Preface

Oceans, which occupy up to two thirds of the surface of our planet, were not really approached from scientific point of view until the second half of the 19th century and even the 20th with regard to microbial and unicellular life. Today, the importance of marine biodiversity has been fully recognized. It is, indeed, one of the aspects which, over the two past decades, have made a major contribution to our knowledge and vision of the living planet.

Marine organisms make up a very large collection of living beings, of which the number of species is likely to exceed that of land species by several orders of magnitude. However, the major interest in marine living systems is mainly linked to the exceptional diversity of molecular structures, of chemical interactions reflecting a long evolutionary history and also the fact that marine life spreads within multiple and complex three-dimensional spaces. From a very practical and trivial point of view, marine life can be seen as a huge reservoir of molecules which enable marine organisms to defend themselves, to communicate and, more generally, to survive and thrive.

In a very broad sense, marine biotechnologies can be understood as being the various techniques of managing marine living systems for the profit of mankind. The domain covered by marine biotechnologies is vast and ranges over various overlapping disciplines, from developmental biology to the chemistry of natural substances and bioprocess engineering. Not all these fields, however, are ready for practical and industrial applications. Biomass from fishing or the aquaculture industry is, in fact, complex, geographically and seasonally dependent mixtures of compounds requiring adapted purification procedures.

Furthermore, many "natural substances", for which we do not know any terrestrial counterparts, and are, therefore, of the greatest interest, only exist in tiny amounts in rare biological species and their exploitation is likely to call for costly synthetic procedures.

Originally, marine life was used essentially as a provider of biomass directly and indirectly for food. However, today, in the global context of the standstill of world fisheries, common sense requires us to upgrade and exploit the actual biomass better. This clearly means developing techniques for identifying the source of raw materials suitable for specific biomolecules, the design of processes and their scaling up from pilot plant to production processes.

Marine natural products not only display novel characteristics but also complexity in terms of chemical structures. Isolation and structure elucidation represents only the tip of the iceberg. The question of the functionality of new isolated molecules within the perspective of challenging major public health and environmental problems is crucial. In this domain, ecological and evolutionary approaches should help the classical screening systems for determining the right target systems.

In addition, a better understanding of the complex interactions between macro and micro organisms is necessary for us to be able to use these resources for industrial purposes. Thus, more and more groups are focussing on the field of bioprocess engineering and downstream processing in marine biotechnology.

This volume of Advances in Biochemical Engineering/Biotechnology illustrates several topics in line with the following broad objectives: thinking of marine biotechnology as the controlled production and use of marine organisms and molecules for useful purposes, firstly by exploring aspects of marine biodiversity and exploitation of biomass, then considering the identification, production and processing of marine products.

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