

SELECTIVE EXTINCTION OF MARINE PLANKTON AT THE END OF THE MESOZOIC ERA: THE FOSSIL AND STABLE ISOTOPE RECORD;
Y. Herman, Department of Geology, Washington State University, Pullman, WA 99164-2812 USA, and S.K. Bhattacharya, Physical Research Laboratory, Ahmedabad 380 009 INDIA

Floral, faunal and stable isotope evidence in a continuous sequence of latest Cretaceous and earliest Tertiary shallow water marine deposits in the Mangyshlak Peninsula, NE of the Caspian Sea, USSR suggest severe environmental changes at the Cretaceous/Tertiary (K/T) boundary. Time frame is provided by nanno, micro and microfossils as well as by magnetic stratigraphy and an iridium spike.

Oxygen isotopic analyses of the bulk sediments, composed of nanno and microplankton skeletal remains, show a sharp positive spike from -4.2 ‰ to -1.2 ‰, at the K/T boundary. This shift is primarily attributed to severe cooling possibly accompanied by increased salinities of the surface mixed layer. A reversal in the $\delta^{18}\text{O}$ signal from -1.2 ‰ to -4.6 ‰ one mm above the boundary is interpreted to be indicative of warming and decreased salinities. The echinoids exhibit only a modest shift from 0.7 ‰ to 1.3 ‰, suggesting a less drastic temperature decline of the bottom water at the boundary. The echinoid data should be viewed with caution, because it is not known to what degree their isotopic composition is controlled by biological factors.

Floral and faunal extinctions were selective, affecting approximately 90% of the warm-water calcareous phyto and zooplankton genera in the Tethyan-Paratethyan regions. These highly diverse taxa with many endemic representatives were at the peak of their evolutionary development. The coccolithophore *Braadurosphaera* and the calcareous cyst-producing dinoflagellate *Thoracosphaera* survived the late Cretaceous environmental crisis; both have living representatives and are considered tolerant of a wide range of habitats. These survivors are common in the basal Danian in mid and high latitude deposits, but are scarce in low latitude sediments. A similar pattern was observed in planktonic foraminifera. Following the nearly complete annihilation of the entire group at the end of the Cretaceous, one survivor was found in the earliest Tertiary sediments. This species was probably either tolerant to a wide range of environmental conditions or was a subsurface water inhabitant. Higher latitude forms seem to have carried on with less attrition; noncalcareous ones, particularly the diatoms, silicoflagellates and radiolarians diversified at the end of the Mesozoic Era. Other groups of organisms, gradually declining throughout the Cretaceous, died out at the K/T boundary.

Geologic evidence indicates that the terminal Cretaceous temperature decline was coeval with widespread and intense volcanic activity which reached a peak at the close of the Mesozoic Era. Volatile emissions from massive volcanic eruptions led to acid rain which depressed the pH of surface water. Increased acidity temporarily prohibited calcite nucleation of the surface dwelling warm-water plankton. Superimposed upon decreased alkalinity, severe and rapid climatic changes caused the extinction of calcareous phyto and zooplankton.