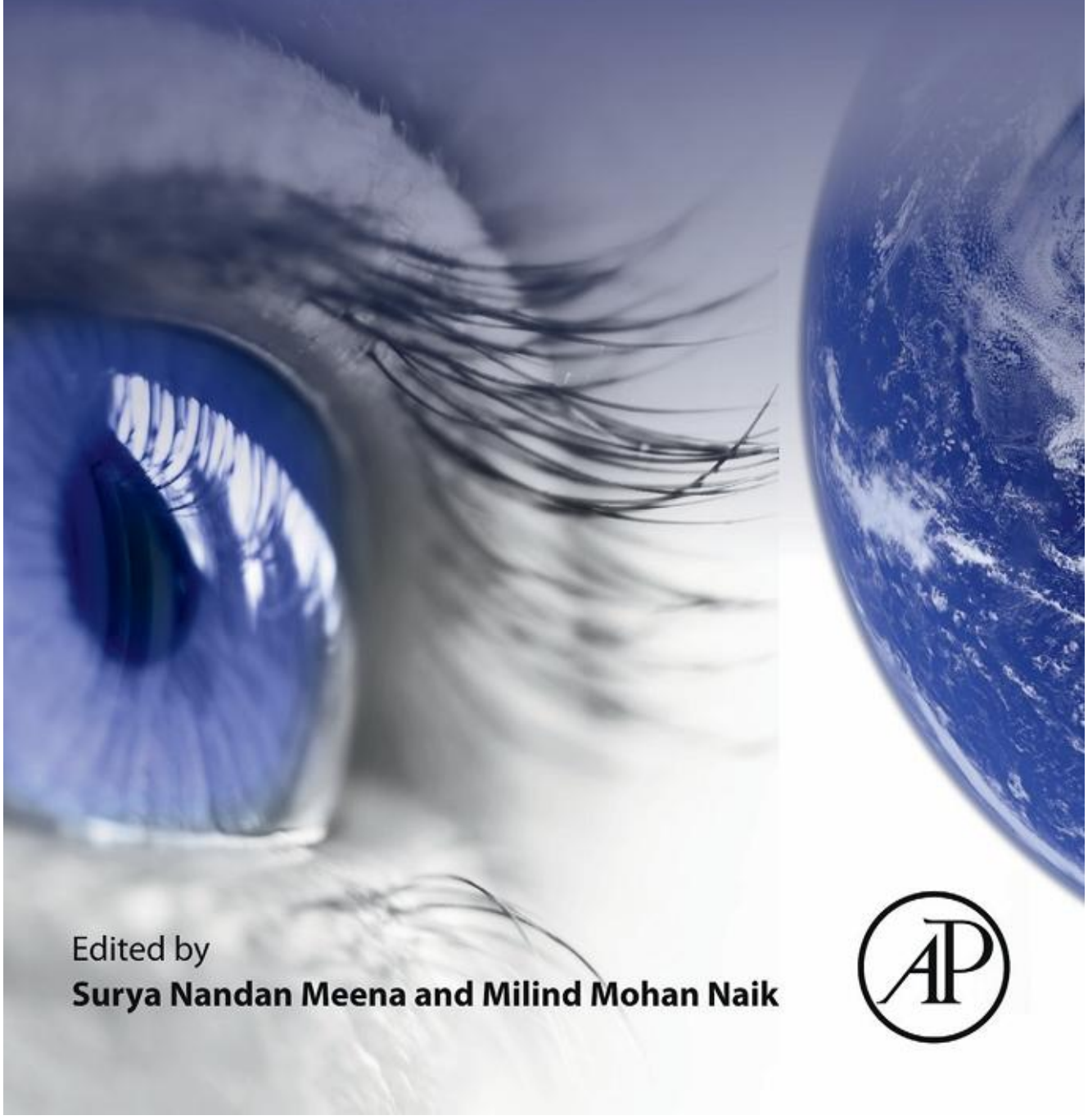
Advances in Biological Science Research

A Practical Approach



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Chapter 31

Advances in sampling strategies and analysis of phytoplankton

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31.1 Introduction

The word *phytoplankton* is derived from the Greek words *phyton* = plant, and *plankton* = wanderer. Phytoplankton are microscopic, single-celled organisms found in all aquatic habitats. They also account for up to 50% of the global primary production [1], and are the base of food webs in aqueous environments. They also play crucial roles in influencing the climate through dimethylsulfoniopropionate (DMSP) production and influences on cloud formation [2], and formation of harmful algal blooms (HABs).

Phytoplankton is composed of both eukaryotic and prokaryotic species. The dominant group in coastal waters is diatoms; other phytoplankton groups are dinoflagellates, coccolithophores, raphidophytes, flagellates, etc. (Fig. 31.1). Diatoms are silica-shelled protists belonging to phylum Bacillariophyta. They are divided into two major orders: order Centrales (centric diatoms having radial symmetry) and order Pennales (pennate diatoms exhibiting bilateral symmetry). Centric diatoms usually inhabit the water column; only some genera grow attached to substrates during their entire life cycle. A few pennate diatoms possess a raphe (long slit along the length of the frustules) that helps in motility and attachment to substrata. Diatoms reproduce asexually by vegetative division and also through sexual means via spores or resting cells. Though the majority of them are photosynthetic, some diatom species also possess a heterotrophic mode of nutrition [3].

Dinoflagellates, another phytoplankton group, are characterized by the presence of cellulose cell walls and two flagella. They possess a range of nutritive strategies (autotrophic, mixotrophic, heterotrophic) and contribute to HABs. They produce resting stages (termed cysts) that help them to survive unfavorable conditions; long-term cysts are reported to provide a seed bank for HABs [4].

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