
Preface

Much of our present knowledge of cell cycle processes in microalgae has come from work using the technique of synchronous culture, first developed some 50 or so years ago. The key findings from such work have highlighted the stages through which a newly released microalgal cell passes as it progresses through its growth and subsequent division phases to produce daughter cells to initiate the next cycle. Among the microalgal species that have been studied, and are reported in this review, are those that divide by simple binary fission, like the diatoms (Bacillariophyceae), dinoflagellates (Pyrrophyta) and the euglenoids (Euglenophyta) as well as those, mainly represented by the green microalgae (Chlorophyta), that divide by various more complex processes of multiple fission. In the latter, the cell cycle includes multiple rounds of duplication yielding 2^n daughter cells per mother cell ($n = 2-5$). Some examples of cell cycle processes in colonial microalgal forms are included for comparison, as also are those which are known for some of the unicellular cyanobacteria (blue-green algae); the latter allowing comparisons between prokaryotic and eukaryotic cell cycles.

It will be shown that although certain details of the cell cycle will vary between the microalgal species, as affected by morphological and physiological features of the adult cell, the basic control and regulatory mechanisms have much in common not only among the microalgae themselves but between them and the cell cycles of other micro-organisms, animals and plants. The case studies described will highlight the flexibility of the microalgal cell cycle under different conditions and the range of processes involved in the progression of the cell through its natural cycle culminating in daughter cell production and release. They will also address the concept of commitment to divide, the role of cell cycle regulatory proteins and their

genetic control and possible links of cell cycle processes to certain endogenous circadian rhythms known to exist in a number of microalgal species. It will be clear that despite the large amount of information now available on various microalgal cell cycles there is much yet to be revealed, especially in relation to the control mechanisms involved.