

physical processes. The sections on wave resonance and harmonic generation are rather specific and, both being strongly mathematical, will probably be of interest only to the specialist.

The sedimentary chapters are far less satisfactory. Hayes's pictorial essay forms a valid introduction and should have been followed by a presentation of the current ideas on the processes which produce the sedimentary features. However, the chapters by Einstein and Kennedy and Locher both describe rather specific laboratory experiments and make little attempt to relate their measurements to the conditions on real beaches. It remains for Longuet-Higgins in the chapter on longshore currents to make the only interesting comments on sedimentary processes on beaches *per se*.

A. J. BOWEN

Organic Reactions

Selected Molecular Rearrangements. By T. S. Stevens and W. E. Watts. Pp. x+212. (Van Nostrand Reinhold: London and New York, 1973.)

MOLECULAR rearrangements comprise a diverse range of organic reactions and a one-volume review has not previously been attempted. The present work is not intended to be comprehensive, yet it covers a large fraction of the subject and includes some esoteric reactions. An introduction is followed by chapters on rearrangements of carbonium ions; nucleophilic rearrangements from carbon to nitrogen and oxygen; 1,2-electrophilic rearrangements and other alkali-induced processes; pericyclic reactions; and aromatic rearrangements.

Such a range necessitates often superficial coverage, but even so the standard is curiously uneven. The chapters on 1,2-electrophilic and related rearrangements which form the heart of the book are outstanding, and that on pericyclic reactions is good. However, the introduction could well be dispensed with and the second chapter has important glosses or omissions. Hydride shifts, the occurrence of "hot" ions in deamination and the controversy concerning classical and nonclassical ions are mentioned cursorily and often the discussion of other topics is uncritical: thus the Tiffereau modification is stated to be superior to the conventional Demjanov procedure, but no explanation is given. In addition, the discussion of aromatic rearrangements is inadequate and propagates the π -complex mechanism for intramolecular processes with no indication that this view is no longer accepted by the majority of workers in the field.

The book might also benefit by the introduction of the concept and terminology of orbital symmetry at the beginning (instead of on page 148); by the inclusion of more quantitative data

(Hammett parameters, migratory aptitudes); and by a distinction between the [2,3] and [1,2] sigmatropic forms of the Wittig and related rearrangements. There are also a few odd statements (how many would consider the Hofmann rearrangement to be "one of . . . the most widely-used reactions in organic chemistry"?), and the reading lists have some strange omissions such as Shine's definitive text on *Aromatic Rearrangements* and chapters from Thyagarajan's series on *Mechanisms of Molecular Rearrangements*. Indeed the review articles listed at the end of each chapter seem to have been rather arbitrarily chosen.

These criticisms aside, the book contains few errors and is very well written. However, the market is not obvious: too much detail is included for most undergraduate courses whereas research workers in any of the discussed fields will soon have to turn to the references for further reading. It is a pity that the authors could not have negotiated for an extra 150 to 200 pages. They could then have widened the discussion of the present material and included topics such as tautomerism, ionotropy, radical rearrangements and a few more specific reactions, for example, the Tiemann, Jacobson and sulphanic-acid rearrangements, such as to give an essentially complete and valuable survey. Perhaps we can hope for a second edition along these lines?

D. V. BANTHORPE

Quantum Optics

Coherence and Quantum Optics. Edited by L. Mandel and E. Wolf. (Proceedings of the Third Rochester Conference on Coherence and Quantum Optics held at the University of Rochester, June 21-23, 1972.) Pp. xiv+911. (Plenum Press: New York and London, 1973.) \$43.

THIS volume consists of the papers given at the Third Rochester Conference on Coherence and Quantum Optics. It records an important gathering together of practically all of the leading figures in this most lively no-man's-land between traditional optics and quantum mechanics.

Yet was the book worth producing in this form? The large majority of the physicists now interested in the field were at the conference and obtained their information at first hand. For future researchers and those unable to attend, all the worthwhile material will surely be published in the usual journals. Some first class review papers (notably that of Jaynes on Neoclassical radiation theory) are made available, but the material is put together in such a haphazard fashion that they do not stand out. The volume is merely a compilation of preprints grouped by conference session with no proper introduction and

apparently no overall editorial hand. In some cases, potentially most interesting contributions (like Willis Lamb's "Critical Comments on Radiation Theory") are only present as abstracts. Furthermore, there is no record of the discussions following the papers, a necessity if the book is to stand as any sort of record of the conference proceedings.

Surely this type of publication is a scientific white elephant? Useful perhaps for impressing a participant's parent institution or for making an imposing presence on the bookshelf, it merely adds to the unnecessary lumber of publications which threatens to drown physics in a sea of paper. Because they are produced, these compilations are bought; but if they did not exist would the physics community be much worse off? D. G. C. JONES

Gravitational Waves

Gravitational Waves in Einstein's Theory. By V. D. Zakharov. Translated from Russian by R. N. Sen. Pp. xx+183. (Israel Program for Scientific Translations: Jerusalem; Halsted Press, a Division of Wiley: New York and London, 1973.) £5.85.

THIS book, which the publishers describe as a "generalised critical review", is the first monograph exclusively concerned with gravitational waves. It consists of a chapter on experiments which has perhaps inevitably been rather superseded by present developments, a chapter on approximation methods, and a review of work on the rigorous mathematical theory of gravitational waves in general relativity. In particular much attention is directed to the problem of developing criteria by which a given space-time may be said to describe a gravitational wave. Nine such criteria are discussed together with the relationships between them and to the Petrov classification. This problem is closely connected with the Cauchy problem and the types of discontinuities that the Riemann tensor may possess. Also included is an account of Bel's super energy tensor. This section is well done, although there are a number of minor errors and misprints—the Penrose diagram is drawn incorrectly, for example.

Then follows a discussion of gravitational wave optics and the propagation of gravitational waves. Here one could have hoped for a clearer discussion of the Goldberg-Sachs theorem and the many exact solutions which have been discovered using it—for example, the important Kerr and Taub-NUT solutions. Indeed the statement on page 81 that the Robinson Trautmann solutions comprise all vacuum algebraically special gravitational fields is definitely