# Don't Drink The Water

## Pesticide, Parasites, and Problems

Sean Laverty

September 13, 2006

# I worked with the following animals

I spent the summer catching, handling, and maintaining: newts, leeches, snails, eggs, tadpoles, frogs, toads, trematodes, stream macroinvertebrate larvae, and undergraduate pre-med majors.

# How many legs does a frog have?

Just over a decade ago eight young Minnesotans discovered:

- legless frogs,

# How many legs does a frog have?

Just over a decade ago eight young Minnesotans discovered:

- legless frogs,
- extra-legged frogs, and

# How many legs does a frog have?

Just over a decade ago eight young Minnesotans discovered:

- legless frogs,
- extra-legged frogs, and
- eyeless frogs.

# 3? 4! 5? 6?

# How does a frog have seven legs?

The science community freaked out, using this as a chance to identify their favorite environmental disaster.

- UV radiation increasing mutation rates,

# How does a frog have seven legs?

The science community freaked out, using this as a chance to identify their favorite environmental disaster.

- UV radiation increasing mutation rates,
- pesticide (teratogen) runoff,

# How does a frog have seven legs?

The science community freaked out, using this as a chance to identify their favorite environmental disaster.

- UV radiation increasing mutation rates,
- pesticide (teratogen) runoff,
- other environmental (non-pesticide) teratogen, and

# How does a frog have seven legs?

The science community freaked out, using this as a chance to identify their favorite environmental disaster.

- UV radiation increasing mutation rates,
- pesticide (teratogen) runoff,
- other environmental (non-pesticide) teratogen, and
- finally (and more correctly) parasites!

# How I spent my summer.

I was involved in roughly two projects.

- Day one - netting newts and removing leeches, screening newts for fungal infection
- Every other day - working with snail, trematode, tadpole, pesticide system

# Day one

I only spent one day on this project during which I caught newts from an agricultural research pond.
We

- collected newts,
- removed all possible leeches, and
- identified and collected Ichthyophonus-infected newts.

# Big picture for the big projects

# Collections

Fieldwork mainly involved not only

- the collection of snails,
- tadpoles, and
- tadpole eggs,

but also,

# Collections

Fieldwork mainly involved not only

- the collection of snails,
- tadpoles, and
- tadpole eggs,

but also,

- falling in dirty ponds,
- finding holes in hip waders,
- getting lost in the woods, and
- carrying heavy buckets.

# Identifications

Daily lab work typically involved

- the (re)screening of snails for infection by trematodes,
- identification of trematode cercaria, and
- animal care and maintenance

and

# Identifications

Daily lab work typically involved

- the (re)screening of snails for infection by trematodes,
- identification of trematode cercaria, and
- animal care and maintenance

and

- late nights
- with lots of coffee.

# Community ecology and pesticides

The head researcher (Dr. Jason Rohr) was interested in studying trematode infections of tadpoles under the influence of pesticides. The research hypothesis assumes that exposure to pesticides will increase tadpoles' susceptibility to trematode infection.
Ultimately, this research is motivated by a desire to understand a recent global decline of amphibians.

# Experimental design

Laboratory and field experiments were used to examine various aspects of the pesticide/parasite relationship.

1. Predator avoidance - Goal is to determine how combinations of pesticide/parasite exposure influence tadpole mortality.
2. Parasite avoidance - Goal is to determine if pesticide exposure reduces ability of tadpole to detect parasite.

# My experiments

Expose individual tadpoles to a fixed number of cercaria to determine infectivity and lethality of cercaria and location of metacercarial cyst. Two tadpole species each with two sizes were exposed to four or five cercaria 'species'. Procedure:

1. Micropipet twenty cercaria into a cup with a single tadpole. (Not easy).
2. Record mortality, preserve or kill and preserve after one week.
3. Clear and stain tadpoles to count numbers and locations of cysts.
   (Not done by me).

# Next

The researchers were interested in food-web modelling - aquatic macroinvertebrate larvae are important consumers of cercaria. How does a variety of macroinvertebrates control the infection?
Among biologists, completing the parasite life cycle is a relatively unsolved problem - successful procedures require sterile conditions at all steps.

# Lessons learned

I learned a few things about experimental biology during my time at Penn State:

- Bad biology smells bad.

# Lessons learned

I learned a few things about experimental biology during my time at Penn State:

- Bad biology smells bad.
- Snails are disgusting.

# Lessons learned

I learned a few things about experimental biology during my time at Penn State:

- Bad biology smells bad.
- Snails are disgusting.
- Microscopes (even if I don't like them) are a useful scientific tool.

Thanks go out to the department/IGERT for providing the opportunity.
PSU→ Muller Lab (a building)→ Hudson Lab (a room in a building)
Sam for **beamerclass**.