Evolutionary branching of a magic trait

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Magic traits are under disruptive ecological selection and simultaneously serve as cues for assortative mating. When a magic trait diverges, reproductive isolation automatically comes along with ecological differentiation, and therefore magic traits are thought to be the most likely route to sympatric speciation. In this talk, we study the adaptive dynamics of magic traits. First, we derive general results on the monomorphic evolutionary singularities and show how stabilizing sexual selection interferes with disruptive natural selection. Assortative mating makes evolutionary branching harder compared to random mating, and also leads to multiple stability in the population genetics of the system. Next, we study the long-term evolution of single-locus genetic polymorphisms under various strengths of assortativity in Levene’s soft-selection model. If adaptive dynamics leads to a polymorphism with sufficiently different alleles under sufficiently strong assortativity, then the corresponding homozygotes cease to interbreed so that sympatric speciation occurs. Speciation can however be prevented by multiple stability in the adaptive dynamics of the evolving population.