# STABLE ISOTOPE RECORD IN MIOCENE FOSSILS AND SEDIMENTS FROM ROHOŽNÍK (VIENNA BASIN, SLOVAKIA)

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A combination of paleontological, sedimentological and isotopical methods enabled to reconstruct palaeoenvironmental changes during Neogene near Rohožník (Vienna Basin, Slovak Republic).

The Neogene sea penetrated into this area in Badenian. Petrographic composition of basal conglomerates and sandstones corresponds to the Triassic basement, indicating their local origin. The overlying Leitha limestones (with abundant red algae, bryozoans, corals, molluscs and foraminifers) represent a typical reef complex related to a tectonically active coastal line, where carbonate sedimentation took place in a narrow zone along the sea shore. The tectonic activity as well as hydrodynamic conditions (waves) caused the formation of coarse-grained forereef sands (with red algae and molluscs). In the direction into the basin, these sediments are finger-like reaching into calcareous clays with abundant foraminifers, ostracods and calcareous nannoplankton and less diversified molluscan communities. With progressing transgression of the Badenian sea, the Leitha limestones carbonate complex sank into greater depths and was gradually covered by pelitic sediments. The upper part of the sequence is formed by sandy clays to sands of Upper Badenian/Sarmatian age with rich molluscan fauna and rare foraminifers and calcareous nanoplankton.

Carbon and oxygen isotope compositions of aragonite shells of molluscs from different facies were used to describe the deposition conditions. Isotopic compositions of carbonate cements were used to characterize conditions of diagenesis.

The first group of molluscs (from coarse-grained forereef sands) lived under normal marine conditions and their shells show $\delta^{13}C$ values from -1.0 to 1.2 ‰ and $\delta^{18}O$ values from -1.0 to 2.3 ‰. Assuming that the $\delta^{18}O$ value of seawater in this area was 0 ‰, we obtained the average temperature of 15 °C as a temperature of water in which this group of molluscs lived. According to palynology, subtropics existed in this area during Badenian. If the Badenian sea could be compared with recent Adriatic Sea, where measured temperatures of seawater at the depth of 50 m vary from 15.5 to 18.5 °C, then the calculated temperature for the Badenian seawater is correct.

The molluscs from the second facies (calcareous clays) lived in seawater at a greater depth. Their shells show $\delta^{13}C$ values from -2.7 to -0.6 ‰ and $\delta^{18}O$ values from 0.7 to 2.5 ‰. Compared to data for the previous group, $\delta^{13}C$ values are lower, whereas $\delta^{18}O$ values are higher. We suggest that molluscs of this group lived in a cooler water which contained a greater portion of $CO_2$ originating from oxidized organic matter.

Paleontological studies indicate that the third group of molluscs studied (facies of sandy clays to sands) lived in a brackish environment. Consistent with paleontological conclusions, the $\delta^{18}O$ values of their shells vary from -3.0 to 0.8 ‰, i. e. they are lower than values found for the first group. The $\delta^{13}C$ values of diagenetic carbonate cements vary from -0.5 to -12.7 ‰, whereas their $\delta^{18}O$ values are between -3.0 to -6.9 ‰. It follows that meteoric water rich in $CO_2$ originating from oxidized organic matter was present during formation of these cements. Extreme $\delta^{13}C$ values (about -50 ‰) and $\delta^{18}O$ values close to 3 ‰ were found for gypsum concretions from calcareous clays. Cements with such isotopic composition can be the result of oxidation of hydrocarbons in near-surface groundwater. Such reactions are confined to the vicinity of fractured hydrocarbon reservoirs. Similar studies could provide a valuable tool in petroleum exploration since the Vienna Basin, including the wider surroundings of Rohožník, represents an important oil- and gas-bearing area.