Asymptotic behaviour in a competition-diffusion model with mutation

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Abstract. This talk is concerned with the asymptotic behaviour of a system of two coupled nonlinear parabolic PDE modelling competition, diffusion and mutation of two phenotypes of a species. Due to the presence of both competition and mutation terms, the reaction-diffusion system is of neither competitive nor co-operative type, which presents challenges for its analysis. The model was originally proposed by Elliott and Cornell (2012), who presented evidence that for a class of diffusion and growth coefficients and a small mutation rate, the two phenotypes spread into the unstable extinction state at a single speed that is faster than either phenotype would spread in the absence of mutation. After first showing that, under reasonable conditions on the mutation and competition parameters, the spreading speed of the two phenotypes is indeed determined by the linearisation about the extinction state, we prove that the spreading speed is a non-increasing function of the mutation rate (implying that greater mixing between phenotypes leads to slower propagation), determine the ratio at which the phenotypes occur in the leading edge in the limit of vanishing mutation, and discuss the effect of trade-offs between dispersal and growth on the spreading speed of the phenotypes. This is joint work with Luca Börger and Aled Morris (Swansea).