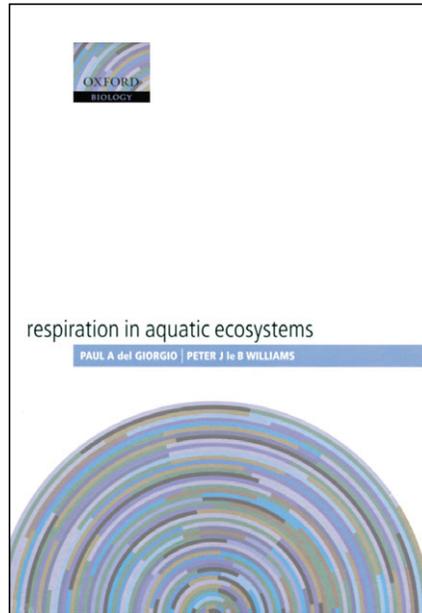


## REVIEWING RESPIRATION



### Respiration in Aquatic Ecosystems

Edited by Paul A. del Giorgio and Peter J. le B. Williams

Oxford University Press (2005)  
328 pp. ISBN 0-19-852708-X  
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What does our future depend on? On many things, certainly, but on a global scale, and from an ecological point of view, the change in the partial pressure of carbon dioxide in the atmosphere could play a major role, together with the resulting change in the Earth's temperature. Oxygen is another story, but current thoughts suggest that the oceans contribute roughly a third of the production of molecular oxygen on our planet. In both cases, the respiratory activity in the seas and oceans plays a fundamental role through the carbon cycle.

It is 'simply' for this reason that this book represents a landmark in our knowledge. As the editors del Giorgio and Williams outline in the Preface, 'although respiration is at the centre of the functioning of ecosystems...it represents the major area of ignorance in our understanding of the global carbon cycle'. There is still a lot of work to be done by a lot of people.

Written and edited by specialists in oceanography and limnology, *Respiration in Aquatic Ecosystems* derives from an ASLO (American Society of Limnology and Oceanography) meeting held in

Copenhagen in 2000, or more precisely from one session devoted entirely to aquatic respiration. Amazingly, at this meeting, which attracted about 1500 participants, the respiration session filled the largest room in the conference centre, even though the organizers had expected to attract no more than a handful of colleagues. As most oceanography and limnology textbooks deal with this question only superficially and no textbook has so far focused on the subject exclusively, this is the very first book to be devoted entirely to an in-depth analysis of the state of the art of this field.

There are 14 chapters, including an excellent Introduction and Conclusion (chapters 1 and 14), very helpful for non-specialised readers, as they are real overviews summarizing past and present research in the field. To tell the truth, I found most contributions extremely instructive. I was disappointed that there was no chapter on respiration in larger metazoans but – as I had imagined would be the case – from an ecosystem standpoint and on a large scale their contribution to the total respiratory budget is considered negligible. Remember that heterotrophic bacteria are the largest contributors to the respiratory budget in most aquatic ecosystems! Chapters 1–5 summarize present knowledge of respiration within major categories of organisms: bacteria, phytoplankton, protists and zooplankton. Next, chapters 6–11 consider the process of respiration in a series of aquatic ecosystems: wetlands, lakes, estuaries, seas (compartmentalised into surface to deep-sea and dark water-column to sediments) and coastal zones (reefs, mangroves, salt marshes, sea grasses and unvegetated sediments). In chapter 12, the problem of respiration in the water column following oxygen depletion is discussed. Finally, chapter 13 considers the need to model respiration in various bacterial and plankton groups and concludes that a critical limiting factor is the lack of good experimental data from ecologically relevant groups. The final chapter synthesizes the findings and conclusions of the different sections and integrates them into a global perspective. The illustrations are excellent, as clear and simple as one could hope to find, and the list of references certainly covers major contributions that have been published in the field.

Thus, I really feel that *JEB* readers, especially those working with aquatic animals and/or dealing with aquatic ecosystems, would be very interested in reading this book and should strongly

recommend it to their Masters or PhD students. Indeed, it is both an open window onto a very much underestimated large-scale problem and a manual to help us understand our oceanographer or limnologist colleagues when they talk about respiration. There are not so many of them publishing in *JEB* but if you have the opportunity to discuss their subject with them, you realize that even a word as apparently simple as respiration can have very different meanings.

More specifically, you will see in this book that, from an oceanographical or limnological standpoint, 'the most common and classical view of respiration is as a major sink of organic matter in the biosphere', a far cry from the definition learned in Biological Sciences courses at universities, especially for our students, so well trained in cellular and molecular biology! Even more interesting,

oceanographers and limnologists use a variety of terms synonymously with the word respiration: oxidation, decomposition, degradation, mineralization, remineralization, etc. This is part of the charm of pluri- or multi-disciplinary science, but nevertheless this is a fundamental problem that will have to be dealt with, as most environmental questions will only be solved by and through a multi-disciplinary approach.

Probably the most important thing about this book is that it represents the state of the art for 2005, defining major gaps and suggesting avenues that might guide future research efforts in specific aspects of aquatic ecology. Indeed, the editors claim that there is no satisfactory answer to most of the questions raised by the different authors in their various chapters. It appears that even the problems that are apparently the most basic ones, and which in my

opinion are already difficult to address at a single animal level, are far from being solved. While the speciality formerly known as Comparative Physiology is making a comeback as Evolutionary and Environmental Physiology or Physiological Ecology, coping with environmental problems is the future for most of us in our work. Many scientists publishing in *JEB* have the necessary tools to tackle major issues that are ecologically relevant. The synthesis presented in this book highlights such major gaps in aquatic ecology that should certainly be the focus of future excellent research and *JEB* articles.

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