Life as a self-perpetuating information system

Genetic Evolution. By Chen Kang Chai. Pp. 341. (University of Chicago: Chicago and London, 1976.) £15.

THE theme of this work is that life is a self-perpetuating information system and that at all levels this undergoes revision or evolution. The author considers, in sequence, the evolution of prebiotic molecules, of genes, symbiosis, the evolution of chromosomes, of biological structure and function and of populations. In spite of protestations otherwise, this cannot be considered a text book; indeed its use as such would be irresponsible. Those without a broad elementary understanding of modern genetics would find this book difficult, and it contains much that should not be uncritically accepted by a genetics undergraduate. It is a hybrid between a collection of essays and a textbook (say, of population genetics); the phenotype of the organism is stimulating and interesting in places; biased and superficial at others. The subjects covered are so broad that response to a particular chapter is likely to be conditioned by previous experience of its subject matter.

Chapter 1 is concerned with the evolution of biological molecules and the genetic apparatus. It is straightforward and recalls the work of Oparin, Calvin and others on the evolution of organic molecules from inorganic precursors. The next chapter deals with the evolution of genes and perpetuates the belief that the rate of amino acid substitution (and thus the rate of change of DNA) is constant for particular proteins. This is no longer upheld by data for cytochrome C and haemoglobin. The α and β chains of haemoglobin have evolved at different rates, and the same chain has evolved at different rates during vertebrate history.

The third and fourth chapters deal with symbiosis as a precursor to sexual reproduction and with the evolution of eukaryote chromosomes respectively. These two chapters are absorbing but one is left with the uncomfortable feeling that the evidence for each thesis is tenuous to the extreme. When dealing with the evolution of structure and function the book is more convincing and the (freely admitted) sin here is one of omission. The remaining chapters largely deal with population genetics with the material arranged to suit the underlying theme of the book. Here, the discussion of genetic load seems uncritical as is the examination of the current controversy between the neo-Darwinists and those subscribing to neutral mutation theory. The author obviously believes that most variability is of selective importance; yet as with data on the constancy of the rate of amino acid substitution, he does not stress alternative arguments.

If one accepts this book's F_1 status (and protects the innocent), it is interesting and enjoyable. With appropriate supplementary material it should form the basis of many lively honours level seminars and discussions.

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Chemical lasers

Handbook of Chemical Lasers. Edited by R. W. F. Gross and J. F. Bott. (Wiley Interscience: New York and London, December, 1976.) Pp. x+744. £31; $49.

THE preface of this volume describes how a meeting was convened in California in September 1964 to discuss the possibility of nonequilibrium chemical excitation and pumping of lasers, and how by the close of the conference a young graduate student was able to claim that he had demonstrated the first photo dissociation laser. In that experiment excited iodine atoms were formed by the photoinducted rupture of alkyl iodine bonds; this work led naturally to the demonstration of chemically-pumped emission in photolytically-initiated hydrogen–chlorine explosions by the same workers (Kasper and Pimentel) in 1965. It is instructive to speculate why so few of the resultant publications in this interdisciplinary field have emanated from the United Kingdom or indeed why relatively few of the twenty authoritative contributors to this handbook work in western European laboratories.

The editors do not claim to have created a basic text book, but rather an up-to-date compendium of relevant (high gain) laser physics, the gas dynamics of reactive flows and the chemical kinetics of nonequilibrium reactions. Pulsed and continuous hydrogen–halide lasers, the carbon monoxide laser, high power photochemical iodine lasers and metal-atom oxidation lasers are treated in detail; between 40 and 240 references per chapter ensure that most of the published journal and report literature between 1967 and late 1974 is well represented. Problems of numerical (gain) modelling certainly merited (and received) a chapter of their own; rather unexpectedly the treatment of optical resonators also extended to some 120 pages. Like many of the other contributions, however, this chapter (by Chester and Chodzko) was a delight to read; their treatment of stable and unstable resonator theory, and the complications introduced by the laser-gain medium in matching theory to experiment, is a jewel of conciseness. The book is well produced and edited, a 'must' for libraries, but rather expensive for the individual research worker.

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