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Program and Abstracts

Isotope sclerochronology and season of annual growth formation in the marine bivalve, *Astarte borealis*, from Arctic and cold-temperate seas

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Astarte borealis shells are well suited to investigate links between environmental change and biological consequences in high-latitude regions because of their long lifespans and abundance in boreal and arctic seas. These traits make *A. borealis* a useful tracker of the rapid climate changes in the Arctic, a region experiencing double the global rate of temperature change. Therefore, it is imperative to understand the isotope sclerochronology of these shells to quantify how factors, such as lifespan, are affected by climate change. Using isotope sclerochronology, we test the hypothesis that this mid- to high-latitude species form winter growth checks in their shells similar to other mid- to high-latitude venerid clams (*Mercenaria mercenaria*) and patelloid limpets (*Patella vulgata*). Specimens were collected alive from Kiel Bay, Germany (cold-temperate zone) and the White Sea, Russia (boreal zone). Oxygen isotope data show that shells from the Kiel Bay population of *A. borealis* slow growth in winter similar to other mid- to high-latitude molluscs most likely representing cold-temperature stress. In contrast, shells from the White Sea slow growth during the summer unlike other mid- to high-latitude molluscs. There are several factors that may contribute to the unexpected timing of slowed growth in the White Sea population, such as reproductive processes, food supply, temperature thresholds, and salinity. We can rule out reproduction as a contributing factor because *A. borealis* has fertile gonads all year round. Nutrient restriction is also unlikely because phytoplankton blooms occur from April to October. Summer temperatures would not trigger slowed growth because typical values for the White Sea do not exceed maximum temperature tolerances. The White Sea experiences pulses of meltwater during the early summers which drop salinity to less than 8 psu (practical salinity unites) in some areas. This decrease in salinity is below the tolerance threshold for *A. borealis* and is a likely cause for the observed slow summer growth.