

**Patrick Kelly**  
*Curriculum vitae*

North Carolina State University  
Department of Biological Sciences  
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## Education

2021: PhD, Biology, University of North Carolina at Chapel Hill.  
“Adaptive plasticity as a fitness benefit of mate choice”  
Supervisors: David Pfennig and Karin Pfennig

2009: BA, Biology, magna cum laude, Cornell College.

## Publications

**Kelly, P. W.**, Pfennig, D. W., & Pfennig, K. S. 2021. Adaptive Plasticity as a Fitness Benefit of Mate Choice. *Trends in Ecology & Evolution*. 36: 4.

**Kelly, P.W.**, Pfennig D.W., and Pfennig, K.S. 2021. A condition-dependent male sexual signal predicts adaptive predator-induced plasticity in offspring. *Behavioral Ecology & Sociobiology*. 75: 28.

**Kelly, P.W.**, Pfennig, D.W., de la Serna, S., and Pfennig, K.S. 2019. Male sexual signal predicts phenotypic plasticity in offspring: implications for the evolution of plasticity and local adaptation. *Philosophical Transactions of the Royal Society B*. 374: 20180179.

Levis, N.A., **P.W. Kelly**, E.A. Harmon, I.M. Ehrenreich, D. McKay, and D.W. Pfennig. 2021. Transcriptomic bases of a polyphenism. *JEZ Part B: Molecular and Developmental Evolution* 336: 482-495.

## Talks and invited lectures

19 October 2022: Invited guest lecture for upper-level undergraduate developmental biology course GN434 at North Carolina State University taught by Dr. Christina Zakas. “Development, phenotypic plasticity, and evolution.”

23 June 2021: “Faux-live” talk at Virtual Evolution 2021 (recorded talk presented in live session online due to COVID restrictions): “Adaptive plasticity as a fitness benefit of mate choice”

06 May 2021: Invited speaker and panelist at UNC Biology Graduate Student Association annual research symposium.

02 January 2021: Contributed talk at the virtual conference of the Society for Integrative and Comparative Biology: “Adaptive plasticity as an indirect fitness benefit of mate choice in variable environments”

17 January 2020: UNC Biology Department “Lunch Bunch”: Gave a talk to the department on my research.

04 January 2020: Contributed talk at the conference of the Society for Integrative and Comparative Biology in Austin, TX: “Sexual Selection and Adaptation in Variable Environments: Offspring Plasticity as an Indirect Benefit of Mate Choice”

12 April 2019: UNC Biology Department “Lunch Bunch”: Gave a one-hour talk to the department on my research.

15 February 2019: Invited guest lecture at Duke University on sexual selection and signaling in spadefoot toads. Delivered a one-hour lecture to an undergraduate herpetology course (Bio290S) taught by Dr. Ron Grunwald and guided students in a data-analysis activity.

07 February 2019: Invited guest lecture on behavioral plasticity for UNC undergraduate course Animal Behavior, BIOL 278, taught by Dr. Cathy Lohmann. Used my research and other empirical examples to explain phenotypic plasticity in the context of animal behavior in the course of a one-hour lecture.

13 August 2018: Contributed talk at the 2018 conference of the International Society for Behavioral Ecology in Minneapolis, MN: “The role of sexual selection in adaptive evolution”; described my most recent findings and their implications for the roles of mate choice and phenotypic plasticity in local adaptation.

13 August 2018: Contributed talk at ISBE 2018: “The role of sexual selection in adaptive evolution”; described my most recent findings and their implications for the roles of mate choice and phenotypic plasticity in local adaptation.

29 July 2018: Together with other Pfennig lab members, led a field trip to spadefoot toad field sites near the Southwestern Research Station for students in a herpetology course at the station.

9 March 2018: UNC Biology Department “Lunch Bunch”: Gave a one-hour talk to the department on my research.

10 July 2017: Invited talk for an EarthWatch group at the Southwestern Research Station on spadefoot toad research performed by Pfennig lab members on and around the station grounds. Also discussed the roles of climate change and agriculture in shaping a spadefoot range expansion.

17 February 2017: Invited guest lecture at Duke University on sexual selection in amphibians. Delivered a one-hour lecture to an undergraduate herpetology course (Bio290S) taught by Dr. Ron Grunwald.

### **Grants and Awards**

2022: NSF Postdoctoral Research Fellowship in Biology: \$138,000

“Genomic and behavioral insights into the role of mate choice in the origins and maintenance of biodiversity”

2020 UNC Chapel Hill Dissertation Completion Fellowship: covers tuition, fees, health insurance, and living expenses without the requirement of TA or RA duties for one academic career to aid dissertation completion.

2019 American Museum of Natural History Theodore Roosevelt Memorial Grant: \$3,015  
Funding given in support of my research on sexual selection and the evolution of plasticity.

2019 UNC Chapel Hill Druscilla French Graduate Student Excellence Award: \$5,000  
Awarded in recognition of distinguished mentorship of undergraduates in a research setting.

2018: UNC Chapel Hill Graduate Student Excellence Award: \$1,500  
Awarded in recognition of service to the UNC Department of Biology.

2016: Sigma Xi Grants in Aid of Research: \$971  
Funding given in support of my research on the evolution of phenotypic plasticity.

## **Teaching**

2017 - 20: Teaching Assistant for Vertebrate Structure and Evolution at UNC Chapel Hill (BIOL 474/474L); led laboratory sections; administered and graded laboratory assignments and exams; taught dissection technique and the use of comparative methods in evolutionary analysis; designed laboratory exercises and wrote exams.

2016 - 20: Teaching Assistant for Anatomy and Physiology at UNC Chapel Hill (BIOL 252/252L); led laboratory sections; administered and graded laboratory assignments and exams.

2016: Teaching Assistant for Ecology and Evolution at UNC Chapel Hill (BIOL 201); led recitations, administered homework assignments and exams, graded assignments and exams.

2015 - 2016: Teaching Assistant for Principles of Biology (BIOL 101/101L) at UNC CH.

## **Undergraduate Mentoring**

Madison Staves – UNC lab volunteer, currently a veterinary student

Rudi Boekshoten – UNC lab volunteer, current undergraduate researcher at Appalachian State University

Audrey Monson – UNC lab volunteer, current UNC pre-med student

## **Outreach, Leadership, and Departmental Service**

22 April 2023: Reach for the Stars: Be a Star: STEM Fair. North Carolina State University. Resource fair for middle and high school students with disabilities and their families and friends with information on how to translate their talents and abilities into a STEM career.

16 March 2019: With other Pfennig lab members, hosted an interactive display at the North Carolina Museum of Natural Sciences annual Reptile and Amphibian Day event. Used my research in combination with that of others in the Pfennig lab as examples; engaged the lay public in discussions of evolution and how evolution is studied by biologists. The event drew 7,961 visitors.

August 2017 – 2018: Biology Graduate Student Association (BGSA): served as BGSA President. Led the organization, funding, and hosting of events for graduate students, post-docs, and faculty at UNC, including social events, working groups, and the annual Biology Department Research Symposium. Liaised between grad students, faculty, and administrative personnel.

August 2017: Designed an educational game based on my research for use in high school classrooms to teach sexual selection. The game was presented by Pfennig lab members to K-12 STEM educators at the annual SciREN conference in Raleigh, and multiple educators adopted it for use in their 2017-18 curricula.

April 2017 and 2018: UNC Science Expo: With other Pfennig lab members, hosted an interactive display with educational modules on evolution, sexual selection, hybridization, and frog conservation. Used my research in combination with that of others in the Pfennig lab as examples; engaged the lay public in discussions of evolution and how evolution is studied by biologists. The Science Expo draws as many as 10,000 visitors annually.

11 February 2017: With other Pfennig lab members, hosted an interactive display at the North Carolina Museum of Natural Sciences annual Darwin Day event. Used my research in combination with that of others in the Pfennig lab as examples; engaged the lay public in discussions of evolution and how evolution is studied by biologists. The event drew 4,811 visitors.

October 2016: Provided mock graduate school admissions interviews for ten UNC undergraduates enrolled in the Chancellor's Science Scholars (CSS) program; this program promotes entry of women and underrepresented minorities to graduate- and professional-degree programs.

August 2016 – 2020: UNC Pre-Graduate Education Advising Program: provided one-on-one advising for UNC undergraduate students seeking help with the graduate school application process. Aided students in school selection, contacting potential advisors, developing research ideas, test preparation, garnering funding, essay writing, application materials, and preparation for graduate studies.

August 2016 – 2017: UNC Biology Graduate Student Association: served as Treasurer; managed BGSA funds and expenditures in accordance with UNC regulations and state and federal law; helped organize and host social and academic events, including the annual Biology Department Research Symposium.

April 2016: UNC Science Expo: Provided tours of the Pfennig laboratory for the lay public.

Showcased my research using lab equipment and preserved and live animals for illustration; spoke with K-12 educators and students about undergraduate and graduate studies in biology. The Science Expo draws as many as 10,000 visitors annually.

July 2016: NC Museum of Natural Sciences Natural World iLab Exhibit: Co-hosted an interactive museum exhibit showcasing phenotypic plasticity, evolutionary ecology, and other topics studied in the Pfennig lab. Helped children and young adults learn to use dissection microscopes and other equipment; provided information and answered questions for approximately 100 museum visitors.

July 2016: NC Museum of Natural Sciences Micro World iLab Exhibit: Co-hosted an interactive museum exhibit showcasing hybridization and related phenomena studied in the Pfennig lab. Helped children and young adults with DNA extraction and other activities; provided information and answered questions about various genetics techniques and their applications in the study of hybridization and evolution for approximately 100 museum visitors.

### **Professional Positions**

(references available upon request)

2022-23: Postdoctoral researcher, North Carolina State University, lab of Dr. Christina Zakas.

2014-15: Senior Manufacturing Associate at KBI Biopharma in Boulder, CO. Biopharmaceutical manufacturing at scale, document writing (SOPs, batch records, protocols, reports, etc.), tech-transfer/scale-up, qualification/validation, equipment maintenance, and laboratory-scale process-development work. *E. coli* fermentation, *E. coli* seed bank production, protein refolding, HPLC protein purification, and tangential-flow filtration at bench, pilot, and manufacturing scales. Personally developed numerous protocols and associated documentation for new drug-manufacturing processes while interfacing with scientists and engineers from client companies.

2014: Contract position at Reckitt-Benckiser Pharmaceuticals in Fort Collins, CO. Researched, planned, and began implementation and qualification of a new human visual-inspection program for prefilled syringes.

2010-13: Technician at Merck biopharmaceutical facility in Boulder, CO. Biopharmaceutical manufacturing at scale, document writing (SOPs, batch records, protocols, reports, etc.), tech transfer/scale-up, qualification/validation, equipment maintenance, and laboratory-scale process development work. *E. coli* fermentation, protein refolding, HPLC protein purification, and tangential-flow filtration at bench, pilot, and manufacturing scales. Included a three-month assignment in the Netherlands aiding Dutch colleagues with HPLC operations.

### **Honors and Distinctions**

Graduated Cornell College magna cum laude 2009  
Cornell College Deans' list 2005-2009

Frank G. Brooks Outstanding Cornell College Senior Biology Major Award 2009  
Frank G. Brooks Outstanding Cornell College Junior Biology Major Award 2008

### **Academic and Professional Societies**

American Association for the Advancement of Science: member  
American Society of Naturalists: member  
Society for the Study of Evolution: member  
International Society for Behavioral Ecology: member  
Animal Behavior Society: member  
Society for Integrative and Comparative Biology: member  
Association of Southeastern Biologists: member  
Society for the Study of Amphibians and Reptiles: member  
Sigma Xi Scientific Research Society: member  
Tri-Beta Biological Honor Society: member  
North Carolina Herpetological Society: member