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Sexually differentiated death rates in the presence of an efficient mating strategy

Darwin noted that some sexually differentiated genetic traits, such as the bright plumage of male birds that seems to make them more visible to predators, appear to contradict the main assumption of natural selection. Darwin proposed the notion of sexual selection to explain this phenomenon, and other explanations have been offered. In this study, we use a system of four nonlinear ordinary differential equations to model male and female populations of two species that have identical, efficient mating strategies but do not interbreed. One species has a higher death rate for males than for females. These otherwise identical species are placed in competition, resulting in a system with multiple fixed points and strong dependence on initial conditions. We show that, with some choices of parameters, increasing the death rate of the male in one of the two species enlarges the basin of attraction in which that species survives and the competitor is driven to extinction, and thus is an adaptive response. We also offer a heuristic argument as to why this should be so.