frontiers | Frontiers in Marine Science

TYPE Editorial
PUBLISHED 13 June 2023
DOI 10.3389/fmars.2023.1230069

OPEN ACCESS

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RECEIVED 28 May 2023
ACCEPTED 05 June 2023
PUBLISHED 13 June 2023

CITATION
Zhu F, Zhu L, Liu W, Cheng P and Huo S (2023) Editorial: Exploration and utilization of marine and freshwater high-value biological resources.
Front. Mar. Sci. 10:1230069.
doi: 10.3389/fmars.2023.1230069

Editorial: Exploration and utilization of marine and freshwater high-value biological resources

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KEYWORDS

biological resources, microalgae, cyanobacteria, high-value utilization, high value-added products, functional active substances

Editorial on the Research Topic
Exploration and utilization of marine and freshwater high-value biological resources

The efficient, safe, and sustainable utilization and exploitation of high-value resources in marine and freshwater systems are conducive to agriculture, food, and environmental security (a recent research hotspot). Marine microalgae biological resources have great economic, social, and ecological value, and play an important role in maintaining material circulation, energy flow, and water purification in the ocean-living systems. As a major contributor to marine primary productivity, carbon dioxide fixation transforms microalgae into high-value bioactive compounds and releases oxygen. Research and development of microalgae biological resources, including natural pigments such as phycoglobin, phycocyanin, carotenoids, astaxanthin, and fucoxanthin, as well as unsaturated fatty acids such as arachidonic acid and docosahexaenoic acid, along with extracellular polysaccharides and minerals, are one of the most practical and innovative fields in global scientific and technological activities. The research and development of microalgae biological resources provide a primary pathway to solving major social and economic problems such as resource shortages and food safety.

With the help of modern biotechnology, there have been important breakthroughs in the development and high-value utilization of marine biological resources to obtain high-value products such as food, medicine, and functional products. In this Research Topic, Yin et al. established an integrated biological process utilizing Porphyridium cruentum for the production of B-phycoglobin (B-PE) and extracellular polysaccharide (EPS). They extracted the highest content of phycobilin through repeated freeze-thaw treatment and finally obtained 7.99 mg/L B-PE (16500 Da), with a purity index of 0.82. Li et al. showed that the zero N condition and lowlight condition were conducive to the highest astaxanthin concentration in the thin-wall motile cell Haematococcus pluvialis, and it was more economical in terms of electricity usage and other costs. Yang et al. used nitrogen

utilization analysis and showed that urea and arginine had synergistic effects on promoting the biosynthesis of phyxanthin in Phaeodactylum tricornutum, which is a promising and efficient strategy for increasing phyxanthin production in the microalgae. Spirulina is an important species for phycocyanin production. Yao et al. simply added mineral elements and peptides to Spirulina maximus culture to improve the phycocyanin yield. Guo et al. discovered that a high bicarbonate level and low temperature significantly increased biomass production and accumulation of arachidonic acid and docosahexaenoic acid (DHA) in Dunaliella salina. In addition, Shang et al. examined the roles of the interacting proteins of the transcription factor DpAP2, which regulates carotenoid anabolism in Dunaliella parva. DpAP2 can promote carotenoid accumulation by binding to the promoter of target genes. Last but not least, this Research Topic also mentions the dynamic changes in fishing resources such as skipjack in the South China Sea and Antarctic krill in the Bransfield Strait, which are of significant value but lack data in global marine fisheries.

In conclusion, the Research Topicon the *Exploration and Utilization of Marine and Freshwater High-Value Biological Resources* paves the way to realize efficient production processes for biomass and bioactive substances of microalgae and cyanobacteria. It is conducive to the development of marine microalgae and cyanobacteria industries for value-added products worldwide.

Author contributions

FZ: writing the original draft, editing, and reviewing. LZ: reviewing and editing. WL: funding acquisition and reviewing. PC: reviewing. SH: reviewing and funding acquisition. All authors approved the submitted version.

Funding

The National Natural Science Foundation of China (21978120), the Innovation Ability Improvement Project of Small and Medium-sized High-tech Companies in Shandong Province (2022TSGC2199), and the Key R&D projects in Jiangsu Province (BE2020405) partially supported the work on this Research Topic.

Acknowledgments

We would like to express our sincere gratitude to all the authors who proposed their work and all the researchers who reviewed the submissions on this Research Topic.

Conflict of interest

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

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