$\delta^{15}N$ as a Potential Paleoenvironmental Proxy for Nitrogen Loading in Chesapeake Bay

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Crassostrea virginica is one of the most common oyster species in eastern North America and is frequently found in archaeological sites and sub-fossil deposits. Although there has been extensive sclerochronological studies utilizing $\delta^{13}C$ and $\delta^{18}O$ data from the shells of this species, little is known about $\delta^{15}N$ stored within the organic matrix of the shells. Such data could potentially be a useful paleoenvironmental proxy to determine nitrogen loading and the subsequent anthropogenic impacts within an area.

Ninety archaeological shells ranging in age from ~120 to 3,400 years old and thirty-two modern shells were collected in Chesapeake Bay at the Smithsonian Environmental Research Center in Edgewater, Maryland. One valve from each shell was sub-sampled and analyzed without acidification using an EA-IRMS system equipped with a CO_2 trap to determine %N and $\delta^{15}N$ content of the shells.

Comparison of %N and $\delta^{15}N$ in *C. virginica* shells from the six different time periods studied show relatively constant values from ~3,400 years ago to 1820 AD. Between 1820 and 1890 AD, there are rapid increases in both %N and $\delta^{15}N$ in the shells, which continue to exponentially increase in value to the modern shells. The increases in %N and $\delta^{15}N$ are correlated with increased anthropogenic impact due to human population, sewage discharge, and urbanization in Chesapeake Bay at this time. These data demonstrate the utility of $\delta^{15}N$ data from *C. virginica* shells as a paleoenvironmental proxy to measure the anthropogenic impact of a specific area over time.