

Handbook of Research in Marine Pharmaceuticals

Exploring Oceanic Microbial Diversity
for Human Health and Wellness



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Editors

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DEDICATION

I dedicate this book with immense love and admiration to my living legendary beloved parents, Sabiha Khatoon and Md. Moinuddin Ahmad. Your unwavering support, wisdom, and unconditional love have been the bedrock of my journey. Your guidance has shaped my character, and your sacrifices have fuelled my aspirations. This book stands as a testament to the values and lessons you've instilled in me. Thank you for being my constant inspiration and for believing in me even during the toughest times.

—Prof. (Dr.) Md. Faiyazuddin, PhD

This book is dedicated to my beloved mother, Hajrah Begum, who left this world so early. To me, she was the whole world. She was the most loving, humble, compassionate, understanding, family-oriented woman. I am going to miss you so much, Mom. I pray to Allah (SWT) to bless your soul and grant you Jannatul-Firdous (the highest level of heaven).

“O Allah, forgive and have mercy upon her, excuse her and pardon her, and make honorable her reception. Expand her entry, cleanse her with water, snow, and ice, and purify her of sin as a white robe is purified of filth. Exchange her home for a better home. Admit her into the Garden; protect her from the punishment of the grave and the torment of the Fire.”

—Prof. (Dr.) Khalid Rehman Hakeem, PhD



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CHAPTER 19

Exploring the Potential of Marine Drugs: A Patent Perspective

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ABSTRACT

The ocean is a potential source of bioactive compounds, but unlike terrestrial plants, it does not have a long history of use in traditional medicine. The marine environment is a one-of-a-kind resource with vast biological diversity that, if properly explored, could lead to breakthrough therapies. The influence of this sector on the pharmaceutical industry is growing as more substances derived from marine sources enter clinical testing. Marine creatures contain a large number of naturally occurring compounds with various structural and pharmacological properties. The recent rise in patent publications amply supports the importance of these compounds as sources of novel therapeutic agents. Marine-derived actives are being researched as prospective sources for anti-cancer, anti-bacterial, antiviral, and anti-inflammatory medications, as well as treatments for a range of other conditions, despite critical supply limitations. As the number of lead marine compounds increases, it becomes essential to explore the ongoing status of patents filed and granted in the field of marine pharmaceuticals. In this chapter, an effort has been made to gather valuable information on the recent patents available on various marine drugs.

19.1 INTRODUCTION

Natural compounds from Earth's biodiverse flora and fauna, known as "secondary metabolites," are a crucial, reliable source of promising therapeutic leads (David et al., 2015). With over a million novel chemical entities found to date, this conventional source of medicine is still regarded as the most effective source of prospective medications. Although synthetic pharmaceuticals tend to be stronger than herbal medicines, over 60% of the drugs on the market today have natural origins due to their lower risk of adverse effects and substantially greater absorption, making them a good option for finding lead structures (Dias et al., 2012; Newman et al., 2016; Cheuka et al., 2017; Bushra et al., 2018). But even now, 95% of the estimated 2 million types of fungi, animals, microorganisms, plants, and similar organisms that makeup biodiversity have not been assessed for any biological activity (David et al., 2015). Therefore, the challenge is finding a solution to effectively and efficiently access and value this inherent chemical variety for medicinal purposes.

Up to 70% of the Earth's surface is covered in water bodies, which are home to 32 basic phyla and support the enormous expansion of marine species. They are biologically diverse ocean dwellers who make up over half of all species worldwide and are influenced by the physicochemical characteristics of the ocean (Suleria et al., 2015). Due to their capacity to resist harsh environments including pressure differences, temperature swings, the impacts of mutation, and infection, these marine animals have developed over time by experiencing physical and chemical adaptations. Although immobile organisms do not adjust their physical defense, they are thought to do so chemically (Jimeno et al., 2004). Due to the marine environment's different physical and chemical circumstances, they thus show the existence of a variety of molecules with unique structural characteristics (Skropeta, 2008). The ocean has a wide variety of creatures, making it appropriate to refer to it as a "cure-all." Additionally, it offers an abundance of sources for new bioactive ingredients, a few of which are utilized in foods, cosmetics, and nutraceuticals (Faulkner, 1995). Their requirement to generate effective medicinal entities has expanded due to their investigation into various biological activities (Kim, 2013). These naturally occurring substances are typically produced from secondary metabolites rather than the core metabolic route (Malve, 2016).

Since ancient times, the vast natural resources of the sea have been utilized, including the utilization of fish and other marine animals as well as preparations made from algae as sources of medicine. The most well-known and long-used marine-derived product is fish oils. The study of compounds having active pharmacological qualities found in the marine class of animals