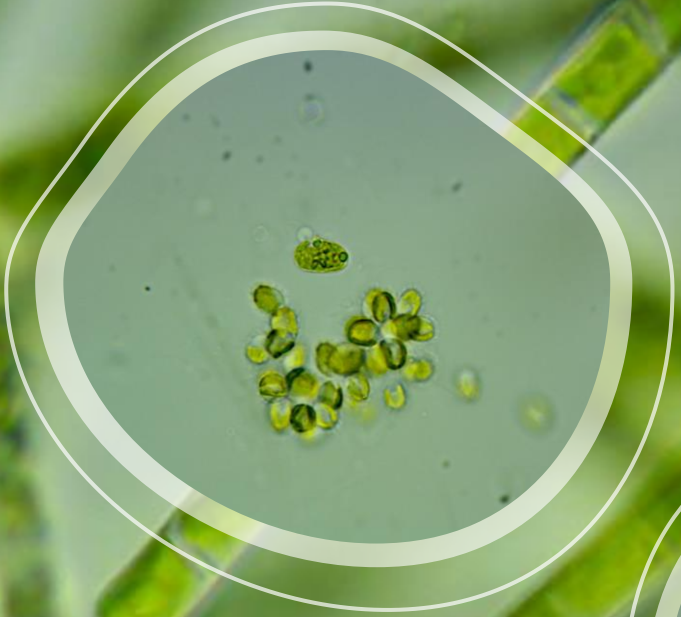
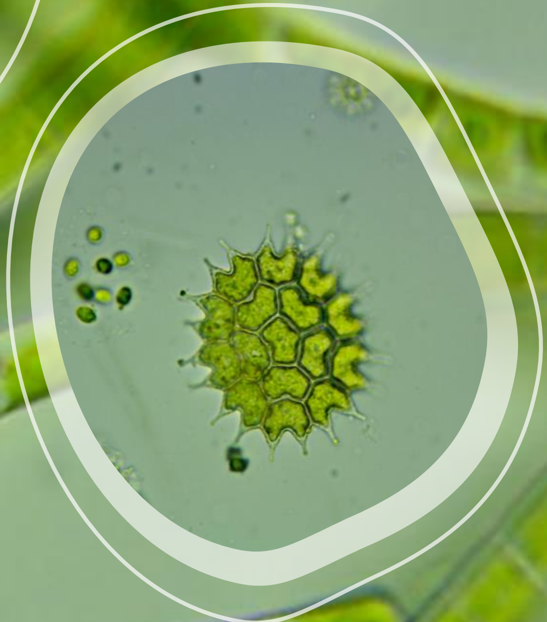
# DID YOU KNOW?





# DID YOU KNOW?

- Phytoplankton are photosynthesizing microscopic protists and bacteria that inhabit the upper sunlit layer of almost all oceans and bodies of fresh water on Earth. In parallel to plants on land, phytoplankton are agents for primary production in water. They create organic compounds from carbon dioxide dissolved in the water, a process that sustains the aquatic food web. Phytoplankton form the base of the marine food web and are crucial players in the Earth's carbon cycle.

- Scientists estimate half of global photosynthetic carbon fixation and 50-80% of oxygen production on Earth comes from the ocean. Most of this production is from marine phytoplankton – drifting seaweed, marine algae, and some photosynthetic bacteria called cyanobacteria. One particular species of bacteria, Prochlorococcus, is the smallest photosynthetic organism on Earth. This bacterium produces up to 20% of all oxygen in the global biosphere, a higher percentage than all tropical rainforests on land combined.

- Phytoplankton obtain energy through the process of photosynthesis and must therefore live in the well-lit surface layer (termed the euphotic zone) of an ocean, sea, lake, or other body of water. Phytoplankton account for about half of all photosynthetic activity on Earth. Their cumulative energy fixation in carbon compounds (primary production) is the basis for the vast majority of oceanic and also many freshwater food webs (chemosynthesis is a notable exception).

- Phytoplankton live in the photic zone of the ocean, where photosynthesis is possible. During photosynthesis, they assimilate carbon dioxide and release oxygen. If solar radiation is too high, phytoplankton may fall victim to photodegradation.

- Phytoplankton species feature a large variety of photosynthetic pigments which species-specifically enables them to absorb different wavelengths of the variable underwater light. This implies different species can use the wavelength of light different efficiently and the light is not a single ecological resource but a multitude of resources depending on its spectral composition. By that it was found that changes in the spectrum of light alone can alter natural phytoplankton communities even if the same intensity is available. For growth, phytoplankton cells additionally depend on nutrients, which enter the ocean by rivers, continental weathering, and glacial ice meltwater on the poles.

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- Phytoplankton release dissolved organic carbon (DOC) into the ocean. Since phytoplankton are the basis of marine food webs, they serve as prey for zooplankton, fish larvae and other heterotrophic organisms. They can also be degraded by bacteria or by viral lysis. Although some phytoplankton cells, such as dinoflagellates, are able to migrate vertically, they are still incapable of actively moving against currents, so they slowly sink and ultimately fertilize the seafloor with dead cells and detritus.

- The effects of anthropogenic warming on the global population of phytoplankton is an area of active research. Changes in the vertical stratification of the water column, the rate of temperature-dependent biological reactions, and the atmospheric supply of nutrients are expected to have important effects on future phytoplankton productivity.

- The effects of anthropogenic ocean acidification on phytoplankton growth and community structure has also received considerable attention. Phytoplankton such as coccolithophores contain calcium carbonate cell walls that are sensitive to ocean acidification. Because of their short generation times, evidence suggests some phytoplankton can adapt to changes in pH induced by increased carbon dioxide on rapid time-scales (months to years).

- Phytoplankton serve as the base of the aquatic food web, providing an essential ecological function for all aquatic life. Under future conditions of anthropogenic warming and ocean acidification, changes in phytoplankton mortality due to changes in rates of zooplankton grazing may be significant. One of the many food chains in the ocean – remarkable due to the small number of links – is that of phytoplankton sustaining krill (a crustacean similar to a tiny shrimp), which in turn sustain baleen whales.

- Based on allocation of resources, phytoplankton is classified into three different growth strategies, namely survivalist, bloomer and generalist. Survivalist phytoplankton has a high ratio of N:P (>30) and contains an abundance of resource-acquisition machinery to sustain growth under scarce resources. Bloomer phytoplankton has a low N:P ratio (<10), contains a high proportion of growth machinery, and is adapted to exponential growth. Generalist phytoplankton has similar N:P to the Redfield ratio and contain relatively equal resource-acquisition and growth machinery.

# About project

The Dinaric Alps are a mountain range in southern and south-eastern Europe, separating the continental Balkan Peninsula from the Adriatic Sea. This area is characterized by a high degree of freshwater habitat types. They are under strong anthropogenic influences. The main aim of this project is a continuation of long-term monitoring of these habitat types on Vranica mountain. However, special emphasis will be placed on the restoration of peatlands and further research of the diversity of photoautotrophic organisms in the selected mountain lakes. Results of the project will enhance the conservation of these habitats and the protection of endangered species.

*Five main practical conservation outputs are derived from this project:*

1. *Establishment of the first ecological station for biomonitoring of biodiversity and ecological state of freshwater oligotrophic habitat types on Vranica mountain.*
2. *Restoration of peatland ecosystems on Vranica and Zvijezda mountains (Practical Approach).*
3. *Assessment of the ecological state of three mountain lakes (Prokoško lake, Boračko lake and Kukavičko lake) using phytoplankton assemblages as bioindicators.*
4. *Transfer of knowledge and training of young researchers in the field of restoration and conservation ecology (Working with young researchers).*
5. *Dissemination of knowledge and raising of ecological awareness about the values and importance of oligotrophic freshwater habitats (Publications and promotive materials, social networks, etc).*