

César D. M. Vargas

Laboratory of Neurogenetics of Language
The Rockefeller University, 1230 York Avenue
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EDUCATION

The Rockefeller University, New York, NY The David Rockefeller Graduate Program, Ph.D. Advisor: Dr. Erich Jarvis, Laboratory of Neurogenetics of Language	September 2023
Vanderbilt University, Nashville, TN B.A. in Neuroscience, Minor in History of Art Departmental Honors in Neuroscience; Honors Thesis under Dr. Vivien Casagrande	May 2016
University of St. Andrews, St. Andrews, Scotland, UK Study Abroad	Fall 2014

EXTERNAL COURSEWORK

<i>Interacting with Neural Circuits</i> , CAJAL Course, Champalimaud Institute for the Unknown	Summer 2019
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RESEARCH & EXPERIENCES

Laboratory of Neurogenetics of Language, The Rockefeller University, New York, NY <i>Graduate Fellow</i>	August 2017-Present
<ul style="list-style-type: none">• Researching the role of motor cortex on mouse ultrasonic vocalizations.• Used intracortical microstimulation (ICMS) and paired electromyography (EMG). Implemented these techniques in the lab as they had not been used in our group before.• Used intracranial and intramuscular viral injections (AAV & PRV) to study the neural anatomy of vocal circuits.• Collaborated on the development of a novel tool, Analysis of Mouse VOcal Communication (AMVOC), to improve the detection of vocalizations in offline analysis, and permit the detection and classification of vocalizations in real-time.• Developed a closed-loop operant training system to test the volitional control of vocalizations in mice.	
Department of Cell & Developmental Biology, Vanderbilt University, Nashville, TN <i>Undergraduate Researcher</i>	January 2015-May 2016
<ul style="list-style-type: none">• Investigated the changes in cortical connectivity and structure in sensory regions in autism spectrum disorders (ASDs) by using a mouse model with a known human mutation in the serotonin transporter.• Used immunohistochemistry and image analysis to assess anatomical changes in primary visual areas and secondary visual areas with known multisensory/auditory input.	
Department of Biological Science, Vanderbilt University, Nashville, TN <i>Undergraduate Research Assistant</i>	September 2013–May 2014
<ul style="list-style-type: none">• Investigated the asymmetric expression of the protein <i>her6</i> and its possible regulatory pathways in the habenula of zebrafish, as well as trying to understand <i>her6</i>'s role in promoting progenitor neurons to post-mitotic neurons.	
Center of Excellence in Neurosciences, Texas Tech University Health Sciences Center, El Paso, TX <i>Research Volunteer</i>	July–August 2014
ASPET Summer Research Program, Vanderbilt, Nashville, TN	Summer 2015
<ul style="list-style-type: none">• Provided funds during the summer to continue my research in the lab of Dr. Vivien Casagrande	

FUNDING & AWARDS

GRC: Carl Storm Underrepresented Minority (CSURM) Fellowship	August 2022
Kavli Neural Systems Institute, Pilot Grant	2019-2021
– \$25,000 grant awarded to pursue “early-stage projects with high technical or intellectual novelty.”	
HHMI Gilliam Fellowship for Advanced Study	2018
Departmental Honors in Neuroscience	May 2016
College of Arts and Science Conference Travel Award	October 2015

TALKS

Rockefeller Student Retreat The Rockefeller University, September 2022
Rockefeller Postdoctoral Association Seminar Series The Rockefeller University, August 2022
Neuromatch conference 3.0 Virtual, October 2020
Keizen Lecture Comparative Bioscience Center, The Rockefeller University, April 2019

PUBLICATIONS

Analysis of Mouse Vocal Communication (AMVOC): a deep, unsupervised method for rapid detection, analysis and classification of ultrasonic vocalisations.

Vasiliki Stoumpou, **César DM Vargas**, Peter F. Schade, J. Lomax Boyd, Theodoros Giannakopoulos, and Erich D. Jarvis. *Bioacoustics* (2022): 1-31.

DRUL for school: Opening Pre-K with safe, simple, sensitive saliva testing for SARS-CoV-2.

Mayu Frank, Nathalie E Blachere, Salina Parveen, Ezgi Hacısuleyman, John Fak, Joseph M Luna, Eleftherios Michailidis, Samara Wright, Pamela Stark, Ann H Campbell, Ashley Foo, Thomas P Sakmar, Virginia Huffman, Marissa Bergh, Audrey Goldfarb, Andrew Mansisor, Agata L Patriotis, Karl H Palmquist, Nicolas Poulton, Rachel Leicher, **César D Vargas**, Irene Duba, Arlene Hurley, Joseph P Colagreco, Nicole Pagane, Dana E Orange, Kevin Mora, Jennifer L Rakeman, Randal C Fowler, Helen Fernandes, Michelle F Lamendola-Essel, Nick Didkovsky, Leopolda Silvera, Joseph Masci, Mabelle Allen, Charles M Rice, Robert B Darnell. *PLOS ONE*. 2021;16(6):e0252949.

Atoms, Elements, Molecules, and Ions. *General Chemistry by Exploration: Resource Book For Peer-Led Team Learning First Semester*. **César D. M. Vargas** (2013). Jose E. Marin, Andres H. Belmont (eds.). LFAC. pp. 46-48.

Accepted

Unsupervised Temporal Analysis of Mouse Vocalizations.

Christodoulos Bochalos, **Cesar Vargas**, Erich Jarvis, and Theodoros Giannakopoulos. *IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology* (2022).

In preparation

Influence of Mouse Motor Cortex on Vocal Musculature

César D. M. Vargas, Rajvi K. Agravat*, Elena N. Waidmann*, Christos Bochalos, Hector Bermudez, Theodoros Giannakopoulos, Erich D. Jarvis; *Equal contribution

POSTERS AND PRESENTATIONS

Society for Neuroscience, San Diego, CA

Vargas, C. D. M., Agravat., R. K., Waidmann, E., Jarvis, E. D. (2022). Mouse Motor Cortex Can Influence Vocal Musculature

Gordon Research Conference: Neural Mechanisms of Acoustic Communication, Mount Holyoke College

Vargas, C. D. M., Agravat., R. K., Waidmann, E., Jarvis, E. D. (2022). Control of Vocal Musculature by Primary Motor Cortex in Mice

Society for Neuroscience – Virtual

Vargas, C. D. M., Waidmann, E., Jarvis, E. D. (2021). Stimulation of Mouse Primary Motor Cortex Activates Intrinsic and Extrinsic Vocal Muscles

NIH High-Risk, High-Reward Research Symposium - Virtual

Vargas, C. D. M., Waidmann, E., Jarvis, E. D. (2021). Assessing the Functional Representation of Vocal Musculature in the Motor Cortex of Mice

Junior Scientist Workshop on Mechanistic Cognitive Neuroscience, HHMI, Janelia Research Campus – Virtual

Attend as Gilliam Fellow

Vargas, C. D. M., Waidmann, E., Jarvis, E. D. (2020). Functional Representation of Vocal Musculature in the Motor Cortex of Mice

Annual Gilliam Fellows Meeting, HHMI – Virtual

Vargas, C. D. M., Waidmann, E., Jarvis, E. D. (2020). Influence of Specialized Forebrain Circuit in Mouse Vocal Communication

Annual Gilliam Fellows Meeting, HHMI, Chevy Chase, MD

Vargas, C. D. M., Ahmed, J., Jarvis, E. D. (2019). Influence of Specialized Forebrain Circuit in Mouse Vocal Communication

Annual Gilliam Fellows Meeting, HHMI, Janelia Research Campus

Vargas, C. D. M., Jarvis, E. D. (2018). Influence of Specialized Forebrain Circuit in Mouse Vocal Communication

Society for Neuroscience, San Diego, CA

Krueger Fister*⁺, J., **Vargas*⁺**, **C. D. M.**, Mavity-Hudson, J. A., Robson, M. J., Veenstra-Vanderweele, J., Wallace, M. T., Blakely, R. D., and Casagrande, V. A. (2016) Changes in thalamocortical projection patterns in a mouse model of autism. *Society for Neuroscienc*, Program No. 30.10/C8. ⁺authors contributed equally

Society for Neuroscience, Chicago, IL

Vargas, C.D.M., Mavity-Hudson, J., Robosn, M., Veenstra-VanderWeele, J., Wallace, M., Blakely, R., Casagrande, V. (2015) Changes in Cortical Wiring in a Mouse Model of Autism. *Society for Neuroscience*, Program No.490.17/E18.

Vanderbilt Kennedy Center Science Day, Nashville, TN

Vargas, C.D.M., Mavity-Hudson, J., Robosn, M., Veenstra-VanderWeele, J., Wallace, M., Blakely, R., Casagrande, V. (2015) Changes in Cortical Wiring in a Mouse Model of Autism. *Society for Neuroscience*, Program No.490.17/E18.

TEACHING

Summer Neuroscience Program

Co-Director

August 2018-2021

Guest Lecturer and Journal Club Mentor

August 2017, 2018, 2022

- Co-director of a two-week, student-run program for introducing 16 high schoolers to neuroscience each year. Program is aimed at students who have fewer school resources devoted to science courses.
- Developed new material for “Temperature and Taste” and develop a lecture on “Neuroscience and AI”
- Helped to read >200 applications annually and conducted interviews to select the final class size
- Students gain experience in reading papers through our journal club, learn how to design and execute simple experiments with crickets or cockroaches, and gain experience in communicating their reading and results in a presentation format.
- Guest lectured on “Neuroethology and Animal Behavior” (2017) and “Sleep and Dreaming” (2018).

Rockefeller Summer Undergraduate Research Fellowship (SURF)

Journal Club Mentor

Summer 2017, 2018, 2019, 2020, 2021

- Invited by the Dean’s Office to participate as a mentor for SURF. Mentored a five undergraduate students each summer. Aided in selection of a paper to be presented to their SURF peers. The process involved learning how to critically read scientific literature and how to make presentations accessible to an audience with a diverse scientific background.

Undergraduate Teaching Assistant

Summer 2013

Department of Physics and Astronomy, University of Texas at El Paso, El Paso, TX

- Led a section for the laboratory component of an introductory Physics (Mechanics) course.

MENTORSHIP

Mia Haraguchi

Rotation Student

Fall 2022

Elena N. Waidmann

Rotation Student

Summer 2020

Hector Bermudez

Research Assistant

Fall 2022–Present

Rajvi A. Agravat

Research Assistant

Fall 2020–Spring 2022

Jannatul Ahemd

Undergraduate Student

Fall 2018–Spring 2021

Hira Choudhri

Undergraduate Student

Fall 2017

OUTREACH

Kavli Science & Society Webinar: Building a Community: Mobilizing your Peers and Leveraging your Resources, Virtual (2021)

-Panelist, responded to questions about organizing peer networks to be involved in mentorship activities

Foro Estudiantil de BioBus - Virtual, Spanish language (2020)

– Panelist for a Q&A where kids (target age 5-15) asked questions about the brain and animal behavior.

BioAccess – Virtual (2020)

– Moderated session for student lectures. Program designed as a professional development workshop for undergraduates and recent Bachelor's graduates to increase graduate school preparation and application success.

Science Saturday (2017-2019)

–Developed scientific demos with the Jarvis lab to teach and engage students on neuroscience, vocal learning, and evolution. Outreach program aimed at K-8, several hundred students participate during the all-day event.

MEDIA

STARTS: Demystifying the Boundary Between STEM and the Arts (2023)

– Podcast guest, Episode 19. Discussed path to research, link between arts and science, and diversity in science.

“Why the F*** Should We Care?” (2020)

– Podcast guest, Episode 9. Discussed my research and mouse vocal behavior.

The Art of Doing Science (2019)

– Blog post hosted by RockEdu on the similarities between the practice of science and the arts.

OTHER LEADERSHIP ACTIVITIES

Rockefeller Inclusive Science Initiative (RiSI)

Co-president

December 2019-2020

University Recruitment Co-Chair

December 2018-December 2019

- Community-run organization at Rockefeller focused on initiatives for diversity, equity, and inclusion (DEI) and fostering community events to increase diversity at the University.
- Collaborate with co-president to develop and lead the initiatives that are of interest to the RiSI and broader Rockefeller URM community. A particular focus is developing a speaker series and long-term mentorship initiatives between RiSI members and local undergraduate students.
- As Recruitment Co-Chair I, along with the co-chairs on this team, helped organize events during the PhD interview weekends to highlight the university's diversity.
- During protests in 2020, our activism on campus led to University implementing strategies to increase hiring of minority faculty, increased representation in lecture series, and led to establishing a Chief Diversity Office.

CODING

Proficiency in Python and with Arduino microcontrollers

Experience with Fusion 360 (3D modeling software)

Experience with MATLAB

Some experience with C++

PROFESSIONAL MEMBERSHIPS

Society for Neuroscience