

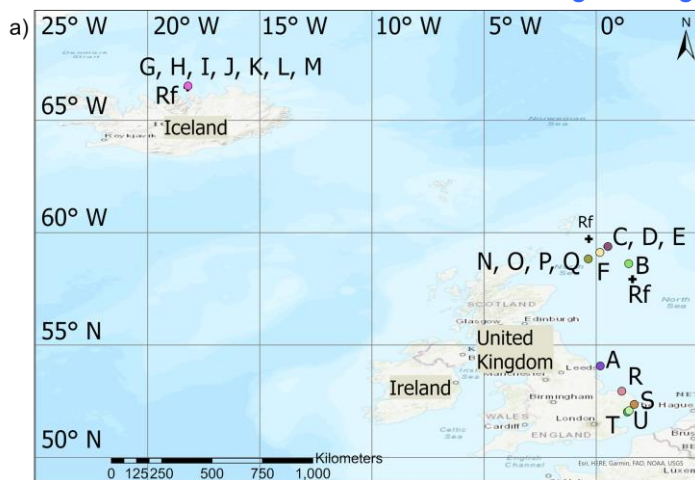
Responses to anonymous referee 2

We thank the reviewer for their useful feedback and valuable comments that will improve the manuscript. Please find below our responses.

The reviewer's comments are in black, our responses in *blue italics* and any suggested changes/additions are in *red italics*.

1. A new and higher quality location map should be included. The sample locations should be identified with a number on the map.

A new map created with ArcGIS was added to Figure 2 and sample locations are identified with letters "A" to "U" and the rangefinding samples as "Rf".



*Figure 2. a) Location of the *A. islandica* samples analysed in this work. Map created using ArcGIS Pro.*

2. Each sample should be identified by numbers/sample sets in the table.

All samples are now identified with letters "A" to "U" and the rangefinding samples as "Rf" in Table 1 and Figure 2a.

3. A sketch of a cross section illustrating the growth of time with should be included.

This will illustrate the way the inner layer(which is growing through the life time is making up most of the section when approaching the umbo).

Thank you for this helpful suggestion, we have added a simplified schematic of the growth of the OSL, ISL and hinge in figure 1c.

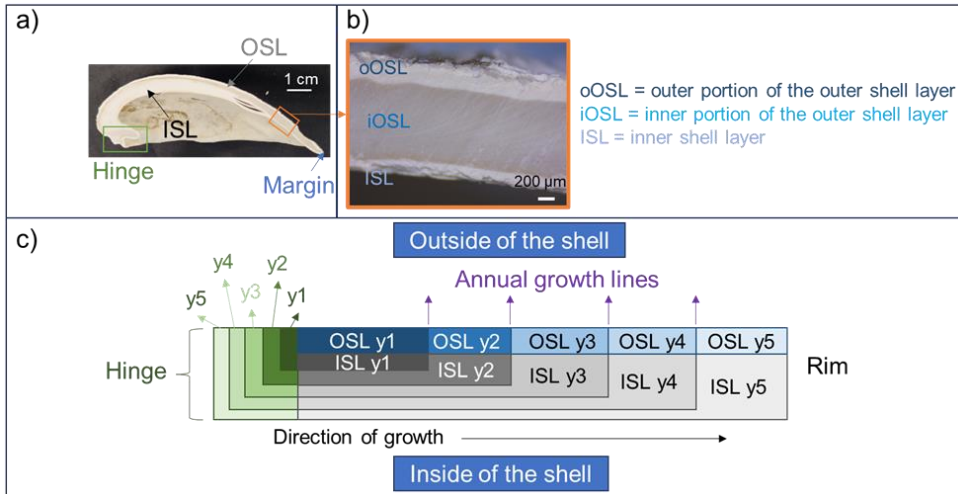


Figure 1. a) cross section of *Arctica islandica* showing the b) inner shell layer (ISL), inner portion of the outer shell layer (iOSL), and outer portion of the outer shell layer (oOSL); c) simplified schematics of the growth of ISL and OSL and hinge (“y” indicates the year of growth).

4. Some places I do not follow the authors definition on when a plateau is reached in their experiments. For some of the data it seem like the plateau is reached between the first (initial) and second analytical points, and this should be stated in text.

We have clarified what we mean by plateau, defined as “little or no change in trend between two or more observations” in section 3.2.

5. It would be good if the authors somewhere present some of their finding on a geological time line.

We refer to the age of the shells to geological time periods (e.g. Pliocene, Pleistocene, Holocene) and the age of the shells is reported in Table 1. We have added a timeline on a million-year scale for the Pliocene, Pleistocene and Holocene (Figure 2b), and thousand-year scale to the Holocene (Figure 2c).

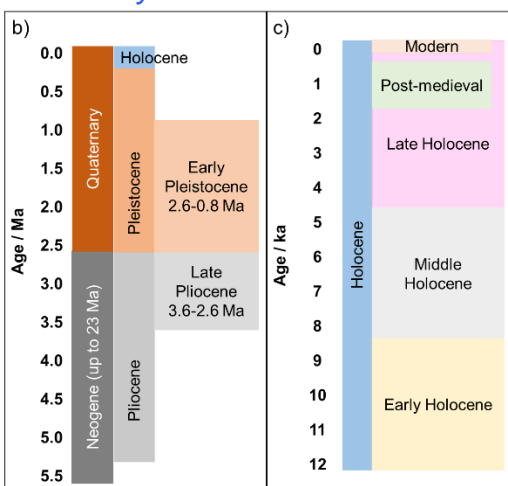


Figure 2. a) Location of the *A. islandica* samples analysed in this work. Map created using ArcGIS Pro. Geological timeline of the b) Pliocene and Pleistocene and Holocene on a million-year scale, and c) Holocene on a thousand-year scale (IUGS International Chronostratigraphic Chart, 2023).

6. Also be clear if recent shells are found with a living animal inside.

The only modern shell that was found with a living animal inside was the ArPe and ArPe2 specimens which were live-collected, meaning that the living animal was inside when the samples were collected. However, we purchased the shells without the animal years after they were trawled. Table 1 states that these samples were live-collected for other purposes, and it states the website we bought them from for this study.