Tahitian gender-bending bug avoids stabbing sex

Adaptations keep closely related species from traumatic interbreeding.

Karen Ravn

19 August 2013

If you lived on an exotic island where unsafe sex was all too common, you'd find ways to ward off unwanted attention. On Tahiti, the females of two related insect species have had to move their genitals to different sides of their bodies and even impersonate the opposite sex — all to avoid getting pierced in the abdomen by the sexual organs of the wrong males, biologists report.

The two insects, which live side by side on the Pacific island of Tahiti and feed on the same plants, are known as *Coridromius tahitiensis* and *Coridromius taravao*. Both species follow the aptly named practice of traumatic insemination. With his genital organ reminiscent of a hypodermic needle, the male stabs a female in the side and shoots sperm into her abdomen.

The ritual — shared by a number of other invertebrates, including bedbugs (*Cimex lectularius*) — can cause injury or infection for the female. Not only that, but insects that use this type of reproductive method are not particularly persnickety about partners, so a male of one species may try to mate with another male — or even with a member of another species.

Such interspecies mating can be costly to both species in terms of wasted time, energy and sperm, says Nikolai Tatarnic, a biologist who is now curator of insects at the Western Australian Museum in Welshpool.

With his colleague Gerasimos Cassis, a behavioural ecologist at the University of New South Wales, Tatarnic examined 152 *C. tahitiensis* individuals (66 males, 86 females) and 39 *C. taravao* (6 males, 33 females). Writing in *The American Naturalist*[1], the authors describe how mating in *C. tahitiensis* is generally instigated by males and does not involve anything close to mutual consent.

The birds and the bees of bugs

During mating, *C. tahitiensis* females are inseminated on the right side of the abdomen through genitalia that seem to have evolved to

facilitate the process — even though the males stab them in the abdomen anyway. The researchers did not observe any mating attempts by the *C. taravao*, but they did discover that females of that species have anatomical structures — which may or may not be genitalia — that can facilitate insemination on the left side, as well as structural reinforcements that may discourage insemination attempts on the right (where a *C. tahitiensis* male might come poking).

The researchers inferred that the two species may have evolved at least two ways of avoiding undesirable, even dangerous, interspecies mating. The genital organs of females of both species have literally moved to opposite sides of their bodies.

In addition, both males and females of *C. taravao* have developed a way to masquerade as *C. tahitiensis* males, displaying the distinctive colouring and hairy patches on the right side of the abdomen that *C. tahitiensis* males have. This 'disguise' is thought to lessen the chances that *C. tahitiensis* males will come courting.

C. taravao's mimicry of *C. tahitiensis* males "is the first documented case of such an extraordinary interaction", says Gregory Holwell, a biologist at the University of Auckland in New Zealand. And Luke Holman, an evolutionary biologist at the Australian National University in Canberra, calls it an interesting twist on the well-known approach in which two closely related species avoid interbreeding by making their sexual signals more distinct.

But the study is not conclusive. "It's not a story that's been all worked out, but it's suggestively compelling," says Locke Rowe, an evolutionary biologist at the University of Toronto in Canada.

Ann Hedrick, a behavioural biologist at the University of California, Davis, would like to see evidence that mating between the two species does not produce viable offspring and that interspecies mimicry and different placement of genitalia do not occur if the two species do not live in close proximity.

Tatarnic agrees. "What we really need to do now is go back to Tahiti to test our hypotheses," he says.

Nature | doi:10.1038/nature.2013.13571

References

1. Tatarnic, N. J. & Cassis, G. *Am. Nat.* http://dx.doi.org/10.1086/671931 (2013).