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A morphometric and genetic comparison between *Littorina obtusata* (L.) from the UK and the high-spired form *Littorina palliata* (Say) from Iceland

R. I. Lewis¹ and Gray A. Williams²

1) University College of Swansea, School of Biological Sciences, Singleton Park, Swansea, SA2 8PP, UK

2) Dept. of Botany and Swire Marine Laboratory, University of Hong Kong, Cape d'Aguilar, Hong Kong

In intertidal gastropods which do not disperse larvae in the plankton, shell shape is often highly variable. Many factors have been shown to influence shell morphology, such as predation, exposure, pollution, heritability, parasitism, and growth rate.

Over its range in the northern Atlantic *Littorina obtusata* (L.) shows geographic variation in shell morphology. Some authors have referred to high-spired northern forms as *L. palliata* (Say) (e.g. Thorson 1941, Hubendick & Warén 1975), whilst others have considered them as variants of *L. obtusata* (e.g. Colman 1932, Knudsen 1949, Seeley 1986).

During the summer of 1989, samples of high-spired forms were collected from Grótta, Seltjarnarnes Cape, Iceland (64°10'N, 22°03'W), and S.W. Borgarnes, Iceland (64°33'N, 21°53'W). Low-spired forms were collected from St. Michael's Island off the Isle of Man (54°05'N, 4°33'W). Morphological differences between sites were investigated using a multivariate discriminant function analysis. The shell parameters length, height, and aperture width (after Goodwin & Fish 1977) were chosen as function variables. Genetic variability was also assayed using standard starch gel electrophoresis techniques (e.g. Ferguson 1980) at 13 allozyme loci. The discriminant analysis showed almost complete morphological separation among the three samples. A Chi-square test based on the transformed Wilks' Lambda statistic (for all functions) was highly significant ($P < 0.001$) indicating that mean values for discriminant scores were highly heterogeneous between the three samples. The shell parameter with the highest correlation with discriminant function scores for function 1 (which accounted for approximately 90 % of total between groups variance in discriminant scores) was aperture width, indicating that this is the most diagnostic of the three variables.

Genetic analysis revealed that the most distant relationship (between the Grótta and Isle of Man samples) was surprisingly close (Nei's (1972) $I = 0.983$). Thus we have no evidence in this study to suggest that the northern high-spired *L. palliata* form from Iceland is not conspecific with *L. obtusata* from the UK.

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