

From kinetic interaction models to reaction-diffusion systems

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Reaction-diffusion systems provide a suitable mathematical framework to describe the evolution and spatial organization of interacting populations. But how can diffusion and reaction mechanisms be derived from a kinetic description of the interactions? We address this question starting from kinetic equations for cell populations and considering a suitable diffusive scaling. The resulting macroscopic equations show how reaction and diffusion emerge from the kinetic description, including nonlinear and cross-diffusion effects. As an application, we consider interacting bacterial populations on a leaf surface and discuss the formation of spatial patterns.

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