



AQUATIC LIFE LAB

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# The Mediterranean marine environment

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# The Mediterranean Sea

## Why does the Mediterranean Sea look like this?

Did a large meteor fall in the middle of the ancient continent Pangea and made a hole in the center that was filled with water?

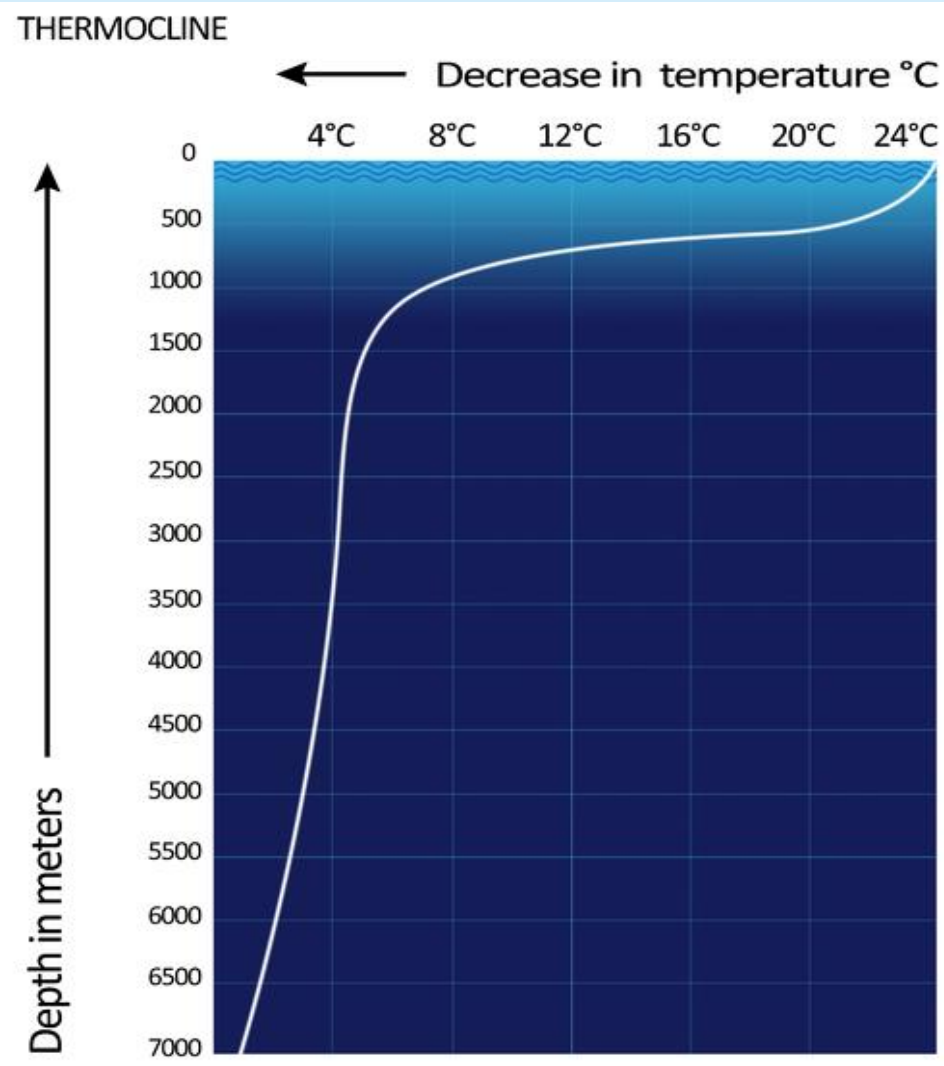
Or did the separation movements of two continental plates originate the Mediterranean basin, 30 million years ago, which was then filled in a short time with a waterfall of ocean waters?



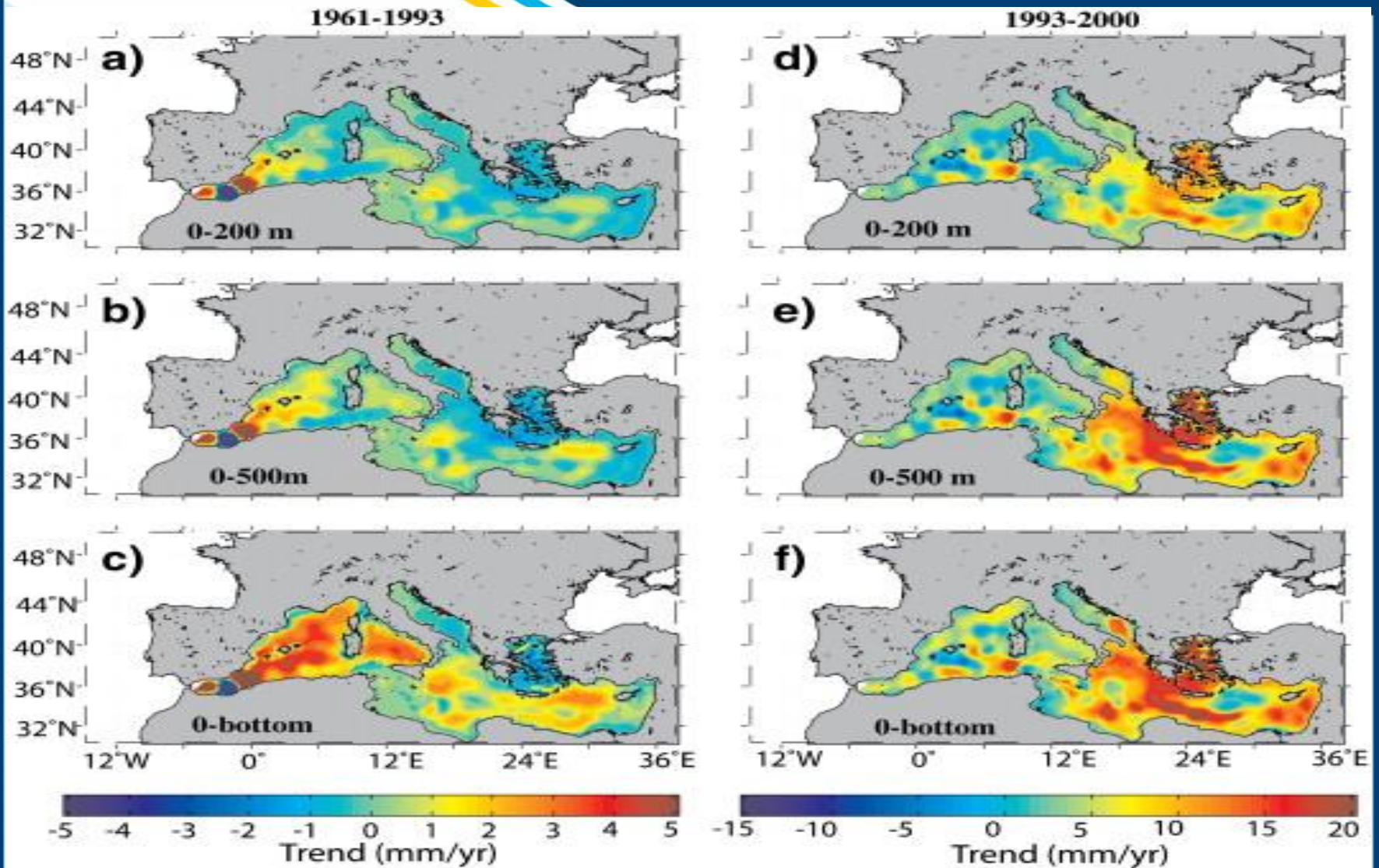
# A couple of facts

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- The name comes from the Latin *Mediterraneus*, the middle sea, because it is surrounded by land and, in ancient times, it was considered the center of the world.
  - The total area of the Mediterranean is now around 2'509'000 Km<sup>2</sup>. Its average depth is 1501 m, while the maximum depth off the Greek coast is more than 5000 m.
  - There are 9 large islands: Cyprus, Rhodes, Crete, Sardinia, Sicily, Corsica, Malta, Menorca and Majorca.

# More data



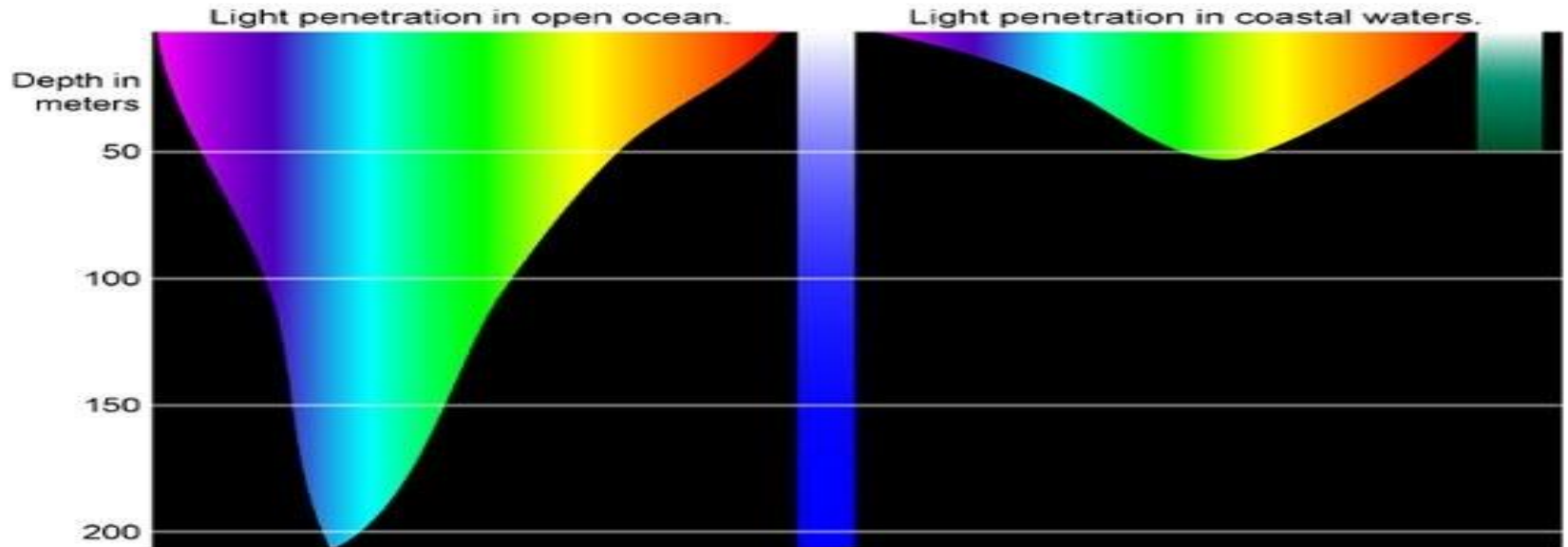
# Temperature variations





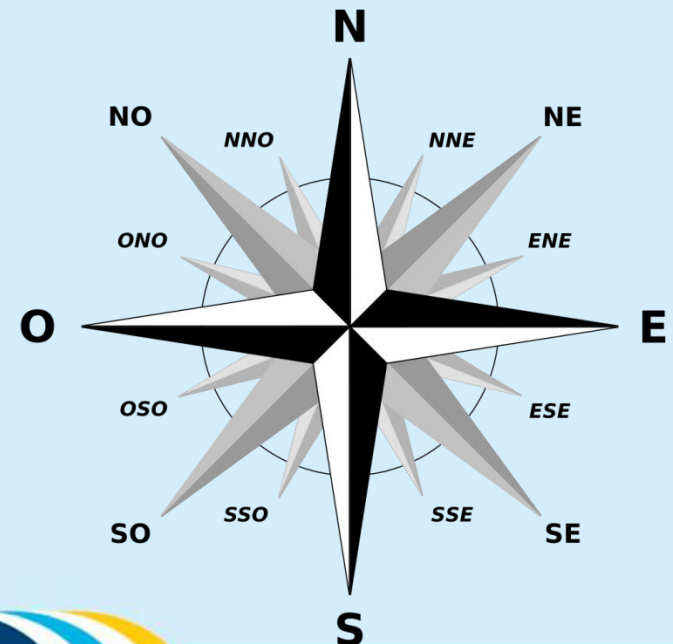
# The light factor

The amount of light that reaches the water depends on latitude, seasons, and sky cover. In relation to the penetration of light, a superficial **euphotic** layer can be distinguished where the phytoplankton photosynthesis processes take place, which in the Mediterranean reaches an average of up to 100 m, an underlying **disphotic** area where light decreases but the vision of animals is still possible and in depth an **aphotic** area where darkness falls.



# The wind factor

- In the Mediterranean basin, depending on the area, it is possible to identify, according to the direction of origin, some particular winds (the famous “Rose of the Winds”) that carry specific meteorological conditions.
- The name “Wind Rose” is due to the arrangement of the rhombuses that compose it and that originally indicated the directions from which the winds blew. The rhombuses are arranged in a circle and are partially superimposed on each other like the petals of a rose.



# The winds

## TRAMONTANA

The North wind, it comes from the polar regions and it's a cold and dry wind. It blows in a gust and it usually brings clear skies, excellent visibility and dry weather. It commonly lasts two to four days.

## GRECO

It blows from the North East, it is a cold and dry, typically wintry, wind. In the Adriatic regions it generally causes atmospheric perturbations, while in the Tyrrhenian ones it leads to a clear sky.

## LEVANTE

It is a fresh and humid wind of weak intensity blowing from the East. In the Mediterranean area it is accompanied by rain and storms. His name refers to his provenience, the East, then called the Levant.

## LIBECCIO

It is the wind that blows from the South West, it comes from Libya. It is a cold and unstable wind that causes the temperature to drop several degrees. During winter or autumn, when it manifests, this wind brings storms.

## SCIROCCO

It's a very hot and dry wind that blows from the South East, it originates the North African hinterland, the Sahara desert. It brings with him rainfall and mists.

## MEZZOGIORNO

It is a wind of southern origin with a very weak effect, it brings rains and storms. It's also called Ostro, from its hemisphere of origin, the Austral one.

## PONENTE

It is the afternoon wind that blows from the West during the summer, it originates from the temperature difference between the land and the sea.

## MAESTRO

It is the master of the winds as its impetuous arrival announces the arrival of winter. It's typical of the central Mediterranean and blows from the North West with a speed that can exceed 120 km per hour. It is a dry wind that brings violent storms.



# The tides

- The rhythmic variation of the sea level, with a movement both vertical and horizontal, is indicated as a “tide” and is determined by the gravitational attraction between the Earth and the Moon and by the centrifugal effect of the rotation of the Earth-Moon system. To a lesser degree also the solar attraction plays a role in this phenomenon.
- In the Mediterranean Sea the change in the sea level due to the tides is, on average, of half a meter, because not much water passes through the Strait of Gibraltar. Nonetheless these small variations can affect the life of marine anemones, who live attached to the rocks. They have evolved solutions for the lack of water during the low tide: they close themselves and keep inside the water necessary for survival.

# The Mediterranean circulation

The circulation in the Mediterranean is conditioned by its morphology: a half closed basin in connection with the Atlantic Ocean through the Strait of Gibraltar and the Black Sea through the Dardanelles Strait.

The geographic location also means that surface evaporation is not balanced by precipitation, but by the entry of Atlantic water. This results in a current conditioned by salinity values; in fact, ocean waters are less salty and have lower density than the Mediterranean ones, therefore they enter the basin at a surface level and spread along the Algerian coast. This thermohaline circulation affects the entire basin and determines a predominantly surface anti-clock circulation, with an intensified current at the main channels.



# How the food chain works

Most of the aquatic species that live in the Mediterranean Sea are tied together through the food web, an explanation of illustrates 'what eats what' in any habitat. In this network usually plants are the ones that produce, the animals those who consume, and they are both tied to the nets of the food network that transfers substances and energy from one organism to another. The removal of even only one component of the network can lead to the destruction of the whole structure. Not only living organisms are important but also dead ones; in fact, organisms that decompose dead matter allow it to be recycled, making it again available.



Dasky grouper



Common prawn

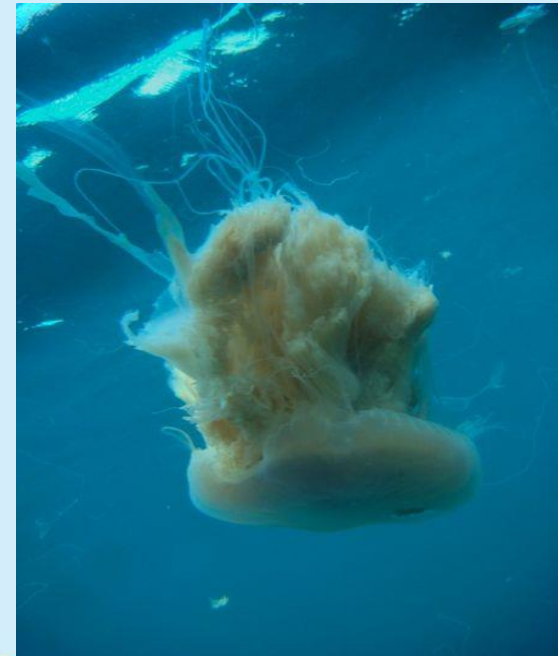


Plants/Alga

# The food chain: Plankton

**Plankton:** Organisms that are defined as planktonic are both animals (zooplankton) and plants (phytoplankton). The characteristic that distinguishes them is that they have no tools to oppose the current; therefore they float in the superficial areas of the sea and they are dragged around by the waves. Generally the size of the planktonic organisms is microscopic, but there are also cases of large animals, such as some jellyfishes.

*Drymonema dalmatium*, the biggest jellyfish in the Mediterranean sea, 1 m of diameter. It stings.





# The food chain: Benthos

**Benthos:** Plants and animals that live on the seabed, whether or not attached to it, are called *benthos*. Nearly 16% of all living animals are benthic species. Anemones, sponges, corals, crabs are some examples of benthic animals. There are not only animals that creep or walk on the bottom, but also those that are buried in the sand or that are attached to the rocks. Many of these animals however, pass the first part of their life (the larval stage) floating between the waves, thus belonging to the plankton.



*Pinna nobilis* the biggest bivalve of the Mediterranean sea, with 1 m of length.

# Who lives under the sea?



*Charonia nodifera* is the largest gastropod mollusc of the Mediterranean sea, with its 40 cm of height. In ancient times it was used as a trumpet.



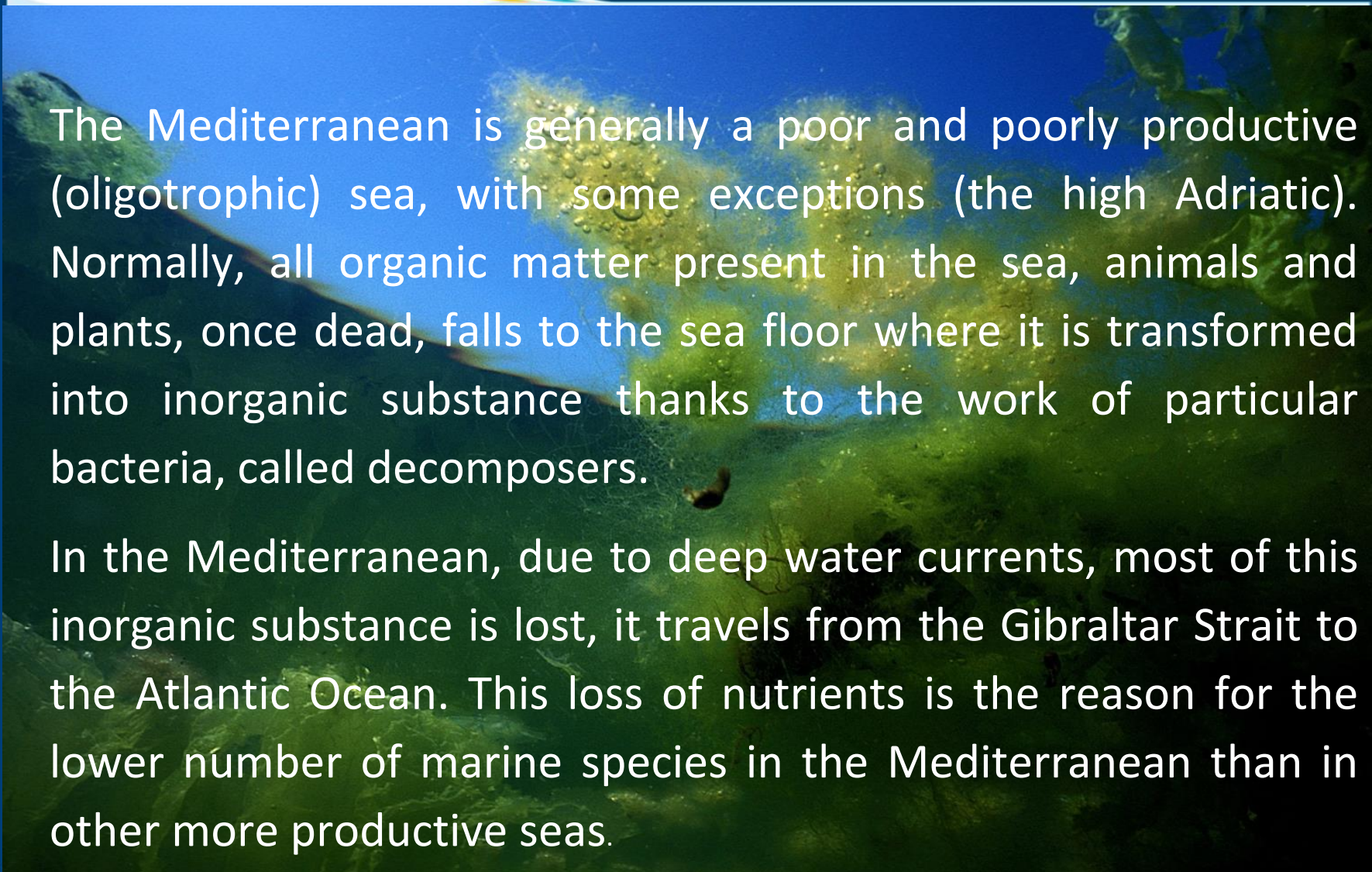
# Who lives under the sea?



*Homarus gammarus* is the longest lobster of the Mediterranean Sea. It's 60 cm in length.



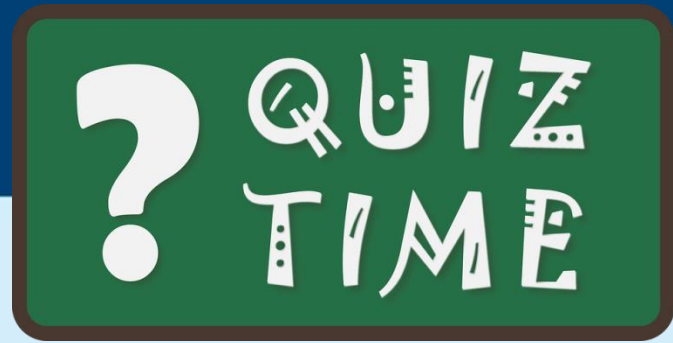
# The productivity of the Mediterranean sea



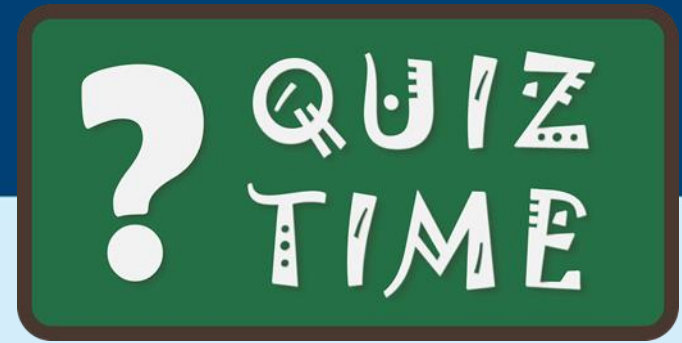
The Mediterranean is generally a poor and poorly productive (oligotrophic) sea, with some exceptions (the high Adriatic). Normally, all organic matter present in the sea, animals and plants, once dead, falls to the sea floor where it is transformed into inorganic substance thanks to the work of particular bacteria, called decomposers.

In the Mediterranean, due to deep water currents, most of this inorganic substance is lost, it travels from the Gibraltar Strait to the Atlantic Ocean. This loss of nutrients is the reason for the lower number of marine species in the Mediterranean than in other more productive seas.





- What is the average salinity of the Mediterranean sea?
- The wind rose is a musical group or a graphic representation of the cardinal points and winds?
- How many winds blow in the Mediterranean?
- What is the average tide induced sea level change in the Mediterranean?
- Which way does the main current in the Mediterranean run?



- How big is the biggest jellyfish in the Mediterranean?
- How long is the largest lobster in the Mediterranean?
- Is the Mediterranean sea unproductive? True or false?