frontiers | Frontiers in Marine Science

TYPE Editorial
PUBLISHED 17 August 2023
DOI 10.3389/fmars.2023.1264798

OPEN ACCESS

EDITED AND REVIEWED BY
Adele Cutignano,
National Research Council (CNR), Italy

*CORRESPONDENCE
Sophia Letsiou
sletsiou@uniwa.gr;
sletsiou@gmail.com

RECEIVED 21 July 2023
ACCEPTED 08 August 2023
PUBLISHED 17 August 2023

CITATION
Letsiou S (2023) Editorial: Biotechnology of marine microorganisms.
Front. Mar. Sci. 10:1264798.
doi: 10.3389/fmars.2023.1264798

Editorial: Biotechnology of marine microorganisms

Sophia Letsiou[1,2]*

[1]Department of Biomedical Sciences, University of West Attica, Athens, Greece, [2]Department of Food Science and Technology, University of West Attica, Athens, Greece

KEYWORDS

marine biotechnology, marine microorganisms, marine bacteria, marine biomolecules, microalgae

Editorial on the Research Topic
Biotechnology of marine microorganisms

Biotechnology encompasses the implementation of science and technology in the service of innovation by transferring knowledge, producing new products, and providing new services for the improvement of human life. In addition, marine biotechnology, having at its core marine organisms, is a promising sector of the blue economy to deliver impressive scientific advances that benefit human wellbeing. Indeed, over the last years, the use of marine microorganism-derived biomolecules, due to their physiological and metabolic properties, has been highlighted in multiple industries. However, the molecular and biochemical mechanisms underlining the bioactivities of marine microorganism-derived biomolecules are not well understood yet. Thus, assessments on the bioactivity of marine microorganism-derived biomolecules have been proven to be a rather important factor to foster the implementation of blue biotechnology and bioeconomy in different areas.

The aim of this Research Topic is to contribute to the scientific knowledge and understanding of marine microorganism-derived biomolecules so that they may be valorized in different sectors of human life, such as aquaculture, public health, and the food industry, and to introduce new ideas and information on the exploitation of marine microorganisms. The research works that are presented in this Research Topic show clearly the diversity of marine microorganisms, their plasticity, and their potential multiple implementations, thus emphasizing their importance to human wellbeing.

Currently, there is a tendency to explore natural sources of surfactants based on marine microorganisms so as to replace synthetic surfactants, which are used widely in several industries, including manufacturing, pharmaceuticals and cosmetics, food and feed, agriculture, petroleum, and environmental remediation, for their ability to adsorb to fluid and solid–water interfaces. Thus, the main objective of this trajectory is to produce biosurfactants and bioemulsifiers through environmentally friendly methods. Zompra et al. present a review focused on an array of analytical methods to characterize, identify, and determine polymeric bioemulsifiers and biosurfactants from marine microorganisms. Although considerable efforts have been dedicated to this direction, rapid, efficient, and, according to industrial standards, high-precision methods still remain a challenge due to their chemical diversity. However, the authors suggest that a combination of analytical methods could be the key for this challenge. Another review of this Research Topic is based

on the marine biome. Vega-Portalatino et al. present the numerous properties of the marine biome, which mainly represents the symbionts of marine macroalgae or microalgae against pathogenic bacteria, fungi, and protozoa or food spoilers along with their impact on aquaculture, public health, and the food industry. In addition, a research article related to marine microbiota is presented by Kaliyamoorthy et al. focusing on two predominant species (*Thraustochytrium* sp. and *Aurantiochytrium mangrovei)* of the Indian mangrove ecosystems. The authors introduce their strong antioxidant activities, which are mainly based on the content of polyunsaturated fatty acids (PUFAs), and their antimicrobial properties, underlining their promising application in pharmaceuticals, aquaculture, and human health.

In addition, Liu et al. investigate the molecular mechanisms of a marine pathogen, which is a threat to fish life and the marine ecosystem in general. With the aid of RNAi technology, they manage to decipher the role of *fliK*, an important virulence gene, which contributes to the pathogenicity of *Pseudomonas plecoglossicida*. It has been noted that the silencing of this gene weakens a pathogen's motility, chemotaxis, adhesion, biofilm formation, and pathogenicity.

Picophytoplankton are the most abundant primary producers in the oceans, despite representing less than 1% of the photosynthetic biomass. Therefore, any change in the growth of phytoplankton population will severely affect the biogeochemical cycles. Foresi et al. explore the influence of different N conditions on *Ostreococcus tauri*, which is a part of picophytoplankton. The authors present a molecular mechanism where N starvation responses are induced without compromising growth, unraveling the way in which cellular N status in eukaryotic phototrophs is sensed and modified. This evidence implies the development of biotechnological tools that could increase algae growth and lipids content under N deprivation.

A fresh and promising idea is introduced by Zhou et al. based on the fact that marine microalgae are widespread in the ocean and play a crucial role in the ecosystem. Thus, an automatic identification and location of microalgae with microscopic images would aid both the monitoring of the ecosystem life state and the water quality evaluation system. The authors propose a new dataset for the visualization of marine microalgae and a range of detection methods. The new dataset contains microscopic images of five genera of microalgae, namely, *Pinnularia*, *Chlorella*, *Platymonas, Symbiodinium*, and *Isochrysis*, as well as one species, namely, *Dunaliella salina.* Furthermore, they explore different physiological states for *Symbiodinium*, such as normal, bleaching, and translating, which can be an indicator of the situation of a coral and its water environment, thus giving future potential to the imaging exploitation of marine microorganisms.

Author contributions

SL: Writing – original draft.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note