
Environmental and spatial effects on the determination of shell traits of the common whelk (*Buccinum undatum* L.)

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Abstract

The expression of heritable characteristics determining phenotypic traits can be affected by interactions with the environment. Mollusc shells exhibit wide variation of easily measurable phenotypic traits including colour, thickness and shape, which make molluscs ideal for the study of genetic and plastic contributions to phenotypic determination. Variability in shell shape and thickness have been linked to environmental factors such as wave action and the presence of predators using model species such as *Littorina saxatilis* and *Nucella lapillus*.

The documented variability in shell morphology of the subtidal gastropod *Buccinum undatum*, along with its limited dispersal capacity, make this species a fitting candidate for in-depth research on trait determination. In Iceland the highest density of whelks is in Breiafjórur, where whelk differ in life history traits between sites as well as in shell-colour, shell-shape and shell-thickness. The species distribution across Breiafjórur covers an ecologically diverse area and many environmental factors that could influence shell morphology. The aim of the project is to understand the causes of the phenotypic variation in the common whelk, with respect to spatial and environmental variation. A combination of traditional morphometrics, geometric morphometrics and shell colour analysis was used to classify shell phenotypes of whelk in Breiafjórur and its variation was analysed with respect to environmental factors and spatial patterns. Results indicated that a combination of environmental and genetic factors affects the shell phenotype of the whelk. Ongoing analysis of genotypic variation and a common garden experiment, will add to the interpretation of factors affecting phenotypic variation.

Keywords: shell morphology, marine ecology, genetics vs. environment, marine gastropod, whelk, *buccinum undatum*

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