

Species of giant cockroaches employ different strategies in the mating game

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Juvenile, Madagascar hissing cockroach at the Atlanta Botanical Garden. Credit: Public Domain

New research suggests that even in the insect world, males must adopt different strategies to win females, depending on their particular physical prowess.

It has been discovered that [giant cockroaches](#) can either be lovers or fighters depending on their species – and have adapted their bodies accordingly to allow them to be as successful as possible in the mating game.

A study by academics at The University of Nottingham, published in the journal *Scientific Reports*, has shown that males from two species of giant hissing cockroaches from Madagascar may have evolved different physical characteristics based on their strategies for winning a female.

Lead author, Dr Kate Durrant in the University's School of Life Sciences, said: "These cockroaches are acting like red deer in the rut, competing for females by combat, but if they don't have the size and strength to win fights outright, they can try and sneak mates. A male cockroach seems to be adapted to be either a lover or a fighter, and what's interesting is that they do this before they become fully adult, at the final moult."

Animals that must compete for a mate can do so in various ways: some males will defend a female from rival males by force, while others will sneak past larger males and mate with females behind their backs. These two strategies, 'fighters' and 'lovers', are associated with different behaviours and characteristics. In theory, males face a trade-off in investment in weapons for fighting and investment in sperm-producing testes for mating, as there is not enough energy available to invest to be competitive in both strategies.

The Nottingham study used the latest in 3-D scanning technology based at the University's Hounsfield Facility – high-resolution X-ray CT scans

- to take precise measurements of body length, body volume and of the 'horns' carried on shields over their heads; from two different types of giant hissing cockroach: the Flat-horned cockroach, *Aeluropoda insignis* and the Wide-horned cockroach, *Gromphadorhina oblongonota*.

This was compared with the cockroaches' level of aggression when fighting rival males and the size of their testes. Larger testes mean more of an investment in mating.

They found that the Flat-horned cockroach, which is small with short horns (as its name suggests), was non-aggressive and had large testes, which indicates that it is more likely to avoid fighting by mating with females behind the backs of larger males, while the Wide-horned cockroach, which is large and heavily armoured with large horns, was highly aggressive in combat between males and was not well-endowed in terms of testes size. This indicates that the Flat-horned cockroaches were following a 'lover' strategy as a species, while Wide-horned cockroaches were following a 'fighter' strategy, and this is reflected in their anatomy and behaviour.

Patterns indicating a trade-off between lover and fighter strategies were also seen within each species - individual [males](#) that had smaller horns had comparatively larger testes to compensate, and this trade-off was stronger for the Flat-horned cockroaches.

More information: Kate L. Durrant et al. Comparative morphological trade-offs between pre- and post-copulatory sexual selection in Giant hissing cockroaches (Tribe: Gromphadorhini), *Scientific Reports* (2016). [DOI: 10.1038/srep36755](https://doi.org/10.1038/srep36755)

Provided by University of Nottingham

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