Conflicts and the evolution of the difference between the sexes

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Sexes differ in morphology, physiology and behaviour, but nevertheless they share almost all of their genome. As both sexes have some different roles and strategies related to reproduction and investment in offspring, the shared genetic material thus can be sub-optimal for achieving higher fitness. For example, selection of female beneficial traits can lead to decreased fitness in males, because the genes coding for these traits have a negative fitness effects, when they are passed on to sons, thus creating a genomic conflict. Other conflicts can happen during interaction of both sexes. When, for example, males increase mating frequency, it can be hurtful to females, because for females one insemination at the same time is enough.

These kind of conflicts are not only happening between the sexes, but also between hermaphroditic organisms, which can reproduce in both sex roles. For hermaphrodites, for example, it can be better to reproduce in the male role, as they can inseminate more individuals, thus increasing their number of offspring. But it can be problematic, if everybody starts to reproduce as males, because it will lead to reduced fitness for the population, so there is a place for different strategies and conflicts. When conflicts between the sexes occur, they have to be resolved. Thus many mechanisms can evolve to escape these sexual conflicts. Escape of these sexual conflicts can lead to fast and unpredictable evolution of traits involved in reproduction as well as even to speciation, if this co-evolution creates sexual isolation from other populations.

To answer some of these problems that arise, when both sexes have different interests, and to understand how the evolution of sexes is driven, I studied hermaphroditic fungus *Neurospora crassa*, where it was forced to reproduce only in one or the other sex role for 21 sexual generations. I analysed if and how these fungi adapted to the limited sex role by counting spores produced after mating in the assigned sex role. I discovered that one line (out of six) has adapted to the assigned sex roles and that some sexual conflicts present in this line may explain the observed adaptation. In this line fitness reproducing in the female role was higher in the knock-out strain that could only reproduce as female, while it was lower in the partner that adapted to reproduce as male. Further, in general increased mycelium growth rate was associated with high male fitness and lower female fitness. Later it is possible to study exact genomic mechanisms underlying this evolutionary process.

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