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Introduction

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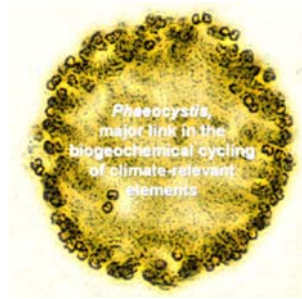

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This special issue of *Biogeochemistry* comprises a selection of papers that describe the role of the ubiquitous microalgal species *Phaeocystis* sp. The papers were presented at the final meeting of Working Group no. 120, ''Phaeocystis, *major link in the biogeochemical cycling of climate-relevant elements*'', of the Scientific Committee on Oceanic Research (SCOR), held at the University of Groningen in Haren, the Netherlands, 30 August–3 September 2005. The SCOR working group embodied the desire expressed by the scientific community to give momentum to research dedicated to this microalgal species. The final meeting illustrated the success of the working group. Despite the awareness that there are still many questions left, much has also been learned over the past decade. Most importantly, we were able to define the most prominent gaps in our knowledge over the course of the meeting.

The combination of a diverse yet well-selected spectrum of scientific disciplines—varying from phylogeny to carbon degradation—with contributions by 46 registered scientists from 11 countries, made this meeting a successful and stimulating event. The opportunity to submit the contributions together in this one special volume of *Biogeochemistry* fully meets our desire to arrive at a joint publication as the outcome of that last meeting. All the presentations *taken together* tell the tale of an algal species that plays a prominent role in biogeochemical cycles but that is still surrounded in mystery.

A section on the taxonomy of *Phaeocystis* sets the stage for this issue. The review by Medlin addresses one of the most important uncertainties that trouble many attempts to improve our understanding of this organism, i.e. the crucial, yet very complex, issue of strain diversification. The intricate life cycle of *Phaeocystis* makes it even harder for one to decipher the role of this organism in biogeochemical cycles. The various stages that make up the life cycle, a phenomenon that is typical for this organism, concur with striking modifications in size and shape. These modifications may well determine the success of *Phaeocystis* as a cosmopolitan species. Moreover, they are crucial for the fate of the organic carbon represented in this species. Therefore, an ecophysiological perspective provides essential insights into a full understanding of the biogeochemical function of *Phaeocystis* in the marine ecosystem.

The biogeochemical role of *Phaeocystis* is tightly linked to ecosystem dynamics. On a small scale, viruses play an important, sometimes decisive, role in the functioning and fate of *Phaeocystis* blooms. The community of grazers, furthermore, determines the fate of *Phaeocystis*. An extensive review by Nejstgaard takes our understanding in this area a serious step forward, by clearly defining the gaps in current knowledge. In this section it is also emphasised that grazing activity and cell lysis do not necessarily

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create conditions for significant carbon export into the ocean interior. Other factors that distinguish a retention system from an export system and, therewith, control carbon fluxes through the ecosystem, are discussed in various papers.

A substantive effort in studies on *Phaeocystis* is focused on its role in sulphur cycles by the production of dimethyl-sulphoniopropionate (DMSP). To put the role of *Phaeocystis* in a global perspective, Stefels has put in an effort to enumerate its dimethyl-sulphide (DMS) contribution. This review bridges the gap between field scientists and modellers. Models exist in a wide variety, covering a vast area, from the cellular level to global processes. The paper that describes models, by Whipple and colleagues, makes a good example of how models can expose gaps in our knowledge and how a combination with empirical studies can bring new insights.

The last treatise in this issue comprises a synthesis of all the presentations at the meeting. The aim of this chapter is not simply to present state-of-the-art knowledge, but to highlight the most relevant insights that we have gained so far and, at the same time, define urgent questions that need to be addressed. One of the stimulating outcomes of the meeting was that all the participants expressed their interest in continuation of a ''*Phaeocystis* community'', with potential collaboration on the level of data exchange or even joint field work. The synthesis chapter may focus future research on *Phaeocystis*.

This symposium also marked the end of the long and distinguished career of Prof. Winfried Gieskes, who chaired this SCOR Working Group jointly with Dr. Sauveur Belviso. Winfried Gieskes has devoted his career to the role of microalgae in the biogeochemical cycling of climate-relevant elements, and he has published a number of benchmark papers. His early work on pigment analysis and his contributions to the development of a method using high performance liquid chromatography have greatly influenced the use of algal pigments as biomarkers for algal distribution. In the 1970s he was one of the first to recognise the role of coastal eutrophication in *Phaeocystis* dynamics, and, since then, *Phaeocystis* has always been one of the study topics in his research group. A number of *Phaeocystis*-orientated theses has been published under his care. Winfried Gieskes has been a faithful participant of the various *Phaeocystis* meetings that have been organised throughout Europe since 1989. These developments culminated in his chairing the SCOR *Phaeocystis* Working Group. The SCOR Working Group, and the entire oceanographic community, would like to thank him most warmly for his contribution to science.

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