

# Matthew L. Holding,

---

Postdoctoral Research Fellow, Life Science Institute, University of Michigan

Email: [venomatt@umich.edu](mailto:venomatt@umich.edu); Phone: 765-749-4348

## EDUCATION

---

|       |  |             |
|-------|--|-------------|
| Ph.D. | Ohio State University – Evolution, Ecology, and Organismal Biology | 2011 – 2017 |
|       | <i>Advisor: H. Lisle Gibbs</i>                                     |             |
|       | <i>Minor: College and University Teaching</i>                      |             |
| M.S.  | California Polytechnic State University – Biological Sciences      | 2009 – 2011 |
|       | <i>Advisor: Emily Taylor</i>                                       |             |
| B.S.  | Ball State University – Biology                                    | 2005 – 2009 |

## PROFESSIONAL POSITIONS

---

|   |                          |
|---|--------------------------|
| Postdoctoral Research Fellow, Life Sciences Institute, University of Michigan | 2021 – Pres.             |
| N.S.F. EPsCoR Research Fellow, NRES, University of Nevada Reno                | 2020 – 2021              |
| National Science Foundation Postdoctoral Research Fellow, Florida State Univ. | 2018 – 2020              |
| Postdoctoral Research Fellow, Biological Sciences, Clemson Univ.              | 2017 – 2018              |
| Presidential Fellow, Ohio State University                                    | 2016 – 2017              |
| Graduate Teaching Assistant – Ohio State University                           | 2011 – 2012, 2014 – 2016 |
| National Science Foundation Graduate Research Fellow – Cal Poly, Ohio State   | 2010 – 2014              |
| Graduate Teaching Assistant – Cal Poly  | 2009 – 2011              |
| Amphibian Research Technician, Green Diamond Resource Company, CA             | 2008                     |
| Avian Research Technician, Indiana Hardwood Ecosystem Experiment              | 2007                     |

## AWARDS AND HONORS

---

|  |             |
|--|-------------|
| Postdoctoral Award for Exceptional Mentoring, University of Nevada Reno          | 2021        |
| National Science Foundation Postdoctoral Fellowship                              | 2017        |
| Presidential Fellowship, Ohio State University                                   | 2017        |
| Outstanding Undergraduate Research Mentor Award, OSU Undergrad. Research Office  | 2016        |
| National Science Foundation Graduate Research Fellowship                         | 2010 – 2014 |
| Outstanding Graduate Student in Biological Sciences, Cal. Poly. State University | 2011        |
| Outstanding Thesis Award Nominee, Cal. Poly. State University                    | 2011        |
| Outstanding Senior in Wildlife Biology, Ball State University Biology Department | 2009        |

## PUBLICATIONS

\* mentored undergraduate; † joint first author

*Manuscripts in Revision/Review/Preprint*

**Holding ML**, Trevine, VC, Zinenko, O, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Parkinson, CL, Grazziotin, FG, Santana, SE, Davis, ME, Rokyta, DR. (under review). The beak of the snake: trait matching of fang length and diet in viperid snakes. In review at *Proceedings B*

Greenhalgh, R.,  **Holding ML**, Orr, TJ, Henderson, JB, Parchman, TL, Matocq, MD, Dearing, MD. Trio-binned genomes of the woodrats *Neotoma bryanti* and *N. lepida* reveal novel gene islands and rapid copy number evolution of xenobiotic metabolizing cytochrome p450 genes. Preprint at [biorxiv.org/content/10.1101/2021.03.08](https://www.biorxiv.org/content/10.1101/2021.03.08).

*Published or Accepted Manuscripts*

[29] Huttinger ZM, Haynes LM, Yee A, Kretz CA,  **Holding ML**, Siemieniak DR, Lawrence DA, Ginsburg, D. 2021. Deep mutational scanning of the plasminogen activator inhibitor-1 functional landscape. In press at *Scientific Reports*.

[28] Byer, NB,  **Holding ML**, Crowell, M., Pierson, TW, Dilts, TE, Shoemaker, KT, Matocq, MD. Adaptive divergence despite low effective population size in a peripherally isolated population of the pygmy rabbit (*Brachylagus idahoensis*). *Molecular Ecology* 30:4173–4188.

[27] Robinson, KR,  **Holding ML**, Saviola, A, Whitford, MA, Clark, RC. 2021. Phenotypic and functional variation in venom and venom resistance of two sympatric rattlesnakes and their prey. *Journal of Evolutionary Biology* 34:1447–1465.

[26]  **Holding ML**, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Ellsworth, S, Nystrom, G, Margres, MM, Colston, TJ, Borja, M., Grünwald, C., Jones, J., Castañeda, G, Frietas-de-Sousa, L, Moura-da-Silva, A, Azevedo, I, Grazziotin, FG, Gibbs, HL, Rokyta, DR, Parkinson, CL. (2021). Phylogenetic diet diversity predicts venom complexity in North American Pitvipers. *Proceedings of the National Academy of Science of the USA* 118, e2015579118.

[25] Claunch, NC,  **Holding ML**, Frazier, JA, \*Huff, EM, \*Schonour, RB, Vernasco, B, Moore, IT, Rokyta, DR, Taylor, EN (In press). Experimental manipulation of corticosterone does not affect venom composition or functional activity in free-ranging rattlesnakes. *Physiological and Biochemical Zoology*.

[24] \*,†Schonour, RB, \*,†Huff, EM,  **Holding ML**, Claunch, NM, Ellsworth, SA, Hogan, MP, Wray, K, McGivern, J, Margres, MJ, Colston, TJ, Rokyta, DR. (2020). Gradual and discrete ontogenetic shifts in rattlesnake venom composition and assessment of hormonal and ecological correlates. *Toxins* 12: 659. [doi.org/10.3390/toxins12100659](https://doi.org/10.3390/toxins12100659)

- [23]  **Holding, ML**, Sovic, MG, Colston, TC, Gibbs, HL. (2020). The scales of coevolution: comparative phylogeography and genetic demography of a locally adapted venomous predator and its prey. *Biological Journal of the Linnean Society*. doi.org/10.1093/biolinnean/blaa192
- [22] † **Holding, ML**, †Putman, BJ, Kong, LM, Smith, JE, Clark, RW. (2020). Physiological stress integrates resistance to rattlesnake venom and the onset of risky foraging in California ground squirrels. *Toxins* 12: 617. doi.org/10.3390/toxins12100617
- [21] Gibbs, HL, Sanz, L, Pérez, A, Ochoa, A, Hassinger, ATB,  **Holding, ML**, Calvete, JJ. (2020). The molecular basis of venom resistance in a rattlesnake-squirrel predator-prey system. *Molecular Ecology* 29: 2871-2888. doi.org/10.1111/mec.15529
- [20] Freitas-de-Sousa, LA, Nachtigall, P, Portes-Junior, JA,  **Holding, ML**, Nystrom, GS, Ellsworth, SA, Guimarãs, NC, Tioyama, E, Ortiz, F, Silva BR, Kunz, TS, Junqueira-de-Azevedo, ILM, Grazzitin, FG, Rokyta, DR, Moura-da-Silva, AM. (2020). Size matters: an evaluation of the molecular basis of ontogenetic modifications in the composition of *Bothrops jararacussu* snake venom. *Toxins* 12, 791. doi.org/10.3390/toxins1212079
- [19] Rautsaw, RM, Hofmann, EP, Margres, MM,  **Holding, ML**, Strickland, JL, Mason, AJ, Rokyta, DR, Parkinson, CL (2019) Intraspecific sequence and gene expression variation contribute little to venom diversity in Sidewinder Rattlesnakes. *Proceedings of the Royal Society B: Biological Sciences*. doi: 10.1098/rspb.2019.0810
- [18] Goetz SM, Piccolomini S, Hoffman M, Bogan J,  **Holding ML**, Mendonca MT, Steen DA (2019) Serum-based inhibition of pitviper venom by Eastern Indigo Snakes (*Drymarchon couperi*). *Biology Open*. doi: 10.1242/bio.040964
- [17]  **Holding ML**, Margres MM, Mason AJ, Parkinson CL, Rokyta DR (2018) Evaluating the performance of de novo assembly methods for venom-gland transcriptomes. *Toxins* 10: doi.org/10.3390/toxins10060249
- [16] Hofmann EP, Rautsaw RM, Stickland JL,  **Holding ML**, Hogan MP, Mason AJ, Rokyta DR, Parkinson CL (2018) Comparative venom-gland transcriptomics and venom proteomics of four Sidewinder Rattlesnake (*Crotalus cerastes*) lineages reveal little differential expression despite individual variation. *Scientific Reports* 8: 15534.
- [15]  **Holding ML**, Margres MM, Rokyta DR, Gibbs HL (2018) Local prey community composition and genetic distance predict venom divergence among populations of the northern Pacific rattlesnake (*Crotalus oreganus*). *Journal of Evolutionary Biology*. doi: 10.1111/jeb.13347
- [14] McCluskey EM, Matthew SN, Ligoeki IY,  **Holding ML**, Lipps GL Jr, Hetherington TE (2018) The importance of historical land use in the maintenance of early successional habitat for a threatened rattlesnake. *Global Ecology and Conservation*. doi.org/10.1016/j.gecco.2017.e00370.

- [13] Claunch NC,  **Holding ML**, Escallon C, Vernasco B, Moore IT, Taylor EN (2017) Good vibrations: Assessing the stability of snake venom composition after researcher-induced disturbance in the laboratory. *Toxicon* 133: 127-135.
- [12] \*Hudson P, Denton RD,  **Holding ML**, Gibbs HL (2017) Repeatability of locomotor endurance in the Smallmouth Salamander (*Ambystoma texanum*). *Herpetological Review* 47: 583-586.
- [11] † **Holding ML**, †Drabeck DH, Jansa SA, and Gibbs HL (2016) Venom resistance as a model for understanding the molecular basis of coevolutionary adaptations. Invited review for *Integrative and Comparative Biology* 56: 1032-1043.
- [10]  **Holding ML**, Biardi JE, Gibbs HL (2016) Coevolution of venom function and prey resistance in a rattlesnake predator and its squirrel prey. *Proceedings of the Royal Society B: Biological Sciences* 283:28-41.  
Featured on [NSF Science360 Super Science Show](#)
- [9] \*Saccucci M, Denton RD,  **Holding ML**, Gibbs HL (2016) Polyploid unisexual salamanders have higher tissue regeneration rates than diploid sexual relatives. *Journal of Zoology* 300: 77-81.
- [8] \*Pomento AM, \*Perry BW, Denton RD, Gibbs HL,  **Holding ML** (2016) No safety in the trees: Local and species-level adaptation of an arboreal squirrel to the venom of sympatric rattlesnakes. *Toxicon* 118:149-155
- [7]  **Holding ML**, \*Kern EH, Denton RD, Gibbs HL (2016) Fixed prey cue preferences among Dusky Pigmy Rattlesnakes (*Sistrurus miliarius barbouri*) raised on different long-term diets. *Evolutionary Ecology* 30:1-7.
- [6]  **Holding ML** †, Denton RD †, Kulesza A, Ridgway JS (2014) Confronting scientific misconceptions by fostering a classroom of scientists in the introductory biology lab. *The American Biology Teacher* 76: 218-523.
- [5]  **Holding ML**, Owen DAS, Taylor EN (2014) Evaluating the thermal effects of translocation in a large-bodied pitviper. *Journal of Experimental Zoology A* 321, 442-449.
- [4] \*Owen DAS, Carter E,  **Holding ML**, Islam K, Moore IT (2014) Roads are associated with a blunted stress response in a North American pit viper. *General and Comparative Endocrinology* 202:87-92.
- [3]  **Holding ML**, Frazier JA, Pollock N, \*Dorr SW, et al. (2014) Wet- and dry-season steroid hormone profiles and stress reactivity of an insular dwarf snake, the Hog Island Boa (*Boa constrictor imperator*). *Physiological and Biochemical Zoology* 87:363-373
- [2]  **Holding ML**, Frazier JA, \*Dorr SW, Henningsen SN, Moore IT, and Taylor EN (2014) The physiological and behavioral effects of repeated handling and short-distance translocation on free-ranging Northern Pacific rattlesnakes (*Crotalus o. oreganus*). *Journal of Herpetology* 48: 233-239.
- [1]  **Holding ML**, Frazier JA, Taylor EN, Strand CR (2012) Experimentally-altered navigational demands induce changes in the cortical forebrain of free-ranging Northern Pacific Rattlesnakes (*Crotalus o. oreganus*). *Brain, Behavior, and Evolution* 79:144-154.

## PRESENTATIONS

---

### *Invited Oral Presentations*

**Holding, ML.** Phylogenetic diet diversity predicts venom complexity in North American pitvipers – *2020 Virtual Presentation Series, Instituto Butantan, Brazil.*

**Holding, ML.** Adaptive Variation in Viper Venom and the Venom Delivery System Spanning the Scales of Biodiversity – *2019 Departmental Seminar, Florida State University, Department of Biological Sciences*

**Holding, ML.** Drivers of diversity in pitviper venoms – Oral Presentation.  
*2018 MVZ Lunch – University California Berkeley, Museum of Vertebrate Zoology*

**Holding, ML.** Drivers of diversity in pitviper venoms – Oral Presentation.  
*2018 Departmental Seminar Series – University of North Carolina Charlotte, Biology Department – Charlotte, NC*

**Holding, ML, Sovic, MG, Gibbs, HL.** Demographic factors predict local adaptation in populations of a venomous snake and its venom resistant prey – Oral Presentation.  
*2017 Venom Biology, Biochemistry, and Evolution Symposium – Instituto Butantan – Sao Paulo, Brazil*

**Holding, ML.** Coevolution of snakes and their venom resistant prey – Oral Presentation.  
*2017 Departmental Seminar Series – Ohio Wesleyan University – Delaware, OH.*

**Holding, ML, Biardi, JE, Gibbs, HL.** Coevolution of venom function and prey resistance in a rattlesnake and a squirrel: Is it an arms-race? – Oral Presentation.  
*2016 Meeting of the Society for Integrative and Comparative Biology – Portland, OR*

Gibbs, HL, **Holding ML**, Smiley-Walters, S. Assessing venom function: Empirical and conceptual approaches. Symposium entitled “Integrative Biology of Venom”.  
*2016 Meeting of the Society for Integrative and Comparative Biology – Portland, OR.*

**Holding, ML, Biardi, JE, Gibbs, HL.** Adaptive variation in a complex chemical phenotype: Northern Pacific rattlesnake local adaptation to venom resistance in ground squirrels. Symposium entitled “Transforming Chemical Ecology”  
*2015 Joint Meeting of Ichthyologists and Herpetologists – Reno, NV.*

**Holding, ML.** Northern Pacific Rattlesnakes at the Cutting Edge of Biology Research.  
*2014 Meeting of the Northern California Herpetological Society – Sacramento, CA*

**Holding, ML** and Denton, RD. Tackling Scientific Misconceptions by Fostering a Classroom of Scientists.

*2013 OSU Center for Life Sciences Education's Seminar Series – Columbus, OH*

### *Contributed Presentations at Professional Meetings*

**Holding ML**, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Ellsworth, S, Nystrom, G, Margres, MM, Colston, TJ, Borja, M., Grünwald, C., Jones, J., Castañeda, G. Frietas-de-Sousa, .L, Moura-da-Silva, A, Azevedo, I, Grazziotin, FG, Gibbs, HL, Rokyta, DR, Parkinson, CL. Comparative analysis of venom complexity and diet diversity in rattlesnakes using a novel, genome-wide phylogeny – Oral Presentation

*2020 Society of Integrative and Comparative Biology Meeting – Austin, TX.*

**Holding ML**, Trevine, VC, Zinenko, O, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Parkinson, CL, Grazziotin, FG, Santana, SE, Davis, ME, Rokyta, DR. The beak of the snake: fang length evolution is predicted by diet. – Poster Presentation

*2020 Society of Integrative and Comparative Biology Meeting – Austin, TX.*

**Holding ML**, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Ellsworth, S, Nystrom, G, Margres, MM, Colston, TJ, Borja, M., Grünwald, C., Jones, J., Castañeda, G. Frietas-de-Sousa, .L, Moura-da-Silva, A, Azevedo, I, Grazziotin, FG, Gibbs, HL, Rokyta, DR, Parkinson, CL. Diet and venom complexity in rattlesnakes. – Oral Presentation

*2019 Biology of Pitvipers 3 – Rodeo, NM*

**Holding ML**, Trevine, VC, Zinenko, O, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Parkinson, CL, Grazziotin, FG, Santana, SE, Davis, ME, Rokyta, DR. Evolutionary matching of fang length to diet in vipers. – Poster Presentation

*2019 Biology of Pitvipers 3 – Rodeo, NM*

**Holding ML**, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Ellsworth, S, Nystrom, G, Margres, MM, Colston, TJ, Borja, M., Grünwald, C., Jones, J., Castañeda, G. Frietas-de-Sousa, .L, Moura-da-Silva, A, Azevedo, I, Grazziotin, FG, Gibbs, HL, Rokyta, DR, Parkinson, CL. Assessing the relationship between diet and venom complexity in rattlesnakes using a novel, genome-wide phylogeny. – Oral Presentation

*2019 Joint Meeting of Ichthyologists and Herpetologists – Snowbird, UT*

**Holding ML**, Trevine, VC, Zinenko, O, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Hogan, MP, Parkinson, CL, Grazziotin, FG, Santana, SE, Davis, ME, Rokyta, DR. Evolutionary matching of fang length to diet in vipers. – Poster Presentation

*2019 Joint Meeting of Ichthyologists and Herpetologists – Snowbird, UT*

Hoffman, EP, Rautsaw, RT, Grünwald, CI, Jones, JM, Franz-Chávez, H, Ahumada-Carillo, IT, Ramírez-Chaparro, R, de la Torre Loranca, MA, Strickland, JL, Mason, AJ, Holding, ML, Borja, M, Castañeda, G, Parkinson, CL. Characterizing venom variation in the Mexican Montane Pitvipers (*Cerrophidion*). – Oral Presentation

*2019 Biology of Pitvipers 3 – Rodeo, NM*

Parkinson, CL, **Holding, ML**, Strickland, JL, Rautsaw, RM, Mason, AJ, Hofmann, EP, Borja, M, Grünwald, CI, Jones, JM, Castañeda, G, Grazziotin, F, Junqueira-de-Azevedo, I, Gibbs, HL, Rokyta, DR. The rattlesnake tree of life, a genome-wide perspective.

*2019 Biology of Pitvipers 3 – Rodeo, NM*

Rautsaw, R.M, E.P. Hofmann, C.I. Grünwald, J.M. Jones, H. Franz-Chávez, I.T. Ahumada-Carrillo, R. Ramírez-Chaparro, M.A. de la Torre Loranca, J.L. Strickland, A.J. Mason, **Holding, ML**, M. Borja, G. Castañeda, and C.L. Parkinson. Variación en el veneno de los vipéridos de montaña Mexicanos (*Cerrophidion*).

*2nd Congreso Nacional de Viperidos Mexicanos y Ofidismo – Aguascalientes, Mexico.*

Parkinson, C.L, **Holding, ML**, J.L. Strickland, R.M. Rautsaw, A.J. Mason, E.P. Hofmann, M. Borja, C.I. Grünwald, J.M. Jones, G. Castañeda, and D. Rokyta. El árbol de la vida de las serpientes de cascabel: una perspectiva de genoma amplio.

*2nd Congreso Nacional de Viperidos Mexicanos y Ofidismo – Aguascalientes, Mexico.*

**Holding, ML**, Margres, MM, Rokyta, DR, and Gibbs, HL. Local prey community composition and genetic distance predict venom divergence among populations of the northern Pacific rattlesnake (*Crotalus oreganus*) – Oral Presentation

*2018 Joint Meeting of Ichthyologists and Herpetologists – Rochester, NY*

**Holding, ML**, Sovic, MG, Gibbs, HL. Demographic differences predict patterns of local adaptation in a venomous snake and its resistant prey – Oral Presentation.

*2017 Evolution Meeting – Portland, OR*

**Holding, ML**, Gibbs, HL. Migration, drift, and the outcomes of coevolution between a rattlesnake and its squirrel prey – Oral Presentation.

*2016 Joint Meeting of Ichthyologists and Herpetologists – New Orleans, LA*

**Holding, ML**, Biardi, JE, Gibbs, HL. Coevolution of venom function and prey resistance in a rattlesnake predator and its squirrel prey – Oral Presentation.

*2016 Evolution Meeting – Austin, TX*

\*Pomento, AM, \*Perry, BW, Denton, RD, Gibbs, HL,  **Holding, ML**. No safety in the trees: Local and species-level adaptation of gray squirrels to the venom of sympatric rattlesnakes.

*2016 Evolution Meeting – Austin, TX – Poster*

**Holding, ML**, Gibbs, HL, Biardi, JE. Testing for local adaptation of pitviper venoms to resistant prey: Interactions between Northern Pacific Rattlesnakes and California Ground Squirrels – Oral Presentation.

*2014 Biology of the Pitvipers Conference – Tulsa, OK*

Owen, DAS,  **Holding, ML**, Geinger, C, Taylor, EN. A comparison of commonly applied body condition indices in snakes – Poster Presentation.

*2014 The Biology of the Pitvipers – Tulsa, OK*

Taylor, EN, Heiken, K,  **Holding, ML**, Moore, IT. Is translocation stressful to rattlesnakes? – Oral Presentation.

*2014 The Biology of the Pitvipers – Tulsa, OK*

Denton, RD,  **Holding, ML**, Ridgway, JS, Mollohan, K, Kulesza, A. Improving students' perceptions of the scientific method by showing them 'How Real Science Works' – Poster Presentation.

*2013 National Association of Biology Teachers Meeting – Atlanta, GA*

**Holding, ML**. Snakes living the island life: Sex steroid concentrations and stress reactivity of the Hog Island Boa (*Boa constrictor imperator*) – Oral Presentation.

*2012 World Congress of Herpetology – Vancouver, BC*

**Holding, ML**. Altered navigational demands induce changes in the cortical brain region of free-ranging Northern Pacific Rattlesnakes (*Crotalus o oreganus*) – Oral Presentation.

*2011 Joint Meeting of Ichthyologists and Herpetologists – Minneapolis, MN*

**Holding, ML**. The physiological ramifications of short-distance translocation in reptiles: a case study using the Northern Pacific Rattlesnake (*Crotalus o. oreganus*) – Poster Presentation.

*2011 Joint Meeting of Ichthyologists and Herpetologists – Minneapolis, MN*



**Holding, ML**, KM Buskirk., EN Taylor, and CR Strand. Experimentally altered navigational demands affect neuroplasticity in the rattlesnake brain – Poster Presentation.  
*2011 International Symposium on Amphibian and Reptilian Endocrinology and Neurobiology, Ann Arbor, MI*

**Holding, ML**. The physiological effects of short-distance translocation on Northern Pacific rattlesnakes – Oral Presentation.  
*2011 Biology of the Rattlesnakes Symposium – Tucson, AZ*

Taylor, EN, Frazier J, **Holding ML**, Strand, C. Sex differences in rattlesnake spatial ecology: it's all in the mind – Oral Presentation.  
*2011 Biology of the Rattlesnakes Symposium, Tucson, AZ.*

## RESEARCH FUNDING

---

|   |      |
|---|------|
| National Science Foundation Postdoctoral Research Fellowship – \$138,000<br><i>Use of Biological Collections Award #1711141: “Innovation, diversification, and complexity: The impact of venom evolution on the integrated venom delivery system of New World snakes”</i> | 2017 |
| American Society of Naturalists’ Student Research Award – \$2000  | 2015 |
| Ohio State Alumni Grants for Graduate Research – \$1990   | 2014 |
| Jones-Lovich Grant in Southwestern Herpetology, Herpetologists’ League – \$1000   | 2014 |
| Ray Travel Award, Ohio State University Council of Graduate Students – \$750  | 2014 |
| Research Grant, Calif. Bureau of Land Management – \$4000   | 2014 |
| Theodore Roosevelt Memorial Grant, American Museum of Natural History – \$2385  | 2013 |
| Grant-in-Aid of Research, American Society of Mammalogists – \$1500   | 2013 |
| Grant-in-Aid of Research, Sigma Xi – \$500  | 2013 |
| Gaige Award, American Society of Ichthyologists and Herpetologists – \$500  | 2013 |
| Graduate Student Research Grant, Chicago Herpetological Society – \$500   | 2013 |
| The Sigma Xi Graduate Research Grant, OSU chapter of Sigma Xi – \$500   | 2012 |
| Center for Life Sciences’ Laboratory Development Grant, Ohio State University – \$2,000   | 2011 |
| N.S.F. Travel Grant for International Research by Graduate Research Fellows – \$1500  | 2010 |
| E.E. Williams Research Grant, The Herpetologists’ League – \$500  | 2010 |

Aryan I. Roest Memorial Grant, Cal Poly Department of Biological Sciences – \$2000 2010

## TEACHING EXPERIENCE

---

### *Instructor of Record*

EEOB 3194: Evolution and Ecology of Amphibians and Reptiles, Ohio State Su 2015  
 Field Herpetology, American Museum of Nat. History's Southwest Research Station 2011 –  
 2013, 2016-Present

### *Guest Lectures*

BSC 5936/4933: Bioinformatics – “Reduced-representation sequencing” Sp 2019

### *Graduate Teaching Assistant*

EEOB 4220: Evolution and Ecology of Mammals, Ohio State Sp 2015, Sp 2016  
 EEOB 3320: Organismal Diversity, Ohio State Au 2015  
 EEOB 3310: Evolution, Ohio State Au 2014  
 EEOB 2510: Introductory Anatomy, Ohio State Au 2012, Su 2012  
 EEOB 3410: Ecology, Ohio State Sp 2012  
 BIOL 1113: Energy Transfer & Development, Ohio State Au 2011  
 ZOO 341: Herpetology, Cal Poly Sp 2011  
 BIO 162: Introduction to Organismal Form and Function, Cal Poly Au 2010, Sp 2010  
 BIO 160: Diversity and History of Life, Cal Poly Au 2009

## SERVICE

---

### *Leadership Positions*

**Social Media Manager and Member** – Florida State Postdoctoral Association 2019  
*Attend OPDA meetings and advertise postdocs and their contributions on Twitter*

**Co-founder and Graduate Student Advisor** – OSU Evolution and Ecology Club 2013 – 2016  
*Advised undergraduate officers on how to run a university organization, organized two field trips and two workshops each year*

**Elected Student Representative** – EEOB Dept. Chair's Advisory Committee 2014 – 2015  
*Represented graduate students at bi-weekly meetings discussing topics of importance to my department*

**Elected Departmental Delegate** – Ohio State Council of Graduate Students. 2012 – 2013  
*Represented EEOB graduate students at monthly meetings discussing issues relevant to graduate students at Ohio State University*

**President** – Ball State University Student Chapter of The Wildlife Society 2008 – 2009  
*Lead bi-weekly meetings, organized workshops and community service events, and facilitated visits from guest speakers*

### *Department and University Service*

**Mentor** – FSU Undergrad Research Opportunity Program (UROP) 2018-2020  
*Served as UROP Program Mentor for 7 undergraduate students who conducted research with me and presented posters at both FSU and national research conferences.*

**Student Representative** – OSU College of Arts & Sciences Curriculum Committee 2016  
*Attend monthly meetings and represent student views on curriculum*

**Prospective Student Liaison** – EEOB Department 2013 – Present  
*Meet with visiting prospective students to discuss how the EEOB Department at Ohio State offers opportunities for undergraduate research*

**Judge** – Ohio State Fall Undergraduate Research Week’s Student Poster Forum 2014  
*Scored and provided feedback on student research posters*

**Judge** – Ohio State Graduate Associate Teaching Award Committee, 2013  
*Evaluated and scored applications for this award*

**Elected Student Representative** – EEOB Department Seminar Committee. 2012 – 2013  
*Scheduled graduate student interactions with invited speakers for the weekly EEOB departmental seminar series and facilitated speaker’s visit*

**Symposium Organizer** – Ohio State Dept. of EEOB’s Darwin Award Presentations 2012  
*Organized two sessions of short talks given by EEOB graduate students to other members of the department*

### *Professional Service*

- Workshop Organizer** – NSF EPsCOR Workshop on Genome Annotation 2020  
*Organized and led a full day workshop on genome annotation combining command-line basics, program install, analysis, and manual curation of annotations. Included 11 attendees from 4 universities in NSF EPsCOR states.*
- Judge** – DCPB Wake Award for Best Student Presentations 2020  
*Judged student presentation competitions at the 2020 Society of Integrative and Comparative Biology Meeting in Austin, TX.*
- Judge** – ASIH Stoye Award 2018, 2019  
*Judged for best presentation of American Society of Ichthyologist and Herpetologists Stoye Award for best student presentation in Genetics, Development, and Morphology*
- Student Mentor** – Joint Meeting of Ichthyologists and Herpetologists 2018  
*Participated as a mentor in Society for the Study of Amphibians and Reptiles New Member Mentorship Program. Helped an undergraduate student navigate the meeting and meet prospective graduate school advisors.*
- Graduate Student Committee Member** – The Herpetologists' League. 2014 – 2016  
*Represent graduate students at annual business meeting of the society, coordinate society fundraisers that provide funds for student travel*
- Workshop Organizer** – Joint Meeting of Ichthyologists and Herpetologists 2015  
*Organized a workshop and expert panel discussion on field work basics and public engagement during research for the graduate students*
- Grant Reviewer** – E. E. Williams Graduate Student Research Grant. 2014  
*Served on the review committee in charge of deciding the grant recipients*

### *Peer Reviewer for the Following Journals*

Ecology Letters • Systematic Biology • Proceedings B • Molecular Ecology • Genome Biology and Evolution • BMC Evolutionary Biology • Journal of Proteomics • Toxicon • Toxins • Journal of Herpetology • Copeia • Conservation Physiology • Biology of the Rattlesnakes Compendium • Experimental Biology and Medicine • American Biology Teacher

## **OUTREACH AND PUBLIC ENGAGEMENT IN SCIENCE**

---

- Classroom Career Day Visit**, Radio Park Elementary, State College, PA. 2021  
*Held a virtual Zoom visit to Mrs. Pantall's 4<sup>th</sup> grade class's career day to talk with her students about how to become a scientist, and what herpetologist.*
- Museum Display Contribution**, Tallahassee Museum of Natural History. 2020  
*Constructed a 2 x 3 meter display of Florida's viperid snake diversity, including a 3 dimensional phylogenetic tree, 3D printed snake fangs at the tree tips for each species, and a panel on the importance of museum collections for biodiversity science.*
- Social Media Manager**, NSF Dimensions of Biodiversity Scales Project group. 2018 – 2019  
*Post weekly content through the @scalesproject Twitter account that showcases research findings in publicly-accessible format from the collaborative NSF Dimensions of Biodiversity project team with which I work.*
- Content Presenter**, Ohio State Museum of Biological Diversity's Open House 2013 – 2016  
*Designed and presented interactive displays showcasing scientific research and live animal handling, servicing over 2,000 people per event*
- Program Organizer**, Univ. of California Santa Barbara's Sedgwick Reserve 2014  
*Led a six hour "Walking Ecology" program for the staff and docents, which highlighted current research on rattlesnakes via a guided nature walk*
- Public Presentation**, June Meeting of the Santa Ynez Natural History Society 2013  
*"Rattlesnake Research in California: Unlocking the Secrets of a Symbol of the American West" Los Olivos, California. Invited oral presentation*
- Volunteer**, Ohio State Museum of Biological Diversity's Open House 2012  
*Assisted with parking and door prizes at this annual public event*
- Event Organizer**, K-12 University Field Trips 2011  
*Planned and oversaw a reptile and amphibian research exhibit during multiple K-12 school field trips to the Cal Poly Biological Sciences Department*
- Presenter**, San Luis Obispo, CA, Cub Scouts 2010  
*Discussed how and why we do research to conserve snakes Cub Scout group*

## WORKSHOPS AND TRAINING

---

- Symposium on Diversity and Inclusion in Research and Teaching** – FSU 2018  
*Attended a day-long series of lectures, round-table discussions, and break-out working groups relating to issues of diversity, inclusion, equity and accessibility in the academic workplace and classroom.*
- Open Doors, Diversity and Implicit Bias Training** – OSU Office of Student Life 2016  
*Received training on the challenges and solutions to implicit bias in the university, empathetic listening, and dealing with colleagues or students in distress, and became an Open Doors Partner*
- Mobile Summer Institute on Undergraduate STEM Education** – OSU 2016  
*Received training on planning courses that facilitate student learning via backward design and student-centered active learning, and used these principles to create a Teachable Tidbit for student interpretation of phylogenetic trees.*
- Invited Participant in “Catalysis Meeting”** – National Evolutionary Synthesis Center 2014  
*Participated in a 3 day meeting in Raleigh, NC, that brought 25 venom biologists from 7 countries together to define and plan to solve current challenges in our understanding of venom evolution and function. Meeting title: “Integrating Organismal and Applied Perspective on Animal Venom Diversity”*
- Professional Development Conference** – National Association of Biology Teachers 2013  
*Attended various presentations and workshops devoted to novel, research-based methods for teaching biology topics.*
- At-risk Student Simulation Training** – OSU Center for the Advancement of Teaching 2013  
*Interactive online module that simulates classroom and office conversations with distressed students to empower instructors to help these students get support.*

## PROFESSIONAL SOCIETY MEMBERSHIP

---

- Society for Integrative and Comparative Biology 2015 – Present
- American Society of Naturalists 2014 – Present
- Society for the Study of Evolution 2012 – Present
- American Society of Ichthyologists and Herpetologists 2009 – Present