Littorina striata is a planctotrophic developer and is therefore, according to the theories of Scheltema (1971) and Crisp (1978), expected to have great dispersal abilities, resulting in a high degree of gene flow between geographic populations. Scheltema (1971) and Crisp (1978) consider gene flow as a homogenizing force, counteracting population differentiation in both genetic and phenotypic traits. However, in contrast to these ideas *L. striata* exhibits a high degree of shell variation and heterogeneity, even on a microgeographical scale. This shell variation can be described by three combinable traits : (1) smooth vs. nodulous shells, (2) shells with or without a white band on the last whorl and (3) eroded or non-eroded specimens. In Ilheu de Vila Franca, a volcanic crater along the south coast of Sao Miguel (Azores), all these shell morphs co-exist, even though there appears to be a clear spatial differentiation : nodulous animals are mainly, but not exclusively, found on the sheltered inside of the crater, whereas the other types are proportionally more common on the wave-exposed outside of the crater.

In order to investigate whether this morphological heterogeneity was correlated with a genetic population substructuring, we surveyed five populations of *L. striata* from Ilheu de Vila Franca and one from Vila Franca on the mainland (Sao Miguel, Azores) by means of polyacrylamide gel electrophoresis of four polymorphic enzyme loci (GPI, PGD, MDH and MPI).

The genotype proportions in the six populations showed no deviations from Hardy-Weinberg equilibrium expectations. Interpopulation allele frequency heterogeneity, as tested by means of a contingency chi-square table analysis (Workman & Niswander, 1970), showed a significant ($p < 0.05$) differentiation at MPI between populations from the inner and outer side of the crater, as well as between the outside populations only. Yet, no allozyme heterogeneity could be detected between any of the morphotypes. Similarly, no sex-linked differences were observed. Finally, Wright's F-statistics revealed no population differentiation (Fst = 0.14) and accordingly, gene flow, as estimated from Fst, was high (Nm = 17.06).

Hence, these preliminary results do not provide evidence for a correlation between morphological and allozyme variation in *L. striata*. However, many more morphological, physiological and genetic data are needed before the nature of the shell polymorphism of *L. striata* may possibly be understood.

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Mate searching in a marine prosobranch, *Littorina littorea* : trail following and fractal dimension of movement

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We studied mate search behaviour in a quantitative way of the gastropod *Littorina littorea* in laboratory experiments during parts of their non-mating season (November 1992) and during their mating season (April-May 1993). Snails were sampled at one boulder shore on the north west coast of Sweden.

In a comparison between the two seasons (one non-mating and one mating) we measured trail complexity of non-sexed snails with fractal dimension, the degree of mucous trail following (coincidence index of marker and tracker trails) and average movement speed of marker and tracker snails. We found no differences of fractal dimension and coincidence index of trails between the two seasons. Tracker snails moved significantly faster than marker snails during both seasons. This, however, could not be explained by trackers using the mucous trail deposited by the marker to increase their speed passively, since there was no correlation between coincidence index and tracker speed.

During the mating season we also conducted trail complexity-, trail following- and speed experiments comparing the behaviour of males and females. There was no difference between male and female speed, and between males and females in the fractal dimension of movement. Furthermore, males tracking other males, females tracking other females and females tracking males followed trails about equally long distances (i.e. coincidence indices did not differ). In contrast, males following female mucous trails (female marker-male tracker) showed a significantly higher degree of trail following than the other sex combinations. This new finding implies that females of *L. littorea* release pheromones in their mucous trails and that males are able to identify them.

Microgeografical variation in shell strength in the flat periwinkles *Littorina obtusata* and *L. mariae*

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The strength of molluscan shells has been shown to vary in adaptive ways in a number of species and one of the main factors thought to be involved is shell-crushing predators (Vermeij, 1978, Vermeij & Currey 1980). In a recent study (Lowell *et al.,* 1993) the sibling species of flat periwinkle *L. obtusata* and *L. mariae* were shown to show significant differences in the rates at which shell strength increased with size in specimens which had been collected from the same location, where the species were sympatric.

A comparative study of the two species from a number of localities around Milford Haven in Pembrokeshire, Wales showed that whilst the modal sizes (maximum shell diameter), heights (minimum shell diameter), and shell masses of the two species differed markedly there was relatively much less difference in strength. In order to facilitate study of the power law relationships which are usually involved in morphometric studies the natural logarithms of the data were analysed. As the animals grow shell mass increases isometrically with size in *L. obtusata* (i.e. mass increases in proportion to the cube of size), but it increases faster than isometrically in *L. mariae*. Thus at all but the smallest sizes the shell of *L. mariae* is more massive than that of a similar sized *L. obtusata.*

Shell strength, determined as the maximum force applied by a hydraulic tensile testing machine before the shell cracked, showed considerable variability, both geographically and between species. Strength increases at a rate not significantly different to the cube of size in both species in this study ; shell strength is thus strongly positively allometric since the isometric exponent is 2. *L. mariae* is markedly stronger than *L. obtusata* of similar sizes.