

## **North American Paleocene Continental Mollusks: From Slow Recovery to High Diversity, but Not a Simple Story**

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Several thousand continental molluscan localities have been documented in Paleocene strata of North America. Nearly every new study that adds detail on temporal resolution, stratigraphic and environmental cohesiveness of paleoecological interpretations, or better sampling shows freshwater and terrestrial mollusks to be more abundant and diverse than previously thought. Most common taxa have been historically known for some time; surprisingly, these are typically limited to relatively brief spans of the Paleocene. Two fundamental issues limit more concise molluscan synecological interpretations of paleoassemblages: 1) understanding morphological variation as a function of biogeography and 2) an undersampling of ecotones and other limited shell-preserved habitats. These problems can be resolved by placing well-collected fossil associations in well-interpreted sedimentological contexts in finely calibrated time scales, where comparison to modern systems becomes realistic.

Increased resolution in calibration techniques and changes in molluscan sampling methods in recent years resolves a more detailed and unique record of Paleocene molluscan evolutionary changes. However, some NALMA are not well known, with few localities from early early and early mid Paleocene strata (Pu1, To1). These intervals are sufficiently represented to suggest causal mechanisms for apparent low diversity.

The Cretaceous-Paleogene event resulted in few continental molluscan survivors. Certain species can be tracked across the boundary, and evolutionary changes can be seen in a few lineages but, in general, continental molluscan diversity crashed from the high numbers near the end of the Cretaceous. Interpreting the recovery of molluscan diversity is complicated by two factors: 1) the loss of diversity at the end of the Cretaceous was fundamental because certain morphological designs were lost and 2) Paleocene molluscan diversity remained relatively low throughout the duration of the Cannonball Sea. With the final retreat of the Cannonball, snail-dominated diversity increased dramatically in mid late Paleocene (Ti3) and remained high throughout the remainder of the Paleocene.

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Abstract 231-3