

## **Opposite shell-coiling morphs of the tropical land snail *Amphidromus martensi* show no spatial-scale effects**

### **Abstract**

Much can be learned about evolution from the identification of those factors maintaining polymorphisms in natural populations. One polymorphism that is only partially understood occurs in land snail species where individuals may coil clockwise or anti-clockwise. Theory shows that polymorphism in coiling direction should not persist yet species in several unrelated groups of land snails occur in stably polymorphic populations. A solution to this paradox may advance our understanding of evolution in general. Here, we examine two possible explanations: firstly, negative frequency-dependent selection due to predation; secondly, random fixation of alternative coiling morphs in tree-sized demes, giving the impression of wider polymorphism. We test these hypotheses by investigating morph-clustering of empty shells at two spatial scales in *Amphidromus martensi* populations in northern Borneo: the spatial structure of snail populations is relatively easy to estimate and this information may support one or other of the hypotheses under test. For the smaller scale we make novel use of a statistic previously used in botanical studies (the K-function statistic), which allows clustering of more than one morph to be simultaneously investigated at a range of scales and which we have corrected for anisotropy. We believe this method could be of more general use to ecologists. The results show that consistent clustering or separation of morphs cannot be clearly detected at any spatial scale and that predation is not frequency-dependent. Alternative explanations that do not require strong spatial structuring of the Population may be needed, for instance ones involving a mechanism of selection actively maintaining the polymorphism.