CHRISTA A. BAKER

(she/her)
Assistant Professor, Dept. of Biological Sciences
Genetics | Comparative Biomedical Sciences | Comparative Medicine Institute | Biotechnology
North Carolina State University, Raleigh, NC, USA
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EDUCATION

2015 **Washington University in St. Louis**, St. Louis, MO
PhD, Neuroscience

2006 **University of Pennsylvania,** Philadelphia, PA
Bachelor of Science in Engineering, Bioengineering, cum laude

RESEARCH EXPERIENCE

2015-2022 **Princeton University, Princeton Neuroscience Institute,** Princeton, NJ
Jane Coffin Childs Postdoctoral Research Fellow, Lab of Dr. Mala Murthy

2009-2015 **Washington University in St. Louis, Department of Biology,** St. Louis, MO
Graduate Student, Lab of Dr. Bruce Carlson

2006-2009 **Johns Hopkins University, Department of Otolaryngology,** Baltimore, MD
Research Technologist, Lab of Dr. David Ryugo

2005 **Ohio State University, Department of Mechanical Engineering,** Columbus, OH
NSF Research Experience for Undergraduates Fellow, Lab of Dr. A.T. Conlisk

HONORS AND AWARDS

2024 C.J. Herrick Award in Neuroanatomy, American Association for Anatomy
2016-2019 Jane Coffin Childs Memorial Fund Postdoctoral Fellowship
2016-2018 NSF Postdoctoral Research Fellowship in Biology, declined
2015 Finalist, James L. O'Leary Prizes for Excellence in Neuroscience Research
2013-2015 Ruth L. Kirchstein National Research Service Award, National Institutes of Health
2013-2015 Early Career Representative to the International Society for Neuroethology Council
2013 Society for Neuroscience Travel Award Nominee for St. Louis Chapter
2012-2014 Student Representative to the Neuroscience Steering Committee, Washington University in St. Louis
2011 Honorable Mention, National Science Foundation Graduate Research Fellowship
2010-2012 Cognitive, Computational, and Systems Neuroscience Training Grant
2005-2006 Dean's List, University of Pennsylvania
2005 Innovation Fund Grant, Weiss Tech House, University of Pennsylvania

FUNDING

2016-2019 Jane Coffin Childs Memorial Fund Fellowship ($160,500 in total costs)
2016-2018 NSF Postdoctoral Research Fellowship in Biology ($138,000 in total costs), declined
2013-2015 Ruth L. Kirchstein Predoctoral National Research Service Award, National Institutes of Health ($60,078 in total costs)
2010-2012 Cognitive, Computational, and Systems Neuroscience Training Grant
2005 Innovation Fund Grant, Weiss Tech House, University of Pennsylvania ($1,000 in total costs)

TEACHING EXPERIENCE

Spring 2023 North Carolina State University, Raleigh, NC
Instructor, *Special Topics in Biology: Acoustic Communication*

Summer 2017, 2018 Princeton Undergraduate Preparatory Program, Princeton, NJ
Guest lecturer, *Fundamental Neuroscience* and *Optogenetics Lab*

Fall 2016, 2018 Princeton University, Princeton Neuroscience Institute, Princeton, NJ
Guest lecturer, *Cellular Neuroscience*

Fall 2012, 2014 Washington University in St. Louis, Department of Physical Therapy, St. Louis, MO
Guest lecturer, *Movement Science III – Biocontrol Mechanisms*

Spring 2014 Washington University in St. Louis, Department of Biology, St. Louis, MO
Guest lecturer, *Introduction to Neuroethology*

Fall 2012 Washington University in St. Louis, Department of Biology, St. Louis, MO
Head Teaching Assistant, *Neurophysiology Lab*

Fall 2010 Washington University in St. Louis, Department of Biology, St. Louis, MO
Teaching Assistant, *Neurophysiology Lab*

PUBLICATIONS

Pang R, **Baker CA**, Murthy M, Pillow J. Inferring neural dynamics of memory during naturalistic social communication. *bioRxiv* 2024. https://doi.org/10.1101/2024.01.26.577404

Baker CA, Guan X-J, Choi M, Murthy M. The role of *fruitless* in specifying courtship behaviors across divergent *Drosophila* species*. bioRxiv* 2023. https://doi.org/10.1101/2023.09.01.556001(*accepted at Science Advances)*

Baker CA, McKellar C, Pang R, Nern A, Dorkenwald S, Pacheco DA, Eckstein N, Funke J, Dickson BJ, Murthy M. (2022) Neural network organization for courtship-song feature detection in *Drosophila*. *Current Biology* 32:3317-3333.

Dorkenwald S*, McKellar C*, Macrina T*, Kemnitz N*, Lee K*, Lu R*, Wu J*, Popovych S, Mitchell E, Nehoran B, Jia Z, Bae JA, Mu S, Ih D, Castro M, Ogedengbe O, Halageri A, Kuehner K, Sterling AR, Ashwood Z, Zung J, Brittain D, Collman F, Schneider-Mizell C, Jordan C, Silversmith W, **Baker CA**, Deutsch D, Encarnacion-Rivera L, Kumar S, Burke A, Bland D, Gager J, Hebditch J, Koolman S, Moore M, Morejohn S, Silverman B, Willie K, Willie R, Yu S, Murthy M, Seung HS. (2021) FlyWire: online community for whole-brain connectomics. *Nature Methods* 19:119-128. *, equal authors.

Baker CA, Clemens J, Murthy M. (2019) Acoustic pattern recognition and courtship songs: insights from insects. *Annual Review of Neuroscience* 42:1.

Baker CA, Carlson BA. (2019) Electric Signals. In: Choe JC (Ed), *Encyclopedia of Animal Behavior* (2nd ed), vol 1, pp. 474-485. Elsevier, Academic Press.

Baker CA, Ma L[#], Casareale CR[#], Carlson BA. (2016) Behavioral and single-neuron sensitivity to millisecond variations in temporally patterned electric communication signals. *Journal of Neuroscience* 36:8985-9000. [#], undergraduate co-author.

Baker CA, Huck KR[#], Carlson BA. (2015) Peripheral sensory coding through oscillatory synchrony in weakly electric fish. *eLife* 4:e08163 [featured in PhysOrg, Electronics Weekly, Newswise, Futurity, redOrbit]. [#], undergraduate co-author.

Baker CA, Carlson BA. (2014) Short-term depression, temporal summation, and onset inhibition shape interval tuning in midbrain neurons. *Journal of Neuroscience* 34:14272-14287.

Baker CA, Kohashi T, Lyons-Warren AM, Ma X, Carlson BA. (2013) Multiplexed temporal coding of electric communication signals in mormyrid fishes. *Journal of Experimental Biology* 216:2365-2379.

Baker CA, Montey KL, Pongstaporn T, Ryugo DK. (2010) Postnatal development of the endbulb of Held in congenitally deaf cats. *Frontiers in Neuroanatomy* 4:19.

O'Neil JN, Limb CJ, **Baker CA**, Ryugo DK. (2010) Bilateral effects of unilateral cochlear implantation in congenitally deaf cats. *Journal of Comparative Neurology* 518:2382-2404.

Ryugo DK, **Baker CA**, Montey KL, Chang LY, Coco A, Fallon JB, Shepherd RK. (2010) Synaptic plasticity after chemical deafening and electrical stimulation of the auditory nerve. *Journal of Comparative Neurology* 518:1046-1063.

MANUSCRIPT IN PREPARATION

Lockwood SE, Murthy M, **Baker CA**. A lack of neuromodulation in the female *Drosophila* auditory connectome.

PRESENTATIONS AND POSTERS

talks:

Baker CA, Guan X-J, Choi M, Murthy M. (2023) The evolving role of *fruitless* in courtship behaviors of divergent species of *Drosophila. Janelia Neuro-Evo Conference.* (talk)

Baker CA, McKellar C, Pang R, Nern A, Dorkenwald S, Pacheco DA, Eckstein N, Funke J, Dickson BJ, Murthy M. (2022) Neural network organization for courtship-song feature detection in *Drosophila*. *Connectomics Conference.* (talk)

Baker CA, Guan X-J, Choi M, Murthy M. (2021) Divergence in the role of *fruitless* in specifying male courtship behaviors in *Drosophila virilis. Cold Spring Harbor Neurobiology of Drosophila conference.* (talk)

Baker CA, Guan X-J, Choi M, Murthy M. (2019) Specification of male versus female acoustic communication behaviors in *Drosophila virilis*. *European Drosophila Research Conference.* (talk)

Baker CA, Guan X-J, Fletcher M, Murthy M. (2017) Specification of male versus female acoustic communication behaviors in *Drosophila virilis*. *J.B. Johnston Club for Evolutionary Neuroscience.* (talk)

Baker CA, Huck K, Carlson BA. (2016) Evolutionary divergence in peripheral sensory coding strategies in mormyrid weakly electric fishes. *Janelia Junior Scientist Workshop on Evolution of Behavior*. (talk)

Baker CA, Huck K, Carlson BA. (2014) Evolutionary divergence in peripheral sensory coding strategies in mormyrid weakly electric fishes. *J.B. Johnston Club for Evolutionary Neuroscience*. (talk)

Baker CA, Huck K, Carlson BA. (2013) Evolutionary divergence in peripheral sensory coding strategies in mormyrid weakly electric fishes. *J.B. Johnston Club for Evolutionary Neuroscience*. (talk)

posters:

Baker CA, McKellar CM, Nern A, Dickson BJ, Murthy M. (2020) Uncovering the neural mechanisms that generate selectivity for song features in *Drosophila*. *Cold Spring Harbor Neuronal Circuits conference.* (virtual poster)

Baker CA, McKellar CM, Nern A, Dickson BJ, Murthy M. (2019) Uncovering the neural mechanisms that generate selectivity for song features in *Drosophila*. *Neurobiology of Drosophila.* (poster)

Baker CA, McKellar CM, Nern A, Dickson BJ, Murthy M. (2019) Uncovering the neural mechanisms that generate selectivity for song features in *Drosophila*. *European Drosophila Research Conference.* (poster)

Baker CA, Guan X-J, Choi, M, Murthy M. (2019) Specification of male versus female acoustic communication behaviors in *Drosophila virilis. New Genetic Tools for Non-Model Organisms.* (poster)

Baker CA, Guan X-J, Fletcher M, Murthy M. (2017) Specification of male versus female acoustic communication behaviors in *Drosophila virilis. Neurobiology of Drosophila*. (poster)

Baker CA, Guan X-G, Murthy M. (2016) Specification of male versus female acoustic communication behaviors in *Drosophila virilis. Genome Engineering: The CRISPR/Cas 9 Revolution*. (poster)

Baker CA, Guan X-J, Murthy M. (2016) Specification of male versus female acoustic communication behaviors in *Drosophila virilis*. *Society for Neuroscience*. (poster)

Baker CA, Huck K, Carlson BA. (2016) Evolutionary divergence in peripheral sensory coding strategies in mormyrid weakly electric fishes. *Janelia Junior Scientist Workshop on Evolution of Behavior*. (poster)

Baker CA, Huck K, Carlson BA. (2014) Phase and amplitude modulations of oscillatory sensory receptors mediate detection of high-frequency group communication signals in an electric fish. *International Congress of Neuroethology.*

Baker CA, Ma X, Carlson BA. (2014) Spike-timing-dependent plasticity shapes interval selectivity of electrosensory midbrain neurons. *Society for Neuroscience*. (poster)

Baker CA, Ma L, Casareale CR, Carlson BA. (2013) Behavioral and single-neuron sensitivity to millisecond timing variations in communication signals of weakly electric fish. *Society for Neuroscience*. (poster)

Baker CA, Ma X, Carlson BA. (2012) Differences in short-term synaptic depression of excitatory and inhibitory pathways contribute to temporal pattern recognition. *International Congress of Neuroethology*. (poster)

Nardos B, Crawford DC, **Baker CA**, Israel EJ, Roman CM, Encarnacion CH, Herzog ED, Thoroughman KA. (2010) The Amazing Brain Carnival: a graduate student-designed brain awareness experience for the public. *Society for Neuroscience*. (poster)

Baker CA, Montey KL, Pongstaporn T, Ryugo DK. (2009) Development of the endbulb of Held in congenitally deaf cats. *Association for Research in Otolaryngology*. (poster)

INVITED TALKS

2023 Duke University, Biology/Neurobiology
2022 Johns Hopkins University Applied Physics Laboratory
2022 Arizona State University, Neuroscience
2022 North Carolina State University, Biological Sciences
2022 University of Southern California, Biological Sciences
2022 University of Nevada – Las Vegas, Psychology
2022 Washington University of Medicine in St. Louis, Neuroscience
2022 Boston University, Biology
2021 West Virginia University, Biomedical Engineering
2021 University of Queensland, Queensland Brain Institute
2021 University of Texas – Southwestern Medical Center, Neuroscience
2021 University of Maryland, Biology
2021 NIH Brain Connectivity Workshop
2020 Emerging Models Symposium, Florida Atlantic University Program in Neurogenetics, *cancelled (COVID-19)*
2019 European Drosophila Research Conference, Engineering non-melanogaster drosophilids and other insects workshop
2019 Jane Coffin Childs Fellows Symposium
2018 Columbia University, NeuroLunch series
2018 Princeton University, Molecular Biology
2014 Princeton University, Princeton Neuroscience Institute
2014 Michigan State University
2014 University of Pittsburgh

COLLABORATIONS

2017-present Collaboration with Dr. Darcy B. Kelley, Columbia University, to automatically identify and segment frog vocalizations, with the ultimate goal of identifying the genetic basis of acoustic call parameters.
2016-2022 Collaboration with Dr. Barry J. Dickson, Janelia Research Campus, to find novel third- and fourth-order auditory neurons in *Drosophila*, with the ultimate goal of understanding auditory coding.

STUDENTS MENTORED

2023-present Ayush Pathak (Baker lab Computer Science Master's student)
2023-present Emma Payne (Baker lab undergraduate student)
2023-present Juman Odeh (Baker lab undergraduate student)
2023-present Morgan Cumberland (Baker lab undergraduate student)
2023 Sam Hesi (Baker lab undergraduate student)
2022-present Emma Droste (Baker lab Genetics PhD student)
2022-2023 Sophie Lockwood (Murthy lab undergraduate student), awarded Brinster Prize for best undergraduate neuroscience thesis
2018-2019 Sage Palmedo (Murthy lab undergraduate student), awarded Brinster Prize for best undergraduate neuroscience thesis
2017 Micah Fletcher (Murthy lab rotation PhD student)
2016 Camden Macdowell (Murthy lab rotation PhD student)
2013 Chelsea Casareale* (Carlson lab undergraduate student)
2013 Kevin Huck* (Carlson lab undergraduate student)

2012 Lisa Ma* (Carlson lab undergraduate student)
*publication co-authors

SERVICE WORK

2023-present Reviewer, *Current Biology*
2014-2022 Co-reviewer, *Cell Reports, Current Biology, Journal of Neuroscience Methods*, *Journal of Neuroscience, Neuron*
2021 Reviewer, *Proceedings of the Royal Society B: Biological Sciences*
2017-2018 Silent Auction Chair, JB Johnston Club for Evolutionary Neuroscience
2017 Judge, Connecticut STEM Foundation High School Science Fair, Darien, CT
2014-2016 International Society for Neuroethology Fellows Selection Committee
2016 Reviewer, *Journal of Experimental Biology*
2013-2015 Early Career Representative to the International Society for Neuroethology Council
2012-2014 Student Representative to the Neuroscience Steering Committee, Washington University in St. Louis

OUTREACH

2023 Volunteer Neuroscience Educator, Brain Night, NC Museum of Natural Sciences, Raleigh, NC
2017-2019 Volunteer Neuroscience Educator, Young Women's Conference, Princeton, NJ
2018 Volunteer STEM Educator, Trenton YMCA Summer Camp, Trenton, NJ
2017 Volunteer Neuroscience Educator, STEMCivics High School, Trenton, NJ
2009-2015 Volunteer Neuroscience Educator, Saint Louis Science Center, St. Louis, MO
2009-2011 Volunteer, Young Scientist Program, Neuroscience Teaching Team, St. Louis, MO
2007-2009 Volunteer Math Tutor, Greater Homewood Adult Literacy, Baltimore, MD
2005-2006 Volunteer Math Tutor, Academy of Automotive and Mechanical Engineering, Philadelphia, PA

PROFESSIONAL MEMBERSHIP

2013-present Society for Neuroscience
2013-present J. B. Johnston Club for Evolutionary Neuroscience
2012-present International Society for Neuroethology
2008-2010 Association for Research in Otolaryngology