

Biological effects of ultraviolet radiation

UV-A: Biological Effects of Ultraviolet Radiation, with Emphasis on Human Responses to Longwave Ultraviolet. By J. A. Parrish, R. A. Anderson, F. Urbach and D. Pitts. Pp.262. (Plenum: New York and London, 1978.) £15.75.

It has long been known that sunlight has both beneficial and deleterious effects on man. Many of these effects are caused by the ultraviolet region of the solar spectrum, which has somewhat arbitrarily been divided into three sections—UV-C (wavelength 200–290 nm), UV-B (290–320 nm) and UV-A (320–400 nm). The biological responses of cells, of skin and of the eye to UV-C and UV-B have been well studied. On the other hand relatively little is known about the responses to UV-A, because on a dose-for-dose basis it is much less potent than the lower wavelength regions of the spectrum. The authors of *UV-A* stress that it is nevertheless of growing importance to assess the biological effects of UV-A.

Although it is of relatively low potency, the incidence of UV-A reaching the Earth from the Sun is very much higher than that of UV-B and UV-C. Also, UV-A is finding increasing use both in industry and in medicine, in the latter case particularly in conjunction with photosensitising drugs. Three problems in studying responses to UV-A crop up in almost every chapter: the inadequate dosimetry in most cases; the difficulty in obtaining sources of sufficiently high intensity; and the possibility that the effects observed may in fact be due to contamination of the UV-A with trace amounts of the much more potent UV-B. The authors have therefore wisely not confined themselves solely to UV-A but in each chapter they have discussed effects of ultraviolet radiation of different wavelengths and used this as a background against which to consider the (usually rather scanty) work with UV-A.

The book is very comprehensive in the range of subjects covered, commencing with light sources, filters and detectors, and proceeding with optical properties of the eye and skin—the parts of the body most affected by ultraviolet light. There follow chapters on the biological effects of ultraviolet light at various levels, starting with molecular studies on cells, and continuing with effects on the skin (erythema, tanning, skin ageing and skin cancer) and the eye (keratitis and cataracts). The book concludes with a

chapter on the uses of UV-A involving human exposure, and one on safety and protection. The former is chiefly concerned with photochemotherapy using psoralens and UV-A (PUVA) for the treatment of various skin ailments such as psoriasis and vitiligo. PUVA treatment is one of the few instances in which it is quite certain that the biological response is indeed mediated by UV-A rather than by shorter wavelength light. A balanced account is presented of the undoubted benefits of this therapeutic regime and the risk against which this must be offset, namely that in the long term the therapy itself may induce skin cancer.

A most impressive feature of this book is the way in which each topic is introduced with a succinct and lucid description of the system under study, so that the non-specialist reader is provided with the necessary basic information to understand what is subsequently discussed. This applies to

aspects of physics (for example, excited states), biochemistry (DNA repair), physiology (structure of the skin and eye) and medicine (description of psoriasis). The authors have therefore been remarkably successful in producing a book which should be comprehensible to anyone interested in the subject matter, whether he be physicist, biologist or clinician. As so little seems to be really known about the biological effects of UV-A at present, it is questionable whether the subject merits a whole book. On the other hand it contains much useful information on related topics. It will therefore be a handy reference book for any photobiologist and it should certainly be compulsory reading for anyone working with UV-A.

A. R. Lehmann

A. R. Lehmann is a member of the scientific staff of the MRC Cell Mutation Unit, University of Sussex, Brighton, UK.

Experimental phycology

Physiological and Biochemical Methods. Handbook of Phycological Methods. Edited by J. A. Hellebust and J. S. Craigie. Pp. 512. (Cambridge University Press: London, New York and Melbourne, 1978.) £18.

ALGAE serve as experimental tools for physiologists, biochemists, molecular biologists, organic chemists and so on, but the experimental techniques which these workers use are scattered throughout the literature. In 1967 the Phycological Society of America had the good sense to promote the publication of a source book on methods used in experimental phycology, written by phycologists. This one book never appeared; instead four were eventually commissioned, and although progress in getting these off the ground was slow initially (the first, on culture methods and growth measurements, appeared in 1973), the second, on physiological and biochemical methods, has been worth waiting for.

This is a "how to do it" book which should find a place on the shelves of any experimental phycologist. Not that I think it will remain on the shelves for long—it will be in constant use by graduate students, teachers, and others interested in algae. Its great advantage is that within the one cover there is such a mine of information. There are 46 chapters, by 46 authors (not necessarily one each), arranged in

seven major sections: isolation of organelles and membranes (how to isolate chloroplasts, microbodies, membranes, and so on); analysis of chemical constituents (pigments, protein, glycolipids and fatty acids, β -1,3 glucans, alginic acid, ATP, and so on); enzyme assays (nitrate reductase, ribulose 1,5-bisphosphate carboxylase, aldolases, and so on); measurement of physiological and biochemical processes (uptake of organic substrates, photosynthetic rates, nitrogenase activity, protein synthesis, and so on); nutrient uptake (nitrate, phosphate, and so on); ion content and transport; and use of inhibitors (a most useful chapter).

Each methods chapter is factual, with the sources of algal material (most workers on micro-algae still seem to use strains of *Chlamydomonas*, *Chlorella* or *Euglena*), equipment and chemicals (sometimes even the catalogue numbers) clearly given. There is usually a short discussion and some key references (few later than 1975). There is a useful appendix to the book which lists the addresses of many chemical and equipment suppliers and the suppliers of algal cultures (a notable exception is the American Type Culture Collection of Bacteria, where the blue-green algae are classified as cyanobacteria!)

A possible problem with such a book is trying to ensure that most of the important techniques are included and yet the price is not exorbitant. The book has most of the important ones but there are surprising omissions. One example: the key NH_4^+ -assimilating enzymes, glutamine synthetase and glutamic acid dehydrogenase, are not