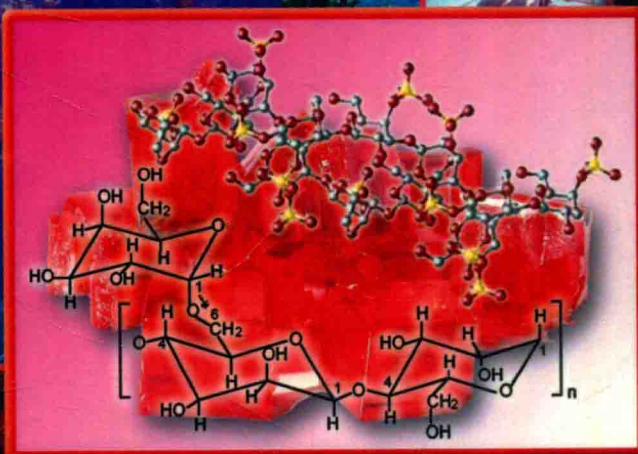


Marine Polysaccharides

Food Applications



Vazhiyil Venugopal



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Dedicated to

Late Prof. K. P. Antony, Department of Chemistry,

St. Thomas' College, Thrissur, India

Preface

Increasing public awareness of the importance of healthy living is presenting new challenges for the commercial food processing sector. Consumer perceptions of processed foods are changing, and processed foods are being recognized as convenient vehicles for the delivery of bioactive compounds and nutraceuticals. This changing scenario has had a profound effect on the global food processing industry, which must consider nutritional quality, cost of production, added value, consumer safety, and convenience. A major contributor to successfully addressing these challenges is the availability of novel and safe additives with fascinating functional properties that can be used to impart appealing properties to foods, such as modified texture, stability, foam and emulsion capacities, water retention, fat replacement, microbial protection, control of rancidity, and enhancement of fiber content, among others. Polysaccharides are water-soluble biopolymers (also referred to as *hydrocolloids* or *gums*), derived from diverse renewable sources such as seeds, fruits, vegetables, plant exudates, microorganisms, and animals, that can meet most of these requirements for food additives. Polysaccharides were introduced to food processing as early as the 1940s, initially through the use of modified specialty starches and high fructose sweeteners. Explosive growth in the use of other carbohydrate ingredients, such as maltodextrins and microcrystalline cellulose, occurred from the 1960s to the 1980s. These compounds are of natural origin and are considered safe and edible. Further, their chemical structures allow modification of their functional properties and expand their potential applications in food, medicine, biotechnology, and other fields.

Marine resources, apart from providing a wealth of protein foods, also provide several polysaccharides with numerous possible uses in diverse fields. Because marine environments are extremely diverse in terms of, for example, available nutrients, temperature, and pressure, organisms inhabiting the oceans have adapted themselves to these varying habitats by evolving several unique compounds. It is likely that marine polysaccharides possess some unique properties that may be useful in food technology and other fields. Although some marine polysaccharides, such as carrageenans, and agar, have found wide use as hydrocolloids due to their ability to form gels and function as thickeners and stabilizers in a variety of foods, the potential of many of these hydrocolloids has yet to be explored. This book attempts to compile recent data on the food applications of marine polysaccharides from such diverse sources as fishery products, seaweeds, microalgae, microorganisms, and corals.

The chapters of the book are grouped into three sections. The chapters in the first section are devoted to discussions on the isolation of polysaccharides from marine sources and their general properties, particularly those important from a food technology point of view. The second section of the book focuses on the actual food applications of these compounds, and the chapter in the third section provides a brief discussion of biomedical applications. Chapter 1 discusses major sources of marine polysaccharides, including crustacean shellfish, macroalgae (seaweed), microalgae, and marine microorganisms, as well as coral. Chapter 2 provides an overview of the general functional properties of polysaccharides, such as their structure; their hydration, gelation, emulsification, and rheological properties; and interactions among themselves and with other food components such as proteins that are relevant to food processing. Chapters 3, 4, and 5 further discuss the isolation and food-related properties of various marine polysaccharides.

The second section covers the use of these polysaccharides for food product and biopackaging development. Recent developments in composite films and nanotechnology have greatly contributed to this field, as discussed in Chapter 9. The safety and regulatory aspects of food ingredients are very important factors to consider during product development, and Chapter 10 addresses these aspects with respect to polysaccharides. The book concludes with an overview of recent developments in the biomedical applications of marine polysaccharides.

I thank Stephen Zollo, Chief Editor, and Patricia Roberson, Project Coordinator, Taylor & Francis, Boca Raton, FL, for their editorial support.

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Section I

Isolation and Properties of Marine Polysaccharides