# Tadpoles Used to Rapidly Detect Water Pollution

December 3 2009

(PhysOrg.com) -- Research conducted by University of Wyoming Professor Paul Johnson and others demonstrates that genetically modified tadpoles work well as sensitive monitors for rapidly detecting water pollution.

In a cover story article published in Environmental Science and Technology, the scientists demonstrated that African clawed frog tadpoles "light up" in response to a pollutant, and can indicate the presence of several chemical species at the same time.

Johnson, a professor in the Department of Physics and Astronomy, says the research meets a pressing need to improve technologies for rapidly detecting physiological effects of environmental pollutants.

"This need is felt not only in the context of screening chemicals that might affect human health, but also to detect pollutants accumulating in the environment," Johnson says. "In each case methods have to be developed that provide robust and reproducible readings obtained on model systems that reflect the full impact of a chemical on a given organism."

The basic principle involves creating genetic constructions that enable a green fluorescent protein to be expressed in response to the physiological stress exerted on the tadpoles by pollutants for which the genetic modification was designed.

"Tadpoles are particularly useful as environmental monitors because they develop a complete immune system as well as complex heart and circulatory systems, similar to humans, but maturing over days, and not years," Johnson says. "In this work we combined genetically modified tadpoles with a detection system developed at UW to detect the presence of heavy metal pollution in river water in real time."

He says numerous detection methods exist for environmental heavy metal monitoring, but they are very labor intensive and time consuming. Such easy-to-use technologies combining rapidity with living organism measurements had not been developed previously.

More information: The article can be found on the Web at pubs.acs.org/doi/full/10.1021/es9008954 .

Provided by University of Wyoming