
Gene mobility and the concept of relatedness

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Abstract

Session: Social microbes (Mitri, Dupre, Clarke, Birch) ‘Genetic relatedness’ is often understood as an intuitive measure of genealogical kinship. In formal work on social evolution, however, relatedness is more commonly conceptualized as a generalized statistical measure of genetic similarity. These ‘intuitive’ and ‘generalized’ measures come apart when genetic similarity is caused by a mechanism that does not rely on shared ancestry. In microbial populations, we know of at least one such mechanism: horizontal gene transfer (HGT). We might conclude from this that the ‘generalized’ measure of relatedness triumphs over the ‘intuitive’ measure in microbial contexts, but I argue that there is a further twist in the tale. For I contend that HGT demands a yet more radical revision of our intuitive concept of relatedness, because it implies that we cannot even talk of an organism’s genotype simpliciter-only of its genotype at a particular time. This introduces a temporal aspect to relatedness, and leads us to ask: at which stage in the life-cycle should relatedness be evaluated? In particular, is it genetic similarity at the time of action that matters to the evolution of cooperation, or genetic similarity at the time of reproduction? I argue that, when HGT is at work, neither of these suggestions is correct: the sort of genetic similarity that really matters to the evolution of cooperation is diachronic similarity between actors at the time of action and recipients at the time of reproduction.

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