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RESEARCH GOAL

Elucidate how insect and crustacean neural circuits for olfaction, learning and memory are modulated and evolved to mediate species-specific behaviors.

APPOINTMENTS

2021 – present	Case Western Reserve University Assistant Professor Department of Biology	Cleveland, OH
2015 – 2020	University of Washington Postdoctoral Research Associate Advisor: Dr. Jeff Riffell	Seattle, WA

EDUCATION

May, 2015	University of Arizona Ph.D. in Neuroscience Minor: Molecular and Cellular Biology Advisor: Dr. Nicholas J. Strausfeld	Tucson, AZ
May, 2006	University of Arizona B.S. with Honors in Molecular and Cellular Biology B.A in French Language and Literature Minor: Chemistry	Tucson, AZ

FUNDING AND AWARDS

2022	Scialog Fellow: Research Corporation for Science Advancement
2019	Univ. of Washington Postdoc Mentoring Award (\$2000)
2018	National Science Foundation (PI). Title: “Collaborative Research: Origin and Evolutionary Divergence of the Pancrustacean Brain” (\$669,976 over 4 yrs)
2018	Univ. of Washington Dept. of Biology Annual Retreat Poster Prize (\$300)
2012-2015	National Science Foundation Graduate Research Fellowship (\$32,000/yr)
2015	Univ. of Arizona School of Mind, Brain & Behavior Poster Session Award (\$100)
2014	P.E.O. Scholar Award (\$15,000)
2014	Univ. of Arizona College of Science Galileo Circle Scholarship (\$1,000)
2014	Center for Insect Science Travel Award (\$900)
2014	Univ. of Arizona Neuroscience GIDP Travel Award (\$425)
2013	Center for Insect Science Travel Award (\$2,200)
2012	Univ. of Arizona College of Science Galileo Circle Scholarship (\$1,000)
2012	Univ. of Arizona GIDP Community Event: Poster Award (\$100)
2012	Univ. of Arizona College of Science Graduate Student Award for Department of Neuroscience Teaching Assistant/Mentor.
2011	Herbert E. Carter Travel Award (\$500)

PUBLICATIONS

Wolff GH, Lahondère C, Vinauger C, Rylance E, Riffell JA. 2022. “Neuromodulation and Differential Learning Across Mosquito Species.” *Proc R. Soc. B.* 290: 20222118.

Strausfeld NJ, **Wolff GH**, Sayre ME. 2020. “Mushroom body homology and divergence across Pancrustacea.” *eLIFE*, 2020;9:e52411 doi: 10.7554/eLife.52411.

Lahondère C, Vinauger C, Okubo RP, **Wolff GH**, Akbari, OS, Riffell JA. 2020. “Olfactory basis of mosquito pollination of an orchid, *Platanthera obtusata*.” *PNAS*, 117(1), 708-716.

Melo N, **Wolff GH**, Costa-da-Silva AL, Arribas R, Triana MF, Gugger M, Riffell JA, DeGennaro M, Stensmyr MC. 2020. “Geosmin attracts *Aedes aegypti* mosquitoes to oviposition sites.” *Curr. Biol.*, 30(1), 127-134.

Thoen HH, **Wolff GH**, Marshall J, Sayre ME, Strausfeld NJ. 2020. “The Reniform Body: An Integrative Protocerebral Neuropil Complex of Stomatopods (Eumalacostraca) persisting in Brachyura.” *J. Comp. Neurol.*, 528(7), 1079-1094..

Wolff GH, Riffell JA. 2018. Invited Review: “Olfaction, experience and neural mechanisms underlying mosquito host-preference.” *J. Exp. Biol.*, 221: jeb157131 doi: 10.1242/jeb.157131.

Vinauger C, Lahondere C, **Wolff GH**, Locke L, Liaw J, Parrish J, Akbari O, Dickinson M, Riffell JA. 2018. “Modulation of host learning in *Aedes aegypti* mosquitoes.” *Curr. Biol.*, 24:3, 333-344.e8.

Sinakevitch IT, **Wolff GH**, Pflüger HJ, Smith BH. 2018. “Editorial: Biogenic Amines and Neuromodulation of Animal Behavior.” *Front. Syst. Neurosci.* 12:31. Doi: 10.3389/fnsys.2018.00031

Wolff GH, Thoen HH, Marshall J, Sayre ME, Strausfeld NJ. 2017. “An insect-like mushroom body in a crustacean brain.” *eLIFE*, 2017;6:e29889.

Thoen HH, Marshall J, **Wolff GH**, Strausfeld NJ. 2017. “Insect-like organization of the Stomatopod central complex: Functional and phylogenetic implications.” *Front. Behav. Neurosci.* DOI=10.3389/fnbeh.2017.00012.

Wolff GH, Strausfeld NJ. 2016. “Genealogical correspondence of a forebrain centre implies an executive brain in the protostome-deuterostome bilaterian ancestor.” *Phil. Trans. R. Soc. B.*, 371: 20150055.

Martín-Duran JM, **Wolff GH**, Strausfeld NJ, Hejnal A. 2016. “The larval nervous system of the penis worm *Priapululus caudatus* (Ecdysozoa).” *Phil. Trans. R. Soc. B.*, 371: 20150050.

Wolff G, Strausfeld NJ. 2016. “The Insect Brain: A Commentated Primer.” *Structure and Evolution of Invertebrate Nervous Systems*. Eds. A. Schmidt-Rhaesa, S. Harzsch, G. Purschke. Oxford: Oxford University Press.

Tuchina O, Koczan S, Harzsch S, Rybak J, **Wolff GH**, Strausfeld NJ, Hansson BS. 2015. “Central projections of antennular chemosensory and mechanosensory afferents in the brain of the

terrestrial hermit crab (*Coenobita clypeatus*; Coenobitidae, Anomura)." *Front. Neuroanat.*, 9:94. Doi: 10.3389/fnana.2015.00094.

Wolff GH, Strausfeld NJ. 2015. "Genealogical correspondence of mushroom bodies across invertebrate Phyla." *Curr. Biol.*, 25:1, 38-44.

Wolff G, Harzsch S, Hansson B, Brown S, Strausfeld N. 2012. "Neuronal organization of the hemiellipsoid body of the land hermit crab *Coenobita clypeatus*: Correspondence with the mushroom body ground pattern." *J. Comp. Neurol.*, 520:13, 2824-2846.

Brown S, **Wolff G**. 2012. Fine structural organization of the hemiellipsoid body of the land hermit crab *Coenobita clypeatus*. *J. Comp. Neurol.*, 520:13, 2847-2863.

PRESENTATIONS AND INVITED TALKS

Gurgis A, Varney R, Oakley T, **Wolff GH**. "The Minute Brains of Sea Fireflies: Evidence of Ancestral Mushroom Bodies." Poster presented at the Society for Integrative & Comparative Biology Meeting, Austin TX, January 3-7, 2023.

Wolff GH. "Olfactory learning and dopaminergic modulation in dipteran antennal lobes." Talk at the International Congress of Neuroethology, Lisbon Portugal, July 24-29, 2022.

Wolff GH. "Mushroom body evolution in insects and crustaceans: conserved traits and evolved loss." Talk at Evolution 2022 Conference, Cleveland OH, June 24-28, 2022.

Wolff GH. "Learning and Memory: An ancient origin and species-specific adaptations." Invited talk at the University of Akron Department of Biology, Akron, OH, October 15, 2021.

Wolff GH. "Species-specific Olfactory Learning in Mosquitoes with Different Host Preferences." Invited talk at the University of Manitoba Department of Biological Sciences, Winnipeg, Canada, April 23, 2021.

Wolff GH, Riffell JA. "Dopamine Neuromodulation and Differential Learning Across Mosquito Species." Invited talk at European Symposium on Insect Taste and Olfaction, Villasimius, Italy, September 15-20, 2019.

Wolff GH, Riffell JA. "Functional imaging of odor-evoked activity and neuromodulation in the mosquito antennal lobe." Invited talk at Entomological Society of America Pacific Branch Meeting, San Diego, CA, March 31-April 3, 2019.

Wolff GH, Riffell JA. "Smell-O-Vision: Functional imaging of odor-evoked activity and neuromodulation in the mosquito antennal lobe." Talk at Society for Integrative & Comparative Biology Meeting, Tampa, FL, January 3-7, 2019.

Wolff GH, Strausfeld NJ. "Mushroom Bodies and Mantis Shrimp: Insect-like Brain Structures in a Crustacean." Talk at the International Congress of Neuroethology, Brisbane, Australia, July 15-20, 2018.

Wolff GH, Lahondère C, Vinauger C, Riffell JA. "Selective Memory: Mosquitoes Learn Salient Olfactory Cues Associated with Preferred Hosts." Talk at Society for Integrative & Comparative Biology Meeting, San Francisco, CA, January 3-7, 2018.

Wolff GH, Riffell JA. "What's for dinner? How mosquitoes choose whom to bite." Invited talk at Whitman College, Walla Walla, WA, April 27, 2017.

Wolff GH, Strausfeld NJ. "An Ancient Origin of the Mushroom Body" Invited talk at Structure and Function of the Insect Mushroom Body, Janelia Research Campus, Ashburn, VA, March 5-8, 2017.

Wolff GH, Lahondère C, Vinauger C, Arnold BY, Adlzate DG, Riffell JA. "Neural basis of host preference across mosquito species." Talk at Society for Integrative & Comparative Biology Meeting, New Orleans, LA, January 4-8, 2017.

Wolff GH "Ground pattern organization and elaboration of learning and memory structures: A framework for comparison." Invited talk at Neuro-Evo: A Comparative Approach to Cracking Circuit Function, Janelia Research Campus, Ashburn, VA, May 15-18, 2016.

Wolff GH, Riffell JA. "Comparative Immunoreactivity in Olfactory Brain Centers Across Mosquito Species." Poster presented at the Society for Integrative & Comparative Biology Meeting, Portland, OR, January 3-7, 2016.

Wolff GH, Strausfeld NJ. "Learning from the Past: Evolution of Vertebrate and Invertebrate Learning and Memory Brain Structures." Invited talk at Gordon Research Seminar: Neuroethology, Lucca (Barga), Italy, June 27-28, 2015.

Wolff GH, Hirth F, Strausfeld NJ. "A multitude of similarities and minuteness of resemblance: do ground patterns of forebrain organization support genealogical correspondence of brains across phyla?" Invited talk at The Royal Society meeting on Homology and convergence in nervous system evolution, Buckinghamshire, UK, March 11-12, 2015.

Wolff GH, Strausfeld NJ. "Genealogical correspondence of learning and memory centers across phyla." Poster presented at the 44th Annual Meeting of the Society for Neuroscience, Washington DC, November 15-19, 2014. [Lay-language summary selected for SfN Press Book].

Wolff GH, Strausfeld NJ. "Ancient memories: genealogical correspondence of learning and memory centers across phyla." Invited talk at the 11th International Congress of Neuroethology, Sapporo, Japan, July 28-August 1, 2014.

Wolff G, Ma X, Strausfeld N. "Expression of DCO in forebrains supports genealogical correspondence of learning and memory centers across Lophotrochozoa and Ecdysozoa." Poster presented at 42nd Annual Meeting of the Society for Neuroscience, New Orleans LA, October 13-17, 2012.

Wolff G, Brown S, Strausfeld N. "Comparative morphology and immunoreactivity in the hemiellipsoid body of the land hermit crab, *Coenobita clypeatus* reveals homology with the insect mushroom body." Poster presented at: 41st Annual Meeting of the Society for Neuroscience, Washington DC, November 12-16, 2011.

RESEARCH EXPERIENCE

- 2015 - 2020 Department of Biology, University of Washington
Research Associate
Advisor: Dr. Jeff Riffell
- 2010 - 2015 Department of Neuroscience, University of Arizona
Doctoral Dissertation Research
Rotation Advisor: Dr. Daniela Zarnescu
Studying gene interactions in Fragile X Syndrome, the most common inherited form of mental retardation.
- Advisor: Dr. Nicholas J Strausfeld
Investigating evolution of “learning and memory” brain structures across the Bilateria to elucidate ground plan circuitry.
- Dec. 2014 Karolinska Institutet, Nobel Institute for Neurophysiology, Stockholm, Sweden
Visiting Scientist
Dr. Sten Grillner laboratory, Neural Networks and Behavior
- Apr. 2014 Sars International Centre for Marine Molecular Biology, Bergen, Norway
Visiting Scientist
Dr. Andreas Hejnal laboratory, Comparative Developmental Biology of Animals
- May 2010 Max Planck Institute for Chemical Ecology, Jena, Germany
Visiting Scientist
Dr. Bill Hansson laboratory, Department of Evolutionary Neuroethology
- 2006 - 2010 Department of Neuroscience, University of Arizona
Research Specialist 2008-2010
Research Technician 2006-2008
Studying arthropod brain morphology, development and evolution.
Primary Investigator: Dr. Nicholas J. Strausfeld
- 2005 - 2006 **Senior Honors Thesis**, Dept. of Neuroscience, University of Arizona
“Immunoreactivity of serotonin in the blowfly, honeybee, and cockroach: Comparable organization in the brain.”
Advisor: Dr. Nicholas J. Strausfeld

TEACHING EXPERIENCE

- 2022 Case Western Reserve University, Biology
Instructor– BIOL 375: “Brain Evolution and Function”
- 2021-2022 Case Western Reserve University, Biology
Instructor– BIOL 374/474: “Neurobiology of Behavior”
- Spring 2017 University of Washington, Biology
Instructor of Record– “Sensory Neurophysiology and Ecology Lab”

- Spring 2016 University of Washington, Biology
Guest lecturer – “Sensory Neurophysiology and Ecology”
- Winter 2016 University of Washington, Biology
Instructor of Record– “Chemical Communication”
- Spring 2011 University of Arizona, Neuroscience
Teaching Assistant- Dr. Wulfila Gronenberg and Dr. Nicholas Strausfeld “Animal brain, signals, sex, and social behaviors”
Held weekly office hours, graded essays, maintained course website.
- Fall 2011 University of Arizona, Psychology
Teaching Assistant- Dana Narter “Introduction to Psychology”
Led review sessions, held weekly office hours, graded essays.

STUDENTS AND POSTDOCS MENTORED

Alexandra Gurgis, PhD Student
Michael Rauscher, postdoctoral associate
Meera Rajamani, undergraduate
Bryan Sun, undergraduate
Thomas Hu, undergraduate
Apple Patel, undergraduate
Riya Verma, Solon High School student
Benjamin Hafey, undergraduate
Elizabeth Rylance, University of Washington undergraduate (*Mary Gates Research Fellowship*)
Ben Arnold, University of Washington undergraduate
Dane Alzate, University of Washington undergraduate
Brian Vickers, University of Washington undergraduate
Erica Peterson, University of Washington undergraduate
Brian Hughes, University of Washington undergraduate
Mina Liao, University of Washington undergraduate
Hanhang Ying, University of Washington undergraduate

DOCTORAL STUDENT COMMITTEES

Shivansh Dave (advisor: Mark Willis)
Yu Huan (advisor: Hillel Chiel)
Karmi Oxman, Drexel University (advisor: Sean O’Donnell)
Nicole Wynn, Virginia Tech (advisor: Clément Vinauger)
Annika Hinze, Swedish University of Agricultural Sciences (advisor: Rickard Ignell)

DEPARTMENTAL SERVICE

2022- present CWRU Dept. of Biology Seminar Committee
2021- 2022 CWRU Dept. of Biology Committee on Graduate Affairs

AD HOC MANUSCRIPT REVIEW

eLIFE
Current Biology
Royal Society Proceedings B

Royal Society Open Science
Neuroscience Letters
Frontiers in Zoology
Frontiers in Physiology
Peer J
Frontiers in Psychology

LEADERSHIP AND PROFESSIONAL SERVICE

2018 - present	International Society for Neuroethology Secretary
2017 - 2019	University of Washington Graduate and Postdoc Program Committee: Postdoc Representative
2016 - 2018	International Society for Neuroethology Council Member: Postdoctoral Representative
2016 - 2018	Frontiers in Systems Neuroscience Guest Associate Editor
2014 - 2015	University of Arizona Graduate Interdisciplinary Program in Neuroscience Student Representative
2013 - 2016	International Society for Neuroethology Council Member: Graduate Student Representative

PROFESSIONAL SOCIETIES

Society for Integrative and Comparative Biology
 International Society for Neuroethology
 Faculty for Undergraduate Neuroscience
 American Society of Naturalists

COMMUNITY ACTIVITIES

2022	Beautiful Bug Brains, CMNH Organizer/Volunteer, Current Science	Cleveland, OH
2017 + 2019	Geek Girl Con Volunteer, DIY Science Center	Seattle, WA
2016 - 2020	Girls in Engineering, Math and Science Volunteer Mentor	Seattle, WA
Mar., 2016	Seattle Expanding Your Horizons conference Presenter	Seattle, WA
Mar., 2016	Brain Awareness Week Open House, U. of Wash. Volunteer	Seattle, WA
Mar., 2014	Arizona Festival of Books	Tucson, AZ

	Volunteer, Brainworks Booth	
2011 - 2014	Arizona Insect Festival Volunteer, Bug Brains Booth	Tucson, AZ
2011, 2013	Insect Discovery! Program Volunteer Teacher	Tucson, AZ
2012 - 2014	Passport to High School Volunteer, Lab tours	Tucson, AZ
July, 2012	Brain Awareness Summer mini-camp Volunteer counselor	Tucson, AZ
Jan., 2012	Senita Valley Elementary School Science Night Volunteer, Brain Zoo	Tucson, AZ