

Jessica L. Hanson, Ph.D.

Research Associate

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Education

Ph.D. in Ecology Evolution, and Behavior	2014
Physiology and Behavior concentration, Neuroscience minor	
Indiana University	Bloomington, IN
B.S. in Biological Sciences	2008
Wildlife and Fisheries Biology minor	
Clemson University	Clemson, SC

Professional Appointments

Post-doctoral Trainee/ Research Associate	2021 - present
Institute for Behavioral Genetics, University of Colorado	Boulder, CO
Assistant Scientist	2019 - 2020
New York University Langone Health	New York, NY
Laboratory Specialist	2016 - 2018
University of Utah and VA Salt Lake City Health Care System	Salt Lake City, UT
Postdoctoral Researcher	2014 - 2015
Department of Biology, University of Utah	Salt Lake City, UT

Recent Research Experience

PI: Dr. Bernardo Rudy	NYU Langone Health
Advisor: Dr. Robert Machold	2019 – 2020

Project: Taste learning is differentially affected by selective elimination of forebrain and brainstem sources of acetylcholine.

Technical Contributions:

I developed a paradigm to test taste neophobia and conditioned taste aversion. I managed a breeding colony of wild-type mice used for pilot data. I provided daily care for each mouse during restricted water diet. I performed all IP injections to induce gastrointestinal malaise and all behavioral observations. I collected and analyzed all water consumption data. The intent for this project was to establish a new behavioral paradigm for our research group to investigate the function of layer 1 (L1) of the prefrontal cortex. The paradigm was successfully used to show differences in taste learning in mice with selective populations of cholinergic neurons intersectionally knocked out (unpublished).

Project: The laminar distribution and density of cortical interneurons expressing vasoactive intestinal peptide (VIP).

Technical Contributions:

I perfused mice and sliced fixed brains. I validated the transgenic mouse lines reporting presence of VIP and calretinin (CR), or VIP and cholecystokinin (CCK) with immunostaining and used confocal microscopy to image several neocortical brain regions, including somatosensory cortex, medial prefrontal cortex, motor cortex, and entorhinal cortex. I used Neurolucida and ImageJ to quantify and SPSS to statistically analyze the relative cortical depth and density of sub-populations of VIP interneurons. My quantification established the presence of a population of VIP interneurons not characterized by either CR or CCK. We plan to publish this work along with electrophysiological data showing relationships among anatomical and physiological features.

Project: The location of thalamic cells projecting to superficial layers of the neocortex.

Technical Contributions:

I stereotactically targeted superficial somatosensory cortex and medial prefrontal cortex with canine adenovirus (CAV) which expressed cre-dependent Tdtomato in mice selectively expressing cre in thalamic cells. I prepared and imaged thalamic brain sections and identified the locations of labeled thalamic cells. This work informed our research group about connectivity between the thalamus and L1 of the cortex for further investigation of the function of L1.

Publications

Wong H, Buck JM, Borski C, Pafford JT, Keller BK, Milstead RA, Hanson JL, Stitzel JA, Hoeffler CA (2022) RCAN1 knockout and overexpression recapitulate an ensemble of rest-activity and circadian disruptions characteristic of Down syndrome, Alzheimer's disease, and normative aging. *Journal of Neurodevelopmental Disorders*.

Alluri RK, Rose GJ, Leary CJ, Palaparthi A, Hanson JL, Vasquez-Opazo GA, Graham JA, Luong K (2021) How auditory selectivity for sound timing arises: The diverse roles of GABAergic inhibition in shaping the excitation to interval-selective midbrain neurons. *Progress in Neurobiology*.

Hanson JL, and Hurley LM (2016) Serotonin, estrus, and social context influence c-fos immunoreactivity in the inferior colliculus. *Behavioral Neuroscience*.

Alluri RK, Rose GJ, Hanson JL, Leary CJ, Vasquez-Opazo GA, Wilkerson J (2016) Phasic supra-threshold excitation and sustained inhibition underlie neuronal selectivity for short-duration sounds. *Proceedings of the National Academy of Sciences*.

Hanson JL, Rose GJ, Leary CJ, Graham JA, Alluri RK, Vasquez-Opazo GA (2016) Species-specificity of temporal processing in the auditory midbrain of gray treefrogs: Long-interval neurons. *Journal of Comparative Physiology A*.

Rose GJ, Hanson JL, Leary CJ, Graham JA, Alluri RK, Vasquez-Opazo GA (2015) Species-specificity of temporal processing in the auditory midbrain of gray treefrogs: Interval-counting neurons. *Journal of Comparative Physiology A*.

Hanson JL, Hurley LM (2013) Context-dependent fluctuation of serotonin in the auditory midbrain: the influence of sex, reproductive state, and experience. *Journal of Experimental Biology*. 217(Pt 4).

Hanson JL, Hurley LM (2012) Female Presence and Estrous State Influence Mouse Ultrasonic Courtship Vocalizations. *PLoS ONE* 7(7).

Presentations

Talks

Communicating species identity: a neural correlate of behavioral preference in closely related diploid and tetraploid frog species. Center for Integrative Studies in Animal Behavior, 22nd Annual Animal Behavior Conference: Indiana University, Bloomington, IN. (2015).

What does the mouse say? Modulation of auditory processing by serotonin. Ecology, Evolution, and Behavior Brown Bag Seminar Series: Indiana University, Bloomington, IN. (2014).

Endogenous fluctuation of serotonin in the female auditory midbrain. Center for Integrative Studies in Animal Behavior, 20th Annual Animal Behavior Conference: Indiana University, Bloomington, IN. (2013)

Mouse ultrasonic vocalizations in context. 13th Annual W.M. Keck Center for Behavioral Biology Student and Postdoc Symposium: North Carolina State University, Raleigh, NC. (2012).

Context dependent auditory plasticity. Ecology, Evolution, and Behavior Brown Bag Seminar Series: Indiana University, Bloomington, IN. (2010).

Posters

Treating Osteomyelitis with a single local infusion of vancomycin. Microbial Pathogenesis Retreat: Salt Lake City, UT. (2016).

Does serotonin modulate processing of courtship vocalizations in the inferior colliculus of the female mice? Brains and Behavior Annual Spring Retreat, Neuroscience Institute: Georgia State University, Atlanta, GA. (2014).

Context-dependent modulation of neural activation by serotonin in the auditory midbrain of female mice. Gordon Research Conference series, Neuroethology: Behavior, Evolution & Neurobiology: Mount Snow Resort, VT. (2013).

Mouse ultrasonic vocal behavior during courtship; influence of female presence, estrous state, and resident/intruder status. The Tenth International Congress of Neuroethology: University of Maryland, College Park, MD. (2012).

Variation in male USVs produced during and after female interaction. Producing and Perceiving Complex Acoustic Signals: Songbirds and Mice as Model Systems: HHMI Janelia Farm Research Campus, Ashburn, VA. (2011).

Serotonin release in the auditory midbrain during acute stress. The Association for Research in Otolaryngology Midwinter Meeting: Anaheim, CA. (2010).

Honors and Awards

Invited discussion leader, Neuroethology class, University of California Riverside	2015
Heiligenberg Travel Award, International Society for Neuroethology (\$700)	2013
Center for the Integrative Study of Animal Behavior Travel Award (\$400)	2010 and 2012
Graduate Research Fellowship, National Science Foundation (\$30,000 yearly, 3 years)	2010

Teaching/Mentoring Experience:

Teaching

Associate Instructor, Indiana University	Bloomington, IN
Vertebrate Zoology Laboratory	Spring 2013
Invertebrate Zoology Laboratory	Fall 2012
Introductory Biology Laboratory	Fall 2008 and Spring 2009
Undergraduate Teaching Assistant, Clemson University	Clemson, SC
Vertebrate Biology Laboratory and Lecture	Fall 2006, Spring and Fall 2007

Mentoring

CU Boulder	Boulder, CO
Mentee: Samantha Cotto	2022
Science, Technology, and Math Program	
Indiana University	Bloomington, IN
The STM Program supported female minority undergraduate interns. As a mentor I provided guidance for student experience in laboratory techniques, discussion of primary literature, and the interpretation and presentation of results.	
Intern: Zita Erbowor-Becksen	2013
National Science Foundation Research Experience for Undergraduates	
Indiana University	Bloomington, IN
As a mentor I oversaw the completion and presentation of student independent research projects, participated in their weekly journal club, and chaperoned field trips.	
Intern: Shannon Perry	2012
Intern: Johnny Saldate	2010

Lilly Scholar Program

Indiana University

Bloomington, IN

The Lilly Scholar program supported underprivileged high school students for one week of laboratory experience. As a mentor I introduced students to basic principles of primary research and data collection methods.

Intern: Kirsten Martin

2010

Intern: Jacqueline Moore

2009