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Ocean exploration's influence on human history and Applicationsof Marine Biotechnology.

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Abstract:

Marine biology is a hybrid field that studies organismal function, ecological interactions, and marine biodiversity. The first studies of marine biology may be traced back to the Phoenicians and Greeks, who are credited with being the first to investigate the oceans and its contents. The marine ecosystem remains an untapped store of biologically active substances with significant potential to offer food components for the creation of novel functional meals. Much research has been performed utilising biotechnological technologies to find and synthesise novel compounds with the objective of improving the availability and chemical diversity of useful marine components. Aristotle produced the earliest recorded observations on the distribution and behaviour of marine life. Marine biotechnology is the use of biotechnology, molecular and cell biology, and bioinformatics to create goods and processes from marine creatures. It is a branch of research concerned with the investigation of the ocean in order to generate new medicinal medications, chemical goods, enzymes, and other products and processes. It also covers aquaculture and seafood safety, bioremediation, and biofuels, among other topics.

Keywords: Marine Biotechnology, History, Application, exploration.

Introduction:

Biotechnology encompasses a wide range of techniques and applications. Biotechnology is defined by the Convention on Biological Diversity (CBD) as "any technical application that employs biological systems, live creatures, or derivatives thereof, to manufacture or alter goods or processes for specialised purpose" (www.fao.org/biotech/fao-statement-on-biotechnology/en). Marine biotechnology is a new subject that focuses on the study and development of technical applications of live marine creatures, as well as their derivatives and bioprocesses. Marine biotechnology, in a wide sense, is the utilisation of marine organisms or their components to generate commodities or services. Marine-derived products have been used in a variety of applications, including health, environmental cleanup, new industrial processes, new medications, and food supply, which is the focus of this analysis. More researchers are now using biotechnology methods to find and produce marine natural compounds [1]. Despite the fact that the ocean covers over 70% of the Earth's surface and plays an important role in maintaining life on our planet, from the air we breathe to the food we eat to weather and climate patterns, our understanding of the ocean remains restricted.Humans made significant advances in ocean exploration in the latter part of the twentieth century. Technological breakthroughs have substantially expanded our understanding of marine biology (ocean life) and marine geology (ocean floor composition and structure). Humans and technology may now dive to tremendous depths to investigate the secret world under the ocean's surface. The great majority of the ocean, however, remains undiscovered.

Making discoveries and looking for the uncommon and unexpected are all part of ocean exploration. The careful observations and documenting of biological, chemical, physical, geological, and archaeological components of the ocean gathered via exploration serve as the first phase in the scientific process, laying the groundwork for future study and decision-making.

We acquire data and information needed to meet both present and emerging research and management demands through ocean exploration. Exploration contributes to ensuring that ocean resources are not only maintained, but also managed in a sustainable manner, so that they are available for future generations to enjoy. Exploration of the United States' Exclusive Economic Zone is critical for national security because it allows us to establish boundaries, safeguard American interests, and claim ocean resources.

For millennia, ocean exploration was mostly restricted to the ocean's surface. Across the oceans, explorers sailed or rowed ships in pursuit of new territories or natural riches. Humans were unable to explore under the surface due to biological constraints. Three major difficulties stopped mankind from exploring the ocean's deep depths. To begin, people must breathe air in order to exist, and humans can hold their breath for a few minutes or fewer. This leaves little time to dive, investigate, and return to the water's surface. Second, as a diver descends into deep water, the weight of the water increases dramatically. Finally, when one goes further into the water, the temperature drops. Approaching the ocean floor, the temperature is near freezing.

Ocean exploration History:

The phrase "deep sea" does not signify the same thing to everyone. The deep sea is defined by fishermen as any region of the ocean beyond the comparatively shallow continental shelf. The deep sea, according to scientists, is the lowest region of the ocean, below the thermocline (the layer where solar heating and cooling cease to have an influence) and above the sea floor. This is the section of the ocean that is deeper than 1,000 fathoms (1,800 metres).

The depths are difficult to investigate because they are perpetually black, exceedingly cold (between 0 and 3 degrees Celsius below 3,000 metres), and under great pressure (15750 psi or over 1,000 times higher than standard atmospheric pressure at sea level). People believed the deep sea was a dead wasteland from the time of Pliny until the end of the nineteenth century. Scientists now consider the deep sea to be the world's biggest home. To investigate this chilly, dark, and pressured environment, special equipment has been devised.

Influence on human history: During the years after the HMS Challenger mission, technology advanced the study of marine biology to new heights. Otis Barton (1877-1962) and William Beebe (1877-1962) went 923 m/3,028 ft below the surface off the coast of Bermuda in a bathysphere constructed and sponsored by Barton in 1934. This depth record was not beaten until 1948, when Barton dived to 1,372 m/4,500 ft in a bathysphere. In the meanwhile, Beebe was able to see deep sea life in its natural habitat rather than in a specimen jar. Although he was chastised for neglecting to publish his findings in professional journals, his evocative descriptions of bathysphere dives in his novels inspired some of today's best oceanographers and marine biologists.

Fortunately, because to the efforts of past and contemporary ocean explorers, the public is becoming more aware of these dangers, prompting government bodies to take action and support study. The efforts of governmental agencies employing a multidisciplinary approach, together with the activities of various private marine conservation groups working on problems such as advocacy, education, and research, will help generate the momentum required to meet the difficulties of ocean preservation.

From the origin of the word "ocean" to the tides in ancient Greece:

Oceanus was the name of a Greek deity, the son of Uranus and Gaia, who was the embodiment of what the Greeks saw as a massive quantity of round water that ringed the Earth. We also owe the name "ocean" to the Greeks, who made some of the first discoveries in the history of geography in general, and oceanography in particular. If Pythagoras is credited with discovering that the Earth is round and Eratosthenes with calculating the Earth's circumference and inventing the concepts of geographical latitude and longitude, the explorer Pytheas is credited with discovering for the first time the relationship between the tides and the movement of the moon (4th century BC).

Marine biology:

Nearly three-quarters of the Earth's surface is covered by saltwater. Animals, plants, and other creatures may be found all throughout the waters. Many marine life species have only been identified in the previous few decades. As humans continue to explore the oceans, many more marine creatures will surely be found. Humans were unable to delve much below the ocean's surface until the last century. Scientists were only able to examine plant, animal, and other life that lived near the surface. Deep-sea submersibles have revealed an universe of living organisms that had been concealed for millions of years. For a long time, scientists considered that all species relied on sunlight for survival. Photosynthesis, or the conversion of sunlight, water, and carbon dioxide into food, is required by plants. Plants are then the bottom of the food chain for animals (the relationship between plants and animals where one species is eaten by another).

Marine geology

Ocean research has also discovered a land-like deep marine environment. The study of the creation and structure of underwater land and rock formation is known as marine geology. The ocean floor is covered in mountain ranges, hills, valleys, volcanoes, and trenches. The majority of these qualities were unknown until the twentieth century. Ocean mapping and submersible technology have revealed the geology of the ocean floor. The Mid-Atlantic Ridge, a mountain range that runs the whole length of the Atlantic Ocean, was found in 1952. The Mariana Trench, the ocean's deepest point, was not found until 1951.

Marine Biotechnology Applications:

Nutrition: There are very few trash fish or wild fish species available for fish meal as a protein source for aquafeeds. Thus, plant-based protein sources are a sustainable alternative with the added benefit of being less expensive. However, most plants contain anti-nutritional properties that make them unsuitable for feed use. Carnivorous fish, for example, have a limited capacity to utilise carbs due to polysaccharide digestibility. To solve this issue, genetic engineering was used to improve the glucose metabolism of salmonid fish. The salmonid fish received genes for glucose transporter and hexokinase.

Reproduction: When kept in captivity, certain fishes do not spawn naturally. Previously, fish gonadotropin, a group of hormones that increase reproduction, was extracted and purified from crude preparations of hundreds of pituitary glands. Large amounts of highly pure gonadotropin may now be manufactured in the laboratory using recombinant DNA technology.

Biofuels: Biofuels made from microalgae are one of the most cost-effective solutions to minimise reliance on fossil fuels. Because of their high oil content, ease of propagation (can be cultivated in seawater or brackish water, thus not competing with conventional agriculture's resources), residual biomass after oil extraction can be used as feed or fertiliser, or fermented to produce ethanol or methane, and the biochemical composition can be controlled by modifying growth conditions, microalgae are considered better sources of biofuels than higher plants. Chlorella, Tetraselmis, Chaetoceros, Isochrysis, Skeletonema, and Nannochloropsis are examples of microalgae with high biomass production and lipid content.

Human Well-being: The majority of our medications are derived from natural resources, and scientists are currently investigating tropical rain forest creatures for potentially significant medical goods. Humans have been aware of the poisonous characteristics of some water organisms for at least the last 4000 years, according to historical records4. Extracts of marine creatures were utilised as medicine more than 2000 years ago. Cod liver oil was used as a supplement to food throughout the nineteenth and early twentieth century. However, it wasn't until the mid-twentieth century that scientists began to methodically search the waters for medications.

Fishery and aquaculture: Marine aquaculture is currently a mature and very effective example of marine biotechnology advancement. Fish is one of the world's most essential protein sources for human nutrition. The history of fishing dates back thousands of years. Previously, fishing was restricted to inland water and coastal zones, but as the population has grown, so has fishing activity. This major food supply appears to be dwindling slowly as a result of overfishing and changes in the global environment. As a result, biotechnology can aid in certain critical measures, such as the use of DNA markers to distinguish individuals, populations, stocks, and sister species of commercially significant and endangered species.

Biomaterials and bioprocessing: Marine creatures produce bioactive compounds such as metabolites, proteins, enzymes, polysaccharides, and lipids, which have led to the development of novel industrial processes. Acinetobacter, a natural 'soap' (biosurfactant) created by an oil-eating sea bacteria, is a biotechnological gift. Improved technology, which allows for the sampling of creatures from the ocean floor, has led to the exploration of several groups of species (extremophiles). These species have evolved to survive and flourish in harsh environments. Uniquely adapted enzymes (and other proteins) with extra stable chemical bonds aid in the survival of these organisms under these settings.

Medicine: Extracts from marine creatures were utilised as medicine about 2,000 years ago. Cod liver oil was a well-known dietary supplement in the nineteenth and twentieth centuries. It wasn't until the mid-twentieth century that scientists began to methodically search the waters for medicines. Other medications originating from the sea are still under clinical development. Bryostatin is a cytotoxic molecule, as are the dolastatin derivatives soblidotin and synthadotin. Aside from these medications, several are in the preclinical stage. Every year, about 1,000 novel compounds with varying potencies and biological roles are introduced to the pipeline, increasing the number of marine chemicals reported.

Conclusion:

One of the most recent biotechnology methods is marine biotechnology. The marine ecosystem is rich in variety, and the organisms contain critical biochemical components that have a wide range of applications in medicine, the environment, and other sectors. As a result, study in this sector is critical in order to access the tremendous potential of the marine environment in order to improve human existence in every manner feasible. India has approximately 8000 kilometres of coastline and over 2 million square kilometres of exclusive economic zone (EEZ). However, the potential of this domain as a foundation for novel biotechnologies is still largely untapped. International research institutes have realised the significance of developing multidisciplinary marine biotechnology research centres. Similarly, efforts should be made in India to investigate the biotechnological potential of the country's unexplored marine biodiversity.

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