OnLine Journal of Biological Sciences

Original Research Paper

Under Water

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Article history
Received: 10-02-2017
Revised: 17-04-2017
Accepted: 10-06-2017

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Abstract: With a 361 million square Km surface and a volume of 1370 million of cubic kilo, world seas and oceans have represented and still remain the privileged space for living species evolution. Other than being the 70% of the Earth surface, water environment, contrary to the terrestrial one where life essentially develops in 2 dimensions, is a 3D fully volume for leaving. This circumstance makes the under water world a huge space of future mankind exploration. Modern man thinks to already know most of the secrets of the universe, although it was not able to process a planet to make it livable (a new planet of reserve), or at least to discover the secrets of the universe or of the small universe, or those secrets from the depths of the ocean planetary. Under water exploration, by facing some of the most amazing creatures of the sea and by understanding their unique evolutionary path, improves our knowledge of life evolution while clarifying the impact of the global climate changes on these delicate ecosystems. This work presents some considerations related to the seas and oceans possible future mankind interactions with the "Blue Planet". Retrieving materials and energy from underwater world is discussed.

Keywords: Biomaterials, Bioengineering, Biology, Geography, Seas, Oceans, Water

Introduction

Oceans and seas form the Pelagic zone, a huge 3D rangeland of 1370 million cubic kilo metres with a vertical range of 11 Kilometres, which is the largest of all inhabited Earth space (Editors of Encyclopædia Britannica, 2009). Pelagic life is present in the entire free water column, with a number of living species and creatures that are proportional to the abundance of nutrients and dissolved oxygen that decreases at increasing depth. Nutrients local and vertical distribution and the related pelagic life, is influenced by several factors such as sunlight intensity and water temperature, salinity and depth pressure.

Modern man thinks he already knows all the secrets of the universe, although it was not able to process a planet to make it habitable (a new planet of reserve), or at least to discover the secrets of the universe or of the small universe, or those secrets from the depths of the ocean planetary. We live on a planet that has about two-thirds of its surface covered in water, so it would be nice to understand the secrets of the depths waters.

Life under water has been evolved in different forms that can be resumed in three categories: The phytoplankton (microscopic photosynthesis living organisms that inhabit the uppermost sunlight irradiated water layer), the zooplankton (living organisms transported by the water motion) and nekton comprising not only free swimmers such as cartilaginous and bony fishes, mollusks and crustaceans, but also some mammals and reptiles.

The marine environment, therefore, represents an optimal space to preserve and to develop life in its most different forms (Under the Sea):

- Pelagic creatures, which do live in the free water zone of ocean
- Demersal ones, which do live on or near the bottom,
- Reef ones, which are associated with coral reefs and benthic ones, which do live in the ecological zone that includes surface sediments and sub-surface layers

Experience of face-to-face by meetings with some of the most amazing creatures of the sea, exploration of her unique and beautiful nature, helps us not only to understand but also to investigate the impact of global climate changes on these spectacular and stable ecosystems. Under water world has been able to preserve

living fossil species over million of years of evolution. Figure 1 compares two parallel living pelagic mollusk species, the common Nautilus belauensis and the rare Allonautilus scrobiculatus, which is inhabiting the Earth for 500 million years.

In Fig. 2 and 3 we may see some demersal creatures living on the costal bottoms; a sea horse (Phyllopteryx taeniolatus) and a leafy seadragons (Phycodurus eques).

Figure 4 and 5 show the explosive coral reef life and adult Pterois miles poisoning fish, respectively.

In Fig. 6 can see pelagic gelatinous zooplankton specie, a beautiful jellyfish Cephea cephea. This species of belong to the Rhizostomeae order of the Medusozoa subphylum, which is characterized by the absence of tentacles at the bell's edges. Jellies or Medusae, according to the term created by Linnaeus (1758), are softbodied creatures with a gelatinous umbrella-shaped bell and trailing tentacles. The bell pulsates to develop propulsion leading them to be considered the transition between zooplankton and free-swimming aquatic animals. Medusae have inhabitated the free waters of the oceans for more than 500 million years making them the oldest multi-organ animal (Cartwright *et al*., 2007).

Zooplankton to Nekton transition increased the range of action and potentiality for species evolution as it has occurred for cartilaginous or bony fishes and marine mammals. Among these, the most feared and evolution's most enduring success still remains sharks, elasmobranch fish characterized by a cartilaginous skeleton. The lineage of sharks ages back to more than 200 million years before earliest known dinosaurs. In Fig. 7 we can see a white shark (Carcharodon carcharias), which is the longest-lived cartilaginous fish.

The aquatic lifestyle of mammals can be conveyed to cetaceans that first began in the Indian subcontinent 50 million years ago (Roach, 2011).

Whales are marine mammals that belong to the suborder of the order “cetacean” that have appeared about 50 million years ago.

Their ancestors were land animals that, due to a gradual adaptation to the marine environment, have progressively lost the pair of hind legs creating a tail. Whales are gentle and intelligent animals, which feed on zooplankton and phytoplankton microorganisms.

Roman and McCarthy (2010) indicated that whales have an active and positive impact to the fish productivity of oceans due to the whale pump effect, which consists in carrying nutrients from the depths back to the surface.

The blue whale (Fig. 8) is a marine mammal of the suborder of baleen whales. With a length of 30 m and with a body mass of over 170 tons, it is the largest animal known to have ever existed (Under the Sea).

Over time blue whales had sharks as enemies, but their population was greater than 270.000 individuals before 19th century whaling. The intensive whaling in the 20th century brought them almost to their extinction with only 1000-2000 individuals in the 60’s (WWF Global,). The present population is of about 20.000 individuals.

Fig. 1. *Nautilus belauensis and* rare *Allonautilus scrobiculatus*, marine cep halopods of Nautilidae family (Papua-New Guinea) Source: http://nationalgeographic.co.id/berita/2015/08/makhluk-lautpurba-kembali-ditemukan-setelah-30-tahun-enghilang

Fig. 2. *Phyllopteryx taeniolatus*, order of the syngnathiformes, Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 3. *Phycodurus eques* (Leafy seadragons), is the only marine fish of the genus Phycodurus (order Syngnathiformes, Shout Australia) Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 4. Reef life and coral colonies. Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 5. Adult *Pterois miles*, order Scorpaeniformes, over coral reef (Gulf of Aqaba, Red Sea, Egypt). Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 6. *Cephea cephea* order Rhizostomeae (Indo-Pacific and East Atlantic) Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 7. *Carcharodon carcharias* (white shark), order Lamniformes, the longest lived cartilaginous fish Source: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/IMAX/under_the_sea

Fig. 8. The blue whale Source: https://en.wikipedia.org/wiki/Blue_whale#/media/File:BlueWhaleWithCalf.jpg

Long and slender, blue whale's body may have different shades of blue-gray on the back side. There are at least three distinct subspecies: “Musculus” in the North Atlantic and North Pacific, “brevicauda” in Antarctic and “intermedia” (also known as pygmy blue whale) found in the Indian Ocean and South Pacific. As with other whales, its food consists almost exclusively of small crustaceans.

By the early twentieth century blue whales were abundant in nearly all oceans on Earth. Whalers hunted them for over a hundred years, until they came close to extinction. A report in 2002 estimated that there are between 5,000 and 12,000 blue whales worldwide, located in at least five groups. Recent research on Pygmy subspecies suggests that the figures are an underestimate (Mate *et al*., 1999). Before the era of hunting, the highest populations were in Antarctica and numbered about 239,000 individuals (between 202,000 and 311,000). There are two concentrations much lower (about 2,000) groups in the North Pacific, Antarctic and Indian Ocean. There are two other groups in the North and at least two in the Southern Hemisphere.

Materials and Methods

About three-quarters (71%) of the Earth's surface is covered by oceans, which it is a global body of salt water (water). The oceans hold about 96.5% of all water on Earth. Oceans are divided by the continents and archipelagos into five oceans: Southern Ocean, Arctic, Atlantic Ocean, Indian Ocean, Pacific Ocean.

Zoning in depth of the oceans (Fig. 9):

- Euphotica epipelagica area or zone to a depth of 200 m consisting in 1,370,000,000 cubic kilometres.
- Disphotica mesopelagica area or zone between depths of 200-1000 m
- Bathipelagica zone between depths of 1000-4000 m
- Abissopelagica zone between depths of 4000-6000 m
- Hadopelagica zone at depths over 6000 m

Ecology

Live many forms of life, such as: fish, cetaceans (whales and dolphins), cephalopods (octopus, squid, cuttlefish), crustaceans (shrimp, lobster), marine worm, plankton and other species.

Dolphins (Fig. 10) are marine mammals related to whales and cetaceans porpoises. There are around 40 species of dolphin in 17 genera. Dolphins vary in size from 1.2 m 40 kg (Maui dolphins), reaching up to 9.5 m and 10 tons (orca or killer whale).

Dolphins are located throughout the world, especially in shallow coastal. They are carnivores, feeding on fish and squid.

Dolphins have a fusiform body, hydrodynamic, quickly swimming adapted. Strong swimmer helps to drive while pectoral fins and tail muscle system provides steering control. Dorsal fin, the species that have such a fin, helps maintain stability during swimming.

Although it varies by species, dolphins fall colours in a basic pattern composed of gray, usually with the back darker.

Dolphin brain is large and very complex; and after the structure is different from those of most mammals.

Dolphins can quickly recover from his injuries (such as shark bites) and only in very rare cases may get an infection.

Generally dolphins sleep with only one hemisphere of the brain at once, then the other, thus maintaining the necessary consciousness to breathe and to watch for possible predators or other dangers. In captivity, it was observed that dolphins can enter the total sleep, a state in which both eyes are closed and the individual does not respond to external stimuli. In this case respiration and reflex is automatic tail beating maintain individual with nasal hole above water if necessary. Dolphins have the habit to live and swim in groups to protect themselves from their enemies, sharks (Fig. 11), (Nowak, 1991).

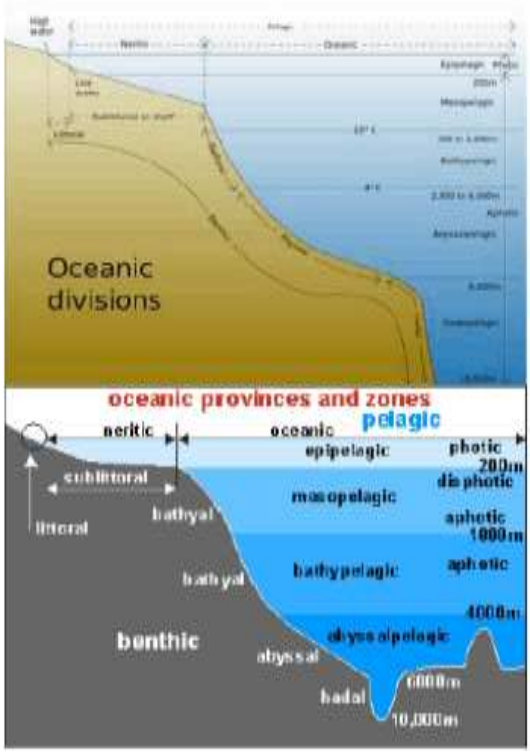

Fig. 9. Zoning in depth of the oceans Source: https://www.quora.com/Oceanography-How-are-oceanszoned

Fig. 10. The dolphin Source: https://www.reference.com/pets-animals/dolphin-protectitself-ea9cec56533f614e

Dolphins are very friendly and even support man or other animals (Nowak, 1991).

There are known many situations where dolphins have saved people from drowning or the attack of some sharks extremely dangerous. From these considerations they have often been trained to support the man in the various missions. Pacific Ocean (from the Latin name Mare Pacificum = calm sea) is the largest ocean in the world, covering about 33% of Earth's surface. Ocean has a total area of 165.3 million square kilometers and stretches approximately 15.5 thousand kilometers from the Bering Strait in the north and to the Ross Sea in Antarctica. The western limit of the ocean is the Malacca Strait and the eastern ocean is bordered by the American continent (Pacific Ocean, From Wikipedia).

Ocean has been called "pacific" because the first European sailors have found a particularly quiet water beyond Cape Horn, the southernmost point of Tierra del Fuego. Despite the name, there are countless storms in the Pacific, typhoons, hurricanes, earthquakes underwater, tsunamis and other natural phenomena with huge energies. The ocean's name was given by the Portuguese navigator Ferdinand Magellan (Ferdinand, Wikipedia).

Pacific surface is greater than the sum of areas of all continents. Pacific Ocean contains the largest volcanic chain on the planet and the highest volcanic activity. For this reason the Pacific Ocean is the cause of most of those earthquakes products, most of the times followed and a tsunami.

The largest tsunami in history hit Alaska in July 9, 1958. A gigantic wave with a height of 524 m, almost twice taller than the Eiffel Tower, struck Lituya Bay region of Alaska. Fortunately, the area is almost deserted, otherwise, say experts, if mega-tsunami would hit a populated area, damage and loss of life would have been incomparably greater than in the tsunami in Indonesia in 2004. Monstrous wave hit the shore almost immediately after an earthquake with a magnitude of 8.3 on the Richter scale, the earthquake led to an enormous crash land. The result of this collapse? The biggest tsunami ever recorded in Earth's history.

The Pacific water temperature varies from point frost in the polar areas, up to about 30°C at the equator. The salinity varies according to latitude: Water near the equator is less salty than in the temperate zone, due to heavy rainfall in the equatorial/tropical. Salinity to the poles is smaller, since the evaporation is very low. Pacific water generally moves clockwise in the northern hemisphere of the Earth and the opposite in the southern hemisphere. Humboldt Current (Fig. 12) is a cold current, with low salinity in the Pacific.

Current flows north-west along the western coast of South America to the southern tip of Chile to the north of Peru. There is a limit current flowing east toward the equator and this limit can be extended up to 1000 km from shore. The current is one of the most important systems in deep waters rise. He maintains an extraordinary abundance of marine life.

Approximately 18-20% of the world's fish catch is due to the Humboldt current. The species are mostly pelagic: Sardines, anchovies and mackerel. Sardines are small epipelagic fish that sometimes migrate along the coast in large schools. They are an important forage fish for larger forms of marine life (Fig. 13-14).

Pacific contains between 20,000 and 30,000 islands. Of these, the south of the Tropic of Cancer excluding Australia are grouped into three divisions:

- Melanesia, Micronesia and Polynesia
- Pacific islands are sometimes called Oceania

Coral reef creatures are painted in shades surprising green, blue, yellow and red. Scientists are learning to decipher the messages these colours convey and perceive them as do the fish (Fig. 15-16).

See the shades of yellow and blue vivid and bizarre of a single imperial angel fish (Fig. 17) and you'll realize the vagaries of evolution. Explores her home in lush coral reefs and soon you will be overwhelmed senses, assaulted by colours and patterns ranging from the sublime to garish. Coral reefs are arguably the most colourful places on earth. I'm wondering why?

Scientists have discovered the colour role played in sexual selection and warning of danger. But only a little in the last decade have begun to understand how wavelengths of light (and hence the colour) appear at different depths and how various marine creatures eyes perceive this light and see each other (Coral *et al*., 2011).

Justin Marshall of the University of Queensland, Australia, George Losey, of the University of Hawaii and their colleagues studied the fishes' eyes. Using a technique called microspectro flame photometry, analyzed the visual pigments and various eye photosensitivity reef fish to determine how and what fish see. They measured the wavelengths of light reflected offshore reefs form in order to calculate "the average colour of it" (Petrescu and Calautit, 2016a; 2016b; Petrescu *et al*., 2016).

In natural light, shades of yellow and blue adorn many fish-girl, wrasse fish or fish-angel, background merges perfectly with the "average" reef, providing them camouflage from predators (Coral *et al*., 2011).

Sulawesi Sea is rich in cephalopods-octopus (Fig. 18-23), squid and cuttlefish-, endowed with the largest brains and the changing colours of all invertebrates.

Coral reefs of the Pacific mixed with fish have some colours and shades of colours beautiful (Fig. 24-30).

Splendid, magnificent, gorgeous, spectacular, fascinating ... we could enumerate endless adjectives to praise the beauty of corals, bearing in mind only the image of exploding colour and life to coral reefs, unfortunately increasingly threatened.

For most of us, beauty means corals.
But beyond that?

Fig. 11. Dolphins have the habit to swim in groups to protect themselves from their enemies Source: https://www.reference.com/pets-animals/dolphin-protectitself-ea9cec56533f614e

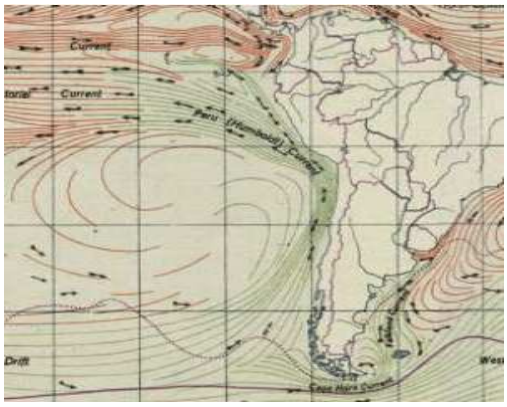

Fig. 12. Humboldt Current Source: https://en.wikipedia.org/wiki/Humboldt_Current

Fig. 13. Sardines Source: https://en.wikipedia.org/wiki/Sardine

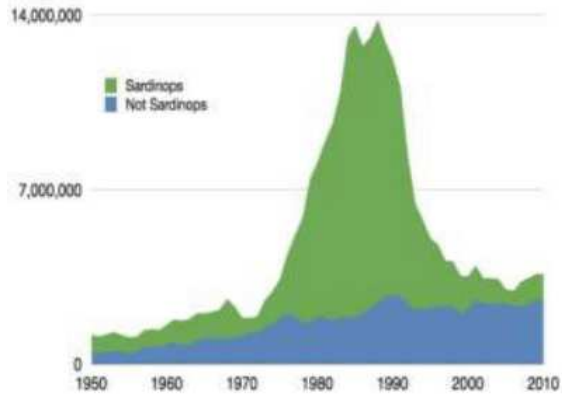

Fig. 14. Global commercial capture of sardines in tonnes reported by the FAO 1950-2009 Source: https://en.wikipedia.org/wiki/Sardine

Fig. 15. Coral reef creatures are painted in shades surprising green, blue, yellow and red Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 16. *Asthenosoma varium* (Fire urchin), order Echinothurioida, sea urchin with flexible test and venom tipped hollow spines Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

The benefits brought by her to man, we judge them, often thinking at most some coral jewelry.

Fig. 17. Shades of yellow and blue vivid and bizarre of a single imperial angel fish Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 18. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 19. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 20. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 21. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 22. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Some better informed, go farther, remembering that reefs are among the richest ecosystems of the planet's biodiversity swings, where thousands of thriving and evolving life forms, many of which can feed and us.

Fig. 23. Octopus Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 24. Coral reefs of the Pacific mixed with fish Source: https://www.natgeo.ro/natura/habitat-onservare/9513-reciful-de-corali-caleidoscop

Fig. 25. Coral reefs of the Pacific mixed with fish Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 26. Red coral reefs of the pacific Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 27. Corals are a resource, valuable and more prized today Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 28. Coral reefs of the pacific Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Fig. 29. Coral reefs of the pacific Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

A closer look teaches us to meditate that the perks brought by corals, are much more numerous and more important. Corals are a resource, valuable and more prized today (Reciful de corali Caleidoscop, National Geographic).

Fig. 30. Corals are a resource, valuable and more prized today Source: https://www.natgeo.ro/natura/habitat-conservare/9513-reciful-de-corali-caleidoscop

Construction Materials from Corals

Calcareous coral skeleton formed, over millions of years, sedimentary rocks which, with the rise of restricting surface of continents and oceans, came ashore.

These coral rocks-several types - some of them are found to be just best for buildings.

These limestone rocks often contain not only the remnants of ancient corals, but also of other organisms with calcareous exoskeleton, their training is linked to the reefs, the abundance of life forms of these marine ecosystems.

These rocks are generally pretty hard to resist the passage of time and erosion weathering but at the same time soft enough to be easily processed, fact which made them a building material highly appreciated (Aversa *et al*., 2016a; 2016b; 2016c; 2016d; 2016e; 2016f; 2016g; 2016h; 2016i; 2016j; 2016k; 2016l).

Many buildings around the world are built of limestone rocks that originate in ancient reefs. Limestone building coral is a material widely used in East Africa, for example, but also in the Caribbean, the Antilles and the neighboring areas, such as the US state of Florida. The west wing (left side of photo) to the parliament building in Bridgetown, capital of Barbados, is constructed of such a stone (Fig. 31).

In Florida there are many buildings of coral limestone; one of rocks most "specialized" so-called coquina, a sedimentary rock incomplete consolidated, formed in the coral reefs and has proved very good for building forts (especially by the Spaniards in the time in which Spain kept trying to sit-and some colonies in Florida, XVI-XVII-XVIII).

Castillo de San Marcos in St. Augustine, Florida, US national monument, the oldest fort built on US soil (construction began in 1672; Fig. 32).

Fertilizer from Corals

The same coquina (Fig. 33) is sometimes extracted from quarries in order to be used for improving soil fertility because it contains both calcium carbonate and phosphates.

Bone Grafts from Corals

The skeleton of the coral limestone structure has similarities with human bone tissue, so the corals could be used used as raw material for obtaining biocompatible materials needed bone grafts. Several papers by Aversa *et al*. (2016a; 2016b; 2016c; 2016d; 2016e; 2016f; 2016g; 2016h; 2016i; 2016j; 2016k; 2016l; 2017) have shown that nano-composites (Aversa *et al*., 2016a; 2016b; 2017) and hybrid materials based on ceramopolymeric and metal structures (Aversa *et al*., 2016c; 2016d) could be used as scaffolding systems (Aversa *et al*., 2016e; 2016f; 2016g) even with specific surface treatments (Aversa *et al*., 2016h; 2016i). This evolutionary approach to materials science (Aversa *et al*., 2016j) has brought significant results in biomedical applications (Aversa *et al*., 2017; 2016k; 2016l).

In the future such materials from the corals will be able to be used more effectively to some scions of bone in place of metals and of composite materials.

A portion of a coral is treated with a special blend of chemicals, resulting in the treatment of limestone coral skeleton is converted to hydroxyapatite, a substance that enters the human bone tissue components.

Once grafted on bone affected, the porous structure of the material (thus obtained) allows the growth of bone tissue inside it.

Effective, well tolerated, such a bone implant helps to regenerate and strengthen the affected bone rapidly.

From a piece of coral skeleton weight of 100 kg can get hundreds of biocompatible material for bone grafts.

Drugs from Corals and Seaweed

Therapeutic substances extracted from marine organisms there are thousands, but if about medicines from algae and shark cartilage heard many people, fewer know that corals are a source of drugs and yet extremely promising. Eleutherobin (extracted from coral genus Eleutherobia) Sarcophytol A and B (extracted from a species of coral peaceful "soft" without calcareous skeleton, Sarcopyhton glaucum) are two of the drugs currently used in the treatment of cancerous tumors. From bacterial and viral infections, to neurodegenerative diseases, many diseases are now the subject of studies investigating the possibility of treating them with various substances extracted from reefs and scientists are increasingly turning their much attention to issues unexplored sea as source of future medicines.

Magnificent Coral Reefs are Hiding and in the Cold Waters of the North Atlantic

Magnificent coral reefs are hiding and in the cold waters of the North Atlantic (Fig. 34-36).

Fig. 31. The west wing (left side of photo) to the parliament building in Bridgetown, capital of Barbados, is constructed of such a stone Source: https://en.wikipedia.org/wiki/Parliament_Buildings_(Barbados)#/media/File:Bridgetown_barbados_parliament_building.jpg

Fig. 32. Castillo de San Marcos in St. Augustine, Florida, US national monument, the oldest fort built on US soil (construction began in 1672) Source: https://www.pinterest.com/pin/168603579769856481/

Near the coasts of Britain and Ireland, there are coral reefs, as splendid as those in tropical waters. Only discovered in the last decade, these amazing ecosystems are already in danger from fishing vessels before have been widely studied.

For thousands of years, these reefs have remained unknown men and were discovered only recently, using robotic video cameras for filming underwater.

Starfish, corals, sea urchins, anemones, marine worms and crustaceans make up a multicoloured kaleidoscope nothing less than those found in shallow warm waters of the tropics region.

Fig. 33. The same coquina is sometimes extracted from quarries in order to be used for improving soil fertility because it contains both calcium carbonate and phosphates

Fig. 34. Magnificent coral reefs are hiding and in the cold waters of the North Atlantic Source: http://www.descopera.ro/dnews/7918152-coralii-migreazaspre-poli

Fig. 35. Magnificent coral reefs Source: http://www.descopera.ro/dnews/7918152-coralii-migreazaspre- oli

Fig. 36. Magnificent coral reefs Source: http://www.descopera.ro/dnews/7918152-coralii-migreazaspre-poli

Was Discovered "Wise Forefather" Barriers Sea Coral Reefs

Only 600 m away from the giant reef in the waters of Australia, another reef, much older, has been recently identified.

The geological investigations initiated in 2007 resulted in the discovery of a structure limestone reefs, buried in the ocean floor up to 110 m depth below the level of the bottom of the sea (Forsman, 2005).

The age of this reef is estimated at 169.000 years.

Reefs of corals move toward the higher latitudes of the planet-the most likely due to global warming, which causes increased water temperatures in the ocean.

The Japanese researchers from the Center for Global Environmental Research, of Tsukuba, have studied 9 species of coral in the waters of Japan, noting that four of the species and have extended the area to the north, some with a tremendous speed (Corals Migrating Toward the Poles, Fig. 37).

Recognized for the stunning wealth of species and for their role in the preservation of biodiversity oceanic atmosphere, the reefs of corals have proved to be particularly important and for the emergence of new species.

Recently, researchers in Germany and the United States of America have drawn up and analyzed a data base containing information about fossil species of invertebrate animals that have lived in the ocean while I was still in the Cambrian period, which started with the 540 millions of years.

By comparing the number of species that occurred in the reefs of corals and other marine ecosystems, scientists have reached the conclusion that almost 22% of the new species have appeared in reef.

After the calculations palaeontologists, a new species of animal has with 45% more chances to appear in a coral reef and than in another of the marine ecosystem, which justifies the description of these groups as "the swings of evolution", as they have called the scientists in an article published in the journal Science.

New Islands Created by Man

The great wall of sand from the Pacific increases. China is building its military outposts in the ocean on the artificial islands, in the South China Sea where the Chinese government building in the brisk pace artificial islands in order to create a bridgehead in a region marked by the territorial disputes.

During this time the island of Gouqi (which is part of the group of 394 islands of China, known under the name of Shengsi Islands), in Zhoushan th, is to be found a village of fishermen abandoned, which nature has decided to take him down and to transform it in what is today: "A large green" which invaded the abandoned buildings for us to delight our eyes (Fig. 38).

Where until not long ago was the desert and water, in Dubai, today, due to investments of some sheikhs Arabs, have been created artificial islands in the desert or on the water, with oases, green, with land of sport with skyscrapers and other wonders (Fig. 39-46).

The Mariana Trench

The Mariana Trench is the deepest oceanic pit currently known and is the deepest part of the Earth's crust. It is located in the northwestern part of the Pacific Ocean, to the east of the Mariana Islands at coordinates 11 °21 'N, 142 °12' E, near the island of Guam. The lowest known point is the survey at 11 034 m depth1. Organisms known as "piezophiles" live there despite pressures reaching 1100 atmospheres i.e., 1114.58 bars (Fig. 47).

The pit lies on a boundary of tectonic plates, in a subduction zone where the pacific plate passes under the Philippine plate. It is a pit engendered by spontaneous subduction in the ocean domain: the ocean-ocean subduction is coupled to a back-arc basin in extension.

It continues to the north as the Izu-Ogasawara Pit along the Nanp arch Archipelago, the Izu Archipelago and the Ogasawara Archipelago, also known as the "Bonin Islands", with which it forms the "Arc Izu-Bonin-Mariannes.

The Mariana Trench was discovered in 1875. It was during this year that the first depth measurements were made during the Challenger expedition conducted on board the Royal Navy ship HMS Challenger (fifth of the name) in 1875. Depths of more than 8,000 m were then recorded.

In 1957, the vessel of the Soviet Union Vityaz announced that the maximum depth of the pit was 11,034 m. This new background, nicknamed Mariana Hollow, has never been redetected and can’t be considered accurate. In 1962, the Spencer F. Baird recorded 10 915 m as the maximum depth, followed in 1984 by Japanese on the Takuyo, which reached a depth of 10 924 m. The most accurate measure is also of Japanese origin, thanks to the submarine probe Kaiko, which on March 24, 1995 reveals a depth of 10 911 m.

Fig. 37. Reefs of corals move toward the higher latitudes of the planet Source: http://www.descopera.ro/dnews/7918152-coralii-migreazaspre-poli

Fig. 38. "A large green" which invaded the abandoned buildings in the island of Gouqi Source: http://www.amusingplanet.com/2015/06/an-abandonedfishing-village-on-gouqi.html

On January 23, 1960, on the bathyscaphe Trieste, the Swiss Jacques Piccard, son of Auguste Piccard (inventor of the bathyscaphe) and the American lieutenant of the US Navy Don Walsh, reached the bottom of the pit at 13 h a descent of 4 h 30. The instruments of borders indicate a depth of 11 521 m, number that will be subsequently revised down to 10 916 m. At this depth, where the pressure is extreme, the two men are surprised to discover, in the middle of the disc of light drawn by their searchlights, several living organisms (including an abyssal fish resembling a sole about 45 centimeters).

Fig. 39. Skyscraper in Dubai Source: http://www.visitdubai.com/en/business-and-investment/whydubai/skyscrapers-in-the-sand

Fig. 40. Skyscraper in Dubai Source: http://www.visitdubai.com/en/business-and-investment/whydubai/skyscrapers-in-the-sand

Fig. 41. On the background of sandy beaches, architecture super-modern looked as though he would be on another planet Source: http://www.miraclegardendubai.net/

Fig. 42. Among the sand and palm trees you can see golf enormous and perfectly neat Source: http://www.miraclegardendubai.net/

Fig. 43. The gardens in Dubai Source: http://www.miraclegardendubai.net/

Fig.44. Artificial islands are created by the deposit of materials Source: https://sites.google.com/site/palmislandsimpact/general information/construction-of-the-islands

Fig. 45. Can be served earth under water, or sleep Source: http://vizts.com/hydropolis-dubai-underwater-hotel/

Fig. 46. Commercial center under water Source: http://www.huffingtonpost.com/jay-tavare/dubai-the-citywith-the-e_b_5584262.html

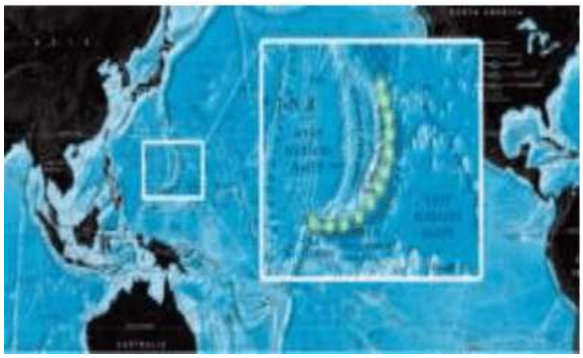

Fig. 47. The mariana trench Source: https://en.wikipedia.org/wiki/Mariana_Trench

With regard to the pressure exerted by the tons of water above, the instruments cover 1,086 bars, i.e., more than 1,000 times the existing pressure at sea level (Mariana Trench, From Wikipedia).

The term abysse (from the ancient Greek ἄβυσσος abyssos, "bottomless") refers to all the zones of an ocean located below the thermocline, from 2,000 m or more. As the environmental characteristics are the same everywhere, we always speak of the abyss in the plural, from ancient Greek ἄβυσσος (ábyssos) meaning "bottomless, immense depth" (in ancient times, it was believed that the ocean was bottomless). Also called deep ocean depths or depths, the abyss occupy two-thirds of the planet earth and represent the largest habitat on the planet.

At a depth of 150 m in the oceans, 99% of sunlight has been absorbed: the 200 m limit is generally accepted by marine biologists as "deep" water. Then, beyond a thousand meters, the night is complete, the intense cold and the colossal pressures: these are the abysses. For a long time everyone thought of life impossible, yet the first bathyscaphs discovered in the 1970s a proliferation of life in unknown ecosystems, close to important mineral resources. Today, some deep hydrothermal sources (black smokers; Fig. 48) are associated with one of the main assumptions about the origin of life on Earth. The abysses remain nevertheless very little known; At present 95% of the abyss remain unexplored, the deep sea is mapped with much less accuracy than the Moon and more men have gone into space than deep into the oceans.

The Atlantic Ocean

The Atlantic Ocean is one of the five oceans of the Earth. Its area of 106 000 000 km 2 makes it the second by the surface behind the Pacific Ocean. It was formed by the remoteness of tectonic plates 180 million years ago. For many centuries it was the starting point of European explorations. Today, it is still an important channel of communication for the countries bordering it and it obviously occupies an important geopolitical role.

The Atlantic Ocean is located between the American continent and Afro-Eurasia, a term designating Europe, Asia and Africa as one entity. The Earth is composed of five oceans forming a single body of salt water, so the boundaries between them are often arbitrary and give rise to certain controversies (such as the limits between the Atlantic and Arctic oceans). The Atlantic Ocean does not derogate from this rule. The Atlantic and Pacific oceans are the only two to be in contact with the other four. The International Hydrographic Organization proposes limits for the oceans. Those of the Atlantic, based mainly on capes, are the following:

From the Arctic Ocean to the North: To the west of Greenland, by a line from the coast of Labrador to Greenland along the parallel of 60° north latitude.

East of Greenland, by a line from Cape Nansen to Greenland at Straumness, in the north-west of Iceland.

To the east of Iceland, by a line from the Gerpir to the east of Iceland, passing through the north-east of Fugloy Island (Faroe Islands), to longitude 0°53 'W, north of the Shetland Islands, thence along the parallel of 61°00 'north latitude to the Norwegian coast.

From the Pacific Ocean to the southwest: By a line drawn from Cape Horn and following the meridian of longitude 67°17 'W, in a southerly direction. This separation between these two oceans is also called Drake's passage.

From the Indian Ocean to the Southeast: By a line drawn from Cape Aiguilles and along the meridian of 20° east longitude, in a southerly direction.

From the Southern Ocean to the South: By the parallel of 60° south latitude (Atlantic Ocean, From Wikipedia).

The Sargasso Sea in the western North Atlantic can be defined as the area where two species of Sargassum (S. fluitans and natans; Fig. 49) float, an area 4,000 km wide and encircled by the Gulf Stream, North Atlantic Drift and North Equatorial Current. This population of seaweed probably originated from Tertiary ancestors on the European shores of the former Tethys Ocean and has, if so, maintained itself by vegetative growth, floating in the ocean for millions of years.

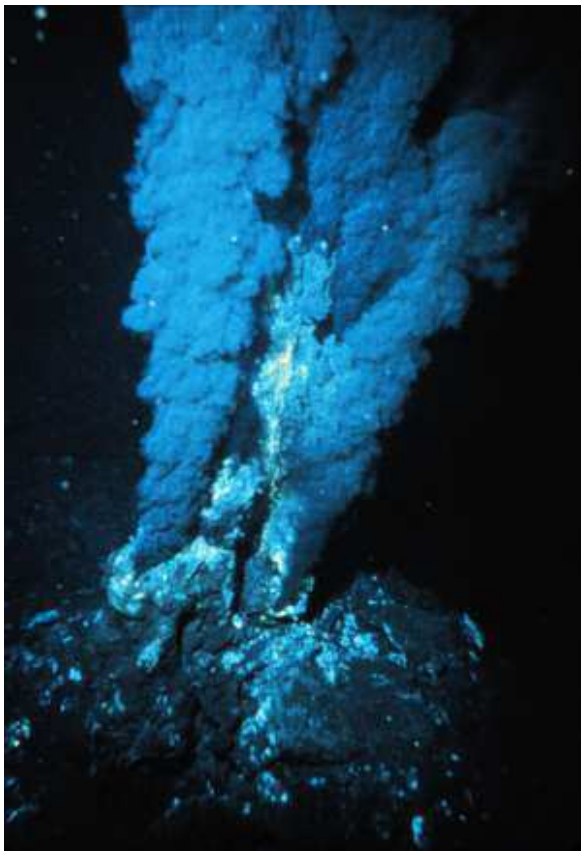

Fig. 48. A hydrothermal source in the Ocean abysses Source: https://en.wikipedia.org/wiki/Deep_sea_community

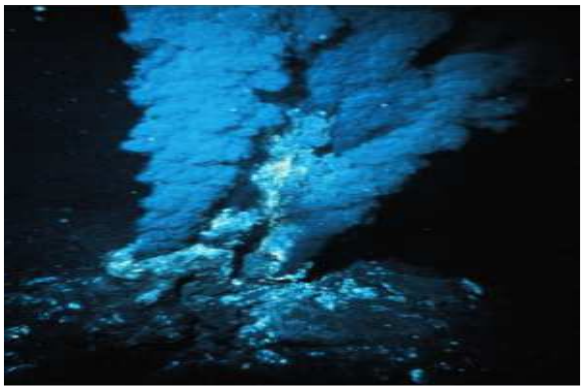

Fig. 49. Sargassum fish Source: https://en.wikipedia.org/wiki/Atlantic_Ocean

A transatlantic tunnel is a theoretical tunnel that would span the Atlantic Ocean between North America and Europe possibly for such purposes as mass transit. Some proposals envision technologically advanced trains reaching speeds of 500 to 8,000 kilometers per h (310 to 4,970 mph). Most conceptions of the tunnel envision it between the United States and the United Kingdom-or more specifically between New York City and London.

Advantages compared to air travel could be increased speed and use of electricity instead of scarce oil based fuel, considering a future time long after peak oil. The main barriers to constructing such a tunnel are cost with estimates of between cost: 88 billion- $175 billion as well as the limits of current materials science. Existing major tunnels, such as the Channel Tunnel, Seikan Tunnel and the Gotthard Base Tunnel, despite using less expensive technology than any yet proposed for the transatlantic tunnel, struggle financially (Transatlantic tunnel, From Wikipedia).

Results

Ocean planetary is the main source of the life maintenance on our planet. Humans and animals are composed of about 70% water. Life without water, it would not be possible here on Earth. Water cycle is done primarily using batteries Water (oceans), then the planet's forests (which produce water and rain) and thirdly using the earth's atmosphere. All the circuit is powered by solar energy. Moreover, people today have learned to produce energy (green and sustainable energy) and by using oceans. In 2015 water has generated about 22-23% of the world's total electricity.

Wave power is the transport of energy by wind waves and the capture of that energy to do useful work – for example, electricity generation, water desalination, or the pumping of water (into reservoirs).

A machine able to exploit wave power is generally known as a Wave Energy Converter (WEC; Fig. 50), (Wave power, From Wikipedia; Petrescu and Petrescu, 2012a; 2012b).

Tidal power or tidal energy is a form of hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity (Fig. 51), (Tidal power, From Wikipedia).

Hydroelectricity is electricity produced from hydropower. In 2015 hydropower generated 16.6% of the world's total electricity and 70% of all renewable electricity (Fig. 52), (Hydroelectricity, From Wikipedia; Petrescu and Petrescu, 2012a; 2012b).

Fig. 50. SINN power wave energy converter Sourse: https://en.wikipedia.org/wiki/Wave_power

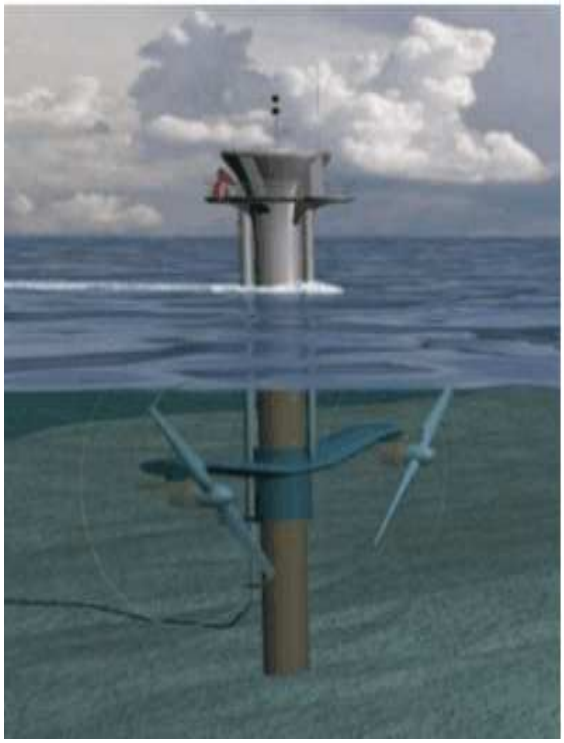

Fig. 51. Tidal power station Sourse: http://www.reuk.co.uk/wordpress/tidal/introduction-to-tidalpower/

Fig. 52. Hydroelectricity Source: https://simple.wikipedia.org/wiki/Hydroelectricity#/media/File:Koep chenwerk01.jpg

Some better informed, go farther, remembering that reefs are among the richest ecosystems of the planet's biodiversity swings, where thousands of thriving and evolving life forms, many of which can feed and us.

A closer look teaches us to meditate that the perks brought by corals, are much more numerous and more important. Corals are a resource, valuable and more prized today.

Calcareous coral skeleton formed, over millions of years, sedimentary rocks which, with the rise of restricting surface of continents and oceans, came ashore.

These coral rocks-several types-some of them are found to be just best for buildings.

These rocks are generally pretty hard to resist the passage of time and erosion weathering but at the same time soft enough to be easily processed, fact which made them a building material highly appreciated.

Many buildings around the world are built of limestone rocks that originate in ancient reefs. Limestone building coral is a material widely used in East Africa, for example, but also in the Caribbean, the Antilles and the neighboring areas, such as the US state of Florida.

The same coquina is sometimes extracted from quarries in order to be used for improving soil fertility because it contains both calcium carbonate and phosphates.

The skeleton of the coral limestone structure has similarities with human bone tissue, so the corals are used as raw material for obtaining biocompatible materials needed bone grafts.

Discussion

In the future such materials from the corals will be able to be used more effectively to some scions of bone in place of metals and of composite materials.

A portion of a coral is treated with a special blend of chemicals, resulting in the treatment of limestone coral skeleton is converted to hydroxyapatite, a substance that enters the human bone tissue components.

Once grafted on bone affected, the porous structure of the material (thus obtained) allows the growth of bone tissue inside it.

Effective, well tolerated, such a bone implant helps to regenerate and strengthen the affected bone rapidly. From a piece of coral skeleton weight of 100 kg can get hundreds of biocompatible material for bone grafts.

Therapeutic substances extracted from marine organisms there are thousands, but if about medicines from algae and shark cartilage heard many people, fewer know that corals are a source of drugs and yet extremely promising.

Eleutherobin (extracted from coral genus Eleutherobia) Sarcophytol A and B (extracted from a species of coral peaceful "soft" without calcareous skeleton, Sarcopyhton glaucum) are two of the drugs currently used in the treatment of cancerous tumors.

From bacterial and viral infections, to neurodegenerative diseases, many diseases are now the subject of studies investigating the possibility of treating them with various substances extracted from reefs and scientists are increasingly turning their much attention to issues unexplored sea as source of future medicines.

Consume huge amounts of fish annually from the world's oceans.

The seas and oceans brought us huge amounts of food, such as: fish, clams, crayfish, oysters, squid,…

Products manufactured from algae and corals are increasingly popular with humans and animals, due to their high quality.

The salt extracted from seawater in industrial quantities is the best in terms of quality.

Conclusion

At a depth of 150 m in the oceans, 99% of sunlight has been absorbed: marine biologists generally accept the 200 m limit as "deep" water. Then, beyond a thousand meters, the night is complete, the intense cold and the colossal pressures: these are the abysses. For a long time everyone thought of life impossible, yet the first bathyscaphs discovered in the 1970s a proliferation of life in unknown ecosystems, close to important mineral resources. Today, some deep hydrothermal sources (black smokers) are associated with one of the main assumptions about the origin of life on Earth. The abysses remain nevertheless very little known; At present 95% of the abyss remain unexplored, the deep sea is mapped with much less accuracy than the Moon and more men have gone into space than deep into the oceans.

Author's Contributions

All the authors contributed equally to prepare, develop and carry out this manuscript.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

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