



## **Project Proposal for Using Snail-Trematode Communities as Indicators of Biodiversity**

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**Proposed Study:** Using larval trematodes as indicators of free-living biodiversity -- Characterization of the parasite community

### **Background & Aims**

It is becoming increasingly clear that parasites may be useful as indicators of biodiversity and the connectance which exists in ecosystem food webs (e.g., Marcogliese & Cone, 1998; Hudson et al., 2006; Hechinger, 2008; Lafferty & Kuris, 2009). Trematode parasites (Platyhelminthes: Digenea) are particularly interesting in this regard given the number of connections they make through their complex, multiple-host life cycles. In the course of its life cycle, a typical digenean trematode will reside as an adult in a vertebrate definitive host and as several larval stages in mollusks and other intermediate hosts, including a great diversity of invertebrate and vertebrate species. Importantly, these parasites intersect with hosts on a variety of trophic levels within an ecosystem and thus have the potential to be relatively sensitive indicators of ecosystem function (Lafferty & Kuris, 2009).

While the concept of using snail-trematode systems as indicators of biodiversity has been examined in only a few instances, these hypotheses are in need of much more rigorous examination (Huspeni et al., 2005) at several different levels. To our knowledge, this has not been examined in Peru. In fact, Peru is an ideal place to study host-parasite interactions and ecosystem dynamics given that it has some of the highest biodiversity on the planet. The aim of this proposed research is to characterize and compare the trematode communities found in snail populations from coastal wetlands near Lima (Pantanos de Villa and Puerto Viejo), from rain forest populations in the area of Iquitos and Tarapoto, and from Andean zone snail populations (Huaraz and Puno). Primarily the work that will be done using laboratory space in the Museo de Historia Natural at Universidad Ricardo Palma will be to characterize and describe the trematode communities from snail collections made at Pantanos de Villa and other collection zones.

## **Materials & Methods**

Trematode communities in snails are relatively easy to collect and process. Approximately 100 snails of prominent and abundant wetland species will be collected biweekly and returned to the laboratory; snails will be measured and then isolated in small containers containing filtered estuarine water and crushed fish food. After 24-48 hours, jars will be examined for free-swimming trematode cercariae (larvae); trematode species will then be identified to the lowest taxonomic unit possible. Snails will then be dissected to examine the intramolluscan larval stages of any trematode infections. Measures of species richness and diversity will be calculated from these data.

Equipment that will facilitate this work includes dissecting and compound microscopes, dissecting equipment (forceps, fine scissors), pipettes, small containers or jars (250), nalgene carboys for filtering water, cheesecloth or filter paper, lamps / lights for illuminating snail containers to induce release of cercariae, ethanol (EtOH), xylene, Canada balsam (for making permanent microscope slides), and glass microscope slides and coverslips.

## **Financial Support, Schedule, and possible Minicourse**

If the Museo de Historia Natural is able to provide me with modest laboratory space, the use of microscopes, and routine dissecting equipment, funding from my home institution (Wabash College, Dept. of Biology) will cover the costs of expendable supplies (listed above). I do not expect this to exceed \$200 USD. Also, funding from Wabash College will cover the costs of travel to local wetland sites.

The proposed work on snail-trematode communities will occur January-March, 2010. Eric Wetzel will arrive in Lima in early January and would like to begin snail collections in mid-January. It is possible that a one or two-day minicourse in parasite ecology (with an emphasis on snail-trematode interactions) could be offered to URP students who might be interested in either the topic and / or helping with the research project. Tentatively, the dates for this could be 25 and 26 January, 2010. During the rest of January, February, and March, 2010 I plan to pursue work on the snail-trematode project as well as a project on zoonotic infections in people living in Pamplona Alta. I will also travel to Iquitos, Huaraz, and possibly Puno (or Tarapoto) during this time. Therefore, I will not need to be working in the Museo everyday, in case that is important for your planning. I hope to discuss with you further details of my schedule after I arrive in Lima.

## **References**

Hechinger, RF. 2008. Trematodes indicate animal biodiversity in the Chilean intertidal and Lake Tanganyika. *Journal of Parasitology* 94: 966-968.

Hudson PJ, Dobson AP, Lafferty KD. 2006. Is a healthy ecosystem one that is rich in parasites? *Trends in Ecology & Evolution* 21:381-385.

Huspeni, TC, Hechinger RF, and Lafferty KD. 2005. Trematode parasites as estuarine indicators: opportunities, applications and comparisons with conventional community approaches. In: Bortone, S (ed.), *Estuarine indicators*. Boca Raton: CRC Press, pp. 297-314.

Lafferty KD, Kuris AM. 2009. Parasites reduce food web robustness because they are sensitive to secondary extinction as illustrated by an invasive estuarine snail. *Philosophical Transactions of the Royal Society B-Biological Sciences* 364: 1659-1663.

Marcogliese, DJ and Cone DK. 1998. Food webs: a plea for parasites. *Trends in Ecology & Evolution* 12:320-325.