

Blue mussel shape is a powerful indicator of environmental change¹

Scientists at the University of Cambridge and British Antarctic Survey have developed a new method to identify natural patterns of shell shape variation in common blue mussels.

Using a dataset spanning about 4,000 km, with sampling locations from the Northern Greenlandic to the French coastlines, researchers developed an approach to accurately measure the variations of shell shape in marine mussels with latitudinal gradients. The work demonstrates the potential of mussel shells as an indicator of changing environmental conditions.

The study involved intensive sampling, and collaboration between researchers across Europe, to gather a variety of mussel specimens from a wide range of environmental conditions throughout the northern Atlantic and Arctic oceans.

Lead author Luca Telesca comments “Our world is changing rapidly, and we need to understand how ecologically and economically important marine organisms, such as blue mussels, may cope with future conditions. We developed an innovative approach through analysis of the natural variations of shell shape in these key species across very large geographic scales, where a multitude of interacting factors make predictions quite challenging. What’s interesting is how this new method can improve our understanding of mussel ecology, and make it possible to predict shape alterations of mussels and other species in response to future environmental changes.”

Shape variability represents an important direct response of organisms to selective conditions. In natural environments, shell form in mussels is shaped by many environmental factors during growth and aging, and it varies between species. These complex interactions constrain our predictions on the future responses of mussel communities to environmental changes.

“Our approach allows us to finely describe which shell traits change with specific environmental parameters, such as temperature or salinity, regardless of aging, species and other potentially confounding factors.” explains Telesca.

“By accurately quantifying shell shape variation in natural environments, we show how shape changes in mussels can be used as a powerful indicator of changes in climate. Moreover the developed approach can find potential applications in many other research fields, such as paleo-climate research, and on a multitude of other target species”.

Blue mussel shell shape plasticity and natural environments: a quantitative approach L. Telesca, K. Michalek, T. Sanders, L.S. Peck, J. Thyrring and E.M. Harper is published in *Scientific Reports*.

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The study was developed as part of the CALcium in a CHanging Environment (CACHE) Marie Curie Initial Training Network aiming at pushing forward our understanding of how commercially important shellfish make their shells in changing environments.



Left to right: variation in blue mussel shells from high to low latitudes. The shells become progressively rounder as temperature and salinity increase.