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The Karangatian epoch in the Neopleistocene history of the Black Sea

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Black Sea Quaternary history shows an alternation of transgressive and regressive stages that are related to global climate change and pronounced due to semi-isolation from the World Ocean. In warm epochs, the Black Sea is connected to the Mediterranean Sea (i.e. World Ocean) via connecting seas and straits. In cold epochs, it becomes isolated or connects to the Caspian Sea via the Manych outlet. During transgressions, sea level rises as does salinity. During regressions, when it drops below the Bosphorus sill, the basin transforms into an isolated lake. During transgressions, organisms migrate into the Black Sea from either the Mediterranean or Caspian. Such migrations affect assemblage structure and increase the number of species, especially in case of Mediterranean transgressions. During regressive stages, the number of species drops, and only holeuryhaline Mediterranean species can survive the lowering of salinity (Yanko-Hombach, 2007).

The most powerful Mediterranean transgression in the Black Sea occurred during the Mikulino (MIS 5e) interglacial, corresponding to the central European Eemian interglacial; it is usually compared with the Alpine Riss-Würm interglacial. Clear traces of this transgression are preserved in coastal outcrops exposed in tectonically elevated terraces of the Kerch and Taman peninsulas, and Caucasus. They are also found in numerous cores and drill holes recovered from the Black Sea bottom. These traces contain numerous Mediterranean organisms (molluscs, foraminifera, ostracoda, etc.), many of which do not live in the Black Sea today. These sediments were first described by N.I. Andrusov (1925) on Cape Karangat, Kerch peninsula, in the early XX century. He called them Tyrrenean as they were similar to those in the Tyrrenean beds that form a coastal terrace in the Mediterranean. This similarity enabled him to conclude that the Mediterranean and Black Sea basins were connected to each other. Later, the Tyrrenian beds were renamed Karangatian by A.D. Arkhangel'skiy and N.M. Strakhov (1938) and were studied by numerous scientists including the present authors. Our material includes detailed study of foraminifera and lithological properties from many outcrops: "Eltigen," "Karangat," "Chokrack" (all Kerch peninsula); "Chushka," "Tuzla," "Krotkov Cape," "Maliy Kut" (all Taman peninsula); "Ashe," "Slot Neozhidannaya," "Agoy," "Chemitakwaga," "Lazurniy coast," "Mamayka," "Krashiy storm," "Adler," "Gudauta" (all Caucasian coast); "Chakvata," "Ureki" (all Western Georgian coast); and two drill holes and 200 vibro- and gravity cores recovered from the Black Sea bottom (Yanko, 1989).

The most complete Karangatian sediments sequence (120-70 ka BP) is in the "Eltigen" parastratotype that contains 73 species of foraminifera, predominantly benthic but a few planktonic also. Most do not live today in the Black Sea but are widely distributed in the Mediterranean basin, with twice the salinity of the Black Sea. In our presentation, we will describe foraminifera and lithology of that parastratotype, comparing it with other outcrops and cores. We will show that the Karangatian transgression increased salinity in the Black Sea above 30 psu and raised its level to at least the present elevation. This transgression was not gradual but oscillating in nature.