1. Record Nr. UNINA9910137093303321

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Titolo	Marine Biomolecules
Pubbl/distr/stampa	Frontiers Media SA, 2015
Descrizione fisica	1 electronic resource (97 p.)
Collana	Frontiers Research Topics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia

Sommario/riassunto

Oceans include the greatest extremes of pressure, temperature and light, and habitats can range from tropical waters to ocean trenches, several kilometers below sea level at high pressure. With its 70% of the surface of our planet marine ecosystem still remains largely unexplored, understudied and underexploited in comparison with terrestrial ecosystems, organisms and bioprocesses. The biological adaptation of marine organisms to a wide range of environmental conditions in the specific environment (temperature, salinity, tides, pressure, radiation, light, etc.) has made them an enormous reservoir of interesting biological material for both basic research and biotechnological improvements. As a consequence marine ecosystem is valued as a source of enzymes and other biomolecules exhibiting new functions and activities to fulfill human needs. Indeed, in recent years it has been recognised as an untapped source of novel enzymes and metabolites even though, with regard to the assignment of precise biological functions to genes, proteins and enzymes, it is still considered as the least developed. Using metagenomics to recover genetic material directly from environmental samples, this biogenetic diversification can be accessed but despite the contributions from metagenomic technologies the new field requires major improvements. A few words on the complexity of marine environments should be added here. This complexity ranges from symbiotic relationships to biology and chemistry of defence mechanisms and from chemoecology

of marine invasions up to the strategies found in prokaryotes to adapt to extreme environments. The interdisciplinary study of this complexity will enable researchers to find an arsenal of enzymes and pathways greatly demanded in biotechnological applications. As far as marine enzymes are concerned they may carry novel chemical and stereochemical properties, thus biocatalytically oriented studies (testing of suitable substrates, appropriate checking of reaction conditions, study of stereochemical asset of catalysis) should be performed to appropriately reveal this “chemical biodiversity” which increases interest for these enzymes. Among other biomolecules, polysaccharides are the most abundant renewable biomaterial found on land and in oceans. Their molecular diversity is very interesting; except polysaccharides used traditionally in food and non-food industries, the structure and the functionality of most of them are unknown and unexplored. Brown seaweeds synthesize unique bioactive polysaccharides: laminarans, alginic acids and fucoidans. A wide range of biological activities (anticoagulant, antitumor, antiviral, anti-inflammation, etc.) have been attributed to fucoidans and their role with respect to structure-activity relationship is still under debate. In this Research Topic, we wish to centralize and review contributions, idea and comments related to the issues above. In particular results of enzymatic bioprospecting in gross marine environment will be acknowledged along with research for structural characterization and biological function of biomolecules such as marine polysaccharides and all kind of research related to the complexity of bioprocesses in marine environments. Inter- and multi-disciplinary approach to this field is favoured in this Research Topic and could greatly be facilitated by the web and open access nature as well.