

Science and the Politician

By Marcus Goodall. Pp. viii + 83. (Cambridge, Mass.: Schenkman Publishing Company, Inc., 1965.) 2.65 dollars.

CONCERN as to the extent of the possibility of planning human activities is shown both by those who welcome the increase of regulation and those who deplore it. Neither party is prepared to consider that the dispute should be subject to investigation; that we should study the extent to which planning is likely to be effective, given the means available at any time.

This is only one practical example of the type of study that Dr. Goodall calls "third science". It is characterized by attention to aims and yet by recognition of the problems that are involved in defining aims. In such respects it transcends the 'second science' of Newton, Maxwell and Einstein, which required drastic uniformizing assumptions, such as those that limit the applicability of the Second Law of Thermodynamics.

Goodall traces the beginning of the modern period back first to Darwin, then to Pierce, with his emphasis on the relationship of observer, symbol and object, and from here to Cantor, Gödel and Tarski. The connexions are only sketched out, but the effect is to provide a series of hints as to the logical problems underlying modern science and especially biology.

The book is especially concerned to point out the inadequate use that is made of modern scientific and logical possibilities by those concerned to regulate the conduct of modern affairs (and particularly 'politicians', the author's favourite aunt-sally). In this, it well represents the frustration that many feel, who see so little use made of such powerful methods. The special value of methods such as those of specification theory, games theory and the like is that it should be possible with them to suggest means to further their wider adoption for human ends. It is to be hoped that Dr. Goodall will follow this stimulating essay with more detailed proposals in which such methods are used to assess the best strategy for applying them.

J. Z. YOUNG

Elementary General Topology

By T. O. Moore. Pp. xi + 174. (Englewood Cliffs, New Jersey, and London: Prentice-Hall International, 1964.) 48s.

THIS very readable book provides an introductory account of general topology (but not algebraic topology) for the beginner. There is some doubt as to when topology should first appear in the training of a mathematician; but the author of this book, after several years' experience in teaching topology to undergraduate and post-graduate students, came to the conclusion that an introductory course might best follow a prior course in abstract algebra, and precede the study of advanced calculus and real analysis. Thereby, it is claimed, "maximum results follow minimum effort". So the present book has been written primarily as a text for undergraduates.

The first chapter is concerned with elementary set theory. Then follow chapters on topological spaces, mappings of such spaces, and compactness. After that, there is a general development of the properties of product spaces, metric spaces and function spaces. An important chapter, on nets and convergence, is concerned mainly with the generalization of the idea of convergence of a sequence to a point in a space. The book closes with a chapter on Peano spaces (continuous curves).

In a book of this kind there are necessarily many definitions. These are clearly stated, often illustrated, and the theorems are separated by graded exercises. At the end of each chapter there is a list of miscellaneous exercises, and, all in all, the book should appeal to students looking for a text supplementary to a course of lectures on the subject.

L. S. GODDARD

Supplemental Tables of Molecular Orbital Calculations

By Prof. A. Streitwieser, Jr., and Prof. J. I. Brauman. With a Dictionary of π -Electron Calculations by Prof. C. A. Coulson and Prof. A. Streitwieser, Jr. Vol. 1: Pp. xxiv + 1-860. Vol. 2: Pp. 861-1223 + xxx + 358. (London and New York: Pergamon Press, Ltd., 1965.) £33 net per set.

HÜCKEL calculations are now a matter of pure routine, but this does not detract from their value as a guide to the physical and chemical properties of conjugated molecules; indeed, in spite of heavy competition the Hückel theory remains the best wave-mechanical model of molecules that we have.

Supplemental Tables of Molecular Orbital Calculations presents the results of Hückel molecular orbital calculations on almost 500 hydrocarbons. The calculations have been performed on a digital computer and the output of the computer has been photographed so that the published papers are free from any errors of transcription. This makes the tables particularly reliable for use by people who do not have the necessary skill to programme molecular orbital calculations themselves. The printed results include the energies and coefficients of all the molecular orbitals of the molecules considered, their total π energies, electron densities and bond orders, and the various types of mutual polarizability. The introduction explains the tables and shows how they may be used. Volume 2 includes the "Dictionary of π -Electron Calculations" which is used also as a separate volume.

The compilation of this considerable body of data is likely to be most useful to the chemist who does not possess access to a computer; the price of the volumes, though relatively high, is negligible compared with the cost of the computing time and expertise which would be needed to carry out a calculation on a mere handful of the molecules treated.

H. C. LONGUET-HIGGINS

Freshwater Microscopy

By W. J. Garnett. Second, revised edition. Pp. xv + 376 + 54 plates. (London: Constable and Co., Ltd., 1965.) 42s. net.

THIS edition of *Freshwater Microscopy* is a great improvement on the original. The inclusion of more information, twenty-six excellent new figures and four new plates, and the bringing up to date of techniques and bibliography, all contribute to this. Apart from the slight expansion of certain paragraphs and the introduction of common species omitted from the first edition, eight of the fifteen original chapters remain substantially unaltered. Of the other seven, the chapter on microscopic equipment has been rearranged in parts to embrace modern methods and equipment, and the chapters on bacteria and fungi, the higher plants and molluscs have been rewritten and enlarged. Leeches have been gratifyingly included in the chapter on worms. The arthropods are now allocated three chapters instead of two, due mainly to the introduction of many more insect species.

While scientific inaccuracies are rare, a few do occur. For example, a single cocoon occurs in *Microdalyellia* and not *Dalyellia*; there are fourteen, not thirteen, British species of leeches; leeches can have up to ten eye-spots—not up to eight; *Planorbis spiralis* should be *P. spirorbis*; and *Holopedius gibbeus* should be *Holopedium gibberum*. Though the bibliography has been extended and brought up to date, there are still obvious omissions such as "A Guide to Freshwater Invertebrate Animals" by T. T. Macan, and two recent publications on mayflies and oligochaetes in the Freshwater Biological Association series. The exclusion of the publisher and on occasion the date of publication is still rather irksome.

These are, however, but minor criticisms of an enhanced edition which admirably fulfils its purpose to "set the beginner . . . on the right path".

J. O. YOUNG