modelé Glaciaire et Nival* by Tricart and Cailleux appeared in 1962, and Lliboutry's very important *Traité de Glaciologie* in 1964-5. These two works covered the general field, but a great gap remained in the English literature. *Glacial and Periglacial Geomorphology* is planned to fill it, and does so in a very acceptable way.

This important book is thorough, scholarly, and well documented. It is pleasantly fitting that the authors are former students of the late W. V. Lewis, who did so much to stimulate glaciological field work and promote cooperation between glaciologists and geomorphologists. Their treatments of the present state of knowledge of glacial and fluvioglacial erosion and deposition, their operations and results, and of periglacial geomorphology, follow a discussion of glaciations and glacial behaviour which occupies the first quarter of the book. It is this section which will bring most in the way of fresh ideas and information to the geomorphologist. There is a reasonable historical slant in the presentation of the literature, but with a proper emphasis on recent work. The particular interests and experience of the authors have helped to determine the detailed cases selected for illustrative treatment, and the book profits from this.

There are obvious difficulties in producing a book covering a wide field and involving the selection of key papers for discussion from an ever-increasing spate. In a few sections length of treatment appears to reflect the bulk of recent work published rather than the inherent importance of the subject. In others, concepts and ideas seem somewhat veiled by factual detail. A rather more prominent discussion of the operation of some of the climatic controls might have interested some readers, and others might feel that an enlargement of the glaciological sections even, if necessary, at the expense of the periglacial geomorphology, which is better covered elsewhere, might have been an advantage. But these are minor criticisms of a stimulating and extremely useful book. After reading it one awaits with all the more interest the geomorphological results which will be forthcoming from the sounding of the Antarctic ice cap from the air, and the publication of work now in hand applying quantitative techniques in geomorphology to glaciated land forms. The authors have revealed that progress in glaciology has recently been more fundamental than in geomorphology, but it may be hoped that appearance of this book will have a stimulating effect on future research.

J. M. GROVE

## Obituaries

### Professor J. E. Harris

JOHN EDWARD HARRIS died in his office in the University of Bristol on July 1, 1968, at the age of 57. He had been professor of zoology for twenty-two years and vice-chancellor of the university for a few weeks short of two years.

He was born in Lincoln and was educated at the City School, Lincoln. In 1928 he went to Christ's College, Cambridge, with an open exhibition to read physics, chemistry and mathematics. He obtained first class honours in the London External General BSc in 1930 and in the Natural Science Tripos Part II in zoology at Cambridge in 1931. In 1936 he obtained a PhD from Cambridge.

His research career began with a Bachelor Research

Scholarship at Cambridge (1931–32), followed by a Commonwealth Fund Harkness Fellowship (1932–35) at Columbia University. He returned to Cambridge in 1935 as Amy Mary Preston Read fellow and later Royal Society Messel research fellow until 1940. From 1940 to 1944 he investigated the fouling of ships' hulls for the Marine Corrosion Sub-committee of the Iron and Steel Institute, a committee of which he later became chairman.

He was appointed to the chair of zoology in Bristol in 1944. From then, until his appointment as vice-chancellor twenty-two years later, he was actively engaged in research and in building up the department, which came to be one of the largest in the country, recognized everywhere as one of the happiest and most productive. His own researches ranged very widely: they include such diverse interests as hydrodynamics of fish locomotion, vertebrate palaeontology, early movements of the vertebrate embryo, functional morphology of *Ascaris*, and vertical migration of plankton. The high quality and originality of this work led to his election to the Royal Society in 1956. In 1961 he was appointed a CBE.

But his contribution to science cannot be measured by the list of his publications. Harris knew much more than he ever wrote, and his influence was transmitted more by personal contact than by the printed word. An explanation of the growth and extraordinary stability of the Department of Zoology—few ever left it and then almost only for chairs in other universities—is to be found in Harris's integrity and industry, in his courteous ability to further a colleague's work without directing it.

Although Harris won an assured place for himself as a zoologist, it is arguable that he made an even greater contribution to the progress of biology not only by his leadership of the Department of Zoology but also by the leadership and vision to which he gave effect on such bodies as the Advisory Committee on Fisheries (1953–65), the Council of the Royal Society (1960–62), the Agricultural Research Council (from 1962), the Natural Environment Research Council (from 1965), and many others.

In time Harris was drawn more and more into problems of teaching and administration. Long before 1966 when he became vice-chancellor he had become known within the university and far beyond as an administrator who could produce workable schemes. When Sir Philip Morris retired from the vice-chancellorship, John Harris was the obvious choice as his successor, and it can rarely have happened that the obvious choice was so completely acceptable. Even so, his success in the short term of his actual tenure was remarkable. At his appointment, everyone thought him supremely qualified for the work. It was typical that he himself spoke cheerfully but quite seriously of having to learn a completely new job, and he set about gathering information and mastering the administration with the fine judgment and mental energy that had distinguished all his previous work.

#### Professor Lieven Ferdinand de Beaufort

ON May 11 Professor de Beaufort died aged 89 after a short illness. For about 20 years he had enjoyed the life of an emeritus professor at his beautiful country house at Leusden near Amersfoort where he had continued his scientific pursuits after retirement.

Born on March 23, 1879, at Leusden, the son of the historian and statesman W. H. de Beaufort, he had a great interest in natural history from his early youth. He began his scientific career as an honorary assistant to Professor Max Weber, whom he succeeded in 1922 as director of the Zoological Museum of the University of Amsterdam. In 1926 de Beaufort was appointed a professor of zoogeography and later also of pharmaceutical zoology.

As early as 1902 as a bachelor of science he had taken part in the first Dutch New Guinea Expedition, and from 1909 to 1910 he travelled with his first wife to Waigeu

and Ceram to make zoological collections on these interesting islands. He published a report on the birds collected during the first expedition in *Nova Guinea* and remained a keen ornithologist for the rest of his life, although under the influence of Max Weber his scientific interest soon turned to the study of fishes, especially those of the East Indies. De Beaufort and Max Weber edited seven volumes of *The Fishes of the Indo-Australian Archipelago*, and de Beaufort continued the work until 1951, when he published the ninth volume in collaboration with W. M. Chapman.

De Beaufort contributed much to our knowledge of fishes and birds. His three handbooks *Zoögeographie van den Indischen Archipel* (1926), *Zoögeographi* (1943) and *Zoogeography of the Land and Inland Waters* (1951) are still extensively used and quoted. After Max Weber's death he edited the *Results of the Siboga Expedition*.

De Beaufort supervised investigations of the fauna and flora of the Zuidzee, before and after it was made into a freshwater basin. He served as member and president of many boards and commissions, including the Commission for Applied Scientific Research (TNO), the Commission for Scientific Research in the Tropics, the Netherlands Ornithological Society, the Geographical and the Entomological Societies. Since 1928 he had been on the board of the Amsterdam Zoological Gardens.

In appreciation of his work on the fishes of the Indian Ocean, Professor de Beaufort was invited to the Indian Science Congress in 1937. For the same reason he was awarded the Golden Joy Gobind Law Medal for Asiatic Researches in Zoology of the Royal Asiatic Society of Bengal. After organizing the seventh International Ornithological Congress in 1930 he was made Ehrenmitglied des Bundes der Ungarischen Ornithologen and the Ornithologische Gesellschaft in Bayern. In 1938 he was made a corresponding member of the Zoological Society of London and an honorary foreign silver jubilee member of the Indian Science Congress Association. In 1946 he became an honorary foreign member of the American Society of Ichthyologists and Herpetologists.

#### Professor N. J. Giarman

THE news of the sudden and untimely death on October 10, at the age of 48, of Dr Nicholas J. Giarman will sadden pharmacologists in many parts of the world. Giarman, professor of pharmacology at the Yale University School of Medicine, was well known to his British colleagues. He had spent a year in the University of Edinburgh during the academic year 1954–55, working in J. H. Gaddum's laboratory; an interesting study of the ability of nervous tissue to synthesize 5-hydroxytryptamine was the outcome of that stay. From then on his interest was centred on neuropharmacology and it was to this field that his own research and that of his colleagues mainly contributed.

For most of his active career Giarman worked at the Pharmacology Department in Yale, where he took his PhD in 1948. Here he built up a very active research group. For this he was well suited, being well versed in classical and modern methods of pharmacological research, but he was also an outstanding teacher, able to awaken and hold the interest of younger colleagues. It is therefore not surprising that there was a stream of visitors to his laboratory, both from within the United States and from abroad. Some of these have already taken up responsible positions elsewhere. He was also a clear and interesting writer; this gift is well exemplified in his latest review article, written jointly with F. E. Bloom, on "Physiologic and Pharmacologic Considerations of Biogenic Amines in the Central Nervous System", which appeared earlier this year in volume 8 of the *Annual Review of Pharmacology*. Giarman was for many years regional editor of *Biochemical Pharmacology*, an office to which he devoted much time and care.