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EXTINCTION AND RECOVERY OF NONMARINE MOLLUSCAN ASSEMBLAGES IN THE LATE CRETACEOUS AND EARLY TERTIARY

HARTMAN, Joseph H.; BUTLER, Ray D.; Energy & Environmental Research Center, University of North Dakota, PO Box 9018, Grand Forks, ND 58202.

The nonmarine molluscan record in the Campanian, Maastrichtian, and Paleocene strata in the Western Interior is one of a sequence of faunal turnovers related to westerly movements of epiric seas. The final faunal turnover is at or near the end of the Cretaceous (K) and is particularly dramatic in that a diverse and widespread assemblage of highly sculptured freshwater clams (Unionidae) is eliminated in the northern plains and elsewhere. This fauna, more or less as a whole, ranges stratigraphically through most of the 100-m section of the Lancian-age Hell Creek Formation in Garfield and McCone Counties, northeastern Montana. This fauna is also well represented elsewhere in Montana and in the Lance Formation of Wyoming, but is virtually absent in the 100-m-thick section of the Hell Creek Formation of easternmost Montana and western North Dakota. The overlying Puercan-age Bear, Tullock, and Ludlow Formations of central and eastern Montana, western North Dakota, and elsewhere not only lack the unionid bivalves, but the numbers of molluscan localities are so reduced as to be considered rare. The beginning Tertiary (T) assemblage includes a few crossover mesogastropod snail taxa, with the bivalve component consisting of a species of the Pisidiidae and one to two species of ovate, unsculptured (except for simple ridges on the anterodorsal valve margin) unionids. The influence of a K/T-boundary sea and possible consequences of an initial transgression of the Cannonball Sea on the nonmarine molluscan fauna are difficult to assess directly, but their effects, such as the loss of many taxa, appear comparable with the magnitude of earlier extinctions in the Late Cretaceous. The nonmarine K/T section in the Missouri River valley, south central North Dakota, is very thin, with no more than a few meters occurring between the Fox Hills and Cannonball Formations, indicating the continued presence of an interior seaway. Subsequently, at least three transgressive–regressive pulses of the Cannonball Sea across western North Dakota influenced the recovery of the nonmarine molluscan fauna across the northern Great Plains. The fauna did not again become abundant and diverse until the late Torrejonian (upper Lebo Formation) in central Montana and until the middle Tiffanian (Slope Formation, in part) in central North Dakota, by which time the Paleocene interior seaway had regressed from the region.