

**A501, Techniques in Reproductive Diversity
Autumn, 2006**

<http://www.indiana.edu/%7Ekettlab/A501/index.html>

Background and Objectives

The recent origins of this class lie in a training grant proposal to the NIH-Child Health and Human Development (NIHCHHD entitled, “Common Themes in Reproductive Diversity.” Dale Sengelaub, Greg Demas, Troy Smith and Ellen Ketterson prepared the proposal with help from Eva Sanders, and the award is being administered by the Department of Biology and the Center for the Integrative Study of Animal Behavior.

The proposal identified 17 IU faculty (now 16 with the loss of Brodie) who conduct research in areas related to reproduction and development, including sex, sex differences, maternal effects and immune function (<http://www.indiana.edu/~reprodiv/faculty.htm>). These faculty represent 4 departments, 3 programs, and 5 centers or institutes <http://www.indiana.edu/~reprodiv/groups.htm> and employ a range of techniques and approaches. Some are theoreticians, others are empiricists; some are evolutionary biologists, others are neuroscientists, developmental biologists, or students of human sexuality or animal behavior.

Collectively, the faculty are attempting to understand reproductive mechanisms and behavior, including parental behavior and other maternal effects, in light of evolution. Conversely they are attempting to understand the evolutionary process as it relates to reproduction and development in light of underlying mechanisms (<http://www.indiana.edu/~reprodiv/themes.htm>).

The faculty are also striving to identify and explore common themes. Whether mouse, (hu)man, worm or lizard, what commonalities do we find in mechanism, functional significance, development, and evolutionary history? How can study of one kind of system inform another? How can the traditions and questions associated with one group of organisms or one discipline be used to profit with new groups?

Progress in this synthesis will surely be made primarily by students, which is why we and the NIH devote so many resources to training. In the proposal we stressed the importance we attach to providing students with opportunities to learn a variety of techniques early in their graduate careers in order to enhance their ability to ask truly synthetic and integrative research questions. We want for you not to be hampered by lack of access to the newest technology or inability to imagine how such questions might be answered.

This course is therefore aimed at PhD students working in fields related to reproduction. We especially hope to emphasize the parallels found in research focused on humans, model organisms, and non-traditional organisms. In fact we hope you will help us see parallels that haven't occurred to us yet. Throughout the class we will ask you to articulate how you might transfer techniques you learn to your organism or question of

choice and how the traditions of your field contribute to a general understanding of reproduction and development.

Format

- Class will meet 2 times per week, Tuesdays, 1:30-4:30 and Thursdays 12:30-1:30. The default location will be CISAB, but you will need to stay alert as the venue will change often.
- On Thursdays we will introduce topics and the principles behind the methods. On Tuesdays we will do the lab or fieldwork.
- Students will need to be flexible and commit to coming in for more than the scheduled class time if you are to get full benefit.

Expectations

- To participate fully, be prepared, be present, have fun. Inform me if you must be away, but the expectation is that you will be fully engaged every week and outside of class when so challenged
- To write at least 3 3-page proposals + one page of references (NSF grad research fellowship style). The proposals should employ at least two methods from the class and address a question related to a clearly articulated common theme in reproductive diversity (broadly defined). One of these might instead be an in depth application of one of the techniques to your own work with a complete exploration of strengths and limitations.
- To complete assignments as made by the various faculty participants. The faculty are free to design a homework, analytical problem, whatever. Some probably will and some may not.

Times, topics and teachers

August 29

Working with wild animals – measuring molt in songbirds, collecting blood samples and feces, response to stressors – Ellen Ketterson, Biololgy

August 31-Sept 5

Extracting hormones and DNA from plasma, feces, and yolk – Amy Poehlman, CISAB, Danielle Whittaker, Biology

Sept 7-12

Measuring colorful phenotypes – Lynn Siefferman, Biology and CTRD post-doc

Sept 14-19

Assessing relatedness - genotyping with microsatellites – Amy Poehlman and Danielle Whittaker

Sept 21-26

Measuring plasma - hormone levels and EIA/RIA– Danielle Whittaker and Amy Poehlman

Sept 28-Oct 3

Modeling the evolution of sex – Curt Lively, Biology

Oct 5-10

Employing neuroanatomical techniques to study sex differences – Dale Sengelaub, Psychological and Brain Sciences, Program in Neuroscience

Oct 12-17

Designing questionnaires to study human sexual behavior– Stephanie Sanders, Gender Studies, Kinsey Institute

Oct 19-24

Imaging brains using fMRI – Heather Rupp, Kinsey Institute, CTRD post-doc

Oct 26-31

Analyzing immune function in birds and mammals – Greg Demas, Biology

Nov 2-7

Analyzing volatile metabolites in biological specimens using GC-MS techniques - Milos Novotny and Helena Soini, Chemistry

Nov 9-14

Understanding evolution using the comparative method – Emilia Martins, Biology

Nov 16-21

Employing comparative anatomy, immunostaining, in situ hybridization, and RNAi to study the evolution of development - Armin Moczek, Biology

Nov 28

Using Molecular techniques, particularly gene arrays to study reproduction – Christine Quirk, Program in Medical Sciences

Nov 30-Dec 5

Recording electrical behavior in animals and cells to study sex differences – Troy Smith, Biology

Dec 7

Overview and retrospective – Ellen Ketterson