Ph.D. Thesis Defense

Student Presentation

Thursday, 16 December 2021 at 10:00

This seminar is open to the public via Zoom at the following link:

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"INVESTIGATION OF THE MIDDLE MIOCENE -LATE PLIOCENE ICHTHYOFAUNA AND PALAEOENVIROMENTAL RECONSTRUCTION OF CYPRUS ISLAND (EASTERN MEDITERRANEAN)"

Fish otoliths are the most important tools for the reconstruction of the fish fauna during the Cenozoic Era. Fish inhabit the entire water column and as a result, their otoliths are found in all marine sediments, reflecting the paleoceanographic conditions of the surface, the intermediate layers and the seabed. Otoliths provide information on temperature, salinity, depth, oxygenation, productivity, temperature fluctuations, oceanic circulation, terrigenous input and other parameters. The Neogene fish fauna of the eastern Mediterranean, in the region of Cyprus, is extremely rare, creating a huge gap in the fossil fish record. Few studies have been published, and these concern fish skeletons, not otoliths.

The purpose of this thesis is the reconstruction of the Middle Miocene and Pliocene fish fauna of the Levantine Basin (Eastern Mediterranean) and the use of these results to assess the paleoenvironmental conditions in the study area. In order to achieve the above purpose, the collected fossil fish otoliths were identified in order to determine the fish assemblages. Then, these assemblages were analyzed paleoecologically and, eventually, the fossil fish were evaluated in relation to other available data on the Neogene and Quaternary Mediterranean fish faunas, as well as present-day fish

faunas of the Atlantic and the Mediterranean, in order to determine the palaeogeographic distribution of recognized taxa and their evolution from the Middle Miocene to the present.

A total of six study areas were selected in Cyprus: Alassa (Limassol), Pissouri (Limassol), Polemi (Paphos), Psematismenos (Larnaca), Kato Moni (Nicosia), and Androlykou (Paphos). The sediments of these areas extend stratigraphically from the Langhian to the Piacenzian, so they are related with the chronostratigraphic framework of the research aims. The following steps were included in the methodology: site observation and sampling, sieving with a 250μm sieve, identification and photographing of the otoliths. Presence/absence data as well as the equation of van der Zwaan et al. (1990) and the oceanity index by Gibson (1989) were used to estimate the paleobathymetry of the sites. Then, the relative abundances of the species were palaeoecologically analyzed using the modern ecological data of the species.

Thirty-one taxa were identified and described in total, belonging to 20 genera and six 6 families. Particularly important is the identification of the new species for science, *Bregmaceros cypriotes* and the abundance in all samples of *Bregmaceros albyi*. The stratigraphic ranges of 15 species and three 3 genera were extended, 12 in the Langhian-Serravallian and six 6 in the Piacenzian in the eastern Mediterranean. In addition, from the 31 identified taxa, 23 are living today in the Mediterranean or outside regions, while the 8 taxa have extincted.

Androlykou site during the Piacenzian belonged to a shelf area in proximity to the shore, with a steep bathymetric gradient and a substratum composed mostly of sandy mud. The fish assemblages are subtropical and completely lack cold-water elements, reflecting the climatic optimum regime of the Late Pliocene. In Alassa area, the fish assemblages consist mainly of mesopelagic taxa, thus they can be considered typical of a continental slope environment with depths >600 m. As far as the paleoclimate is concerned, the dominant presence of *Bregmaceros albyi* (subtropical species) indicates that during the Middle Miocene was warmer than today.