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Aggressive Male Mating Behavior Can Endanger Species

ScienceDaily (May 16, 2011) — Aggressive male mating behavior might well be a successful reproductive strategy for the individual but it can drive the species to extinction, an international research team headed by evolutionary biologist Daniel Rankin from the University of Zurich has demonstrated in a mathematical model.

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Evolutionary biologists have long debated whether the behavior of the individual is able to influence processes on a population or species level. The possibility of selection at species level is still controversial. Using a mathematical model, an international team of researchers led by Daniel Rankin, an evolutionary biologist at the University of Zurich, has now demonstrated that aggressive male sexual behavior not only harms the female, but can also cause entire populations to die out.

The paper recently published in the journal *The American Naturalist* was made possible by funding from the Swiss National Science Foundation (SNSF).

For their study, the scientists concentrated on the extreme sexual conflict of seed beetles, which are considered as pests in agriculture. Male seed beetles have barbed penises which make it impossible for the female to shake off an unwelcome mate. The aggressive males have a higher reproductive rate as they are more successful than less aggressive males; however, they harm the female during the mating process. The researchers have now shown that the greater mating success of aggressive males can result in the males of a species becoming more aggressive in general. The aggression spiral has dramatic consequences for the population and species: More females are harmed during mating and die from their injuries. This means the females become scarcer as a resource for the males and the species eventually dies out. Individual interests and the interests of the population contrast greatly in the present case.

In economics, such clashes of individual and group interests are referred to as the "tragedy of the commons." The principle refers to the overexploitation of collective resources and serves, among other things, to describe human dilemmas related to environmental pollution and global warming. In nature, the tragedy of the commons is limited as aggressive behavior is costly for the individual. This also explains why such severe sexual conflicts as in the case of the seed beetle cannot be observed everywhere. Species with too high an injury rate during reproduction have driven themselves to extinction in the course of evolution. In the case studied, the female's tactical response is to steer clear of aggressive males.

"In nature, there are many examples of tragedies of the commons," says Daniel Rankin. What he means is that understanding how nature solves the tragedy of the commons could also inspire solutions to human problems.

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Journal Reference:

1. Daniel J. Rankin, Ulf Dieckmann and Hanna Kokko. **Sexual conflict and the tragedy of the commons.** *Daniel J. Rankin, Ulf Dieckmann and Hanna Kokko*, Vol 177, June 2011 DOI: <http://www.asnamat.org/node/109>



Seed beetle. Aggressive male mating behavior might well be a successful reproductive strategy for the individual but it can drive the species to extinction, researchers say. (Credit: © Cosmin Mancu / Fotolia)

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