

Seasonality of Freshwater Phytoplankton

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H.J. Dumont

Seasonality of Freshwater Phytoplankton

A global perspective

Edited by

M. Munawar and J.F. Talling

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Preface

This volume originated in a belief, shared by the two editors, that the time was ripe for a world-wide survey – or at least sampling – of seasonality in freshwater phytoplankton. An opportunity was provided by the International Limnological Congress (S.I.L.), held at Lyon in August 1983, to plan a one-day symposium on the topic. From this enjoyable and successful occasion, augmented by additional written contributions, the present volume has emerged. As convenors and editors, we are grateful to the contributors for their cooperation in this international venture.

The seasonality of phytoplankton is widely conditioned by that of climate. Thus one may expect to find the geographical differentiation of climatic patterns reflected in the seasonal patterns of algal occurrence. Diversity in the global perspective is also introduced by considerations of geomorphology, geochemistry, and genotypically determined response.

Nevertheless, the historical base of our subject is firmly rooted in the north-temperate zone. From its freshwaters, and seas, there have evolved virtually all of the approaches and techniques now being applied to the analysis of phytoplankton seasonal dynamics. One can instance the correlation of events in time-series of environmental and algal observations, aided by statistical techniques or simply very long-term sampling; the evidence from chemical composition of the crops and element-budgets; algal responses in culture and under bioassay procedures, as for nutrients and contaminants; activity measurements, as of photosynthetic C balance; the analysis of horizontal as well as seasonal variability in large lakes; the size-fractionation of biomass, pigments and primary productivity; and information from small lakes, or large enclosures, available for experimental manipulation. These and other 'strategies' of phytoplankton study are illustrated in the following pages.

Our present aim of a truly global perspective, with some degree of regional synthesis, is one scarcely represented in the literature. The greatest success in unravelling causal relationships is likely to come from intensive local studies, preferably combining several approaches. Thus many contributions here have centred their attention on single or adjacent sites. Each is an object-lesson in itself, and in aggregate present a world-wide array with varying factor-emphasis, amplified by some wider regional comparisons.

The classic ground of central and western Europe is well represented by four contributions. One (Sommer) develops some broad regional comparisons of seasonal patterns and successions; others give especial attention to depth-distributions (Dokulil & Skolaut), to phytoplankton size (Bailey-Watts), and to experimental manipulations through large enclosures (Reynolds). Problems of physical origin in more northerly latitudes are described from the USSR (Petrova) and the Canadian tundra (Sheath). Aspects of the seasonality of large temperate lakes in a continental (N. American) climate are also treated, with emphasis on the behaviour of biological components, in the North American Great Lakes including picoplankton and ultraplankton (Munawar & Munawar) and of sediment-water exchanges in shallow Canadian lakes (Hecky, Kling, Brunskill & Fee).

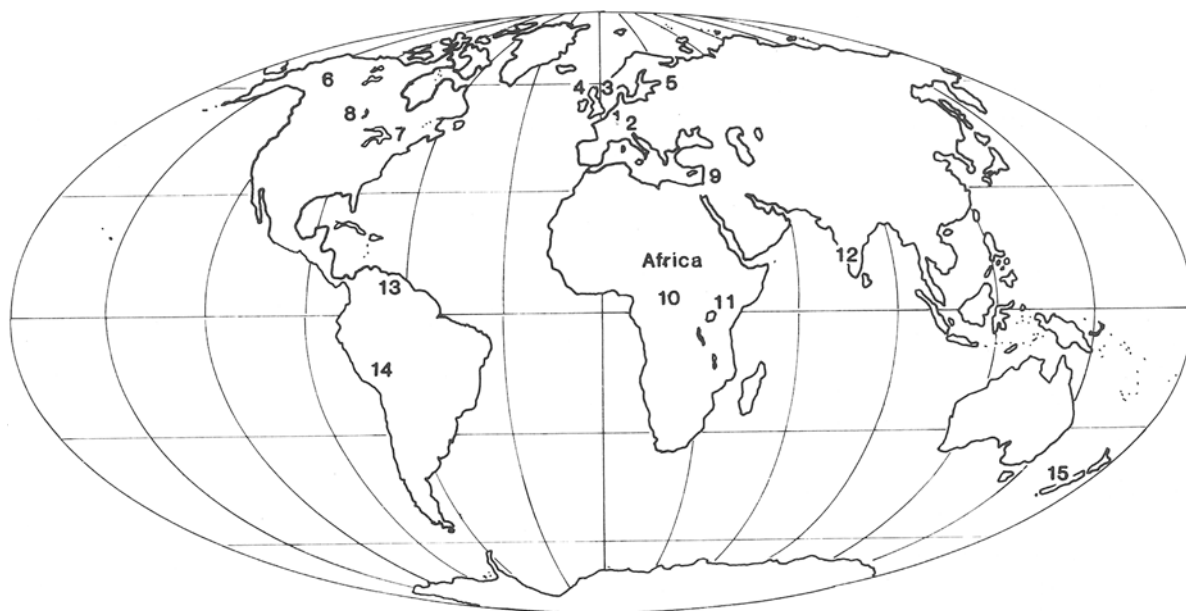
The scene then shifts to the sub-tropics. Here no lake has been more extensively studied than L. Kinneret, where the resting stage of a dominant phytoplankton copes with the problem of 'over-summering' rather than

of over-wintering (Pollinger). The diversity of seasonal patterns in the continent of Africa is surveyed (Talling), and experience from Kenyan lakes used to examine some general issues of geographical variation (Kalf & Watson). From South India, patterns of seasonal development under a monsoonal climate are described (Zafar). From South America there are unusually long-period records for the lowland *L. Valencia* (Lewis) and the elevated andine *L. Titicaca* (Richerson, Neale, Wurtbaugh, Alfaric & Vincent); these are used to statistically and objectively define successional sequences and categories of periodic variation.

Lastly, one of the very few records of phytoplankton seasonality in temperate latitudes of the Southern Hemisphere is presented (Duthie & Stout).

We hope that this assemblage – the first of its kind – will appeal to the interests and imagination of a wide variety of readers. We would like to thank the numerous referees for meticulously reviewing the manuscripts in addition to the reviews performed by both the editors which indeed ensured the highest level of scientific quality. We wish to express our gratitude to Wil Peters of Dr W. Junk Publishers and Henri Dumont, Editor-in-Chief of *Hydrobiologia* for their interest, encouragement and assistance in the publication of the proceedings.

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The global distribution of numbered contributions.

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