Emergent cooperative behavior in transient compartments

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We introduce a minimal model of multilevel selection on structured populations, considering the interplay between game theory and population dynamics.

Through a bottleneck process, finite groups are formed with cooperators and defectors sampled from an infinite pool. After the fragmentation, these transient compartments grow until the maximal number of individuals per compartment is attained. Eventually, all compartments are merged, well mixed and the whole process is repeated. We show that cooperators, even if interacting only through mean-field intra-group interactions that favor defectors, may perform well because of the inter-group competition and the size diversity among the compartments.

These cycles of isolation and coalescence may therefore be important in maintaining diversity among different species or strategies and may he

lp to understand the underlying mechanisms of the scaffolding processes in the transition to multicellularity.