Helgol Mar Res (2002) 55:306–307
DOI 10.1007/s10152-001-0086-7

BOOK REVIEW

Martin Thiel

S. de Mora, S. Demers, M. Vernet (eds): The effects of UV radiation in the marine environment

Cambridge University Press, Cambridge, 2000. 324 pp, 77 figures, 7 tables (ISBN 0-521-63218-8) US$ 80.00

Published online: 17 October 2001
© Springer-Verlag and AWI 2001

Ultraviolet radiation has received considerable notoriety during the past two decades. As a consequence of the diminishing ozone layer, radiation levels are increasing in many regions of the globe, and humans more than ever face the need to protect themselves from UV radiation. Free-living organisms and natural communities are exposed to UV radiation and have lived with it for millions of years, but now the changes in the UV regime are occurring very rapidly, and the consequences for natural communities are little known. This book by de Mora, Demers and Vernet (with 17 additional authors) illustrates how marine organisms and communities cope with UV radiation and how they may suffer from increasing levels of UV radiation.

The book contains eleven chapters, ranging from the physics behind UV radiation to the effect of UV radiation on single organisms to the implications for the global carbon cycle. In the first chapter, the possible effects of rising UV radiation on the marine environment are introduced – among other to pics the authors discuss the harmful effects on cellular and molecular processes, but emphasise that little is known about the consequences. In the following chapter, readers are introduced to the processes affecting the UV spectrum of solar radiation in the atmosphere and in the water column. A major point is that UV radiation encompasses a wide range of spectra, and these are affected differently by physical processes; conversely, radiation of a particular spectrum has particular effects on the living (and non-living) environment. For example, atmospheric ozone depletion primarily affects the UV-b spectrum, which is more harmful than radiation in the UV-a spectrum – these facts and their implications in UV research are introduced in Chapter 3.

Communicated by H.-D. Franke

M. Thiel (✉)
Facultad de Ciencias del Mar, Universidad Católica del Norte,
Larrando 1281, Coquimbo, Chile
e-mail: thiel@nevados.ucn.cl
Fax: +56-51-209812

Dissolved organic matter (DOM) is an enigmatic part of the material contained in seawater – its quantification has presented problems to chemical oceanographers for a long time. DOM is also exposed to photochemical processes that affect its production and degradation. The resulting products may also affect other processes – it appears that DOM remains an area in significant need of further research. This issue is introduced in Chapter 4 and further elaborated in Chapter 5, which emphasises the importance attributed to it by the editors. UV radiation can produce damage in marine (and terrestrial) organisms in many different ways, either by direct effects or by indirect effects via products resulting from photochemical processes, such as reactive oxygen species (Chapter 6). In the next chapter, the mechanisms employed by organisms to minimise the negative effects of UV radiation are described. The impact of UV radiation on heterotrophic bacterioplankton and viruses largely involves nucleic acids – these organismal impacts may subsequently affect other essential processes in which these organisms play a role (Chapter 8). In the next chapter, which deals with the UV impact on marine phytoplankton, it becomes even more evident that cellular effects may have community-wide consequences. In the chapter on zooplankton and fish, most examples are taken from freshwater systems; despite the fact that the authors emphasise that marine systems should be affected in a similar way, it becomes evident that research in the marine environment is lagging behind. For freshwater zooplankton, an important mechanism for avoiding potentially damaging UV radiation appears to be diurnal migration (Leech and Williamson 2001), and while there is no reason to believe that marine zooplankton would react differently, it needs to be demonstrated. Following these detailed accounts, the final chapter attempts to put it all into perspective by elaborating how marine environments might change under conditions of increasing UV radiation. The general message of the book is that much research remains to be done and is indeed presently under way.

Research in this area is advancing extremely rapidly, motivated by the hazardous nature of increasing UV radi-

ation and the great concern this has caused in society. Regardless of any advances to be expected in future years, the basics presented in this book will remain valid for a long time to come. The book contains a wealth of useful information for marine biologists doing research in this field. Given that the book is well balanced and most chapters are well written, it is unfortunate to see that some figures are poor in their design and layout. For example, the maps of the global distribution of ozone and UV radiation depend on the colour scale with which they were originally constructed. There are also several other figures originally produced in colour; reproducing them as black-and-white figures renders them largely "unreadable". Regardless of these minor shortcomings, for which the publisher (and not the editors) is responsible, the book represents a very valuable and timely resource. Libraries with a focus on biological oceanography and marine biology should have this book on their shelves.

Reference

Leech DM, Williamson CE (2001) In situ exposure to ultraviolet radiation alters the depth distribution of *Daphnia*. Limnol Oceanogr 46:416–420