Common pesticides kill amphibian parasites, study finds

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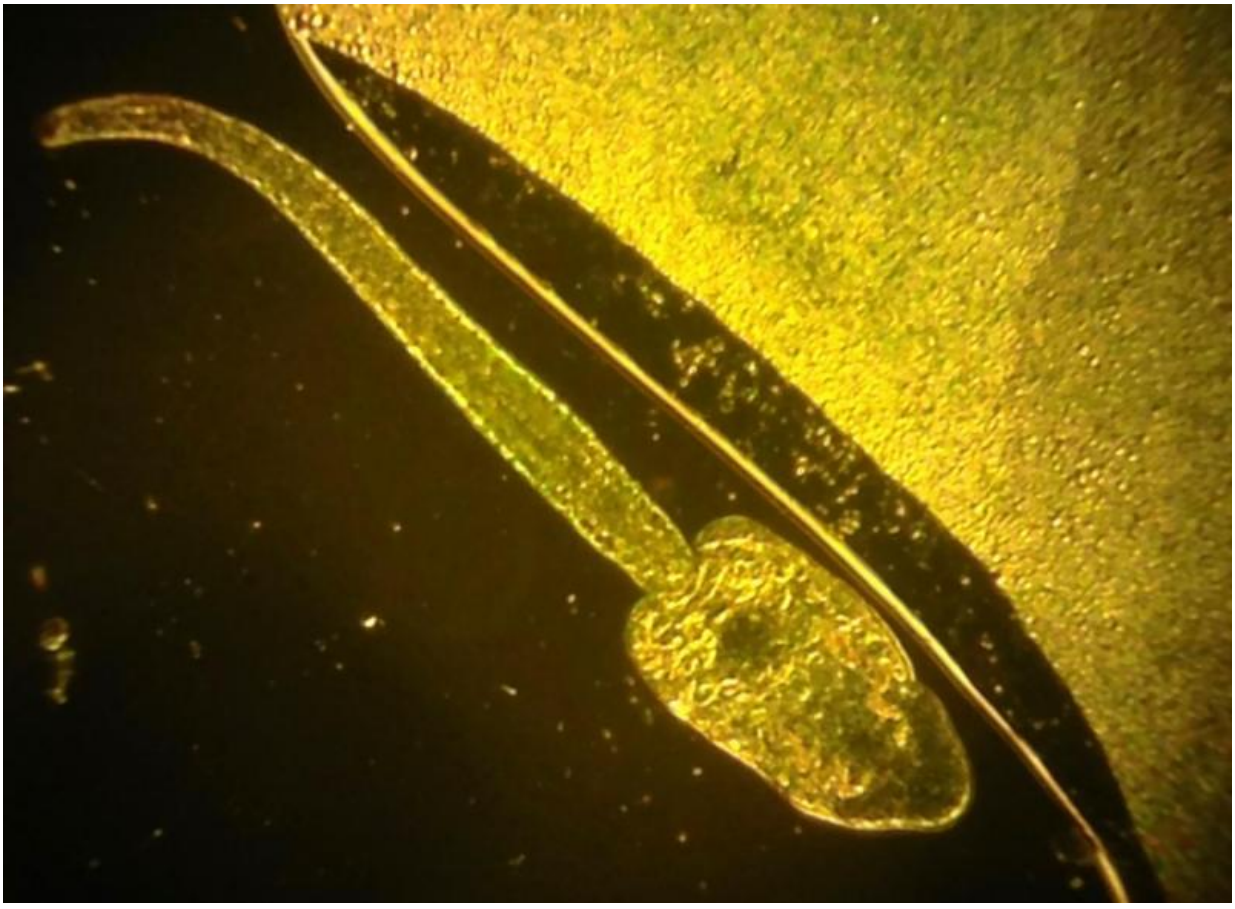

The free swimming stage of the trematode, *Echinoparyphium* Lineage 3. Credit: Jessica Hua

The combined effects of pesticides and parasites threaten wildlife

populations worldwide (e.g. amphibians, honeybees). Pesticides are predicted to exacerbate the effects of parasites on their hosts by reducing the host's ability to defend against parasite infection. Many studies have examined the effects of pesticides on the host organism, but not much attention has been paid to how pesticides directly affect parasites - until now.

A recent study by Jessica Hua, assistant professor of biological sciences at Binghamton University, and colleagues, explored the effects of six commonly used pesticides on two different populations of a widespread parasite of amphibians. They found that a broad range of insecticides commonly used in the U.S. kill amphibian parasites, which could potentially decrease the number of parasites that amphibians must defend against. For the pyrethroid and neonicotinoid pesticides tested in this study, this pattern has not been documented before.

"We often focus on how pesticides influence the ability for a host to defend against a parasite," said Hua. "However, a less studied perspective is whether and how pesticides affect the ability for parasites to successfully infect their hosts."

Of the two parasite populations tested, Hua and her team found that parasites from the population living closer to agriculture were consistently more resistant to the pesticides. These findings suggest that considering multiple populations is critical to assessing toxicity of pesticides to amphibian parasites. "Overlooking population-level differences in pesticide resistance could lead to an underestimation or overestimation of how toxic a chemical is to parasites," said Hua. "Adding realistic complexity such as population variation in resistance to our studies of toxicology is important to understanding how pesticides affect the interaction between host and their parasites."

Finally, while all six pesticides tested caused mortality of trematodes at

the cercariae stage (the "free swimming stage" of the parasite). Increasing concentrations of pesticide did not always cause higher parasite mortality (i.e. the dose did not always make the poison). This suggests that traditional methods of toxicology that rely on dose-dependent responses may not be enough to help us predict what pesticides are doing to parasites.

More information: JESSICA HUA et al. Population-specific toxicity of six insecticides to the trematode Echinoparyphium sp., *Parasitology* (2016). DOI: 10.1017/S0031182015001894

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