COS NEWS

Biology doctoral students receive NSF funding for research

Three UT Arlington doctoral students in biology have received funding from the National Science Foundation to further their dissertation research.

Daren Card, Drew Schield and Alex Hall were selected to receive funds from the NSF's Doctoral Dissertation Improvement Grants (DDIG) program, which typically awards funding to 100-200 projects nationwide each year. Card and Schield each will receive $19,695, while Hall was awarded $16,993. Few institutions receive multiple DDIG awards each year, and the fact that UT Arlington earned three speaks highly of the level of work being done by its student researchers, said Laura Gough, professor and interim chair of the Department of Biology.

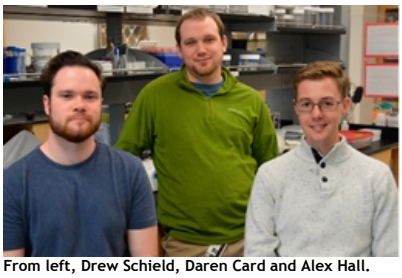
"These students and their mentors are conducting world-class research into important evolutionary biology questions," Gough said. "These grants bring prestige and accolades to the students and their mentors, as well as to our department and the University."

Hall is a fourth-year Ph.D. candidate in the lab of Matthew Fujita, assistant professor of biology. His project, titled "Origins of Parthenogenesis in the Common Checkered Whiptail", will seek to identify evolutionary processes which shape diversity in a clonally-reproducing lizard. Most species utilize sexual reproduction, which can generate and maintain biodiversity, but a few use clonal reproduction.

"Understanding the evolutionary trajectories of unisexual populations will help identify why sex is the prevalent mode of reproduction for life on Earth," Hall said. "This project will address the ability of clonal reproduction in generating genetic diversity in unisexual lizards, the only group of vertebrates capable of reproducing without any input from males. The goals of this project are to identify the evolutionary processes that shape organismal diversity in a clonally-reproducing lizard."

Most vertebrate species maintain genetic variation by reproducing sexually, but several all-female lizards reproduce without males by cloning themselves; mothers beget daughters whose genomes are all but identical, Hall explained. However, cloning is imperfect: because of mutation, individuals may not produce genetically-identical clones. The study will utilize emerging genomic approaches and unique lizard models to investigate the tempo and mode of mutation processes generating diversity in a clonally-reproducing lizard, thus providing insight into the origins and evolution of unisexuality in vertebrates.

Card is a third-year Ph.D. candidate in the lab of Todd Castoe, assistant professor of biology. His project, titled "Genomic basis of convergent phenotypic evolution in island populations of boa constrictors", will examine what drives the ability of boas to evolve dwarfed body size multiple times on multiple independent islands.



From left, Drew Schield, Daren Card and Alex Hall.

"The drastic variation between normal, large-sized mainland boas and their closely-related dwarfed island relatives suggests that a relatively small number of highly penetrant genetic variants in the Boa constrictor genome may underlie island dwarfism, and that this system may therefore provide new insight into the genetics of body size in vertebrates," Card said.

The project will also leverage the replicated evolution of dwarf populations of Boa constrictor to investigate if repeated evolution of dwarfism is driven by shared or unique genes or functional pathways across multiple independently evolved dwarf island populations, Card added. The work will therefore address fundamental topics in evolutionary biology, including the genetic bases of local adaptation in natural populations and the propensity for genetic convergence to drive phenotypic convergence.

Schield is a third-year Ph.D. candidate in the Castoe lab, studying the population genetics of speciation and adaptation in vertebrates. His project, titled "Delineation of populations, species, and genomic adaptations across a widely distributed venomous snake species complex", will attempt to answer how adaptations evolve over time in these species to better suit them to their environment. In particular, the study seeks to understand whether the same evolutionary forces and processes may act in a similar manner to produce locally adaptive traits in closely related lineages. The project will focus on a unique system of North American rattlesnake, the Crotalus viridis species complex.

"Snakes of this group are highly diverse in their coloration, size, and venom composition, and thrive in diverse ecoregions," Schield said. "This research program will first generate a robust understanding of the evolutionary relationships among members of this group, which will also provide a contextual framework for testing hypotheses of how natural selection has driven their diversification. We will then use information collected from throughout the genomes of these lineages to look for evidence of genes and sets of genes that are common targets of selection for local adaptation."

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