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Edited by
Stéphane La Barre and Stephen Bates

Blue Biotechnology

Production and Use of Marine Molecules

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Volume 1

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Volume 2

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Preface

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The initiative by STÉPHANE LA BARRE and STEPHEN S. BATES to edit a volume on the prospects of "Blue Biotechnology: Production and Use of Marine Molecules" is remarkably timely, as the Earth is facing major challenges with global changes and increased human impacts. Indeed, blue biotechnology is a key approach for a sustainable ocean future. The unexplored and understudied nature of much of the underwater world means that the capacity of marine organisms, other than fish and shellfish, to provide inputs to the blue economy is only just beginning to be appreciated. This is partly through the development of new gene sequencing technologies for cultivable and uncultivable organisms, bio-inspired chemistry, genetic engineering, and sustainable aquaculture.

There have already been successes. The antiviral drugs Zovirax™ and Acyclovir™ were obtained from nucleosides isolated from Caribbean sponges. Yondelis™, developed from small soft-bodied marine tunicates, was the first drug of marine origin to fight cancer. Exploration of the ocean's biodiversity is now helping us understand, for example, how organisms that can withstand extremes of temperature and pressure and grow without light could be used to develop new industrial enzymes or pharmaceuticals, as well as novel biomaterials. At the same time, concerns about the limitation of terrestrial crops are driving efforts to explore the use of algae as a source of high value-added chemicals and bioactive compounds.

Accelerating this process will require a combination of basic research on ocean life and applied research on possible industrial applications with low probabilities but high rewards for success. Companies that have historically never considered marine biotechnology to impact their business are now starting to claim it or to use it to their benefit. To a large extent, this is driven by the quest for sustainability: to synthesize our daily life products from renewable resources by means of smart and eco-efficient processes. Increasingly, major and small industries have begun to take part in the growing marine bio-economy. They are shifting their raw material basis and production routes from fisheries or mining sources to renewable cultivated materials and by-products optimization using a biorefinery concept and biosynthetic chemistry. In addition, blue biotechnology is providing cues to prevent the loss of essential ecosystem services.