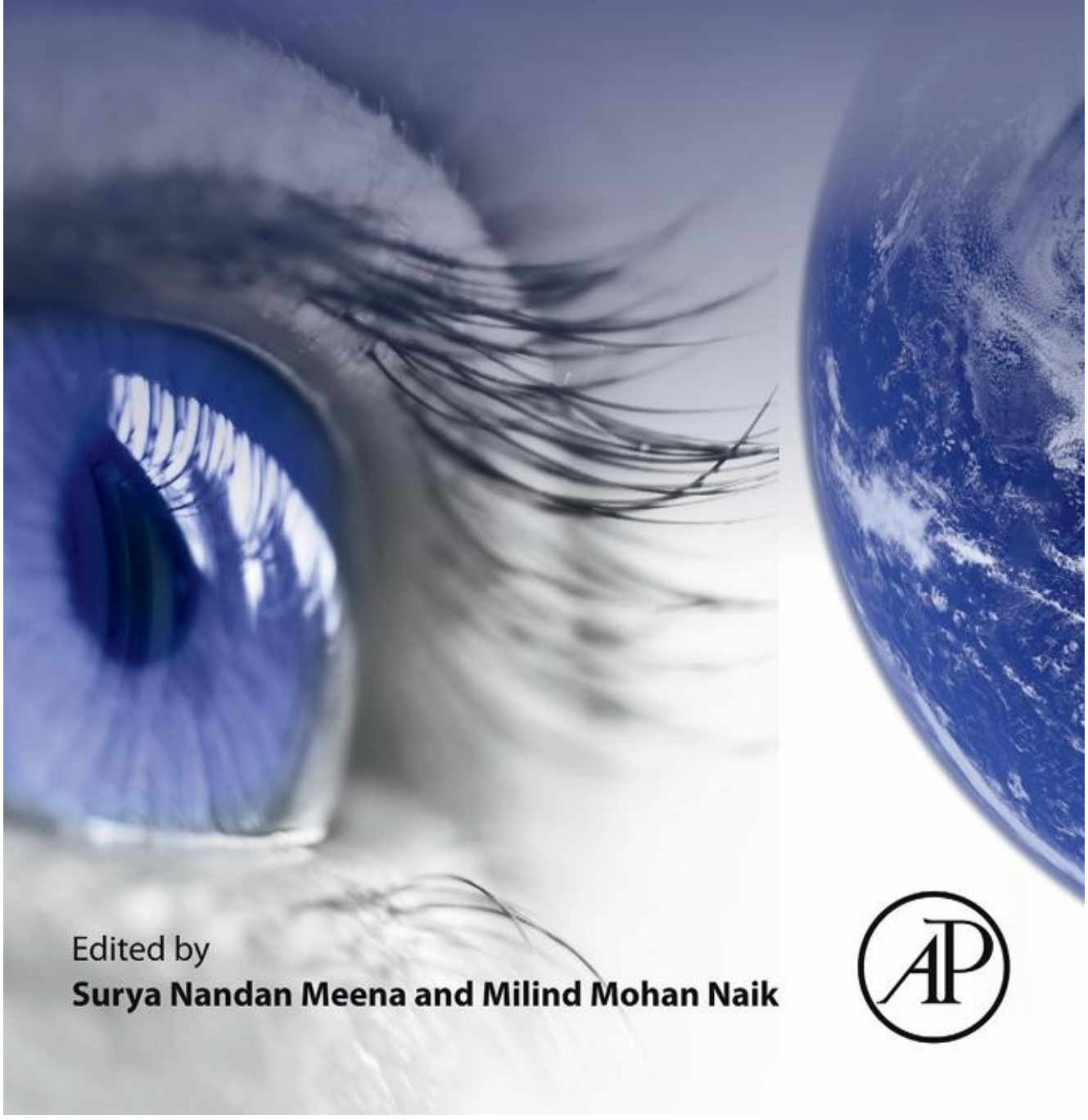
Advances in Biological Science Research

A Practical Approach



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Chapter 9

Microbial lectins: roles and applications

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9.1 Introduction

Lectins are proteins known to bind to sugar moieties on a cell surface and are widely known for their cell adhesion properties. These adhesins are known to bind to glycan receptor surfaces via carbohydrate-recognition domains, which are also known as C-type lectins, while some lectins tend to bind to internal sequences of oligosaccharide chains [1]. Their binding to sugars gives an agglutination reaction, and this phenomenon is seen to have many applications as discussed in this chapter.

Most of the reports on lectins are derived from plants such as *Glycine max*, *Ricinus communis*, and *Moringa oleifera* [2–4]. Animal and microbial lectins have been studied only recently for a wide range of applications in bioremediation, bioflocculation, and probiotics [5]. Microbial lectins are comprised of lectins obtained from fungi, bacteria, protozoa, and viruses. It was observed that only a few lectins were isolated since the 1970s, however, the importance of microbial lectins was realized later due to continuous research in this field, which led to extensive studies on lectins from microorganisms [1,5,6]. Alfred Gottschalk in the early 1950s was the first to identify a microbial lectin. This lectin was seen to be of viral origin and was isolated from the influenza virus [1]. Sharon et al. were the first to study bacterial lectins in the 1970s [6]. The main function of microbial lectins includes attachment to host cells, which is a prerequisite condition to cause infection. Lectins are beneficial to microbes in assisting their adherence to the cell surface. The prevention of this function could lead to the curtailing of several microbial diseases in humans [7,8].

Lectins were primarily known only for their adhesion properties. However, studies have shown that this property was the basis of many future applications and approaches in biomedical sciences [1,8]. They are used as carriers of chemotherapeutic agents as a part of cancer therapy, purification of proteins by chromatography, in bioremediation of heavy metals, and bioflocculation in the

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