

Jessica Rae Whitaker-Fornek

Marquette University

Department of Physical Therapy

Cramer Hall, Office 215J, Lab 215K

Jessica.whitaker-fornek@marquette.edu ph: 618-530-9571

EDUCATION

Ph.D., Biological Sciences

Dec 2020

Idaho State University, Pocatello, ID

Mentor: Jason Q. Pilarski, Ph.D., Department of Biological Sciences

M.S., Molecular, Cellular and Systemic Physiology

Aug 2016

Southern Illinois University, Carbondale, IL

Mentor: Andrew A. Sharp, Ph.D., Department of Anatomy

B.S., Zoology

May 2014

Southern Illinois University, Carbondale, IL

RESEARCH EXPERIENCE

Assistant Professor, Marquette University

Oct 2026 – present

Understanding the neural control of breathing during development in health and disease.

Postdoctoral Fellow, University of Michigan

Oct 2022 – Sep 2026

Determining how endogenous opioids regulate breathing control network development.

Mentor: Erica S. Levitt, Ph.D.

Postdoctoral Associate, University of Florida

Jan 2021 - Oct 2022

Characterized the development of inhibitory neurotransmission in a mouse model of Rett Syndrome, a severe neurodevelopmental disorder characterized by breathing problems.

Mentor: Erica S. Levitt, Ph.D.

Graduate Research Assistant, Idaho State University

Aug 2016-Dec 2020

Tested the central CO₂ and pH chemosensitivity of the avian breathing control network.

Mentor: Jason Q. Pilarski, Ph.D.

Master's Fellow, Southern Illinois University

Aug 2015-Aug 2016

Controlled muscle contraction in living chicken embryos using optogenetics.

Mentors: Andrew A. Sharp, Ph.D. & Sylvia Fromherz, Ph.D.

Undergraduate Research Assistant, Southern Illinois University

Apr 2012-Aug 2014

Mentor: Andrew A. Sharp, Ph.D.

NSF REU Fellow, Rocky Mountain Biological Laboratory May 2013-Aug 2013
Tested the effects of noise stimuli on bird behavior.
Mentor: Daniel T. Blumstein, Ph.D., University of California, Los Angeles

Research Assistant, Rocky Mountain Biological Laboratory June 2012-Aug 2012
Conducted a census of small mammals and scavenger beetles.
Mentor: Rosemary Smith, Ph.D., Idaho State University

AWARDS AND HONORS

Travel Award, International Narcotics Research Conference	2026
Outstanding Oral Presentation Award, Midwest Pharmacology Colloquium	2025
Research Recognition Award, Respiration Section, American Physiological Society	2025
Travel Award, International Narcotics Research Conference	2025
Shaomeng Wang & Ju-Yun Li Postdoctoral Fellow Award	2024
Travel Award, International Narcotics Research Conference	2024
Outstanding Poster Award, Respiration Section, American Physiological Society	2024
Honorable Mention, Postdoctoral Poster Award, Midwest Pharmacology Colloquium	2023
Dr. Deborah Davis Memorial Scholarship Award, Idaho State University	2020
Outstanding Graduate Student, Idaho State University	2019

PUBLICATIONS

Demery, C., Moore, S., Kochan, K., Li, M., Prince, T.D., Clements, B.M., Chen, Z., **Whitaker-Fornek, J.R.**, Levitt, E.S., Anand, J.P., Traynor, J.R. Fentanyl decreases arterial blood oxygen saturation more than furanylfentanyl in mice due to increased apnea. 2026. *Psychopharmacology*. PMID: 42387073

Whitaker-Fornek, J.R., Levitt, E.S. Endogenous opioids and the development of the mammalian respiratory control network. 2025. *American Journal of Physiology Lung Cellular and Molecular Physiology*. PMID: 40240763

Maletz, S.N., Reid, B.T., Baekey, D.M., **Whitaker-Fornek, J.**, Bateman, J.T., Bissonnette, J.M., Levitt, E.S. 2024. Effect of positive allosteric modulation and orthosteric agonism of dopamine D2-like receptors on respiration in mouse models of Rett Syndrome. *Respiratory Physiology & Neurobiology* 328

Whitaker-Fornek, J.R., Nelson, J.K., Pilarski, J.Q. 2024. Chloride modulates central pH sensitivity and plasticity of hindbrain breathing biorhythms in zebra finch embryos. *Developmental Psychobiology* 66 (e22518).

Whitaker-Fornek, J.R., Jenkins, P.M., Levitt, E.S. 2023. Inhibitory synaptic transmission is deficient in the Kolliker-Fuse of male, but not female, Rett Syndrome mice. *Journal of Neurophysiology* 130 (1578-1587).

- Whitaker-Fornek, J.R.***, Dossat, A.M.*, Kokoska, M.*, Sniffen, S.E., Kulkarni, A., Levitt, E.S., Wesson, D.W. 2023. Gustatory cortex glucagon-like peptide-1 receptors influence food intake. *Journal of Neuroscience* 43 (4251-4261).
*indicates co-first author
- Varga, A.G., **Whitaker-Fornek, J.R.**, Maletz, S.N., Levitt, E.S. 2022. Activation of orexin-2 receptors in the Kolliker-Fuse nucleus of unanesthetized mice leads to transient apneas. *Frontiers in Physiology* 13.
- Whitaker-Fornek, J.R.**, Nelson, J.K., Lybbert, C.W., Pilarski, J.Q. 2019. Development and regulation of breathing rhythms in embryonic and hatchling birds. *Respiratory Physiology and Neurobiology* 269.
- Fromherz, S., **Whitaker-Fornek, J.R.**, Sharp A.A. 2018. Classroom-based experiences to support underserved STEM student success: from introductory inquiry to optogenetics in the embryonic chicken. *The Journal of Undergraduate Neuroscience Education* 17 (A97-A110).
- Blumstein, D.T., **Whitaker, J.R.**, Kennen, J., Bryant, G.A. 2017. Do birds differentiate between white noise and deterministic chaos? *Ethology* 123 (966-973).

FUNDING

CCHS Network Research Grant Award	2026-2027
K99 Career Transition Award 1K99HL177177-01A1	2025-2027
T32 Multidisciplinary Postdoctoral Training Program in Biology of Drug Abuse	2024-2025
International Narcotics Research Conference Travel Award	2024
Biology Graduate Student Association Travel Award	2020
Idaho State University Graduate School Travel Award	2020
Idaho State University Biological Sciences Graduate Student Research Award	2019
Doctor of Arts Fellowship for biology teaching	2018
College of Science and Engineering Intramural Grant	2018
College of Science and Engineering Dean's Excellence Funding	2018
Idaho Idea Network of Biomedical Research (INBRE) Fellowship Award	2018
Biology Graduate Student Association Travel Award	2016
Master's Fellowship in Physiology, Southern Illinois University, Carbondale, IL.	2014

TEACHING AND MENTORING EXPERIENCE

- Instructor, EXPH 2045/46 Human Physiology**, Marquette University October 2026-present
Taught lecture and lab sessions on respiratory, endocrine, metabolic, reproductive and developmental physiology to ~119 undergraduate students.
- Postdoc Teaching Essentials Online Course**, University of Michigan Fall 2025
Participated in a 5-week online course about teaching and learning practices including equity-focused teaching, engaging students through active learning, planning a class session, grading assignments and exams.
- Teaching Internship**, Foundations of Neural Science, Idaho State University April 2020
Created and remotely taught a unit on the development of the brain and spinal cord

for 27 undergraduate students and 2 graduate students.

Teaching Internship, Oral Histology and Embryology, Idaho State University Fall 2019
Created and led 5 hands-on lab activities for the embryology lab portion for 8 dental students.

Guest Lecturer, Invertebrate Zoology, Idaho State University April 2019
Prepared and presented a 15-minute lecture to 10 undergraduate students on sea urchin embryonic development from a morphological perspective.

Guest Lecturer, Organic Evolution, Idaho State University Nov 2018
Led a discussion activity with 13 undergraduate students on epigenetics and the cephalopod nervous system.

Teaching Internship, Oral Histology and Embryology, Idaho State University Fall 2018
Designed, executed, and analyzed the results of a pedagogical research study for 32 dental hygiene students and 8 dental students.

Guest Lecturer, Herpetology, Idaho State University Feb 2018
Presented a 50-minute talk, mixed lecture and active learning, to 10 undergraduate students on gas exchange and ventilation in reptiles and amphibians.

Lab Assistant, Oral Histology and Embryology, Idaho State University Aug 2017-Oct 2017
Planned lab discussions of scientific literature and developed two lab exercises involving live zebra finch embryos and histological specimens.

INBRE Graduate Fellow, Idaho State University Aug 2016-Aug 2017
Mentored 2 students in independent research projects involving electrophysiological and neuroanatomical tracing techniques.

Teaching Assistant, NIH Southern Illinois Bridges to the Baccalaureate June 2014-Aug 2015
Planned and led inquiry-based lab exercises for community college students.

Undergraduate Mentees: Martin Flores (SIU), Lauren DeRossett (SIU), Janet Leon (ISU), Jennie Nelson (ISU), Jayden Burton (ISU), Casetin Lybbert (ISU), Erik Nakken (ISU), Kory Anderson (ISU), Camdon Kay (ISU), Nicole Filippelli (UF), Charlie Keldsen (UM), Kai Bartol (UM), Carley Beeman (UM), Andre Wielenga (UM)

Rotating PhD Student Mentees: Saba Ghodrati (UM), Carley Beeman (UM)

ORAL PRESENTATIONS

Selected invited extramural presentations

J.R. Whitaker-Fornek. “Endogenous opioid influence on breathing and respiratory neuron development.” 7th Global Congenital Central Hypoventilation Syndrome Research Conference. Lisbon, Portugal. October 2026.

J.R. Whitaker-Fornek. “Breathing development and the influence of endogenous opioids.” Hot Topics in Respiratory Control. American Physiological Society Summit. Minneapolis, MN. April 2026

- J.R. Whitaker-Fornek.** “I’m here, how do I get involved.” American Physiological Society Summit. Minneapolis, MN. April 2026
- J.R. Whitaker-Fornek.** “Critical windows of endogenous opioid influence on breathing development.” Trainee Hot Topics. International Narcotics Research Conference. Bologna, Italy. July 2025.
- J.R. Whitaker-Fornek.** “Endogenous opioid regulation of breathing development.” 51st Annual Midwest Pharmacology Colloquium. Ann Arbor, MI. June 2025.
- J.R. Whitaker-Fornek.** “Cardiorespiratory function in a rabbit model of Dravet Syndrome.” Foundational Science Symposium on Cardiorespiratory Coupling Across the Animal Kingdom. American Physiological Society Summit. Baltimore, MD. April 2025.
- J.R. Whitaker-Fornek.** “Influence of endogenous opioids on breathing development.” Nano Talk. Breathing for Life: 16th Oxford Conference on breathing, emotion and beyond. Williamsburg, VA. September 2024.
- J.R. Whitaker-Fornek.** “Assessing cardiorespiratory function in a rabbit model of Dravet Syndrome.” Respiration Section Trainee Hot Topics. Control of Breathing Mixer. American Physiological Society Summit. Long Beach, CA. April 2024.
- J.R. Whitaker-Fornek.** “Serotonin and breathing under the influence of opioids.” Winter Conference on Brain Research. Breckenridge, CO. January 2024.
- J.R. Whitaker-Fornek.** “Age-dependent effects of pH on breathing biorhythms in a bird embryo.” International Society for Developmental Psychobiology Annual Conference. In-person symposium speaker. Chicago, IL. November 2021.

Selected Intramural presentations

- J.R. Whitaker-Fornek.** “Endogenous opioid influence on breathing and respiratory neuron development.” University of Michigan Pharmacology Department Seminar. Ann Arbor, MI. May 2026.
- J.R. Whitaker-Fornek.** “When Breathing Goes Wrong During Development.” University of Michigan Pharmacology Department Seminar. Ann Arbor, MI. May 2025.
- J.R. Whitaker-Fornek.** “Before the seizures start: studying early life respiratory function in Dravet Syndrome.” University of Michigan Basic Epilepsy Research Group Seminar. Ann Arbor, MI. January 2025.
- J.R. Whitaker-Fornek.** “Endogenous opioids and breathing at birth.” University of Michigan Opioid Research Institute Coffee Connections. Ann Arbor, MI. May 2024.
- J.R. Whitaker-Fornek.** “Exploring the role of serotonin neurons in opioid-induced respiratory depression.” UM Pharmacology Departmental Seminar. Ann Arbor, MI. April 2024.
- J.R. Whitaker-Fornek.** “Examining brainstem breathing control neurons in Rett Syndrome.” UM Pharmacology Departmental Seminar. Ann Arbor, MI. May 2023.
- J.R. Whitaker-Fornek.** “Communicating science effectively.” Idaho Idea Network of Biomedical Research Excellence (INBRE) Friday Talk Series. Pocatello, ID. June 2019.
- J.R. Whitaker-Fornek.** “A peek inside the eggshell: how a baby bird’s nervous system develops to control breathing.” Three Minute Thesis. Idaho State University Graduate Research Symposium. March 2019. 3rd Place.
- J.R. Whitaker-Fornek.** “Role of central $[H^+]$ and CO_2 in early rhythmic neural activity and breathing rhythms in the developing zebra finch brainstem.” Three Minute Thesis. Idaho State University Graduate Research Symposium. March 2018. 2nd Place.

J.R. Whitaker. “Light-activation of channelrhodopsin-2 expressed in hindlimb muscle of living chick embryos.” Southern Illinois University School of Medicine 26th Annual Trainee Research Symposium. First Place Graduate Student Winner for Oral Presentation. April 2016.

SELECTED POSTER PRESENTATIONS

J.R. Whitaker-Fornek, E.S. Levitt. “Endogenous opioids and breathing development.” International Narcotics Research Conference. Denver, CO. July 2026.

J.R. Whitaker-Fornek, E.S. Levitt. “Investigating inhibitory synaptic transmission in developing Kolliker-Fuse neurons from mu opioid receptor knock-out mice.” American Physiological Society Summit. Minneapolis, MN. April 2026

J.R. Whitaker-Fornek, E.S. Levitt. “Critical periods of endogenous opioid regulation of breathing development.” Winter Conference on Brain Research. Big Sky, MT. January 2026

J.R. Whitaker-Fornek, E.S. Levitt. “Critical windows of endogenous opioid influence on breathing development.” International Narcotics Research Conference. Bologna, Italy. July 2025.

J.R. Whitaker-Fornek, E.S. Levitt. “Exploring endogenous opioid influence on respiratory development.” American Physiological Society Summit. Baltimore, MD. April 2025.

J.R. Whitaker-Fornek, E.S. Levitt. “Endogenous opioids regulate breathing during postnatal development.” Winter Conference on Brain Research. Lake Tahoe, CA. January 2025.

J.R. Whitaker-Fornek, E.S. Levitt. “Influence of endogenous opioids on breathing development.” Oxford Breathing for Life Conference. Williamsburg, VA. MI. October 2024.

J.R. Whitaker-Fornek, E.S. Levitt. “Influence of endogenous opioids on breathing development.” International Narcotics Research Conference. Ann Arbor, MI. July 2024.

J.R. Whitaker-Fornek, R. Pauly & E.S. Levitt. “Exploring serotonergic mechanisms of opioid-induced respiratory depression.” *Top Ten Respiration Section Poster Award.* American Physiological Society Summit. Long Beach, CA. April 2024.

J.R. Whitaker-Fornek & E.S. Levitt. “Inhibitory synaptic transmission in the Kolliker-Fuse of Rett Syndrome mice.” Michigan Postdoctoral Pioneers Symposium. Ann Arbor, MI. December 2023.

J.R. Whitaker-Fornek & E.S. Levitt. “Inhibitory synaptic transmission in the Kolliker-Fuse of Rett Syndrome mice.” 6th International Congenital Central Hypoventilation Syndrome Science Conference. Orlando, FL. September 2023.

J.R. Whitaker-Fornek & E.S. Levitt. “Fentanyl blocks a serotonergic brainstem circuit that stimulates breathing.” 49th Annual Midwest Pharmacology Colloquium. East Lansing, MI. June 2023. *Postdoctoral Trainee Poster Presentation Honorable Mention.*

J.R. Whitaker-Fornek & E.S. Levitt. “Exploring sex differences in inhibitory synaptic transmission in the Kolliker-Fuse of Rett Syndrome mice.” American Physiological Society Summit. Long Beach, CA. April 2023.

- J.R. Whitaker-Fornek**, N.M. Filippelli, E.S. Levitt. “GABAergic and glycinergic synaptic transmission in respiratory-controlling Kolliker-Fuse neurons in female and male Rett Syndrome mice.” International Rett Syndrome Foundation Scientific Meeting. Nashville, TN. April 2022.
- J.R. Whitaker-Fornek**, N.M. Filippelli, E.S. Levitt. “GABAergic and glycinergic synaptic transmission in respiratory-controlling Kolliker-Fuse neurons in female and male Rett Syndrome mice.” Winter Conference on Brain Research. Snowmass, CO. February 2022.
- J.R. Whitaker-Fornek**, J.K. Nelson, J.Q. Pilarski. “The role of chloride in the breathing-related response to central acidosis in developing birds.” Experimental Biology. San Diego, CA. April 2020. Event cancelled.
- J.R. Whitaker-Fornek**, C.W. Lybbert, J.K. Nelson, J.Q. Pilarski. “Role of central hypercapnia in rhythmic spontaneous neural activity and breathing rhythms in the developing avian medulla.” Experimental Biology. San Diego, CA. April 2018.
- J.R. Whitaker** and A.A. Sharp. “Non-invasive control of avian hind limb muscle using light-activated ion channels.” St. Louis Area Undergraduate Research Symposium, April 2014. 1st Place.

ADDITIONAL SCIENCE COMMUNICATION & TRAINING

Peer Reviewer Training, APS Online Workshop	Nov 2023
Trainee, APS virtual Op-Ed Writing Workshop	Jan 2023
Trainee, Alan Alda Center two-day science communication Workshop	Sept 2022
Reporter for science radio series, KISU-FM, Idaho State University	Sept 2019—Dec 2020

SCIENTIFIC RESEARCH TRAINING

Advanced Research Training Course in Neural Systems & Behavior Marine Biological Laboratory, Woods Hole, MA.	June-July 2018
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PROFESSIONAL SERVICE

Ad Hoc Manuscript Reviewer

Advances in Physiology Education
 BioEssays
 Biomedicine & Pharmacotherapy
 BJA Education
 Journal of Pharmacology & Experimental Therapeutics
 JoVE
 Neurotoxicology

Extramural service (discipline and community)

Chair, Trainee Advisory Committee, American Physiological Society (APS)	Jan 2025--present
Moderator, PhysioPalooza Trainee Trivia, APS Summit	April 2026
Chair, Session on Physiology in a Changing World, APS Summit	April 2024
Volunteer, Feria de ciencias, en nuestra lengua, UM SACNAS	March 2024
Chair, Session on setting up your own lab and being a GREAT mentor, APS Summit	April 2023
Moderator, Game Changer Session on Climate Change and Physiology, APS Summit	April 2023
Trainee Advisory Comm. Rep., Comparative & Evolutionary Physiology	March 2022-2025
Poster Judging Coordinator, Respiration, APS Experimental Biology	March 2022-present
Poster Judge, Respiration Section, APS	April 2021-2023
Reviewer, Dale Benos Early Career Professional Service Award Applications	January 2023
Reviewer, Comparative & Evolutionary Physiology Section Award Applications	January 2023
Member, International Society of Developmental Psychobiology	June 2021-present
Member, AAAS	March 2020-2021
Member, The Society for Neuroscience	Sept 2015-2017
Member, The American Physiological Society (APS)	Apr 2018-present
Organizer, Pocatello's March for Science and Science Expo	Feb 2017-Apr 2017
Science fair judge, Pocatello High School, Grace Lutheran Elementary	Fall 2016-2020

Intramural service

Postdoc Rep., Michigan Pharmacology Awards Committee	October 2023-present
Organizer, Michigan Pharmacology in Color Symposium	June 2024 - 2025
Co-Lead, Michigan Pharmacology Postdoc Association	Spring 2023- Summer 2024
Volunteer, Michigan Brains Rule Science Outreach Event	March 2024-2025
Moderator, Michigan Pharmacology Alumni Career Panel	Summer 2023
Volunteer instructor, Brain Awareness Week, University of Florida	2021-2022
Member, Developmental Biologist Faculty Search Committee	Fall 2019-Spring 2020
Biology Graduate Student Assoc., President	Fall 2019- Spring 2020
Biology Graduate Student Assoc., Holiday Party Silent Auction Organizer	Dec 2018
Member, Tenure and Promotion Committee	Fall 2018
Biology Graduate Student Assoc., Administrative Liaison	Fall 2018-Spring 2019
Volunteer, Science Olympiad Herpetology Section	March 2018
Biology Graduate Student Association, Secretary, ISU	Fall 2017-Spring 2018