

Isotope composition of Mesozoic molluscs from the Saratov-Samara region and main Early Cretaceous climate trends at the Russian Platform-Caucasus area

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Palaeotemperatures obtained from calcitic bivalve shells from the Middle and Upper Volgian substages in the Samara area range from 26.8 to 39.8 (average 34.0) °C and from 28.7? to 32.6 (average 31.8) °C, respectively. However, Late Volgian belemnites secreted their rostra in cooler conditions (14.3–23.6 °C) likely of mesopelagic depths in adjacent basins. They arrived to warmer places possibly for spawning. The Aptian aragonitic bivalve and gastropod molluscs, observed in *Laevidentalium*-bearing sandstone (~10 m), exposed in the Volsk area and provisionally dated to the Volgensis or Tenuicostatus zones, give palaeotemperatures of 25.5–34.4, average 27.7°C. However, belemnite rostra associated with them were also secreted in cooler conditions (17.1–23.6°C). The higher temperatures, comparable of those for the mid Volgian interval, were deduced from the O isotope composition of ammonite shells, occurring in overlaying clay (~ 3 m) of the Volgensis Zone (20.5–38.6, average 32.7°C). In contrast, some investigated benthic and nectobenthic dwellers from the Saratov-Samara region (an inoceramid bivalve of late early Campanian age and belemnites of Maastrichtian age) inhabited significantly cooler waters (14.3°C and 7.4–10.2 °C, respectively). The obtained isotope records and a review literature data on the Russian Platform and the Caucasus allow supposing of the following temperature trend in these regions during Early Cretaceous time: 1. Estimated Valanginian-early Hauterivian cooling was followed by warmer temperature conditions at least during the early late Barremian. 2. A drop of isotopic palaeotemperature at the end of Barremian time, very similar to lower-middle Callovian one, has been documented in both the Ulyanovsk and the Caucasus areas (however, it was not so marked apparently than that of the late early Campanian-Maastrichtian time in this area). 3. The highest temperatures for the E. Cretaceous were calculated for the mid early Aptian of the Saratov and Ulyanovsk areas, as well as the early late Aptian of the Caucasus. 4. This warming was followed by somewhat cooler conditions at the end of the Aptian in the Northern Caucasus. 5. Judging from an E. Cretaceous belemnite palaeotemperature trend for the Caucasus and a late Albian ammonite oxygen isotope record for the adjacent area (Mangyshlak), the mentioned environments were likely followed by the warmer and the significantly warmer conditions in the early Albian and the late Albian, respectively.