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# **QUATERNARY STRATIGRAPHY AND PALEONTOLOGY OF THE SOUTHERN RUSSIA: connections between Europe, Africa and Asia**

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The conference is devoted to the memory of Andrey Dodonov – geologist, colleague, friend and teacher

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The book presents the materials of the International Conference held in Rostov-on-Don (Rostov Region, Russia). Reports concern a wide spectrum of issues connected to the study of Quaternary marine and continental deposits of Eastern and Western Europe, Asia, and Africa. Paleobiological record of the Eastern Europe, faunal connections with Asia, Africa, and Western Europe are considered. The special attention is given to questions of paleogeography, climatic changes in the Quaternary, stratigraphy and sedimentology of Eastern Europe. Also presented are the newest data on the tectonics and climatic record. Questions of distribution and chronology of Paleolithic sites, adaptations of the ancient people to paleoenvironment are discussed.

Addressed to geologists, stratigraphers, paleontologists, paleogeographers, and archaeologists.

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## THE RECONSTRUCTION OF HYDROLOGICAL REGIME AND THE LEVEL OF THE AZOV SEA IN THE QUATERNARY TIME BY USING DIATOM ANALYSIS

**Galina KOVALEVA.** Institute of Arid Zones RAS, Southern Scientific Centre of Russian Academy of Science, Rostov-on-Don, Russia.

*kovaleva@ssc-ras.ru*

Diatoms, being one of the most informative paleontological objects, are successfully addressed to throughout the researches of biostratigraphy and paleo-oceanology. Being widely-spread and long-kept fossilized, diatom microorganisms enable to reconstruct global and regional oceanological and climatic events of the past, the replacement of oceanic circulation and sediments' deposition modes, changes in productivity of surface waters.

Stratigraphy of Quaternary Azov deposits is mainly based on the work materials on fossilized shellfish (Neveskaya, Neveskiy, 1960; Neveskaya, 1963; Barg, Yatsenko, 2001), and partially, spore-and-pollen analysis (Vronskiy, 1976; Isagulova, 1978). No data about distribution of diatoms in Late Azov Quaternary deposits (New Azov Layers), besides mentioning about the discoveries of a few mass species, were found. (Vronskiy, 1974).

Consequently, general regularities of diatoms' allocation in New Azov Layers were explored in the following researches (Kovaleva, Polshin, 2006; Kovaleva, 2007, 2008; Matishov et al., 2009). It was discovered, that irrespective of the area of column sampling, two species – *Actinocyclus octonarius* and *Actinoptychus senarius* (fig. 1) represent the mass species in lower layers of sediments.

*Actinocyclus octonarius* – mesohalobic species, occurring at the shallow waters' plankton of estuaries of mesothermal seas. *Actinoptychus senarius* inhabits sublittoral zones and is sporadically found in plankton. Both species are registered isolated at recent Sea of Azov. Taking into consideration biometrics of these species, they serve as markers of shallow waters. In addition, *Actinocyclus octonarius* is specific for plant-filled basins with low hydrodynamic activity.

Hydrological and climatic conditions, having been changing periodically during Late Azov period (New Azov Layers), reflected in rhythmic alternation of deposits. Silt deposits layers are interrupted by shell detritus layers. Having explored 165 cm the column sampling of bottom sediments with high discreteness (sampling each 1–3 cm), scientists have emitted 6 zones, characterizing change of hydrological regime conditions during last  $3110 \pm 170$  years. It was discovered that specific diatoms are found in specific lithologic deposits. Thus, for instance, mollusk shells are followed by high numbers of *Actinocyclus octonarius*. And, on the contrary, increase of *Chaetoceros* spores has been discovered only in the layers, free of shell detritus interruption.

For zone 1 (separated in terms of diatoms) high content of *Actinocyclus octonarius* shell detritus is typical (fig. 1). The results of the spore-and-pollen analysis evidence, that only this layer contains large number of macrophytes' spores (pondweed, etc.). Thus, sediments have been accumulating in a shallow-water gulf or bay, abundantly overgrown with macrophytes.

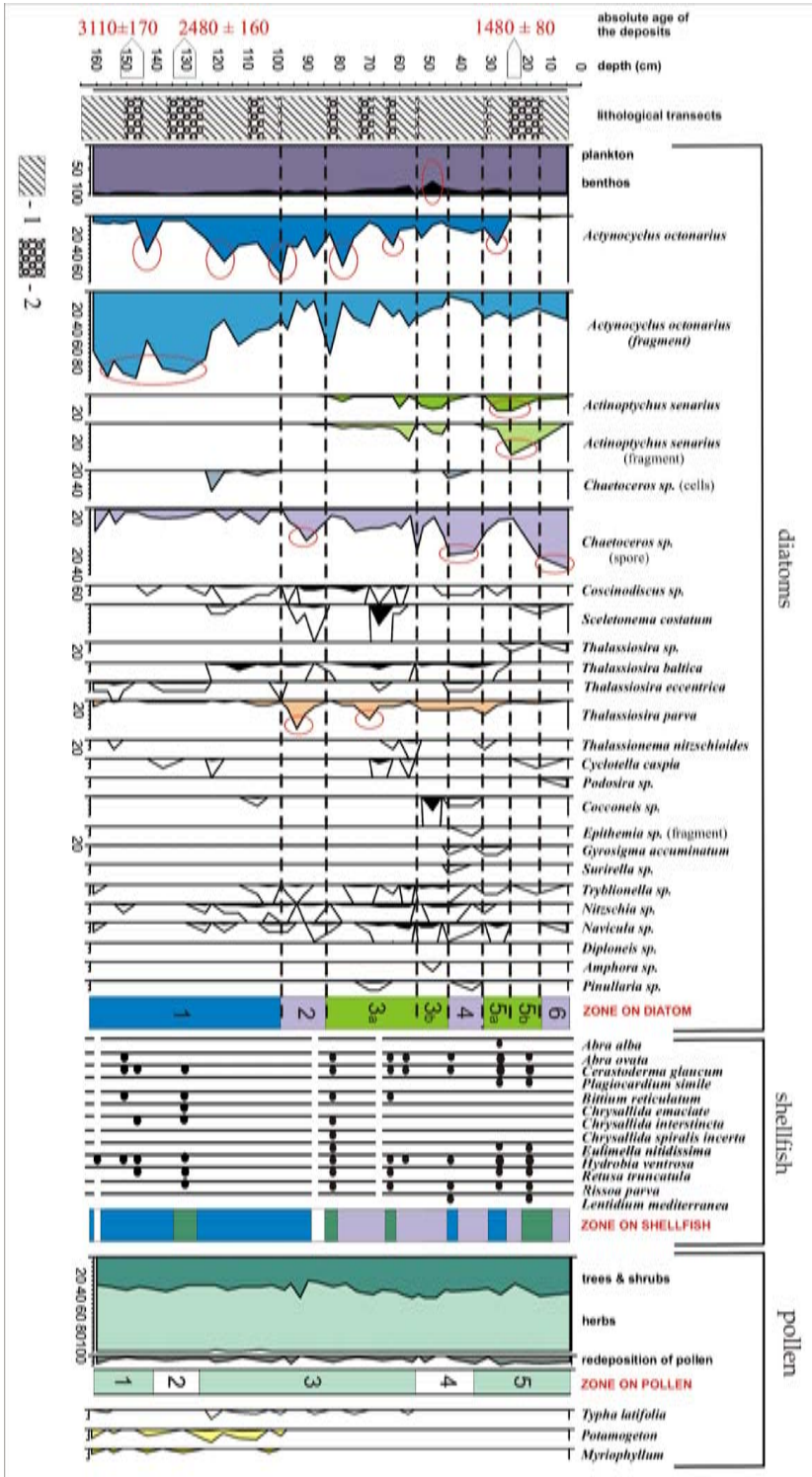


Fig. 1. Diagram of distribution of pollen, diatoms and mollusks in the sediment cores K-86 (South-eastern part of Azov Sea)/  
 Keys: 1 – argillaceous silt, 2 – silt shell detritus

Zone 2 presents large numbers of *Thalassiosira parva* and *Chaetoceros* spores. It should be noted that changes of cells and spores numbers of *Chaetoceros* genus in diatoms aggregations – serve as reliable indicator of waters' mixing in the zone, where hydrological fronts combine and the sea level increases (Sancetta, 1981, 1982; Makarova, Semina, 1982; Makarova, 1987; Koç Karpuz, Schrader, 1990; Stabell, Koc, 1996; Crosta et al., 1997; Polyakova, 1997; Booth et al., 2002). Thus, during the time, layers, corresponding with the zone 2, have been cumulating – the sea level increased, which evidences large contents of plankton frustules of *Thalassiosira parva* and *Chaetoceros* spores. Probably, salinity of the basin has also increased at that time period.

Zones 3 and 5 are marked out due to occurrence of *Actinoptychus senarius* in the deposits. These zones have smaller subdivisions ( $3_a$ ,  $3_b$ ,  $5_a$ ,  $5_b$ ), as since diatoms distribution scheme authenticates that ecological conditions have differed at lower and upper parts of the zones. Thus, the increase of benthic diatoms' numbers is typical for the zone  $3_b$  (fig. 1).

In the lower part of the zone 5 the dominant species (*Actinoptychus senarius* and *Actinocyclus octonarius*) occur together (fig. 1, zone  $5_a$ ), and in the upper part of the same zone – the second specie has vanished (fig. 1, zone  $5_b$ ). For the zones 4 and 6 (as for the zone 2) the increase of *Chaetoceros* spores content is typical, which specifies the change in the hydrological regime of the basin towards the sea level increase and reinforcement of its hydrodynamics.

Therefore, high sampling frequency (1-3 cm) and exploitation of marker diatoms allowed reconstruction of the changes of hydrological regime during Late Azov period. Diatoms distribution zones do not coincide with the same, marked out by pollen (fig. 1), as long as the latter reflecting changes, having occurred at the seashore.

Consequently, during the study on diatoms of New Azov Layers 6 zones are separated, specifying the changes of hydrological regime of the basin during last  $3110 \pm 170$  years. It is revealed, that the diatom zones, correlate with lithologic content of the deposits, malacology and spore-and-pollen analysis.

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