The ecology of freshwater phytoplankton

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Freshwater Biological Association

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This book is dedicated to
MY WIFE, to whom its writing
represented an intrusion
into domestic life,
to Dr JOHN LUND and Mr CHARLES SINKER
who taught me so much

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Preface

The importance of phytoplankton is beyond question. Planktonic primary production provides the base upon which the aquatic food chains culminating in the natural fish populations exploited by man are founded, at the same time generating some 70% of the world's atmospheric oxygen supply. Excessive algal production in lakes and reservoirs presents expensive problems in the water industries, whilst deleterious effects upon fisheries and water-based recreation are fairly attributed to overabundance of phytoplankton. There is, therefore, a powerful economic and social need for as complete as practicable an understanding of the factors which regulate the spatial and temporal variations in the distribution and productivity of phytoplankton – or, in short, its ecology.

The volume of scientific literature devoted to phytoplankton biology is daunting and often bewildering. Many more titles are added each year. Fortunately, for both the beginner and the more seasoned student, there is a number of excellent general books and review papers describing fundamental features of plankton biology but there is a constant need for updating and revision as new principles and hypotheses become established.

I shall make no further attempt to justify the addition of yet another book to those already available. This volume is concerned mainly with the factors which determine the wax and wane of specific phytoplankton populations in standing freshwaters (lakes and reservoirs), though reference is made to marine plankton which is, generally, subject to similar controls. It is primarily intended for use by students, and I have therefore tended to oversimplify some of the more complex aspects of the subject, for the sake of ready comprehension, but further reading is recommended wherever suitable or relevant texts are available. I hope that I have adequately resisted the temptation to be unnecessarily encyclopaedic in referencing literature: there are many significant contributions that have not been cited.

Ecology is a complex science. There are probably almost as many definitions of 'ecology' as there are books on the subject. In framing this

text, I have adopted the phrase to which I was introduced as a would-be ecology student: 'What lives where – and why'. Specifically, I have endeavoured to develop this theme through an overview of the structure of planktonic communities in which the functional adaptations of pelagic life are emphasised, building up to the dynamic aspects of production and seasonal periodicity. Biochemical aspects of phytoplankton are not specifically covered and I have included no more physiological information than I have found necessary. Again, appropriate further reading is referenced.

The text could not have been prepared without the considerable help of a great many friends and colleagues. I am grateful for advice on the presentation and discussion of subject matter (often outside my primary interests) freely contributed by Dr G. Fryer, F.R.S., Mr T. I. Furnass, Dr D. G. George, Dr G. H. Hall, Dr S. I. Heaney, Dr J. Hilton, Mr J. E. M. Horne, Mr G. H. M. Jaworski, Dr J. G. Jones, Dr J. W. G. Lund, F.R.S., Dr J. F. Talling, F.R.S. and Dr L. G. Willoughby. The excellence of the Freshwater Biological Association's comprehensive library facilities proved to be extremely beneficial to my background reading and literature searches; it is a pleasure to express my appreciation to the Council, Director and Library staff of the Association.

I should like to thank especially: Dr Hilda Canter-Lund F.R.P.S., not only for the selection of her excellent collection of algal photomicrographs but also for the enthusiastic and time-consuming trouble she took over their presentation; Sheila Wiseman, whose collaboration and support during the preparation of the book has been invaluable, and whose illustrative talents contributed most of the text figures herein; and Elisabeth Evans, upon whom fell the almost impossible task of turning my handwritten pages into a legible typescript.

Finally, special acknowledgements are also accorded to Mr Charles Sinker, O.B.E., M.A., and to Dr John W. G. Lund, C.B.E., F.R.S., both of whom deeply influenced my appreciation of ecology in general and of phytoplankton in particular, during my formative years. The most that I could wish for is that, through the pages of this text, I may in turn pass on the benefit of their teaching to others.

The Ferry House, Ambleside, Cumbria
January 1983

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