

Books for Autumn 1975

Fish Communities in Tropical Freshwaters

R H Lowe-McConnell

By reference to ecological studies in freshwater fishes, this book illustrates how tropical fish communities differ from those in temperate waters. The book makes available to the general ecologist the results of recent research into the ecology of the fish.

Although the book is intended primarily for college and university students it will be of interest to the general reader concerned with ecological concepts, zoogeography or fish biology.

£10.00 net

Forthcoming:

Guidebook to Stereochemistry

F D Gunstone

This guidebook provides a foundation for the understanding of stereochemistry - a subject which is of fundamental importance in all sciences studied at the molecular level. As most molecules exist in three dimensional form, molecular shape must be understood in order to rationalise and predict chemical and biological behaviour. There are chapters dealing with *cis-trans* isomerism, enantiomerism, conformation, and dynamic stereochemistry.

£2.95 net

Forthcoming:

Heterocyclic Chemistry

D W Young

An introduction to the chemistry of heterocyclic compounds for students of chemistry, pharmacy and biochemistry, who possess a basic knowledge of biochemistry. The reactions of heterocyclic compounds are compared with those of their simple organic-functional group analogues by noting how ring and heteroatoms interact to produce the unique properties exhibited by heterocyclic compounds.

The chemical effects of aliphatic heterocyclic compounds are discussed, and consideration is given to aromaticity and tautomerism, leading to a discussion of heteroaromatic compounds in general.

Probably £3.50 net



Longman

Quantum optics

Introduction to Quantum Optics. (*Documents on Modern Physics.*) By H. M. Nussenzweig. Pp. xiv + 246. (Gordon and Breach: London, New York and Paris, December 1974.) DM 59; \$24.40.

Optical Resonance and Two-Level Atoms. (Interscience Monographs and Texts in Physics and Astronomy, vol. 28.) By L. Allen and J. H. Eberly. (Wiley Interscience: New York and London, March 1975.) £10.80.

ALTHOUGH the range of topics discussed in these books is not identical there is, nevertheless, some relationship between them. One obvious link is that Professors Nussenzweig and Eberly are both in the same department of the University of Rochester. Furthermore, the books are of comparable length and depth, and are clearly intended for the same type of audience. And both include chapters on superradiance, a topic that has so far received little text book coverage.

In *Introduction to Quantum Optics*, the foundations of the subject are treated in a fairly standard way. The bulk of the book is based on a series of lectures presented by the author at the Latin American School of Physics in La Plata in 1970, and is devoted to the classical and quantum theories of optical coherence and the semiclassical and quantum theories of the laser. A chapter has since been added on coherent interactions, in which superradiance, photon echoes and self-induced transparency are described from a semiclassical viewpoint. The book closes with a rather disjointed 30 page appendix on recent developments (much of which is devoted to the quantum theory of superradiance), which certainly serves to emphasise the unfinished nature of quantum optics research. The style throughout is very readable and there are adequate references at the end of each chapter.

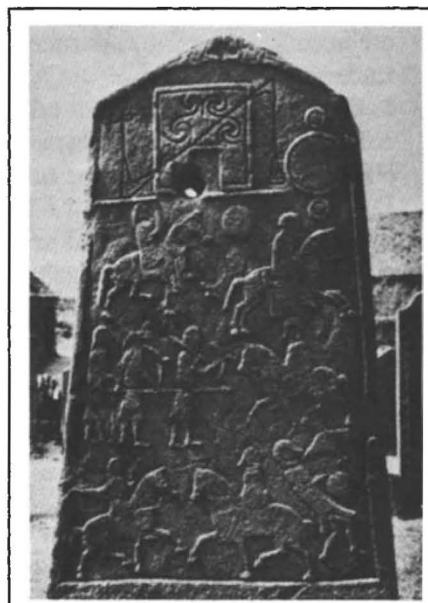
The book is by no means unique in its coverage, apart from perhaps the welcome inclusion of superradiance. In his introduction, Professor Nussenzweig states that the book is "aimed at theoretical physicists and graduate students . . . as an introduction to a new subject with which no previous familiarity is assumed". One happy consequence is that the level of presentation is not so high that the experimentalist will immediately be daunted. In this, perhaps, lies the book's particular merit.

Optical Resonance and Two-Level Atoms is more original in conception, bringing together material that has until now been widely scattered in other books or reported only in research journals. Indeed, it forms an excellent sequel to *Introduction to Quantum Optics*, being devoted entirely to the resonance phenomena treated in the last chapters

of Professor Nussenzweig's book. Both authors have published extensively in this field although the stated intention of the book is not to emphasise recent research but rather to reveal the general principles involved. The first chapter deals with the classical theory of absorption from an unconventional point of view which allows the authors to introduce the idea of pulse "area". An examination of the validity of the two-level assumption and a useful discussion of the various other approximations commonly used leads on to an extended treatment of Bloch vector dynamics and self-induced transparency, which forms the central section of the book. Experimental results are compared with the theoretical predictions, the possible confusion of self-induced transparency with incoherent saturation effects being carefully explained. A chapter on single-atom spontaneous emission using quantised field theory lays the groundwork for the discussion of cooperative phenomena, superradiant decay and photon echoes which forms the second part of the book. The style of writing is clear and informal and the emphasis throughout is always on the physics of the processes taking place. There are numerous helpful illustrations and adequate lists of references.

Both *Introduction to Quantum Optics* and *Optical Resonance and Two-Level Atoms* represent welcome additions to the literature on quantum optics. The latter will prove particularly valuable because of its unusual coverage, although both can be warmly recommended.

G. H. C. New



Pictish horse and foot soldiers form a battle scene on the back of a Pictish sandstone cross slab, Aberlemno churchyard, Aberlemno, Angus, Scotland. Taken from *Scotland: An Archeological Guide* by Euan W. Mackie. Pp. x + 298. (Faber and Faber: London, June 1975.) Cloth £5.50; paper £2.95.