

Plenary

Post-copulatory sexual selection – male and female effects

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The recognition in the past twenty years that the females of most animal species are promiscuous has changed the way we think about reproduction. The two most fundamental questions about female promiscuity are these: (i) What is its functional significance? In other words, what evolutionary benefits do females obtain from copulating with more than one male? And (ii) What are the underlying mechanisms that dictate which of a female's several partners will fertilise her eggs? In other words, are there any rules that dictate the outcome of sperm competition? These two questions require different types of thinking; the first focuses on the evolution of traits, the second is concerned with mechanisms. The two approaches are complimentary and together provide greater insight into reproductive processes. There is no consensus about the benefits females obtain from copulating with more than one male. We used a quantitative genetics approach to address this question in order to establish the heritability of sexually selected traits, but more revealingly, the genetic correlations between different traits in the zebra finch (*Taeniopygia guttata*). This showed unexpected associations between a sexually selected trait and immune function, and this result provides a basis for why females prefer particular males. We also compared the genetic basis for different personality traits in the zebra finch, again with some unexpected results. In terms of mechanisms, I will focus on female processes. It is well established that a variety of male attributes, including sperm numbers and sperm quality, influence the outcome of sperm competition. The influence that females have over the fertilisation of their ova is much less clear. The notion of cryptic female choice - defined as any female-mediated process that influences the outcome of sperm competition - is controversial, partly because cryptic female choice is difficult to demonstrate unequivocally. I present two examples, using the feral fowl as a model study species; one in which females base their choice of sperm on the male's phenotype. In the second, male phenotype was excluded as a cue (by using artificial insemination), yet we still obtained evidence that females can discriminate between the sperm of different males. Finally, I will consider some of the evolutionary adaptations to sperm competition. Reproductive traits are among the most rapidly evolving traits, especially when females are promiscuous. We used our quantitative genetics study of the zebra finch to examine the evolution of reproductive traits associated with sperm competition and female promiscuity. We show that genetic correlations can act as constraints on the evolution of optimal traits.