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Marine Biotechnology: Developments and Perspectives

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Marine biotechnology (or blue biotechnology) is considered an area of great interest and potential due to the contribution for the building of a eco-sustainable and highly efficient society. The aquatic environments are still not fully explored and their resources could play an important role for various industrial activities. Different research priorities could be identified in the field on marine biotechnology to show the vision of the developments and perspectives for the next few years. A fundamental aspect is related to aquaculture: new methodologies will help in selective breeding of species, in increasing sustainability of production and in enhancing animal welfare, including changes in food supply, preventive therapeutic measures and use of zero-waste recirculation systems [1-3]. Moreover, aquaculture products will be improved to gain optimal nutritional properties for human health [4]. Another strategic area of marine biotechnology is related to the development of renewable energy products and processes, mainly using marine algae [5-8]. In addition, marine environment is a largely untapped source of novel compounds that could be potentially used as novel drugs, health, nutraceuticals and personal care products [6,9-12]. One of the main examples of a novel drug is the trabectedin, a marine compound first extracted from the marine tunicate *Ecteinascidia turbinata* which is at the basis of the anti-cancer drug Yondelis®. This product is actually used for the treatment of soft tissue sarcoma and ovarian cancer and is produced in an economically sustainable semisynthetic process. The carotenoid astaxanthin, an antioxidant pigment produced by different microalgae, is instead an example of an high value compound obtained from marine resources.

Blue biotechnology could be further involved in address key environmental issues, like in bio-sensing technologies to allow *in situ* marine monitoring, in bioremediation and in developing cost-effective and non-toxic antifouling technologies [13-15]. Finally, marine-derived molecules could be of high utility as industrial products or could be used in industrial processes as new enzymes, biopolymers and biomaterials [16-22]. Some example of products already in the market includes DNA ligase from *Thermococcales,* selected for their high fidelity, shrimp alkaline phosphatase (SAP), due to its heat inactivation properties, and green florescent protein (GFP) from *Aequorea victoria.*

In conclusion, marine biotechnology represents a pivotal sector to provide new useful tools for key societal challenges in the next future.

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