Sexual Cannibal Spiders May Have Poor Impulse Control

Spider courtship is a risky business. In some species females routinely decide that they would rather eat a courting male than mate with him, and researchers have struggled for decades to understand why. A recent experiment with Iberian tarantulas suggests that the reason may depend on an individual spider's personality.

"When females are attacking and killing and eating males instead of mating with them, we ask the question[s], 'Well isn't this costly behavior? Wouldn't the female be better off mating with a male?'" says Chad Johnson, associate professor of mathematical and natural sciences at Arizona State University and one of the researchers who has examined this behavior.

A virgin spider can't be sure how many chances she will have to mate. Every male could be her last, and if she eats all of them, she will never reproduce. There are three main possibilities that explain why she might take the risk:

- She's choosy. She wants to mate, but not with the male in front of her, so she holds out for someone better. In the meantime, hey, free meal.
- She's just hungry. "It doesn't matter if you have a great father for your offspring if you're going to die tomorrow. If you're starving, eat him," says Jonathan Pruitt, assistant professor of behavioral ecology at the University of Pittsburgh, who has studied cannibalism in funnel-web spiders.
- She has terrible impulse control. A successful spider is a voracious predator. The more she eats, the more resources she can devote to making big, healthy egg sacs. But aggressive tendencies that help with hunting might not be so helpful in other contexts. If a spider is just generally vicious, her aggression toward prey might spill over onto potential mates in what is known as the "aggressive spillover hypothesis."

So which is it? All three explanations have found support in some experiments but not in others. The answer probably varies with species and population. In some species females have the option of eating males after mating, whereas in others the males have evolved ways of escaping. (Male funnel-web spiders, for example, use pheromones to knock females unconscious before mating.) Some spiders live far apart and may only see one male in their lifetimes, others live in dense populations where mates are plentiful but nutritious food is scarce. All these factors must be taken into account by a discerning female that has a male beckoning on her doorstep.

For Iberian tarantulas, it seems that not all females are equally discerning. The study found that some females were choosy about which males they ate whereas others seemed unable to pass up a free meal. The difference came down to personality.

Iberian tarantulas, which are a type of wolf spider, live in arid regions of the Iberian Peninsula. Researchers from the Experimental Station of Arid Zones caught 80 juvenile females, housed them in artificial burrows and fed them as many beetles and wood lice as they wanted. Some females put on weight more quickly than others. "Since all females had similar prey availability, we estimated that female growth rate would be the result of female voraciousness," says Rubén Rabaneda-Bueno, the study's lead author.

After each female molted to adulthood, a male was placed in her enclosure and allowed to approach the burrow. Most females mated with the first male who came calling. Some ate him instead. Females who ate their suitors were offered additional chances with new males.

Most of the cannibal females were choosy. They ate males who were in poor condition and mated with males who were high quality. “But we found that there were a few females that would consistently get a male and kill it and get another male and kill it—so they were really aggressive,” says Jordi Moya-Laraño, the study’s senior author. The most aggressive females killed big, healthy males as often as they killed scrawny ones. The same females also had the highest growth rates, indicating that they were the most aggressive toward prey. “In this study, a female personality trait—her voracity toward prey—was correlated with her aggressiveness toward males. This is evidence that aggression is consistent between foraging and mating contexts,” Rabaneda-Bueno says. “Our results provide evidence that different female personalities can lead to different outcomes in the interactions between males and females in a sexual cannibal.”

So is it wise for a spider to eat her suitors? Sometimes, perhaps, if she knows what she’s doing. But if the traits that make a good hunter are the same traits that produce a cannibal, you may end up with a few spiders who think that all boys look like food.

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A female fishing spider first attacks a courting male, then allows him to mate with her. Afterward, she devours him.