End of blue-green algae

Sergey V. Shestakov

The Biology of Cyanobacteria.
Edited by N.G. Carr and B.A. Whitton.
Blackwell Scientific/University of California Press: 1982.
Pp.688. £42, $75.

IT IS now unarguable that phototrophic organisms, which have for over a century been called blue-green algae, belong to the prokaryotes and are thus the property of microbiologists rather than botanists. The best proof of this is the appearance of an authoritative book with the word "cyanobacteria" in its title. The term has thus been fully legalized. In the foreword, written shortly before his death, Roger Stanier succinctly defined them as: "Microorganisms that harbour within a typically prokaryotic cell, a photosynthetic apparatus closely similar in structure and function to that located within chloroplasts of phototrophic eukaryotes".

The book is a successor to *The Biology of Blue-Green Algae,* published by Blackwell Scientific and University of California Press in 1973, and clearly reflects the progress in cyanobacteriology made in the intervening decade. The contributors are all leading experts and between them provide comprehensive reviews of the morphology, physiology, biochemistry and ecology of the cyanobacteria, and (in the final chapter) of palaeomicrobiological aspects of their origin and evolution.

The role of cyanobacteria in freshwater and marine ecosystems is described in great detail, and the peculiarities of structure and function of membranes and cell wall, heterocysts and akinetes, phycobilisomes and gas vesicles are discussed in a new light. A lot of attention is also paid to photosynthesis, carbon, nitrogen and phosphate metabolism, and to motility and taxis. Particularly stimulating are the chapters on genetics and molecular evolution, in which the genome of cyanobacteria and their phylogenetic position within the prokaryotes and in relation to eukaryotes are for the first time exhaustively analysed. The genetic relatedness of cyanobacteria and plastids of eukaryotic photosynthesizers is well argued.

The book is not without its disappointments, however. Cyanoviruses, symbiotic systems and soil ecology of cyanobacteria are not included, while the omission of certain contemporary issues in applied biology — the use of cyanobacteria in agriculture and biotechnology, for example — is especially regrettable. (Cyanobacteria are promising subjects for the genetic engineer, and may in time provide the clues by which we unravel the intricacies of such fundamental processes as nitrogen fixation, membrane biogenesis and cell differentiation.) The editors have in general done an excellent job; but some of the authors, although giving an impressive show of their knowledge, have sadly failed to give pointers to the immediate research problems to be tackled in their specific areas.

But the plus points easily outweigh the minus. The book is extensively illustrated and thoroughly referenced, even including very recent data, which will make it a good source for advanced students and new research workers. And since cyanobacteria are now attracting an increasing number of scientists from a variety of backgrounds, this highly sophisticated book will certainly be appreciated not only by microbiologists, but also by biochemists, cytologists, ecologists, molecular biologists and other specialists. □

Sergey V. Shestakov is Head of and a Professor in the Department of Genetics at Moscow State University.

In colour

Colour Vision: Physiology and Psychophysics, a book stemming from the conference on the subject held in Cambridge, UK, in 1982, has recently been published by Academic Press. Editors are J.D. Mollon and L.T. Sharpe; price is £28, $49. Issues raised at the conference were discussed in a News and Views article in *Nature* **300**, 320; 1982.

Life dictionary

A new edition of E.A. Martin's *Dictionary of Life Sciences,* which first appeared in 1976, has been published by Macmillan Reference Books, London. According to the editor, revision of the *Dictionary* has taken account of advances in genetics, molecular biology, microbiology and immunology, while coverage of the more traditional aspects of biology has been reduced slightly. Price is £22.50.

Algebraic astronomy

P.K. Seidelmann

Vectorial Astrometry.
By C.A. Murray.
Adam Hilger, Bristol/Heyden, Philadelphia: 1983. Pp.353. £25, $49.

THE lack of a comprehensive yet readable text on spherical, or practical, astronomy is generally recognized. Instead, a number of good, specific-purpose texts*, and several, much older textbooks† which are still valuable reference works when wisely used, have had to suffice.

While astrophysics has changed drastically in the last century, astrometry has changed by degree. Thus, an astrophysics textbook from the last century would be wrong, but a spherical astronomy volume from the nineteenth century would only omit recent developments and lack the accuracy of current standards. This evolutionary progress in astrometry may explain the previous absence of a textbook based on vector and matrix algebra.

C.A. Murray's *Vectorial Astrometry* is not the much-needed comprehensive, readable text. Rather it attempts to apply vector and matrix algebra systematically to spherical astronomy. At the same time the International Astronomical Union reference system, time scales and constants, introduced at the beginning of 1984, are explained and used throughout the volume.

The personality and interests of Andrew Murray are accurately reflected by the strengths of the book. Photographic astrometry, relativistic astrometry, the theory of refraction, precession and nutation are well presented. For many subjects the latest developments are included and the vectorial and matrix equations are derived.

The volume would be significantly improved by good diagrams, however. The present two-dimensional, captionless line drawings add little to the clarity of the treatment. On subjects that are not associated with previous interests of the author, there is little in the way of descriptive explanation; the purpose appears to be the derivation of the necessary equations rather than communication of their reason and purpose. Several chapters contain individual sections without any apparent connection between the subjects. Also, I suggest reading the appendices first, so the notation and basis of some equations are understood.

While many new textbooks provide the cookbook formulae and methods for performing specific computations, this volume emphasizes the theory and derivation of equations and avoids the practical applications. Thus, under the title of astrometry through the atmosphere, the theory of refraction is discussed in great detail, but there is no mention of practical methods of calculating refraction.

For those who believe that astrometry has never entered the twentieth century, this is the book to change their minds. If you wish to apply vector or matrix algebra to spherical astronomy, if you need the relativistic formulation of astrometric calculations, and if you are interested in the latest developments and most accurate methods of astrometry, you will find this book to be interesting and useful. For all astrometrists, and for astronomers who must make accurate spherical astronomical computations, it will be an important reference volume.

P.K. Seidelmann is at the US Naval Observatory, Washington DC.

*e.g. I.I. Mueller's *Spherical and Practical Astronomy as Applied to Geodesy* (Frederick Ungar, 1969); E.W. Woolard and G.M. Clemence's *Spherical Astronomy* (Academic, 1966); L.G. Taff's *Computational Spherical Astronomy* (Wiley, 1981); P. Duffett-Smith's *Practical Astronomy with your Calculator* (Cambridge University Press, 1979).

†e.g. S. Newcomb's *A Compendium of Spherical Astronomy* (Macmillan, 1906/Dover, 1960); W. Chauvenet's *A Manual of Spherical and Practical Astronomy* (Lippincott, 1863/Dover, 1960); W.M. Smart's *Textbook on Spherical Astronomy* (Cambridge University Press, 1931).