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SÉMINAIRE

Fidelity of parent-offspring transmission and the evolution of social behaviour in structured populations

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The theoretical investigation of how spatial structure affects the evolution of social behavior has mostly been done under the assumption that parent-offspring strategy transmission is perfect, i.e., for genetically transmitted traits, that mutation is very weak or absent. In this talk, we investigate the evolution of social behavior in structured populations under arbitrary mutation probabilities. We consider spatially structured populations of fixed size N , in which two types of individuals, A and B , corresponding to two types of social behavior, are competing. Under the assumption of small phenotypic differences (weak selection), we provide a formula for the expected frequency of type A individuals in the population, and deduce conditions for the long-term success of one strategy against another. We then illustrate this result with three common life-cycles (Wright-Fisher, Moran Birth-Death and Moran Death-Birth), and specific population structures. Qualitatively, we find that some life-cycles (Moran Birth-Death, Wright-Fisher, when social interactions affect fecundities) prevent the evolution of altruistic behavior, confirming previous results obtained with perfect strategy transmission. Imperfect strategy transmission also alters the balance between the benefits and costs of staying next to one's kin, leading to surprising results in subdivided populations, in that higher emigration probabilities can be favourable to the evolution of altruistic strategies.