

Battle of the insect sexes

Insects and arachnids have the most complicated sex lives in the whole of the animal kingdom. Both males and females have evolved extraordinary tactics that enable them to gain the sexual upper hand. There are males who use guerrilla warfare to ensure they capture a mate and that no rival can compete. There are females who choose only the fittest and strongest suitor, even offering gifts to tempt them to mate. There are males that sacrifice their lives to ensure their line continues. This is the battle of the insect sexes and in evolutionary terms, it is a never-ending one.





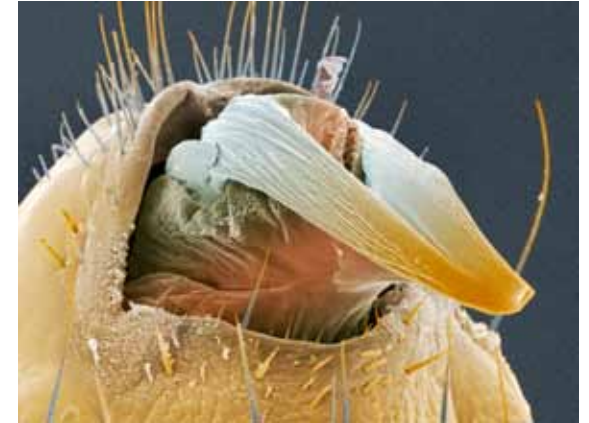
Honeybee drone penis



Bedbug penis



Damselfly penis



Headlouse penis

In the words of Cole Porter, “Birds do it, bees do it, even educated fleas do it.” Sex is everywhere. But, in the whole of the animal kingdom, insects and arachnids have the most complicated sex lives. Both males and females have evolved extraordinary tactics that enable them to gain the sexual upper hand. There are males who use guerrilla warfare to ensure they capture a mate and that no rival can compete. There are females who choose only the fittest and strongest suitor, even offering gifts to tempt them to mate. This is the battle of the insect sexes and in evolutionary terms, it never ends.

Tough love

Sex for some species is a brutal affair. For example, the male dust mite (*Dermatophagoides* sp.) forcibly kidnaps a female and then drugs her. Specially adapted ‘suckers’ on the underside of his abdomen grip strongly to the back of his mate. She is rendered helpless by the male’s sex pheromones, allowing him to mate with her uninterrupted. Once

insemination is complete, the male dust mite abandons the female. It takes up to half an hour for her to recover full mobility.

The female dust mite might consider herself fortunate. In the case of the bed bug (*Cimex lectularius*), the male not only has it all his own way, but nearly kills the female in the process. With no obvious genital opening on the female’s body, the male uses his sabre-like penis to pierce the body cavity of the female – in effect stabbing her with a knife. If the female mates several times, the repeated woundings will shorten her lifespan dramatically.

Flea tactics

The male flea (*Ceratophyllus farrieni*) uses cunning and stealth to get his mate into position. During mating, he will approach a female and nudge her head. She responds by turning away and attempting to escape. But turning her back on him is what the male flea wants. He quickly sneaks beneath the female and

forcefully clamps onto her using special suckers on his antennae and claspers on his abdomen. Once attached, he is able to raise his abdomen to achieve genital linkage. It is an elaborate procedure, but it needs to be, because the male flea has probably the most complex penis in the whole of the animal kingdom.

Curled inside the male flea is a very long but, at only one hundredth of a millimetre wide, incredibly thin penis. This complicated structure has to transfer the sperm into the female. So it’s no wonder mating can take up to several hours. All the while, the female will try her best to escape. This is where special bristles on the male genitals, known as ‘feathers’, come into action. These bristles gently stroke the female’s sensillum, a sensitive organ located on the abdomen, and subdues her. It doesn’t always work, and whenever a female tries to run away, the male will suffer the indignity of being pulled backwards by the penis until he can eventually extract it.

Male fleas, bed bugs and dust mites use

force and coercion to ensure a successful mating. The female does not appear to have much control or choice in the matter. This is not always the case with other insects and spiders.

Female power

The male honeybee (*Apis mellifera*) is condemned to a brief life of hanging around while he waits to mate with a virgin female. Without the appropriate organs to collect nectar or pollen, male honeybees, known as drones, are unable to feed themselves and are also stingless. Mating, when the opportunity does arrive, is a chaotic affair where hundreds, even thousands of individuals, will compete to mate with one virgin queen. The prize of a successful sexual conquest is certain death as the drone’s penis is ripped apart from his abdomen and left behind still attached to the female. The sacrifice may even have been in vain, as she will often mate with other males, who remove the previous male’s penis, or ‘endophallus’. The new queen stores all



the sperm in special organs that will last her entire egg-laying lifetime.

Male rivalry

Dying in vain is not the strategy employed by male fruit flies (*Drosophila* sp.). Instead they compete for the female by mating with her in the knowledge that their sperm will flush out the sperm from a previous mate. In addition, the ejaculates contain potent chemicals that act as an 'antiaphrodisiac', reducing the chances of the female mating again with a rival. This strategy is known as sperm displacement and is common in a large number of insect species. It usually means that the last one in will be the one to father their offspring.

Damsel flies (*Ischnura elegans*) use a set of horns attached to their penis that literally scoop out the ejaculate from a previous male. To ensure that his own precious cargo will remain inside the female and not be removed by another male, he will continue to hold on to her throughout the process of egg laying.

The male bean weevil (*Callosobruchus maculatus*) has developed structures to ensure that sperm displacement is less successful than those who are 'first past the post'. His penis is tipped with sharp spines that puncture the lining of the female genital tract during mating. The damage is so bad that if she mates again, she can expect to die much earlier.

In the evolutionary battle of the sexes, female fruit flies and honeybees seem to have the upper hand. By being able to mate several times, the female is able to select males who are stronger and fitter, ensuring that her offspring will contain good genetic stock. This process is known as sexual selection and species such as damselflies and bean weevils have clearly evolved tactics to counter these selection pressures.

Size matters

But not all males are stronger and fitter. In fact, in many species of insects and spiders, the male is very much smaller than the female. This difference in size is known as sexual dimorphism. It means that males must use a different set of tactics to win over a female if he is not to be ignored, or even eaten alive.

Male spiders play a game of death when trying to find a mate. For a start, the solitary nature of spiders means it is not always easy to find a female. But following the scent trails of female pheromones usually leads the way. Unfortunately, the presence of other males will usually mean a fight for access. If he succeeds, the hard work has only just begun. He must spend a great deal of care and attention during courtship in sending the right signals. If she shows signs of acceptance, he is free to mate with her. Get one thing wrong and he is dinner. For a few species of spiders, the male sacrifices himself to the female after he mates with her. Although it seems like suicide, in evolutionary terms it means that by providing both sperm and nutrition for the female, he ensures the successful continuation of his line.

The male Zeus bug (*Phoreticovelia dispar-*

ata) is very much smaller than the female. But rather than having to woo his mate with an elaborate courtship, it seems the opposite is true. Female Zeus bugs secrete a tasty fluid from glands on their backs to tempt the male to mount her. This form of nuptial feeding seems to be unique to Zeus bugs. The male gets free food, unlimited sex and free transportation. Biologists believe that this twist in the evolutionary battle between the sexes could be a tactic that saves the female from wasting energy fending off hoards of suitors.

Biologists are only beginning to understand the diverse and complex sex lives of insects, spiders and other bugs. With an estimated 800,000 species of insects on the planet, many still unidentified, there will be many more surprising discoveries in the battle of the insect sexes.

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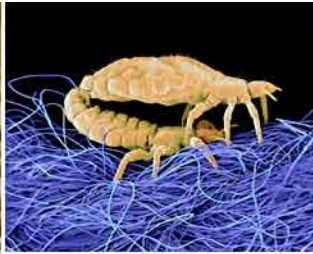


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