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Sympatric speciation and its dependence on competition and strength of reinforcement

Sympatric speciation is the evolutionary split of one species into two or more species in the same environment. We consider a mathematical model for this phenomenon, in which reinforcement plays an important role. By reinforcement we mean a phenotypic trait that influences the choice of mating partner, but has no impact on the adaptation to the environment. The model is individual based, implemented as a discrete time Markov process in a space $\mathcal{Z}^N$, where $\mathcal{Z}$ is the phenotype space of an individual and N is the number of individuals. Reproduction is modelled as the result of the interaction of pairs of individuals, but does not involve different genders, and the size of the offspring depends on the parents's adaptation to the environment. The basic model is presented in [1], where simulations simulation results are presented that show that reinforcement is essential for speciation to take place. In this paper the model is further developed, and in particular we investigate the impact of specialization to the environment on the rate of speciation events, and on the long term survival of the decendants of a species.

References

[1] J. Henriksson, T. Lundh and B. Wennberg, *A model of sympatric speciation through reinforcement*, Kinetic and related models **3** no 1, 143–163.