



## The endemic mollusks reveal history of the long-lived Pliocene Lake Slavonia in NW Croatia

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The present investigation deals with the fossil mollusk record of the long-lived Pliocene Lake Slavonia settled in the southern Pannonian Basin. The samples originate from Vukomeričke gorice, a low hill-range situated north of the Kupa River in the area between the towns of Zagreb, Sisak and Karlovac in NW Croatia. Representing the SW margin of the Lake Slavonia the freshwater deposits alternate there with the alluvial series, providing altogether about 400-m-thick, Pliocene continental succession, known in literature by informal name *Paludina* beds (acc. to a junior synonym of *Viviparus*). The endemic fauna of the Lake Slavonia became particularly well-known in the late 19<sup>th</sup> century after Melchior Neumayr demonstrated that the gradual evolutionary change of the mollusk phenotypes toward more complex morphology represents a function of adaptation to environmental change in the paleolake. Even Charles Darwin commented that result as *by far the best case which I have ever met with, showing the direct influence of the conditions of life on the organization.*

The deposition in the Lake Slavonia (~4.5 to ~1.8 Ma) coincides with the Pliocene Climate Optimum (PCO), but captures also the transition into the Pleistocene climate marked by the initial Ice Age pulse at 2.59 Ma. The increase of polar temperatures resulted during PCO in a significant melting of the ice caps leading to a global sea level rise tentatively getting up to 25 m higher than today. Coincidence of the climate and geodynamic settings in southeastern Europe provided conditions supporting extended settlement of lacustrine environments including Lake Slavonia, Lake Kosovo, Lake Transylvania and Lake Dacia, all characterized by explosive adaptive radiations of viviparid snails. In particular, the latter adaptive radiations resulted in the regional phylostratigraphy of Lake Slavonia *Viviparus* species enabling excellent stratigraphic control for the investigated deposits. Hence, based on this evidence, the present study proves Lake Slavonia flooding events into the investigated area during the early Pliocene *Viviparus fuchsi* Zone, the middle Pliocene *Viviparus dezmanianus* Zone, as well as during the late Pliocene *Viviparus hoernesii* Zone.

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