

# GIFT

(Georgia Internships For Teachers)

# Ribeiroia: One Cause of Amphibian Malformations How Does It Do It and How Is It Diagnosed

This is part of an ecological study on amphibian health by graduate students Elizabeth Burton and A. Chandler Schumaker, lead by Dr. Matthew Gray, Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, Tennessee  
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- Factors that affect Ribeiroia Life Cycle:**
- Farm animal access (cattle)
  - Water quality
  - Pesticide runoff

- Other malformations:**
- Missing limb
  - Additional limb



Clearing

Primary Host  
Water Bird  
The adult trematode produces eggs

1. Skin & eviscerate
2. (Even the toes)
3. Check for cyst



Malformed Frog

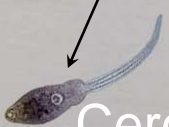
## Ribeiroia Life Cycle

Trematode eggs

Miracidium



1<sup>st</sup> Intermediate Host: Plenorbella Snails



Cercaria

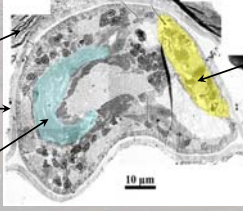
2<sup>nd</sup> Intermediate Host: Tadpole



Histological Examination



Electron Microscopy



Encysted Metacercaria

Photo credits:  
 Dana K. Fletcher  
 Adam Shepley  
 A. Chandler Schumaker  
 Elizabeth Burton  
<http://www.burtonlab.com/birding.html> (blue heron)  
<http://images.wix.com/photos/ajstetter/818d8e9c2081off/amphibian-tadpoles.html> (cercaria)  
[http://iath.hawaii.edu/whd/hadspic04\\_05p02/Introduction/Amphibian%20Legs.html](http://iath.hawaii.edu/whd/hadspic04_05p02/Introduction/Amphibian%20Legs.html) (multi-legged frog)

References:  
<http://www.ncbi.nlm.nih.gov/pubmed/14138896>  
<http://www.ncbi.nlm.nih.gov/pubmed/10993333>  
 Johnson, P.T.J., K.H. Luedtke, H.G. Rulifson and A.F. Lauen. 1999. The effect of trematode infection on amphibian limb development and survivorship. *Science* 284:802-804.  
 Stapp, G.F., D. Harker, B.A. Frazee and S. Sletten. 2002. How trematode cause limb deformities in amphibians. *Journal of Experimental Zoology* 296:252-263.  
 Johnson, P.T.J. and E.H. Sutherland. 2003. Amphibian deformities and Ribeiroia infection: An emerging ichthyozoosis. *Trends in Parasitology* 19:332-335.  
 Johnson, P.T.J. and M.J. Chien. 2004. Parasites in the pond with: Linking amphibian malformations and aquatic contamination. *Ecology Letters* 7:521-526.  
 Kiesecker, J.M. 2002. Spermium between trematode infection and pesticide exposure: A link to amphibian limb deformities in water? *Proceedings of the National Academy of Sciences* 99:990-9904.  
 Kiesecker, J.M., L.S. Bollen, K. Shea and M.J. Raboin. 2004. Amphibian decline and emerging disease: What can sick frog teach us about new and emerging disease in human populations and other species of wildlife? *American Scientist* 92:138-147.