Flies with brothers make gentler lovers

January 22 2014

This is a head-on view of a *Drosophila* fly used in Oxford University experiments. Credit: Amy Xinyang Hong & Cedric Tan

Flies living with their brothers cause less harm to females during courting than those living with unrelated flies, say Oxford University scientists.

The study, published this week in *Nature*, found that unrelated male flies compete more fiercely for females' attention than related flies, resulting in shorter lifespans for males and reduced fecundity for females.

'In large populations brothers don't need to compete so much with each other for female attention since their genes will get passed on if their sibling mates successfully anyway,' said Dr Tommaso Pizzari of Oxford University's Department of Zoology, who led the study. 'Their more relaxed attitude to mating results in fewer fights and they also harm the females less as their courting is not so aggressive. When unrelated flies are together, the females are constantly being pestered for sex, which may leave them little time to eat or rest.'

The researchers placed trios of virgin male flies with single virgin females and allowed them to feed and mate freely. They compared the behaviour and lifespans of the flies in different groups depending on their relatedness: AAA, AAB and ABC. AAA groups contained three full brothers, AAB groups had two brothers and one unrelated male and ABC groups contained three unrelated males.

'Flies in AAA groups were typically more relaxed in their attitude to mating and spent less time harassing the females than males in other groups,' said Dr Pizzari. 'Interestingly, this approach worked against them in the AAB groups, where the unrelated B flies typically had as many offspring with the females as both A flies put together. This is a classic example of sexual conflict where the selfish interests of individual males can work against the wider interests of the group. In this case, the female flies had shorter reproductive lifetimes and produced fewer offspring overall when unrelated males were constantly harassing them.'

The reduced lifespan and reproductive abilities of flies was most pronounced in the ABC groups, where all three males competed fiercely for female attention. In these cases, the selfish incentive for to each male to father as many offspring as possible damaged the overall health of the group, reducing the lifespan of all flies, possibly through increased fighting and aggressive courtship.

These are mating *Drosophila* flies. The Oxford University study found that flies living with their brothers cause less harm to females during courting and mating than those living with unrelated flies. Credit: Amy Xinyang Hong & Cedric Tan

The study highlights the important role of kin selection in evolution, where organisms are more inclined to favour others to the extent to which they are genetically related. It is difficult to know exactly how many flies are related in natural groups but as they only live for a few days flies cannot travel too far from their birthplace. It is therefore likely that many flies living together will be related, but unrelated flies that turn up are likely to father a disproportionate number of offspring.

'As the AAB studies showed, a renegade fly that gets blown into a group of related flies will probably be more sexually active,' said Dr Pizzari. 'The related flies in the group will be more complacent about sex since they can be fairly confident that their brothers will be passing along

genetic information anyway, meaning less competition for the renegade. The aggressive sexual behaviour of this outsider will result in more fights and lower lifespans for the group as a whole, but will benefit the individual as he will father more offspring.'

Exactly why females in groups of unrelated flies have fewer viable offspring is unclear. Chemicals in male flies' ejaculate are known to inhibit the propensity of females to mate with other flies. However, this study found no evidence that female harm is caused by physiological effects associated with mating and suggests instead that the cost is behavioural. Fly courtship is complex and involves singing and genital licking. Repeated harassment of this sort may physically damage females as well as leaving them less time to get the food and rest they require for a healthy life.

More information: Paper: dx.doi.org/10.1038/nature12949

Provided by Oxford University