

Leeches ferry infection among newts

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Parasite-carrying bloodsucking leeches may be delivering a one-two punch to newts, according to biologists, who say the discovery may provide clues to disease outbreaks in amphibians.

The findings could also lead to a better understanding of diseases affecting humans, such as malaria, chagas disease and sleeping sickness. All these diseases are transmitted through a vector, an organism that spreads disease from one animal to another.

The researchers found evidence for leech-borne transmission of a little-known fungus-like organism of the genus *Ichthyophonus*, which infects the muscles of red-spotted newts and other amphibians in North America. It does not appear to kill amphibians but might affect their ability to reproduce. "This is the first evidence that newts are getting infected through the bites of leeches," said Thomas R. Raffel, a postdoctoral researcher at Penn State's Center for Infectious Disease Dynamics, and the study's lead author.

Early infections in the newts appear as clusters of small dark dots under the skin, which can later develop into a large area of swollen muscle. The swollen muscle contains many spores (also called spherules), each of which contains hundreds of infectious cells called endospores. Raffel and his colleagues think that the infection is transmitted when one of these spores bursts open and releases its endospores onto the mouthparts of a feeding leech. Their findings are outlined in the January issue of *Journal of Parasitology*.

In 2004, Raffel and his Penn State colleagues Peter J. Hudson, professor of biology, and James R. Dillard, then an undergraduate student and now with the Pennsylvania Department of Environmental Protection, conducted a survey of 16 red-spotted newt populations in lakes and ponds near Centre County, Pa. They found the disease in 12 of the 16 newt populations.

A strong correlation between infection prevalence and numbers of bloodsucking leeches, plus the finding that the infection is more likely to appear on commonly bitten body parts, suggested that leeches were the most likely vehicle transferring the disease. Further work showed that new infections generally begin at sites recently bitten by leeches, which leave behind a characteristic patch of blood under the skin.

Raffel, whose work is funded by the National Science Foundation, says "when a leech sticks its proboscis into an infected newt, either the mechanical action of the probe or the anti-inflammatory chemicals injected by the leech, could be used by the parasite as a cue to release its packet of spores. The spores could then latch on to the leech's proboscis, and the infection would be passed along to the next newt the leech bites."

The researchers point out that *Ichthyophonus* might not be as contagious as other leech-transmitted amphibian parasites. That is because this particular parasite lodges itself in muscle tissue instead of blood. A leech would have to be feeding right on top of a newt's infected muscle in order to transmit the infection. However, it is still unclear if the spores are multiplying within the leech, or simply ferrying on its proboscis.

Even though the infection is not fatal to the newts, it could affect their numbers, says Raffel. "When newts get infected, they often stop breeding, apparently to shore up their immune system to fight off the disease. But that comes at the cost of having fewer offspring," he adds.

Findings from the study may also indicate that human activities could lead to increases in the infection, since these leeches are most abundant in wetlands with lots of aquatic vegetation.

The Penn State researchers say fertilizer-laden wastewater from farms and other sources often causes increased growth of aquatic vegetation in ponds, providing leeches with a firmer footing. "It could lead to more leeches and create potential hotspots of disease," Raffel noted.

Source: Penn State

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