

Annotated Curriculum Vitae

Adam Keener: McNair Scholar

Dr. Jesse Barber: Mentor

Biological Sciences, Ecology



Abstract

An annotated curriculum vitae is provided highlighting my accomplishments during my time as a McNair Scholar. Peer-reviewed publications, presentations, grants and awards, and research expeditions are listed and described. Additionally, a brief description of my research interests and long term goals is provided. The annotated curriculum vitae ends with a statement on the importance of studying sensory ecology.

Research Interests

I am broadly interested in sensory ecology and predator-prey interactions. My research has concentrated on bat-prey dynamics from several angles. Within the bat-moth arms race, my focus has been examining moth anti-predator defenses that circumvent capture by bats. I'm also interested in how multiple sensory modalities work synergistically, which I've explored in gleaning bats and their terrestrial prey. My long-term research goals are to move into visual ecology and pursue research that combines both acoustic and visual predator-prey questions in a multimodal framework.

Publications

Barber JR, Leavell BC, **Keener AL**, Breinholt JW, Chadwell BA, McClure CJW, Hill GM, Kawahara AY. *Moth tails divert bat attack: Evolution of acoustic deflection*. Proceedings of the National Academy of Sciences (2015).

Abstract: Bats and moths have been engaged in acoustic warfare for more than 60 million years. Yet almost half of moth species lack bat-detecting ears and still face intense bat predation. We hypothesized that the long tails of one group of seemingly defenseless moths, saturniids, are an anti-bat strategy designed to divert bat attacks. Using high-speed infrared videography, we show that the spinning hindwing tails of luna moths lure echolocating bat attacks to these nonessential appendages in over half of bat-moth interactions. Further we show that long hindwing tails have independently evolved multiple times in saturniid moths. This finding expands our knowledge of antipredator deflection strategies, the limitations of bat sonar, and the extent of a long-standing evolutionary arms race.

Presentations

Oral Presentations

Keener AL, Barber JR. 2014. *Investigating Subtle Behavior in a Predator-Prey Interaction using the Pallid Bat (*Antrozous pallidus*)*. Presented at the 2014 Idaho Conference on Undergraduate Research. Boise State University, Boise, ID. Oral presentation.

An oral presentation examining bat-scorpion interactions and the limitations of the current literature. Heavy emphasis was placed on investigating subtle metrics that have been overlooked—flight metrics that require 3D videography, and qualitative metrics that require high framerate, high resolution video collection.

Poster Presentations

Keener AL, Barber JR. 2014. *Are bats wary of scorpions? A test of sensory foraging behavior in the gleaning bat, *Antrozous pallidus**. Presented at the 2014 Idaho Conference on Undergraduate Research. Boise State University, Boise, ID. Poster.

A proposal to examine bat-scorpion dynamics by measuring latency to capture under a variety of conditions. Latency to capture is intended to serve as a proxy to the amount of risk a bat poses while hunting scorpions. Examining this metric under conditions that limit the use of certain senses can illustrate the importance of each sense in dealing with risky prey.

Keener AL, Barber JR. 2014. *Can bats tell footstep sounds apart?: A test of novel prey discrimination in the pallid bat, *Antrozous pallidus**. Presented at the 11th Annual Undergraduate Research and Scholarship Conference. Boise State University, Boise, ID. Poster.

Proposal to investigate discrimination abilities in a local gleaning bat. Aerial hawking bats are believed to be unable to discriminate prey due to bioacoustical constraints imposed by echolocation. However, gleaning bats should not be under such a constraint because they utilize passive listening for prey localization. This proposal suggests examining whether gleaning bats are able to discriminate between prey by listening to their footsteps.

Olvera R, Bunkley JP, Mroz Z, Leavell BC, **Keener AL**, Barber JR. 2014. *Effects of Anthropogenic Noise on the Foraging Efficiency and Echolocation Characteristics of the Pallid Bat, *Antrozous pallidus**. Presented at the 11th Annual Undergraduate Research and Scholarship Conference. Boise State University, Boise, ID. Poster.

This poster presented conservation-related research examining the effects of anthropogenic noise on a local gleaning bat. Presence of anthropogenic noise increased latency to capture prey items, showing an impact on foraging ability.

Research Expeditions

Panama, June 2013

Conducted international research on bat-moth interactions with Dr. Jesse Barber and Dr. Akito Kawahara from the University of Florida. Work was funded by an NSF grant. Involved field work, data collection, and animal care at the Smithsonian Tropical Research Institute on Barro Colorado Island, Gamboa, and greater Panama. Collected bioacoustic, behavioral, and genetic data.

French Guiana, May 2014

Further investigated bat-moth interactions broadly with Dr. Jesse Barber and Dr. Akito Kawahara at the Nouragues Research Station in French Guiana. Involved field work, bat mistnetting, animal care, and collection of bioacoustic, behavioral, and genetic data.

Grants and Awards

McNair Scholar, Boise State University (2013-current)

McNair Scholars are underrepresented students that aim for advanced degrees. Scholars are selected after a competitive application process. McNair Scholars are required to design and conduct research with faculty mentors, as well as engaging in two years of preparation for academia.

McNair Research Scholarship (2013-2014, Amount of **\$2,800**)

A research stipend awarded for work towards McNair-directed research. These funds went towards a project examining the partitioning of sensory tasks in the pallid bat (*Antrozous pallidus*). This research is scheduled to go out for review in a peer-reviewed publication in May 2015.

Northwest Scientific Association Grant Award (2014, Amount of **\$1,500**)

A highly competitive award given to the winners of a grant competition by a regional scientific association. My submission of “Can bats tell footstep sounds apart?: A test of a novel form of prey discrimination in the pallid bat, *Antrozous pallidus*” was selected. I was one of 11 grants awarded from a pool of 78 candidates. Ninety percent of applications were from MS or PhD candidates, and I was one of two undergraduates selected.

Purdue Doctoral Fellowship (2015-2017, Amount of **\$24,000 / year**)

A highly competitive fellowship that supports outstanding Ph.D-track students at Purdue that enhance the diversity of the student body through their diverse backgrounds, views, and experiences. Two years of full stipend support is awarded as well as a guarantee of two additional years of support.

Dr. P.T. Gilham Graduate Fellowship (2015, Amount of **\$3,000**).

An honorary fellowship given to the brightest and most capable students of the entering graduate class at Purdue University. Intended to provide young scientists with resources to ignite their scientific careers with a one-time award.

Research Importance

Sensory ecology allows us to examine information exchange over a vast number of ecological interactions. Important drivers of evolution such as finding and capturing prey, detecting and avoiding predators, and finding and judging mates are governed by information acquisition and efficiency. Examining sensory abilities and how such abilities are utilized provides a window into these essential drivers of evolution. Implementing sensory experiments can allow us to examine dynamics between predators and prey and signaler and receiver at the most fundamental levels.

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