

# Sex is thirst-quenching for female beetles

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Female beetles mate to quench their thirst according to new research by a University of Exeter biologist. The males of some insect species, including certain types of beetles, moths and crickets, produce unusually large ejaculates, which in some cases can account for around 10% of their body weight. The study shows that dehydrated females can accept sexual invitations simply to get hold of the water in the seminal fluid.

Dr Martin Edvardsson, whose research is published in the journal *Animal Behaviour* (August 2007), studied the bruchid beetle *Callosobruchus maculatus*, a serious pest in warmer parts of the world. Some females were given unlimited access to water while others were not. All females were free to mate with males and the study found that thirsty females mated 40% more frequently than those with free access to water.

Female bruchid beetles can absorb the water in the seminal fluid through their reproductive tracts and need to mate less frequently the more water they take from each mating. This is to a male's advantage because the longer the female goes without mating with another male, the greater his chance of successful fertilization. By transferring a large amount of water with the sperm, a male can help ensure his sperm has more time to fertilize the eggs without having to compete with the sperm from future matings. Dr Martin Edvardsson of the University of Exeter says: 'The large ejaculates may have evolved because males can make it less beneficial for females to remate by providing them with a large amount of water.'

From morsels of food to less useful offerings like dried leaves or balls of silk, insects' nuptial gifts are thought to perform the role of enticing a female to mate or investing in the resulting offspring. However, this study shows that males can also prevent females from mating with other males by giving them a valuable nuptial gift. Dr Edvardsson says: 'This research offers an alternative theory on the function of 'nuptial gifts', which are an important part of insect courtship and mating.'

Dr Edvardsson argues that the trade-off between the costs and benefits of mating is essential to the mating behaviour of female bruchid beetles. The males have spines on their genitalia that puncture the females' reproductive tract as they mate. Because of the damage this causes, females must carefully trade off the costs and benefits of mating, and limit the number of times they mate depending on their need for water and sperm.

Because there are always costs as well as benefits associated with mating, similar trade-offs are likely to be important in many species where males provide their mates with material resources. 'The key thing' says Dr Edvardsson 'is that the resource provided by males is less beneficial to females the more of it they already have, like water or food for example.'

Though Dr Edvardsson believes these findings may be relevant to many other animal species, he does not think the study has any implications for our understanding of sexual behaviour in all other animals. He concludes: 'This is unlikely to occur in say, mammals and birds, because it is impossible for a male to give a female a gift that would fulfill her needs for food or water for such a long period of time. Also, while many female insects can store live sperm inside for long periods of time, females of these species need relatively fresh sperm to fertilize their eggs.'

Source: University of Exeter

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