Team finds common bioindicator resistant to insecticides

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In a novel study, a University of Oklahoma researcher and collaborators found a common bioindicator, *Hyalella azteca*, used to test the toxicity of water or sediment was resistant to insecticides used in agricultural areas of central California. The study is the first to demonstrate that the indicator species may adapt to polluted conditions of a habitat and become an entirely unreliable source of information about ecosystem health.

Gary Wellborn, professor of biology in the OU College of Arts and Sciences and director of the Oklahoma Biological Station; Donald P. Weston, University of California, Berkeley; and Helen C. Poyton, University of Massachusetts, Boston; tested cultures in the laboratory and water samples from California lakes, ponds and streams. The *Hyalella* amphipods are aquatic crustaceans commonly used by scientists and agencies as an indicator species of a healthy, unpolluted environment.

"Our study documented the specific genetic changes that allow the amphipods to survive at 500-times the normal lethal dose of the pesticide," says Wellborn. "The results have far-reaching implications for biomonitoring programs that rely on *H. azteca* as a bioindicator. *H. azteca*, a species common across North America, may prove to be an unreliable indicator in other agricultural states where biomonitoring programs use *H. azteca* as a principal species for monitoring and environmental policy decisions."

Insecticides for agricultural crops are regulated by the Environmental Protection Agency, but runoff during rains can enter a lake, pond or stream and contaminate a non-target species, like *H. azteca*. The evolution of *H. azteca* in this study occurred when the species mutated and adapted to the widely used pyrethroid insecticides—a principle known as adaptive evolution. As reported in this study, the resistant *H. azteca* was no longer reliable as a bioindicator when used to test the toxicity of water and sediment.

More information: A technical article on this study was published in the October 8, 2013 issue of the *Proceedings of the National Academy of Sciences*.

Provided by University of Oklahoma