

3rd Marine Biotechnology Conference: Emerging Opportunities and Future Perspectives

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المؤتمر الخليجي الثالث للتكنولوجيا الحيوية البحرية: الفرص الناشئة والآفاق المستقبلية

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ABSTRACT. The Center of Excellence in Marine Biotechnology, Sultan Qaboos University had successfully organized the “Third GCC Marine Biotechnology Conference: Emerging opportunities and future perspectives”. This conference was held virtually from 8 to 9 December 2021. The main objectives of the conference were to share scientific results between researchers and promote marine biotechnology in the region. In total, 27 oral and 12 poster presentations were delivered during the conference. The conference had 40 participants from different countries. Professor Sergey Dobretsov was served as the chair of the conference. All papers in this volume are perceived.

KEYWORDS: Marine biotechnology, conference, Oman, Sultan Qaboos University

الخلاصة: نظم مركز التميز في التكنولوجيا الحيوية البحرية بجامعة السلطان قابوس بنجاح "المؤتمر الخليجي الثالث للتكنولوجيا الحيوية البحرية: الفرص الناشئة وآفاق المستقبل". عُقد هذا المؤتمر افتراضياً في الفترة من ٨ إلى ٩ ديسمبر ٢٠٢١. وكانت الأهداف الرئيسية للمؤتمر هي تبادل النتائج العلمية بين الباحثين وتعزيز التكنولوجيا الحيوية البحرية في المنطقة. وفي المجمل، تم تقديم ٢٧ عرضاً شفهيًا و١٢ عرضاً تقديميًا خلال المؤتمر. وحضر المؤتمر ٤٠ مشاركاً من مختلف البلدان. البروفيسور سيرجي دوبريتسوف منصب رئيس المؤتمر. وتحقق وراجع جميع الاوراق المقدمة في هذا المجلد

الكلمات الرئيسية: التكنولوجيا الحيوية البحرية، مؤتمر، عمان، جامعة السلطان قابوس

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Background

Marine biotechnology is the sustainable use of marine bioresources for the benefit of mankind (Goddard et al., 2015). While first use of marine organisms was dated more than 4000 years ago, an intensive development of marine biotechnology has started recently. More than two thirds of our planet is covered with oceans that have high diversity of species and environments. In order to live in such a diverse environment marine organisms evolved unique structures, metabolic pathways, re ays, bioactive compounds, and novel processes can be found in marine organisms. Marine organisms are the source of novel bioactive compounds, novel genes, novel materials and biochemical processes that can be used in different industrial applications. Aquaculture of marine species can provide a sustainable food supply and create new sources of income and job opportunities.

The Sultanate of Oman has a long coastal line of more than 3000 km and diverse marine resources, including many species of fishes, mussels, corals, seaweeds, and microorganisms. Living marine resources are Oman's major renewables and have remarkable potential for commercial exploitation (Al-Fudaili and Burgess, 2014). This remarkable potential of marine resources was recognized by the government. This resulted in the establishment of a UNESCO Chair in 2004 and the Center of Excellence in Marine Biotechnology in 2015 at Sultan Qaboos University. The aims of these are to serve as the focal points for marine biotechnology in the country through multi-disciplinary research programs, training, and dissemination of information. Current Oman's development plan – Oman Vision 2040 - supports marine biotechnology through the programs of sustainable utilization of marine resources, development of food security, and a green economy.

About the Conference

In order to promote marine biotechnology, disseminate the knowledge, train young researchers, and enhance cooperation between researchers working in different institutions of the Sultanate of Oman and in the Gulf region, series of the marine biotechnology conferences were organized by the Center of Excellence in Marine Biotechnology (CEMB), Sultan Qaboos University (SQU). The first conference took place in Muscat in 2013 (Goddard et al., 2015), while the second one was in 2017 (Dobretsov, 2019). The “3d GCC Marine Biotechnology Conference: Emerging opportunities and future perspectives” was held from 8th to 9th of December 2021 by CEMB. The symposium was supported by Sultan Qaboos University and the European Society of Marine Biotechnology. Members of the Center of Excellence in Marine Biotechnology, and representatives of different departments of the university were the members of the conference organizing committee. Due to the COVID-19 pandemic, the conference was organized online. The main objectives of this marine biotechnology conference were to assess and promote the development of marine biotechnology in the region. The conference had four major themes, such as Fisheries and Aquaculture Biotechnology; Marine Genetics and Biodiversity; Marine Natural Products and Biofouling, and Marine Ecology. These topics were selected based on the current research activity in the Sultanate of Oman and the region. The conference had 40 participants from different countries, like Australia, the USA, Spain, Egypt, Iran, Bahrain, Qatar, Saudi Arabia, Kuwait, Oman, India, and Sri Lanka. In total, 27 oral and 12 poster presentations were delivered during the conference. Four keynote speakers delivered their talks including Prof. Dean Jerry of James Cook University, Australia, Dr. Nicholas Robinson of Nofima, Australia, Prof. Russell Hill of the University of Maryland, Center for Environmental Science, USA, and Dr. Radhouan Ben-Hamadou of Qatar University, Qatar. The conference was concluded by the final session

which reviewed a number of national and regional issues in marine biotechnology.

On the first day of the conference, there were presentations about fisheries and aquaculture biotechnology, and marine genetics and biodiversity. The keynote speaker Prof. Dean Jerry, James Cook University, Australia presented his talk entitled “The future of genomics and artificial intelligence to maximize aquaculture productivity”. He highlighted the importance of genomics and artificial intelligence and machine learning for aquaculture development. This includes using genomics to increase the rate of genetic gains and to select difficult-to-improve traits in selection programs, understanding the role of the bacteria, and detecting incipient pathogens causing sub-clinical effects. The development of artificial intelligence/machine learning algorithms offers the ability to implement rapid, industrial-scale digital acquisition of phenotypic data, predict the occurrence of disease outbreaks and automate management activities, such as feeding and disease control. The keynote presentation was followed by a series of examples of successful cultivation of different species including sea cucumbers, fish species, and microbes, such as spirulina. After a break, Dr. Nicholas Robinson, Nofima, Australia presented a keynote talk entitled “Genomic selection for white spot syndrome virus (WSSV) resistance in white leg shrimp (*Litopenaeus vannamei*) boosts survival under an experimental disease challenge test”. White spot syndrome virus disease is a major problem for shrimp aquaculture throughout the world. The development of resistant shrimp populations is an attractive option for the management of this disease. Dr. Robinson presented the data of the study designed to determine the power and accuracy of genomic selection to improve WSSV resistance in *L. vannamei*. Their study suggested that genetic selection has a large potential to prevent disease outbreaks. Other presenters showed evidence that microsatellite markers can be used for fisheries management of scalloped spiny lobster (*Panulirus homarus*)

and differential gene expression under thermal stress. Other researchers presented DNA barcoding of marine species and rDNA characterization of microbial communities.

On the second day of the conference, there were talks about marine natural products and biofouling, as well as marine ecology. The keynote and plenary speaker Prof. Russell Hill, the President of the International Society of Marine Biotechnology, University of Maryland Center for Environmental Science, USA, gave a talk entitled “Marine sponge and their symbionts: Significance for nutrient cycling and drug discovery”. Marine sponges are abundant invertebrates in many benthic ecosystems and characteristically are very effective filter-feeders and host many microorganisms. The role of sponges and their associated symbionts in transforming dissolved organic carbon and nitrogen is now well understood in many sponge species. Prof. Hill highlighted that many novel bacteria are present within sponges, some of which can be cultured and readily be accessed for drug discovery. Other microbes are recalcitrant to culture and molecular approaches are required to access biosynthetic gene clusters from these microbes in order to produce compounds of interest. Finally, Prof. Hill made a conclusion that a detailed understanding of sponge microbiology is essential in marine biotechnology, both because of the potential to discover new drugs and for a better understanding of the processes of nutrient cycling. The keynote presentation was followed by several oral presentations that provided examples of marine natural products isolated from different organisms of the region. The researchers used these marine drugs to treat cancer in humans and other diseases in marine organisms. Additionally, several talks were presented on biofouling and biofouling prevention. The keynote speaker Dr. Radhouan Ben-Hamadou, Qatar University, Qatar gave a talk entitled “Marine Biodiversity in the Anthropocene: between threats to opportunities”. In this talk, Dr. Ben-Hamadou highlighted that the ROPME Sea Area (RSA) is rich in a variety of productive but sensitive ecosystems like coral reefs, seagrass beds, and mangroves. The ecosystem services they provide to societies

include the provision of food, healthy coastal waters, and tourism. He also mentioned that the Arabian Gulf has environmental conditions that make its coastal ecosystems unusually fragile and susceptible to impacts from human activities. Dr. Ben-Hamadou overviewed research and development works being carried out in Qatar and the RSA combining conservation of healthy ecosystems, restoration of degraded ecosystems, and providing alternative natural and artificial habitats. The following talks presented the effect of ocean acidification on bio-mineralization, reproduction, and growth of marine species. Additionally, important aspects of harmful algal blooms, trophic structure, and food web model of the Sea of Oman were presented.

At the end of the conference, a conclusion session was organized. During this session, the participants discussed the perspective of marine biotechnology development in the region. Additionally, participants expressed their opinion that the conference was informative and well organized. Finally, two prizes for the best oral and poster presentation done by young marine biotechnology researchers was given by Sultan Qaboos University and the European Society for Marine Biotechnology (Table 1).

In this special issue of the journal, we selected several manuscripts that covered the main topics of the conference, including fisheries and aquaculture biotechnology, and marine genetics and biodiversity. All papers are peer reviewed by the experts in this field. We are confident that these articles will serve as the foundation for future research in marine biotechnology in the region.

Key References

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Table 1. Best oral and poster awards given at the conference

Prize	Authors	Title
Best oral presentation	Marquez J.G., Francisco Javier A., Feliz L.F., Salvador A., Diaz R.T.A.	Cultivated and wild juvenile thick-lipped grey mullet <i>Chelon labrosus</i> : a comparison from a nutritional point of view
Best poster presentation	Al-Shmali S., Al-Sawafi M., Al-Maharbi S, Al-Habsi S., Al-Hashmi K., Al-Hoqanu U.	Isolation and characterization of indigenous <i>Coscinodiscus</i> as a potential feedstock for biodiesel production