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Biogeography of marine benthic diatoms in the light of research on the carapace microbiome of *Caretta caretta* turtles nesting on the coast of Mediterranean Sea

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Abstract

Diatoms (Bacillariophyceae) are unicellular protists, the characteristic feature of which is the siliceous exoskeleton, also known as frustules. Diatoms occur in marine, freshwater and terrestrial habitats. As a phytobenthic component, they occur on surfaces immersed in water, while as phytoplankton they float in the water column. Diatoms can be classified in terms of ecology or habitat (microhabitat). Epipsamic diatoms live attached to sand grains, epilithic diatoms inhabit rock surfaces, epiphytic diatoms live on plants, while epizoic diatoms inhabit surfaces of animals, the latter two categories are commonly called epibionts.

This paper presents the morphological and molecular data on species composition based on observations in light microscope (LM), scanning electron microscopy (SEM) and single gene (*rbcL*) phylogeny consisting of diatom taxa grown from samples taken from the carapaces of *Caretta caretta* turtles nesting on the coast of the Mediterranean Sea in 2014, 2015, 2016 and 2018 and from *C. caretta* and *Chelonia mydas* individuals temporarily kept in Sea Turtle Research Center, Sea Turtle Rescue and Rehabilitation in Pula, Croatia. All strains used for DNA sequencing have microphotographic documentation made with LM and SEM or only SEM. Phylogeny was performed for 331 taxa, including 55 taxa isolated from the carapaces of *C. caretta* sea turtles nesting on the Mediterranean coast on Dalyan Beach in Turkey, 4 taxa isolated from the carapaces of *C. caretta* turtles and 1 from carapace of *Ch. mydas* from the Sea Turtle Research Center, Sea Turtle Rescue and Rehabilitation in Croatia, 2 taxa isolated from the benthic zone at the nesting site of sea turtles in Turkey and 37 taxa isolated from the benthos of selected stations off the coast of Croatia. Taxa isolated from the coastal sites were placed on a phylogenetic tree for comparison purposes.

The analyzed diatom taxa are represented by 12 genera. The highest number of species belonged to the genus *Navicula* (29), *Halamphora* (10), *Melosira* (5), *Achnanthes* (4), *Entomoneis* (3), *Karayevia* (3), *Parlibellus* (2), *Paralia* (2), *Amphora* (1), *Nanofrustulum* (1), *Psammodictyon* (1). One epizoic species was isolated, i.e. *Achnanthes elongata*, with its occurrence on *C. caretta* in the Mediterranean Sea recorded in 2015. The isolated strains also include the species *Melosira lineata*, the occurrence of which has not been previously documented in the Mediterranean Sea. Due to the migration of sea turtles, the analyzed strains are species resistant to changes in salinity, temperature, and pH, or they are part of the diatomaceous assemblages of the Mediterranean Sea, i.e., the nesting sites of sea turtles.

The results of the analysis of turtle carapace fragments showed that diatoms are the basic component of the *C. caretta* sea turtle microbiome. This analysis was performed with scanning electron microscope. The dominance of epizoic taxa was observed, i.e. *Chelonicola* sp., *Chelonicola costaricensis*, *Tripteron* sp., and the dominant genera were *Navicula* sp., *Tripteron* sp. and *Achnanthes* sp.

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Data, podpis

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