

***Mytilus californianus* as an environmental monitor: a case study from central
California**

Frank Forcino

Advisor - Stephen Schellenberg

ABSTRACT

Intraskelatal oxygen stable-isotope ratios ($\delta^{18}\text{O}$) and minor element ratios (Mg/Ca) were examined in modern *Mytilus californianus* specimens to test the hypothesis that these variables record ambient seawater temperature, and therefore can be measured in fossil specimens as a means of reconstructing paleotemperature. Specimens representing a range of ontogenetic stages and two extreme intertidal positions were collected monthly for one year from Santa Cruz, CA. While general linear modeling (GLM) of various monitored environmental parameters revealed temperature as the primary explanatory variable, the best goodness-of-fit GLMs for $\delta^{18}\text{O}$ and Mg/Ca explained only 37.1% and 28.5% of variation, respectively, with additional significant variance attributable to intertidal positions and specimen size. Thus, *M. californianus* appears to be an unreliable means to reconstruct paleotemperature given the large amount of unexplained variation in intraskelatal $\delta^{18}\text{O}$ and Mg/Ca and the role of variables effectively unknowable in the fossil record (e.g., intertidal position). In addition, a proxy species of interest cannot be assumed to be a comparable indicator of environmental conditions to similar species in the same genera or that share ecological characteristics.