# Lack of ecological and life-history context can create the illusion of microbial social interactions.

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Research on social microbes often focuses on one fitness component (reproductive success within the social complex) undermining the effect of other stages of the life cycle and the role of the ecological context. This can lead to paradoxical results. The life cycle of the social amoeba Dictyostelium discoideum includes a multicellular stage in which not necessarily clonal amoebae aggregate upon starvation to form a possibly chimeric (genetically heterogeneous) fruiting body made of dead stalk cells and spores. Lab-measured spore contributions in these chimeras indicate a strong skew in the fraction of spores that belong to each genotype. This skew suggests a strong social antagonism that should result in low genotypic diversity, which is inconsistent with observations from nature.

Two studies have suggested that this inconsistency stems from the one-dimensional assessment of fitness (spore production) and that the solution lies in tradeoffs between multiple life-history traits [1], e.g.: number of spores versus viability; and spore-formation versus staying vegetative [2]. I will present an ecologically-grounded, socially-neutral model (i.e. no social interactions between genotypes) for the life cycle of social amoebae to theoretically explore multiple non-social life-history traits and tradeoffs [3]. Experimental results regarding apparent social interactions within chimeric mixes can be qualitatively recapitulated under this neutral hypothesis, without needing to invoke social interactions. This allows for simple potential resolutions to the previously paradoxical results, but life-history tradeoffs alone do not resolve strain coexistence. Finally, two ecological processes: spore dispersal [2] among different patches and seasonality [4] within a single patch are proposed as driving forces of diversity in *D. discoideum*

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[3] R. Martinez-Garcia, C.E. Tarnita, ”Lack of ecological and life-history context can create the illusion of social interactions in *D. discoideum*”, *PLOS Comp. Biol.*, **12**(12), e1005246, 2016.

[4] R. Martinez-Garcia, C.E. Tarnita, ”Seasonality can induce coexistence of multiple bet-hedging strategies via storage effect in *D. discoideum*”, *arXiv.*, 2016.