

Study tackles evolution mystery of animal, plant warning cues for survival

May 27 2015

Not every encounter between predator and prey results in death. A new study co-authored by a University of Tennessee, Knoxville, professor suggests that prey emit warning cues that can ultimately lead to both their survival and that of their predators.

The hypothesis addresses a 150-year-old mystery of evolution on how warning signals of animals and plants arise and explains animals' instinctive avoidances of dangerous prey.

The study is published this month in the *Biological Journal of the Linnean Society*..

"People aren't going to necessarily agree with our theory," said Gordon Burghardt, a UT Alumni Distinguished Service Professor who holds appointments in the departments of Psychology and Ecology and Evolutionary Biology. "But we think it's an advance that the field is going to have to deal with. We feel like we're able to explain things that other people haven't been able to do."

Burghardt co-authored the study with Paul Weldon of the Smithsonian Conservation Biology Institute. Burghardt is Weldon's former graduate adviser.

In 1867, Alfred Russel Wallace, co-proponent with Charles Darwin of the <u>theory of evolution</u> through natural selection, proposed that animals evolve colorful, distinctively recognizable appearances to advertise their



distastefulness or toxicity to predators. Despite a number of attempts, however, no satisfactory evolutionary mechanism for the origin of warning cues has been proposed.

Leading theories postulate that predators know to avoid prey after eating one that harmed them.

Burghardt and Weldon suggest predators don't have to learn to avoid prey from the experience of eating distasteful or poisonous ones. They instinctively know to stay away because they are sensitive to the prey's chemical signals or they recognize the visual or behavioral warning cues being displayed. They call this mechanism "concurrent reciprocal selection," which means the signals being emitted by the prey and the predators' sensitivity to the signals repel one from the other and work simultaneously, ensuring both can survive. A predator that ignores its sensitivity to the toxic prey perishes, as does the prey that is consumed.

Historically, warning signals have focused on bright visual cues. Burghardt and Weldon emphasize that any number of cues, including chemical and auditory, may be used. So they expand the scope of warning signals.

"This theory is the only one to effectively account for the evolution of instinctive and unlearned avoidances of dangerous <u>prey</u> by <u>predators</u>, and of the avoidance of unrelated but superficially similar mimics, such as bees and wasps," Burghardt said. "It is a simple idea, but it has been overlooked in lieu of more complicated scenarios."

More information: Evolving détente: the origin of warning signals via concurrent reciprocal selection, DOI: 10.1111/bij.12565



Provided by University of Tennessee at Knoxville

Citation: Study tackles evolution mystery of animal, plant warning cues for survival (2015, May 27) retrieved 3 May 2024 from <u>https://phys.org/news/2015-05-tackles-evolution-mystery-animal-cues.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.