Curriculum Vitae

Eric D. Roth

Department of Psychological and Brain Sciences
University of Delaware
108 Wolf Hall
Newark, DE 19716-2596
Phone: (713) 205 2488
Email: eroth@udel.edu

Research Interests:

My research uses a multidisciplinary approach and integrative techniques to address questions broadly centered in the fields of spatial behavior, social behavior, cognition, and neurobiology. Where is an organism at a given point in time and why is it there? What navigation mechanisms are used to move from location to location? How is sensory information integrated and processed to influence spatial decision making, perception, learning, and memory? What biological, ecological, neurobiological, cognitive, and evolutionary factors interact to produce spatial behavior and related social interactions?

Positions Held and Education

Assistant Professor (CNTT) (Fall 2013 – Present), Dept. of Psychology, Univ. of Delaware.
- Director of the Neuroscience BS Program and 4+1 MS Program

Visiting Assistant Professor (Fall 2010 – Spring 2013), Dept. of Psychology, Univ. of Delaware.

Postdoctoral Scholar (January 2007 – August 2010), Univ. of Alabama, Birmingham, with Dr. David Sweatt: Behavioral Neuroscience: Exploring molecular epigenetic (DNA methylation) and neurophysiological mechanisms (place cell spatial representations) of spatial learning, memory, and behavior.

Postdoctoral Scholar (May 2005 – December 2006), Univ. of Texas Med. School, Houston, Tx with Dr. James Knierim: Behavioral Neuroscience: Exploring the neurophysiology (place cells) of spatial behavior.

Ph. D. Univ. of Oklahoma, Norman, OK, (Aug 1999-May 2005), Zoology Dept.
Advisor: Dr. Laurie Vitt
Dissertation: Cottonmouth (*Agkistrodon piscivorus*) spatial ecology, behavior, and cognition.

B.S. Stetson Univ., Deland, FL, B.S. Cum Laude (May 1997), Biology Dept.
Co-advisors: Dr. Peter May and Dr. Terry Farrell
Undergraduate Thesis: Pigmy rattlesnakes (*Sistrurus miliarius*) use frog-derived chemical cues to select foraging sites.

Professional Teaching and Course Development Experience

(20+ years of teaching experience in a variety of lecture and laboratory courses: see below)

Hands-on Neuroscience (LAB) : Univ. of Delaware. This hands-on lab course has been approved as a capstone and 2nd writing course. This course explores aspects of neuroanatomy, physiology, neuroscience methods, surgical techniques, and animal behavior.

Research Methods: Univ. of Delaware: This course introduces students to concepts in experimental design, statistics, data analysis, and scientific writing

General Psychology: Univ. of Delaware: This course outlines fundamental principles in psychology and psychological research

Psychological and Brain Sciences: Univ. of Delaware: This is an introductory psychology/neuroscience course for neuroscience majors. This course outlines basic neuroanatomical, neurophysiological, and psychological principles.

Ecological Psychology: Univ. of Delaware. This honors course focuses on the interactions between the environment and the brain as they relate to a behavioral outcome. Basic fundamentals of psychology, neuro-anatomy, ecology, and natural selection are introduced. Comparisons of cognitive traits are made across taxa and discussed within an evolutionary context.

Brain and Behavior: Univ. of Delaware. This course covers the fundamental principles of behavioral neuroscience

Introduction to Neuroscience: Univ. of Delaware. This course is similar my Brain and Behavior course but goes into greater detail in areas of neurophysiology and molecular neurobiology

Sci. Tech. Honors: Behavioral Neuroscience: Guest Lecturer: Univ. of Alabama, Birmingham. This course involved multiple lectures on topics of spatial learning and memory.

Experimental Herpetology: Univ. of Oklahoma. This course was co-taught at the University of Oklahoma Biological Station. The course focused on identification of herpetological taxa, animal behavior, field sampling techniques, experimental design, and scientific writing.

Human Anatomy: Univ. of Oklahoma. I served as the teaching associate for the Human Anatomy Lab for most of my graduate career. Responsibilities included coordinating all laboratory activities, lecturing, managing 6-10 teaching assistants, and directing dissection of 8-10 human cadavers each semester.

General Biology: Introduction to Zoology: Univ. of Oklahoma. This laboratory course primarily focused on comparing the anatomy and physiology of several taxa, concepts of experimental design, and scientific writing. Laboratory activities generally included a brief lecture, dissection, and occasional behavioral experiments.

Primary Areas of Teaching Interest

Behavioral Neuroscience, Brain & Behavior, Intro to Neuroscience, Neurophysiology
Animal Behavior, Animal Cognition, Behavioral Ecology, Learning and Memory
Human Anatomy, Comparative Vertebrate Anatomy, Comparative Neuro-anatomy
General Biology, Conservation Biology
General Psychology, Biopsychology, Comparative Psychology
Research Methods
Herpetology
Special Topics: Spatial Cognition, Spatial Ecology, Animal Navigation, Social behavior

Other Professional Activities

Peer reviewer: Animal Behaviour**,** Behavioral Ecology, Brain Behavior and Evolution, Ethology, Lateralization, Southwestern Naturalist, Biological Conservation, Copeia, The Herpetological Journal, and Journal of Herpetology

CoAdvisor/Mentor: Graduate Research
Frankie Heyward, Fall 2009. Place cells and animal cognition. Rotating graduate student. Univ. of Alabama, Birmingham.

Luke Coddington, Summer 2008. Place cells and animal cognition. Rotating graduate student. Univ. of Alabama, Birmingham.

Advisor/Mentor: Undergraduate Research
Kendra Crews, Fall 2008. Differentiation in DNA methylation patterns of the *BDNF* gene associated with spatial exploration of a novel environment. Univ. of Alabama, Birmingham.

Whitney Hudman, 2008-2009. The role of DNA methylation in maintaining place field properties. Honors and McNair Scholar Research: McNair poster competition, Awarded 2nd place, Biological sciences 2009. Univ. of Alabama, Birmingham.

Sonda SenGupta, 2008-2011. Assessing the epigenetic influence on spatial learning and memory in a Morris water maze task. Honors research. Univ. of Alabama, Birmingham.

Kelli Money, 2007- 2010. The role of DNA methylation in spatial learning and memory. Honors and McNair Scholar Research: McNair poster competition, Awarded 2nd place, Biological sciences 2008. Univ. of Alabama, Birmingham.

Jamie Keeton, 2007. Neurophysiology and behavior: McNair Scholar Research. Univ. of Alabama, Birmingham.

Walter Ginn, 2003-2005. Cottonmouth spatial ecology: Univ. of Oklahoma.

Science/Technology Honors Thesis Committee Member of:

Kelli Money, 2007-2010. The influence of epigenetic mechanisms on neurophysiological correlates of space. Univ. of Alabama, Birmingham.

Sonda SenGupta, 2008-2011. Assessing the epigenetic influence on spatial learning and memory in a Morris water maze task. Honors research. Univ. of Alabama, Birmingham.

Grants, Scholarships, Awards

Classroom Transformation Grant, approx. $4000 (Equipment and Services), Univ. of Delaware 2015

Honors Program Course Enrichment Grant, $840, Univ. of Delaware, 2014

Adam's Summer Scholarship, $2500x4, Univ. of Oklahoma, 2001-2004

James M. Thompson Excellence in Teaching Award, Univ. of Oklahoma 2004

Adam's Yearly Scholarship, $1000, Univ. of Oklahoma, 2003

Departmental Travel Grant, $250, Univ. of Oklahoma, Spring 2001-2003

Graduate Student Senate Grant, $208, Univ. of Oklahoma, 2003

Graduate Student Senate Grant, $200, Univ. of Oklahoma, 2002

Oklahoma Department of Wildlife Conservation Research Grant, Cottonmouth Spatial Ecology, $500, 2002

Graduate Student Senate Grant, $250, Univ. of Oklahoma, 2001

Graduate Student Senate Grant, $350, Univ. of Oklahoma, 2000

Most Outstanding Senior Research: $75, Pigmy rattlesnakes use frog-derived chemical cues to select foraging sites. Stetson Univ., 1997

Invited Talks

Roth, E.D. 2019. Adventures of a snake psychologist. Univ. of Delaware Wildlife Society, Newark, DE.

Roth, E.D. 2016. Brains, behavior, and things that slither. DHSS Campus: Delaware Psychiatric Center, New Castle, DE.

Roth, E.D. 2016. Teaching Small things to large classes. UD Summer Faculty Institute Newark, DE.

Roth, E.D. 2012. Spatial Behavior: An Integrative Perspective. Delaware State University, Dover, DE.

Roth, E.D. 2011. The role of DNA modifications in maintaining spatial representations: Implications for spatial cognition and behavior. Sam Houston State Univ. Seminar Series.

Roth, E.D. 2010. Epigenetic mechanisms in spatial learning and memory. Univ. of Southern Mississippi Seminar Series.

Roth, E.D. 2008. In vivo neurophysiological techniques. Implications for spatial learning and memory and animal navigation. Joint Meeting of Ichthyologists and Herpetologists, spatial ecology symposia, Montreal, Canada.

Roth, E.D. 2007. Neurophysiological correlates of space, integrating ecology, behavior, and neurobiology. Science and Technology Seminar Series. Univ. of Alabama, Birmingham.

Roth, E.D. 2006. Adventures in spatial behavior and ecology. An integrative approach. Sam Houston State Univ. Seminar Series.

Roth, E.D. 2005. Neurobiology of Animal Navigation. Univ. of Texas Medical School, Houston, Texas.

Roth, E.D. 2004. Probing the Minds of Cottonmouths: Brains, Behavior, and Ecology. Univ. of Oklahoma Seminar Series.

Roth, E.D. 2002. Cottonmouth Spatial Ecology. Sam Houston State Univ. Seminar Series.

Publications

Lutterschmidt, W.I., E.D. Roth, Z.E. Perelman, and J.M. Weidler. 2022. Surviving Hurricane Harvey: Pre and Post Flood-event Site Fidelity of Northern Cottonmouths (Agkistrodon piscivorous) in Harmon Creek, Walker County, Texas **Texas J. of Sci** 74 (1): Article 4

Lutterschmidt, W.I., B. Cornell, E.D. Roth, and J.M. Weidler. 2022: Midsummer observations of temporal and structural riparian habitat use by foraging Northern Cottonmouths, Agkistrodon piscivorous, (Lacepede, 1789) in an East Texas perennial stream. **Herpetology Notes** 15: 317-328.

Lutterschmidt, W.I., Z.E. Perelman, D.R. Neyland, M.L. Thies, and E.D. Roth. 2021. Agkistrodon piscivorus (Northern Cottonmouth). Diet (Snake diet: analysis of hair samples belonging to the eastern mole). **Herpetological Review** 52 (3): 655-656.

Warren, M.R., R. Clein, M.S. Spurrier, E.D. Roth, and J.P. Neunuebel. 2020 Ultrashort-range, high-frequency communication by female mice shapes social interactions. **Scientific Reports** 10: article 2637

Warren, M.R., M.S. Spurrier, E.D. Roth, and J.P. Neunuebel. 2018. Sex differences in vocal communication of freely interacting adult mice depend upon behavioral context. **PLoS One** 2018:13(9) e0204527.

Weidler, J.M., M.L. Thies, A. Smith-Herron, E.J. Trivador III, E.D. Roth, and W.I. Lutterschmidt. 2017. *Agkistrodon Piscivorus Leucostoma* (Western Cottonmouth). Unusual Field Injury. **Herpetological Review** 48:664-665.

Roth, E.D., T.L. Roth, K.M. Money, S. SenGupta, D.E. Eason, and J.D. Sweatt. 2015. DNA methylation regulates neurophysiological spatial representation in memory formation. ***Neuroepigenetics:*** 2:1-8.

Blaze, J., E.D. Roth, and T.L. Roth. 2015. The contribution of genetics, epigenetics, and early-life experiences to behavior. In ***The New Cognitive Neurosciences V***. (Eds. Gazzaniga, M., Mangun, R. MIT Press, pp145-152.

Roth, E.D. 2014. Chapter 2: The social lives of reptiles: Attraction, avoidance, and environmental influences. In: ***Social behavior: evolutionary pathways, environmental influences and impairments***. Eds. Watson, P., Nova Publishers, pp47-70.

Monaco, J., G. Rao, E.D. Roth, and J.J. Knierim. 2014. Attentive Scanning Behavior Drives One-Trial Potentiation of Hippocampal Place Fields. ***Nature Neuroscience:*** 17: 725-731.

Matt, S., E.D. Roth, and T.L. Roth. 2014. Role of epigenetics in the brain. In ***Epigenetics in Psychiatry***. Eds, Avramopoulos, D., Grayson, D.R., Peedicayil, J. Elsevier. pp79-99.

Roth, E.D. 2013. The interplay between social interactions, spatial behavior, and cognition in squamate reptiles. In: ***Social Interactions: evolution, psychology, and benefits***. Eds. Aubert, A., Nova Publishers

Roth, E.D. 2013. Near the water's edge: Cottonmouth Spatial Ecology, Behavior, Cognition and Neurobiology. In ***Reptiles in Research: Investigations of ecology, physiology, and behavior from Desert to Sea***. Eds. Lutterschmidt, W.I., Nova Publishers

Roth, E.D., X. Yu, G. Rao, and J.J. Knierim. 2012. Functional differences in the backward shifts of CA1 and CA3 place fields in novel and familiar environments. ***PLoS ONE***. 7:e36035

Roth, E.D. and W.I. Lutterschmidt. 2011. Experimental validation of sex differences in spatial behavior patterns of free ranging snakes: Implications for social interactions. ***Ethology***. 117:852-858

Penner, M.R., T.L. Roth, M.K. Chawla, L.T. Hoang, E.D. Roth, F.D. Lubin, J.D. Sweatt, P.F. Worley, and C.A. Barnes. 2011. Age-related changes in *Arc* transcription and DNA methylation within the hippocampus. ***Neurobiology of Aging***. 32:2198-2210.

Roth, T.L., E.D. Roth, and J.D. Sweatt. 2010. Epigenetic regulation of genes in learning and memory. ***Essays in Biochemistry***. 48:263-274.

Roth, T.L., E.D. Roth, and J.D. Sweatt. 2010. Epigenetics of memory processes. In ***Handbook of epigenetics: the new molecular and medical genetics***, pp 381-390. (T Tollefsbol, Ed.) Elsevier, CA.

Lubin, F.D., E.D. Roth, J.D. Sweatt, and T.L. Roth. 2008. A novel approach to understanding neural plasticity: epigenetic regulation of the *BDNF* gene. In ***Neural Pathways Research***, pp 193-203 (FL Pichler, Ed.). Nova Science Publishers, Inc., NY.

Lutterschmidt W.I., E.D Roth, K.G. Wunch, E. Levin, and L.H. James. 2007. Bacterial microflora of the anterior digestive tract of two *Agkistrodon* species. Additional evidence for food partitioning? ***Herpetological Review*** 38(1), 33-35.

Roth, E.D., W.I. Lutterschmidt, and D.A. Wilson. 2006. Relative medial and dorsal cortex volume in relation to sex differences in spatial ecology of a snake population. ***Brain, Behavior and Evolution*** 67:103-110

Roth, E.D. 2005. Buffer zone applications in snake ecology: A case study using

cottonmouths (*Agkistrodon piscivorus*). ***Copeia*** 2005 (2): 399-402.

Roth, E.D. 2005. Spatial ecology of a cottonmouth (*Agkistrodon piscivorus)* population in East Texas. ***Journal of Herpetology*** 39 (2): 309-312.

Roth, E.D. and J.A. Johnson 2004. Size-based variation in antipredator behavior within a snake (*Agkistrodon piscivorus*) population. ***Behavioral Ecology*** 15 (2): 365-370.

Roth, E.D. 2003. Handedness in snakes? Lateralization of coiling behavior in a cottonmouth (*Agkistrodon piscivorus leucostoma*) population. ***Animal Behaviour*** 66 (2): 337-341.

Roth, E.D. and M. Yuan. 2003. The importance of reporting the geodetic datum with geographic coordinates. ***Herpetological Review*** 34 (3): 193-195.

Roth, E.D., W.D.W. Ginn, L.J. Vitt, and W.I. Lutterschmidt. 2003. Diet: *Agkistrodon piscivorus leucostoma*. ***Herpetological Review*** 34 (1):60.

Roth, E.D., P.G. May, and T.M. Farrell. 1999. Pigmy rattlesnakes use frog-derived chemical cues to select foraging sites. ***Copeia*** 1999(3):772-774.

Presentations/Meeting Abstracts

Meckler, L.A., M.R. Warren, M.S. Spurrier, E.D. Roth, and J.P. Neunuebel. 2017. Using sound source localization to investigate the reproductive cycle on mouse vocal expression. Society for Neuroscience.

Meckler, L.A., M.R. Warren, M.S. Spurrier, E.D. Roth, and J.P. Neunuebel. 2017. Using sound source localization to investigate the reproductive cycle on mouse vocal expression. Delaware Neuroscience Symposium.

Spurrier, M.S., E.D. Roth, M.R. Warren, and J.P. Neunuebel. 2016. Sex differences in the acoustic structure of mouse ultrasonic vocalizations. Society for Neuroscience

Spurrier, M.S., E.D. Roth, M.R. Warren, and J.P. Neunuebel. 2016. Sex differences in the acoustic structure of mouse ultrasonic vocalizations. Delaware Neuroscience Symposium

Monaco, J., G. Rao, E.D. Roth, and J.J. Knierim. 2013. Scanning behavior in novel environments promotes *de novo* formation of hippocampal place fields in rats. Society for Neuroscience.

Roth, E.D., K.M. Money, D.E. Eason, T.L. Roth, and J.D. Sweatt. 2009. The role of DNA methylation in spatial learning and memory. Society for Neuroscience.

Penner, M.R., T.L. Roth, F.D. Lubin, E.D. Roth, L.T. Hoang, J.D. Sweatt, and C.A. Barnes. 2009. DNA methylation of Zif268 is not dynamically regulated within the aged hippocampus following spatial behavior. Society for Neuroscience and Molecular and Cellular Cognition Society.

Roth, E.D., K.M. Money, J.N. Keeton, and J.D. Sweatt. 2008. The role of DNA methylation in maintaining stable hippocampal place fields. Society for Neuroscience.

Penner, M.R., L.T. Hoang, T.L. Roth, E.D. Roth, J.D. Sweatt, and C.A. Barnes. 2008. DNA methylation patterns in the hippocampus of memory-impaired aged rats following spatial behavior. Society for Neuroscience.

Glaudas, X. Roth, E.D. and M.E. Dorcas. 2008. Cottonmouth antipredator behavior. JMIH, spatial ecology symposia.

Roth, E.D., X. Yu, C. Conner. and J.J. Knierim. 2007. Functional differentiation between CA1 and CA3: Backward shifts of place fields in familiar and completely novel environments. Society for Neuroscience.

Roth, E.D. 2005. Do social interactions influence spatial behavior within a cottonmouth population? Southwestern Association of Naturalists.

Roth, E.D., W.I. Lutterschmidt, and D.A. Wilson. 2004. Cottonmouth (*Agkistrodon piscivorus*) neuro-ecology : An integrative approach to examining patterns of spatial use. Snake Ecology Meeting.

Roth, E.D., W.I. Lutterschmidt, and D.A. Wilson. 2004. Can neuro-anatomy predict home range size? Cottonmouth (Agkistrodon piscivorus) neuro-ecology. Joint Meeting of Ichthyologists and Herpetologists.

Roth, E.D. 2003. Terrestrial buffer zones in wetland ecology. Southwestern Association of Naturalists 50th Anniversary Meeting.

Johnson, J.A. and E.D. Roth. 2003. Ontogenetic variation in antipredator behavior of a snake (*Agkistrodon piscivorus*) population. Graduate Student Research and Creativity Endeavors / Poster Session.

Johnson, J.A. and E.D. Roth. 2003. Size based variation in antipredator behavior of a snake (*Agkistrodon piscivorus*) population. Joint Meeting of Ichthyologists and Herpetologists.

Roth, E.D. 2002. Handedness in snakes? Behavioral laterality in a cottonmouth population. Joint Meeting of Ichthyologists and Herpetologists.

Roth, E.D. 2002. Lateralized coiling behavior in snakes. Animal Behaviour Society Meeting.

Other Professional Positions Held

Environmental Lab Analyst/Chemist: Karr Environmental, Orange City, Florida, 1997-1998.

Museum Curator: Road Ark, Santa Fe, New Mexico: Academy of Natural Sciences (Philadelphia), Science Museum of Western Virginia (Roanoke), and Museum of Discovery (Little Rock), 1998-1999.

References

Dr. David Sweatt (dsweatt@nrc.uab.edu, postdoctoral mentor: molecular neurobiology: learning and memory: Univ. of Alabama, Birmingham)

Dr. Jim Knierim (jknierim@jhu.edu, postdoctoral mentor: spatial cognition, neurophysiology: Johns Hopkins)

Dr. William Lutterschmidt (bio_wil@shsu.edu, dissertation committee, physiological ecology, current collaborator, Sam Houston State University).

Dr. Laurie Vitt (vitt@ou.edu, dissertation advisor, ecology, University of Oklahoma)