BOOK REVIWES

Elements of Group Theory for Physicists —Third edition, A. W. Joshi, Wiley Eastern Limited, New Delhi, 1982; Pages: 334 + xiii, price

The text is designed for a course at an introductory level in 'Group Theory' for students of the Indian Universities in Physics at the Master's level. The 3rd edition of this text has little changed from the 2nd edition (pages 324 vs. pages 334 of the third edition). The author has, in particular, included an appendix on mappings and function and made some additions in Chapter 3. The text has chapters on (1) Abstract group theory, (2) Hilbert spaces and operators, (3) Representation theory of finite groups, (4) Continuous groups and their representations, (5) Group theory in Quantum mechanics I, (6) Group theory in quantum mechanics II, (7) Crystallographic and molecular symmetries and (8) Group theory in solid state physics. The order in which the topics are discussed is satisfactory and the treatment is adequate. The book has a few problems listed at the end of every chapter.

The book is a good introduction for the graduate or post graduate students in Physics. Moreover, it will also be of value as a reference in the Library.

D. N. SATHYANARAYANA

Department of Inorganic and Physical Chemistry,
Indian Institute of Science,
Bangalore 560 012.

Annual Review of Biophysics and Bio-Engineering — Vol. 11, 1982, by L. J. Mullis, published by Annual Review Inc. 4139, El Camino Way, Palo Alto, California, 94306. U.S.A. Pages: 494. Price: USA $22.00 elsewhere $25.00.

Volume 11 of the Annual Review of Biophysics and Bioengineering, maintains the tradition of presenting excellent review articles on new biophysical findings and important developments and techniques in biological and medical research.

There are a number of articles on proteins and other biomolecules relating to their structures and functions. For example, the article on 'Crystallographic and -NMR studies of the serine proteases', suggests models of the charge relay triad for several stages of the enzymatic pathway of the serine proteases. Knowledge of the complete structure of the first membrance protein, bacteriorhodopsin, provides substantial information on the nature of membrance channel. In the article on the 'Structural basis of proton-translocating protein function' the authors discuss the amino acid sequence of bacteriorhodopsin and DCCD-binding subunits of H^+-ATPases which would make possible, the detailed investigation on both structural organisation and the functional mechanism of proton-translocating moieties. The article on 'Protein conformation Dynamics and folding by computer simulation' discusses the use of energy calculation as a model building tool to aid experimentalists, interpreting and planning experiments on protein conformation. This article is extremely useful to researchers in the field of protein conformation. Other articles on biomolecules relate to a) the novel pressure effects on proteins, nucleic acids and membrances which have opened up fields, such as piezobiophysics, b) evolution of genome size and cell volume, evolutionary significance of cell volume, control of nuclear volume, etc. These are important factors which should be taken into account in proposing optimal DNA theories.

This volume also contains important articles on newer applications of biophysical techniques such as NMR to biologically important molecules. We would like to mention particularly the article on Optical detection of magnetic resonance in biologically important molecules (ODMR)', which discusses its application to peptides, proteins, coenzymes, nucleic acids, porphyrins and photosynthetic systems. The definite advantages of ODMR over optical spectroscopy in biological systems is well brougtout.

The chapters dealing with the ultrasonic tissue characterization for medical diagnosis, proton and neutron therapy for treatment of tumors and X-ray computed tomography for medical imaging and image reconstruction are written exceedingly well and are very useful for those researchers interested in applying these techniques to medical problems. In particular, the article on X-ray computed tomography is written starting from the basic principles and covering its widespread use for medical imaging.

Overall, this volume of the Annual Review of Biophysics and Bioengineering will be a very useful book for beginners as well as those already working in different fields of biological and bio-medical research.

V. SASISEKHARAN AND K. R. K. EASWARAN
Molecular Biophysics Unit,
Indian Institute of Science,
Bangalore 560 012.

Dusan Zachar, 1982. **Soil Erosion**: Development in Soil Science 10), Elsevier Scientific Publishing Co., Amsterdam, pp. 547.

In his preface the author rightly recognise soil as of fundamental importance for agriculture and for the environment as a whole. The degradation of this component of the environment is of particular interest to ecologists apart from its relevance to pedologists, biologists, agriculturists, geographers, etc.

The book is divided into five chapters, each one dealing with an aspect of the problem ranging from terminology, types of erosion, factors contributing to it, to geographical considerations. The chapter dealing with the problems and methods of soil erosion research is a welcome one, particularly in an inter-disciplinary area such as this; this summarises the scattered literature for the benefit of those who are in the peripheral disciplines. The chapter on global distribution of erosion has, unfortunately, much less to say on Asia; this may partly be indicative of lesser research efforts from this part of the world. However, I suspect that it is also related to lesser accessibility to publications originating from here. Much or what in written on Asia pertains to the Asian part of the U.S.S.R. or to Japan. I wish the region of Asia, which are densely populated and under high rainfall belt such as the Indian Sub-continent and the South-East Asia, had received more emphasis than what is contained in this book. These areas fall among those where erosion problem is more acute.

The problem of erosion is a complicated phenomenon with a variety of view points, depending upon the specialists who handle it and with regional overtones. As pointed out in the concluding section, ecological consequences of this problem are less understood. Thus the slash and burn agriculture systems of the humid tropics present a unique spectacle of land degradation which deserves more attention. This book, I am sure, would stimulate the appetite of those in peripheral disciplines and would contribute for a better understanding of the ecological consequences of soil erosion.

Professor of Botany P. S. RAMAKRISHNAN
North-Eastern Hill University
Shillong 793 014.

Dwarwinism Defended—A Guide to the Evolution Controversies: by Michael Ruse (Addison-Wesley Pub. Co., Advanced Book Program World Science Division, Reading, Massachusetts) 1982, pp. xvii+356, Price: $12.50.

Darwinism has passed through three phases in its history since the publication of Charles Darwin's book *The Origin of Species* in 1859. First, there was its furious refutation, largely during Darwin's own life time, nore particularly after his *The Descent of Man* was published in 1871. Then, after the rediscovery of Mendel's laws of inheritance and the development of genetics, which provided powerful support to Darwinism and elevated it to Neo-Darwinism, there was a period of its tranquil acceptance which lasted for around 60–70 years in this century. The third phase began in the nineteen seventies when fresh doubts arose in the minds of biologists about Darwinism, not only regarding the universal or even wide-spread operation of natural selection as the mechanism of organic evolution which Darwin propounded, but also the validity of the theory of evolution itself. We are currently in this third phase and the book under review is an attempt to re-establish Darwinism (or Neo-Darwinism) as a "Scientific theory or discipline that can stand proudly next to the other great theories of Science"

It is odd but interesting that over a hundred years since Darwin's death and 123 years after the publication of *The Origin of Species*, questions are being asked about the validity of the evolution theory and doubts expressed regarding the authenticity of natural selection as its mechanism. And while the earlier condemnations were occasioned by a blind and unquestioned acceptance of creation as the mode of origin of myriads of plants and animals (as outlined in Genesis), the current reservations are based on a closer examination of the theory itself. The earlier questions arose out of an emphasis on creation; the current ones have their origin in the inadequacies of Darwinism as a theory to explain evolution.

Some of these imperfections Darwin himself was aware of. While Darwin conceived of natural selection as an initiating force of evolution, he did not invest it with the ubiquity or power which his promoters and defenders did. Indeed it has turned out to be a misfortune that Darwinism's champions, particularly in the current phase of the controversy, are out-doing Darwin and in the process, preventing a measured appraisal of the criticisms of the theory.

Michael Ruse's is one such attempt at defending Darwinism. He possesses no qualifications to evaluate Darwinism, let alone defend it. He is not a trained biologist, indeed he admits to being a "nonbiologist looking at matters from the outside". His own subject is philosophy, and biologists, and scientists generally, are rather tired of philosophers trying to teach science to scientists, witness Herbert Spencer and science, and it seems generally fitting and proper that philosophers function in their own realm.

Much of Michael Ruse's account of the life and work of Darwin presented in Part I, *Darwinism yesterday*, is well known and fully documented. The additions are his rhetorical, impulsive, eristic and opinionated statements which are so characteristic of a non-scientist. To declare, "for me", "as far as I am concerned", the theory is proved, is not good science and Ruse is a master at such declarations.

The second part, *Darwinism Today*, is a rehash of Mendelian genetics, population genetics and palaeontology, in what Ruse believes to be in the service of Darwinism. Kettlewell's peppered moth is again the example chosen for speciation. But where is the new species? Ruse clearly is unaware that while industrial melanism is illustrative of adaptation and change, it is no longer cited as an example of the origin of *new species*. He deals extensively with the compound eyes of trilobites but fails to contend with the central problem of the sudden and climactic appearance of the Cambrian fauna; it just is not convenient to him. On the other hand, Ruse is anxious to class Darwinism along with Einsteinian astronomy, quantum mechanics, plate tectonics and so on. He does not seem to heed his own warning against overstating the case and continues to insist that "Neo-Darwinism centering on natural selection, holds the secret to evolutionary change". Palaeontology doesn't support this; and complex and perfect structures like the mammalian eye and the mammalian ear which Ruse rarely mentions, have been areas where it is difficult to imagine the working of natural selection.

Part III "*Darwinism Tomorrow*?" deals with such assorted subjects like origin of life, population ecology, sociobiology and palaeontology. Ruse is particularly uncomfortable dealing with palaeontology and craves for compromises. Stephen Gould nettles him with his theory of punctuated equilibria, but what can he do? If Darwinism is killed, palaeontology will be the weapon of its slaughter. And Ruse knows it well, to his chagrin.

In the three chapters in part IV, *Darwinism and Humankind*, Ruse is in his element, or so he thinks. You see, he is a philosopher and believes he is qualified to pontificate on Man, his place in nature, his uniqueness and of course his role, in addition to his origins. He draws extensively from E.O. Wilson's views on Human Sociobiology and believes that only by application of Darwinism principles to human social behaviour can man's true nature be apprehended. Absurd!

The final part V, *Darwinism besieged*, finds Ruse particularly aggressive. He blasts Creationism and produces one argument after another why Creationism is not only wrong but ludicrous in the extreme.

Creationism is no alternative to evolution. Genesis is a religion-based formulation and christianity is not the only religion of man. Indeed, it happens that each religion has its own affirmations of the origin of animals, plants and man. Unfortunately Ruse doesn't effectively employ this argument against Creationism; clearly the flaws and foibles of Darwinism cannot be employed to strengthen the case of Creationism. That in U.S.A. there is a revival of Creationism and efforts are being made to teach it in schools is an unfortunate development.

But then, the way to counter this attempt is not to proclaim that Darwinism is the only theory to explain the origin and maintenance of species as Ruse does; but to take an objective scientific look at all the arguments, including the alternative scientific theories of evolution.

We need to have a new look at the nature. We need to know more about evolution, about variations and their selection. We need to know more about mutation rates, what influences those rates, how mutations work to produce changes in the organism. Evolution is still a delemma but thumping the table is no solution to it.

B. R. SESHACHAR

Centre for Theoretical Studies,
Indian Institute of Science,
Bangalore 560 012.

Edited and Published by Prof. M. R. A. Rao, Current Science Association, Bangalore 560 080
Phototypeset and Printed at Sri Sudhindra Offset Process, Bangalore 560 003.