Research Focus & Approaches Used in my Lab:

Research in my lab focuses on understanding the interplay among evolutionary, ecological, and developmental processes, as well as how this interplay impacts phenotypic evolution and diversification. Presently, research in the lab focuses primarily on:

- the evolutionary and ecological implications of phenotypic plasticity;
- the evolutionary and ecological implications of non-genetic inheritance;
- the proximate (behavioral, physiological, genetic, transcriptional, and developmental) mechanisms of plasticity;
- competition's role in diversification; and
- mimicry.

Although my lab has utilized a variety of model systems, I strongly encourage my students to study *natural* populations of organisms, especially those with which I am familiar, such as amphibians (especially spadefoot toads or ambystomatid salamanders), reptiles (especially snakes), and insects (especially Hymenoptera). We also employ a wide array of approaches, including field and lab observations and experiments; behavioral observations; phylogenetic/population genetic analyses; and (increasingly) molecular approaches, such as genome-wide association surveys (e.g., using restriction associated DNA sequencing and shotgun whole genome sequencing) and gene expression analyses (e.g., using RNA sequencing and Real Time Reverse Transcription-PCR).

Generally, to be admitted into my lab, a student's research interests need to fit well within my comfort zone. However, I'm open to having new students broaden the research focus of the lab if they can convince me that they are likely to succeed in doing so. Indeed, some of these departures have been quite successful.

Independence vs. Collaboration:

I very much enjoy training graduate students. Moreover, I regard each of my graduate students as budding colleagues and treat them as such. Thus, I work closely with my students, from helping them identify interesting and important topics to investigate, to obtaining and analyzing the data, to writing the paper.

Yet, because the goal of a Ph.D. program is to teach students to perform *independent* scientific research, I expect my students to demonstrate that they can also operate independently from me. Thus, I often encourage my graduate students to import new ideas and new techniques into my lab (e.g., that they may have learned by working for a short time in another lab, which I strongly support). I also encourage my graduate students to develop collaborations with other lab members or even other PIs, including those at other universities. Indeed, several of my students have published with other students (or other PIs) papers on which I did not appear as an author.

In short, a Ph.D. dissertation must strike a balance between collaboration and independence.

Selecting a Ph.D. Project:

I do not “assign" my students their Ph.D. project. I expect my students to come up with their Ph.D. project. This does not mean that I expect this to happen without substantial input from me. I sit down with each student on a weekly (or more frequent) basis and help him/her identify interesting questions and systems. This may involve assigning the student readings and then discussing them one-on-one and/or in our weekly lab meetings. Through this process, the student’s interests become more refined. I also like to suggest a “first-year” project to each student that he or she and I can work on together in their first year of graduate school. The immediate goal of this project is a publication; the longer-term goal is for each of us to learn how we approach science. I have found that this is a very successful approach for students to gain confidence in doing research.

As far as selecting an actual Ph.D. project, in my mind, the “ideal" Ph.D. project is one that optimizes the following four factors (listed from most to least important):

- the graduate student is personally excited about;
- will make a significant and original contribution to his/her field of study;
- is feasible within the time frame of a Ph.D.;
- can be broken down into separate, publishable components.

I work closely with my students in finding the Ph.D. project that optimizes these four criteria. However, once they identify a project, I expect my students to take the lead in performing the actual research, analyses, and writing.

Funding:

In terms of stipends, each student admitted into our department is *guaranteed* at least 5 years of support; the default funding source is a TA position, in which the student helps teach undergraduate courses and lead recitations and laboratories. Presently, a TAship in the UNC Biology department pays $9,750 per semester, along with the student’s health insurance, tuition remission, and tuition credit; students are responsible only for their fees. Additionally, there are a number of fellowship opportunities available through the UNC graduate school. Moreover, if I have the grant funds to do so, I try to support my students over the summer with an RA. I generally do not expect anything in return for this summer stipend, other than for the student to make good progress toward his/her Ph.D.

In terms of research funding, I endeavor to provide my students with as much financial support as possible for research-related expenses (e.g., travel, supplies, etc.). I provide this support off of my grants, irrespective of whether or the student is working on research questions directly relevant to the grants.

An Ideal Timeline:

<u>Summer 0</u>: If possible, begin to learn organisms, site, people, methods, and questions before start of first academic year. This may include accompanying the lab group to field sites in AZ during July.

<u>Academic year 1</u>: Take classes to fill any gaps. Read extensively. Get familiar with the lab group(s), cohort, and department. Get in the habit of attending weekly seminars, especially our Friday lunch bunch, but including seminars at UNC, Duke, and NCSU. Publish any prior work. Work on a first-year project with me. Analyze and publish the results. If you come in with a Master's degree, plan to present your Master's work in our Friday lunch bunch. Successfully make they transition from being a student to becoming a professional scientist.

<u>Summer 1</u>: Learn organisms, site, people, and methods (if you did not already accomplish this in year 0). Collect preliminary data as an initial test of at least one hypothesis that might constitute your Ph.D. If feasible, plan to attend a meeting (e.g., SSE; ESA; ABS). With input from me, select and ask 4 other faculty to be on your Ph.D. committee.

<u>Academic year 2</u>: Finish required classwork (if necessary). Conduct focused reading for a review / idea paper to be submitted by the end of the academic year. Analyze data from field season 1. Give a short talk to the lab group on results to date. Pass your general knowledge oral exam.

<u>Summer 2</u>: Finish data collection for the first empirical thesis chapter. Collect preliminary data and/or establish experiments for two more empirical thesis chapters. If feasible, plan to attend a meeting (e.g., SSE; ESA; ABS).

<u>Academic year 3</u>: Finish all remaining classwork. In early Fall semester, write a prospectus of your proposed Ph.D. work, use this proposal to pass your feasibility exam, and incorporate suggestions on the proposal from your committee. Revise and publish review / idea paper. Give one lab talk and one lunch bunch talk on results to date. Finish and submit to a journal the first empirical thesis chapter. Prepare a talk for a meeting (SSE, ESA, ABS, or SICB). Outline thesis chapter titles, introductions, and methods sections.

<u>Summer 3</u>: Continue data collection.

Academic year 4: Continue analysis, presentation, and publication of results. Develop list of possible postdoc advisors and network with them.

Summer 4: Wrap up all data collection. Present talk at meetings.

Academic year 5: Finish analyses. Continue presentation and publication of results. Apply for postdocs or jobs. Finish writing, present, and defend thesis.