

'Paranoia' about rivals alters insect mating behavior

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Scientists at the University of Liverpool have found that male fruitflies experience a type of 'paranoia' in the presence of another male, which doubles the length of time they mate with a female, despite the female of the species only ever mating with one male.

Females in many species of animal have multiple mates and males have evolved particular reproductive characteristics to ensure their sperm are successful when in competition with the sperm of other males. [Adaptations](#) include [physical traits](#) that result in increased sperm count, as well as behavioural alterations such as mating with females for up to 21% longer than they normally would.

In types of fruitfly where the female only mates once, however, there is little need for competitive behaviour. The male is not expected to increase its reproductive efforts in response to competition, because it 'knows' that the female will be fertilised with its sperm only. Scientists at Liverpool, however, have found that once a male had been in contact with another male, it subsequently increased the length of time it mates with a female by 93%, even though the risk of the female being fertilised by another male was remote.

The study suggests a number of reasons for this apparent 'paranoid' behaviour. One possible explanation is that females do occasionally mate with more than one male, and the male responds to the possibility of this rare event by changing its [reproductive behaviour](#). Another reason could be that the presence of a competitor prompts the 'fear' that a male is unlikely to obtain another mate and it therefore increases its reproductive efforts in order to keep the one female fertile with its sperm for the female's entire [lifespan](#).

Dr Anne Lize, from the University's Institute of [Integrative Biology](#), explains: "We already knew, from previous studies, that male insects evolve

physical and behavioural characteristics to make them a stronger reproductive competitor for females that mate with many males. Some [butterflies](#), for example, have evolved disproportionately large testes so that males can deliver increased sperm numbers. Fruitflies have behavioural reactions to the presence of rival males that result in prolonged reproduction with females to ensure fertilisation before the female mates with other males.

"We wanted to understand how this compared to fruitfly species where females only mated once, to see whether drivers of evolutionary change are different in species where sperm competition is low. What we observed might be considered the evolutionary equivalent of male 'paranoia'. Males more than doubled the length of time they mated with a female after they had been in the presence of other males.

"There doesn't appear to be an immediate biological reason as to why they would do this, but it is perhaps to ensure that the female remains fertile with one male's [sperm](#) for her lifespan, even though the chance of reproducing with another is remote.

"Our findings are significant because they demonstrate that particular behaviours, such as the response to [competitor](#) males, can have diverse evolutionary drivers. This takes us a step closer to understanding the differences between males that have evolved within species where individual females mate with many males and those have just one partner."

The research is published in *Biology Letters*.

Provided by University of Liverpool

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