MOVEMENT VARIABILITY
in intertidal snails




The spontaneous movement of animals across a range of spatial and temporal scales can contribute to the survival of a species. Migration of individuals maintains gene fluxes between populations and protects from the risk of extinction. In the current changing global climate, the ability to migrate enables a species to keep pace with rapid environmental changes by moving towards a more hospitable habitat.

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Surprisingly, despite the impact of such movement on rocky shore ecosystems, the reasons for this behaviour are still not fully understood. Displacement of invertebrates such as intertidal snails is usually complex and highly variable because it is controlled by a range of environmental and biological factors.

We investigated the movements of three intertidal herbivorous gastropod species: *Nerita atramentosa*, *Bembicium melanostoma* and *Austrocochlea porcata*, all commonly encountered on south Australian rocky shores. The main objectives of this study were to distinguish the nature of movement (innate versus acquired) to assess properties such as speed and orientation and to quantify the related variability at the species and individual levels. Specifically, the displacements of 10 individuals per species were recorded for up to an hour in a PVC tank under controlled conditions. Only one individual at a time was filmed per trial to avoid the bias caused by biological interactions. Routes taken by the animals were then computerised and quantitatively analysed. The results demonstrated that the observed movement was much like the optimal foraging strategy related to the distribution of the resources expected on the rocky shore. For example, the movements of *B. melanostomum*, a macroalgae grazer, were particularly tortuous and limited to localised areas of the tank, as if individuals were located on a macroalgal blade. In addition, displacements were highly variable between individuals. If individual animals display different patterns of movement, the species might be able to respond to a range of environmental changes and so may be able to survive climate disruptions. Finally, the variability and intermittency of movement of individuals may be considered an adaptation to the usual short-term fluctuations in environmental conditions experienced by organisms living on a rocky shore.

To summarize, this work has emphasized the complexity and variability of snail displacements, which happens even in the absence of external cues. It is likely that this variability of behaviour contributes to the adaptation of individuals to various environments and therefore should be more integrated into ecological climate impact models.

OTHER *JMBA* PUBLICATIONS:
Chapperon, C. & Seuront, L., 2010. Variability in the motion behaviour of intertidal gastropods: ecological and evolutionary perspectives. *JMBA*, Published online by CUP, doi:10.1017/S002531541000007X.