



## Review paper

# *Arctica islandica* (Bivalvia): A unique paleoenvironmental archive of the northern North Atlantic Ocean



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## ABSTRACT

High-resolution environmental proxy data from the extratropical North Atlantic prior to the instrumental era are of critical importance to decipher processes and mechanisms of global change. In this regard, shells of the extremely long-lived bivalve mollusc, *Arctica islandica* (Linnaeus, 1767), have gained particular attention during the last decade because they serve as reliable, subseasonally resolved multi-proxy archives of environmental variability in that very region. With a lifespan of more than 500 years, *A. islandica* is the longest-lived solitary animal. Its shell grows periodically throughout life and contains distinct annual and daily growth increments. These growth patterns function as a calendar that can be used to place each shell portion into a precise temporal context. Furthermore, changing environmental conditions are encoded in the shells in the form of variable increment widths and geochemical properties. By means of cross-dating, growth increment width chronologies from different specimens can be combined into much longer time-series, so-called composite or master chronologies, covering centuries to millennia and many generations of bivalves.

The present paper provides a comprehensive review of research on this species with a special focus on long-term climate and environmental reconstructions using isotopes, trace and minor elements and variations in shell growth. This review also highlights challenges involved with the interpretation of proxy data obtained from *A. islandica* and identifies future research needs. *A. islandica* does not easily reveal its secrets. It needs a holistic approach to unlock the multi-proxy records stored in their shells. The goal of this paper is to increase the recognition of this high-potential natural archive and encourage future interdisciplinary research.

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