A501, Techniques in Reproductive Diversity
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Ellen Ketterson, Organizer, JH033, ketterso@indiana.edu
Christy Bergeon Burns, Co-organizer, CISAB lab, cbergeon@indiana.edu

Background and Objectives: When you think about it, you can't help but marvel at all the ways in which humans act like other animals…. and the degree to which other animals exhibit properties we used to associate exclusively with humans. So the more we look, the more we see, and I hope you will find pleasure and challenge in thinking about "Common Themes in Reproductive Diversity (CTRD)."

The title of the course is the same as that of the training grant supported by the National Institute of Child Health and Human Development (NICHD). The goal of the training grant is to advance understanding of reproductive mechanisms and behavior in light of evolution (http://www.indiana.edu/~reprodiv/what.php). The goal of this course is to introduce students to methods that will help make that advancement possible.

The course faculty are affiliated with the Center for the Integrative Study of Animal Behavior (CISAB) and conduct research in reproduction and development, sex and sex differences, maternal effects, immune function, cognitive aspects of mate choice, nutritional state and human conception, sexual behavior, molecular developmental genetics, genomics, and more. http://www.indiana.edu/~reprodiv/faculty.php

Not surprisingly it is you – the students - who will make the greatest progress towards new insights, and we hope that this class will play a role in that. We want you to have access to the newest technology and ideas, so you can make great strides. Thus this course is aimed at PhD students working in fields related to reproduction. Please help us see even more parallels and contrasts when comparing humans, model organisms, and non-traditional organisms.

As you move through the class, please take every opportunity to consider how you might transfer the techniques you learn to your organism or question of choice, and how your field can contribute to other people's projects and to a general understanding of reproduction and development.

Format

- Class will meet 2 times per week, Tuesdays, 1:30-2:30 and Thursdays 1:30-4:30 with at least one exception: March 29-31, where the long class is on Mar 29, and the shorter class on Mar 31. You may be asked to be flexible on other dates too.
- Some labs will run over or require that you come in at other times, Again, you will need to be flexible and commit to coming in for extra time if you are to get full benefit.
- The default location is CISAB, but please stay alert, as the venue will change often.
- In general, Tuesdays rotating faculty will introduce topics and the principles behind their methods. On Thursdays you will do the lab or fieldwork.
- There is no textbook; you may need to make a software purchase during the semester.
- There will be a required proposal to be turned in at the end of the semester and involve a written document and a class presentation during the last week of classes.

Theme: In some years we have had a theme for the class and most recently that theme was stress, which is the response organisms exhibit to stressors in the environment (cold, food shortage, crowding, toxins, anthropogenic and other forms of environmental change, etc.). Stress may be acute or chronic and can influence reproduction, immune status, development, cognitive function, cellular metabolism, and more.

If you are interested in how socially challenged mothers affect the sexual development of their offspring or the impact of an urban environment on bird populations, or the effect of population density on the mental health of zoo animals or humans, then you are interested in stress.

Sex differences are also inherently fascinating and we are all curious about the mechanisms that rise to sex differences developmentally and among adults, and also how selection leads to their evolution.

We will learn methods while posing questions such as these: Does restraint (handling) influence adreno-corticoid output in circulation and does the output vary by sex? In humans, do the sexes differ in sexual desire? What is the relationship between sex, stress, and gender? How might stress influence receptor abundance in blood? How do humans rate attractiveness and do the sexes differ? How do you test for pregnancy in other cultures?

As it turns out having a theme has proved to be a challenge in a class like this, because the goal is to pursue a range of techniques that you are likely to apply quite differently depending on your particular area of research. So when you read the expectation below that you synthesize some of the techniques you will learn into a faux grant project, please be a synthesizer and select a theme that makes sense to you.

Caveat: I don't want to engage in false advertising. We will touch on these subjects, but time is short, so please don't expect depth that we won't be able to deliver.

Expectations of you

- 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
- To complete assignments as made by the various faculty participants. The faculty are free to design homework, analytical problem, whatever. Some probably will and some may not.
- To join a small group in order to prepare a collaborative research proposal, which you will turn in to me and present during the last week of classes.
- The proposal should employ at least two of the techniques you will learn this semester, ideally more, and attempt to connect the proposal to our theme.
- You may choose the question. I recommend that you choose 1-3 collaborators and prepare a proposal that is 4-5 pages of text plus 1 page of references and 3 figures. One collaborator may be ideal. I am already looking forward to your presentations.

2016 SCHEDULE

Jan 12: Preparing for chemical and biosafety – Chris Kohler, Christy Bergeon Burns, Amanda Snyder, Environmental Health – Tuesday **only**, CISAB, 409 N. Park

Jan 19-21: Working with wild animals: measuring response to stressors and field techniques – Ellen Ketterson, Adam Fudickar, Rachel Hanauer, Mikus Abolins-Abols, Sam Slowinski, Abby Kimmitt, Christy Bergeon Burns, Charli Taylor, Biology and CISAB – Tuesday, CISAB; Thursday, Kent Farm Banding Station

Jan 26-28: Extracting DNA and hormones for analysis – Christy Bergeon Burns, Rachel Hanauer, Mikus Abolins-Abols, Abby Kimmitt, Biology and CISAB – Tuesday, CISAB; Thursday, CISAB lab, JH 348

Feb 2-4: Using EIA to characterize adrenal responsiveness to restraint and PCR to assess malaria infection status – Christy Bergeon Burns, Rachel Hanauer, Mikus Abolins-Abols – Tuesday **and** Thursday, CISAB lab, JH348

Feb 9-11: Detecting protein antigens in skin cells – John Foley, Medical Sciences – Tuesday CISAB, Thursday (TBD)

Feb 16-18 Analyzing volatile metabolites in biological specimens using GC-MS techniques – Helena Soini, Chemistry - Tuesday CISAB, Thursday, Chemistry C105A

Feb 23-25: Using functional genomics to measure environmentally induced changes in gene expression – Matt Hahn, Biology – Tuesday, CISAB; Thursday (TBD)

Mar 1-3: Studying stress and human sexual behavior and sexual psychophysiology – Tierney Lorenz, Kinsey and CTRD – Tuesday, CISAB; Thursday, Kinsey Institute, Morrison Hall, 3rd floor (please arrive early to get signed in)

Mar 8-10: Observing behavior: video and telemetry techniques – Will Kenkel, Jeff Alberts, Kinsey and PBS – Tuesday, CISAB; Thursday (TBD)

Mar 22-24: Employing neuroanatomical techniques to study sex differences – Dale Sengelaub, Cara Wellman, PBS – Tuesday, CISAB; Thursday, Sengelaub and Wellman labs, PBS building, PYA408

Mar 29-31: Using quantitative PCR to assess transcript abundance for target genes – Kim Rosvall, Biology – Tuesday, CISAB lab (long class); Thursday, CISAB (short)

Apr 5-7: Studying human mate search and choice – Peter Todd, PBS and Cog Sci – Tuesday, CISAB; Thursday, Adaptive Behavior and Cognition lab, HK330

Apr 12-14: Labeling socially relevant peptides, enzymes and receptors in songbirds – Marcy Kingsbury, Biology – Tuesday, CISAB; Thursday, Kingsbury lab, JHA007

Apr 19-21: Assessing immune function – Greg Demas, Biology – Tuesday, CISAB; Thursday, Demas lab, JH267

Apr 26-28: Overview, retrospective and proposal presentations – Ellen Ketterson - CISAB