

Contribution ID: 64

Type: **Oral Presentation**

Modelling the evolution of sex-specific dominance in response to sexually antagonistic selection

Wednesday, 11 July 2018 11:00 (30 minutes)

Arguments about the evolutionary modification of genetic dominance have a long history in genetics, dating back over 100 years. Mathematical investigations have shown that modifiers of the level of dominance at the locus of interest can only spread at a reasonable rate if heterozygotes at that locus are common. One hitherto neglected scenario is that of sexually antagonistic selection, which is ubiquitous in sexual species and can also generate the stable high frequencies of heterozygotes that would be expected to facilitate the spread of such modifiers.

I will present a recursion-equation model that shows that sexually specific dominance modification is a potential outcome of sexually antagonistic selection. The model predicts that loci with higher levels of sexual conflict should exhibit greater differentiation between males and females in levels of dominance and that the strength of antagonistic selection experienced by one sex should be proportional to the level of dominance modification. These predictions match the recent discovery of a gene in Atlantic salmon, in which sex-dependent dominance leads to earlier maturation of males than females, a difference that is strongly favoured by selection. Finally, I suggest that empiricists should be alert to the possibility of there being numerous cases of sex-specific dominance.

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Session Classification: Pleiotropy, adaptation and the evolution of sex differences

Track Classification: Minisymposium: Pleiotropy, adaptation and the evolution of sex differences