Temperature and Predation Impacts on Latitudinal Patterns of the Shell Formation of the Eastern Oyster

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Oyster reefs are crucial components of estuarine ecosystems worldwide. Oyster reefs provide essential goods and services such as water filtration and clarity, shoreline stability and protection from sea-level rise; they also provide habitat for commercial fisheries as well as increased biodiversity. However, our inability to predict how rapid climate and human-caused changes will affect oyster reef persistence and services is limited by experimental studies that lack observations from multiple populations in natural environments. The eastern oyster *Crassostrea virginica* is a key ecosystem engineer creating reef habitats along the Northwest Atlantic coastline, from above Nova Scotia to Texas. A better understanding of oyster's ability to produce their shell across latitudes will help us to identify regional differences in this organism's vulnerability and protective ability from future climate and environmental alterations. Here, we investigate how latitudinal gradients and predation affect the calcification process of the *C. virginica* by comparing shell deposition and microstructure of cultured and wild-caught oysters from multiple estuaries along the U.S. coastline. Observed differences in shell deposition and microstructure between the cultured and the wild specimens reflected the oyster's life history strategy to protect itself from predation, while latitudinal variations reflect temperature and water chemistry effects on the calcification process. This project uncovers natural patterns of these key foundation species and the vulnerability of oyster reefs' integrity and services under rapidly changing climates.