Drew R. Schield, Ph.D.

Curriculum Vitae

Department of Ecology and Evolutionary Biology | University of Colorado, Boulder
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Professional Positions

Assistant Professor January 2024 –
Department of Biology
University of Virginia

NSF Postdoctoral Research Fellow February 2020 – present
Research Advisor: Dr. Rebecca J. Safran
University of Colorado Boulder, Department of Ecology and Evolutionary Biology

Postdoctoral Research Fellow June 2018 – Jan 2020
Research Advisor: Dr. Todd A. Castoe
University of Texas at Arlington, Department of Biology

Graduate Research Assistant June 2017 – May 2018
University of Texas at Arlington, Arlington, TX
Project: *Systematics, introgression, and adaptation in Western Rattlesnakes: a model system for studying gene flow, selection, and speciation*

Enhanced Graduate Teaching Assistant August 2012 – June 2017
University of Texas at Arlington, Arlington, TX

Education

Doctor of Philosophy (Ph.D.) in Quantitative Biology May 2018
Dissertation title: *Rattlesnake genomics illustrate patterns of speciation, adaptation, and links between genome structure and function*
University of Texas at Arlington
Advisor: Dr. Todd A. Castoe

Bachelor's Degree (B.A.) in Biology May 2012
University of Minnesota Morris, Morris, MN
Advisor: Dr. Heather L. Waye

Publication and citation statistics

Publications: 56 (plus 2 manuscripts submitted or in review)
Total citations: Google Scholar = 1,822
H-index (h papers cited a minimum of h times): Google Scholar = 23
i10-index (papers cited a minimum of 10 times): Google Scholar = 33

Publications (PDFs available at https://drewschield.github.io/publications/)

Published Manuscripts (56)

1. Smith, C.F., Z.L. Nikolakis, B.W. Perry, **D.R. Schield**, J.M. Meik, A.J. Saviola, T.A. Castoe, J. Parker, and S.P. Mackessy. The best of both worlds? Rattlesnake hybrid zones generate complex combinations of divergent venom phenotypes that retain high toxicity. *In Press at* ***Biochimie***.

2. Smith, C.F., Z.L. Nikolakis, K.N. Ivey, B.W. Perry, **D.R. Schield**, N. Balchan, J.M. Parker, K. C. Hansen, A.J. Saviola, T.A. Castoe, and S.P. Mackessy. 2023. Snakes on a plain: biotic and abiotic factors determine venom compositional variation in a wide-ranging generalist rattlesnake. ***BMC Biology*** 21: 136.

3. Carter, J.K., R.T. Kimball, E.R. Funk, N.C. Kane, **D.R. Schield**, G.M. Spellman, and R.J. Safran. 2023. Estimating phylogenies from genomes: A beginner's review of commonly used genomic data in vertebrate phylogenomics. ***Journal of Heredity*** 114: 1–13.

4. Nikolakis, Z.L., **D.R. Schield**, A.K. Westfall, B.W. Perry, K.N. Ivey, R.W. Orton, N.R. Hales, R.H. Adams, J.M. Meik, J. Parker, C.F. Smith, Z. Gompert, S.P. Mackessy, and T.A. Castoe. 2022. Evidence that genomic incompatibilities and other multilocus processes impact hybrid fitness in a rattlesnake hybrid zone. ***Evolution***: evo.14612.

5. **Schield, D.R.**, B.W. Perry, D.C. Card, G.I.M. Pasquesi, A.K. Westfall, S.P. Mackessy, and T.A. Castoe. 2022. The rattlesnake W chromosome: A GC-rich retroelement refugium with retained gene function across ancient evolutionary strata. ***Genome Biology and Evolution*** 14: evac116.

6. Gopalan, S.S., B.W. Perry, **D.R. Schield**, C.F. Smith, S.P. Mackessy, and T.A. Castoe. 2022. Origins, genomic structure, and copy number variation of snake venom myotoxins. ***Toxicon*** 216: 92–106.

7. **Schield, D.R.**, B.W. Perry, R.H. Adams, M.L. Holding, Z.L. Nikolakis, S.S. Gopalan, C.F. Smith, J.M. Parker, J.M. Meik, S.P. Mackessy, and T.A. Castoe. 2022. The roles of balancing selection and recombination in the evolution of rattlesnake venom. ***Nature Ecology & Evolution*** 6: 1367–1380.

8. Perry, B.W., S.S. Gopalan, G.I.M. Pasquesi, **D.R. Schield**, A.K. Westfall, C.F. Smith, I. Koludarov, P.T. Chippindale, E.B. Chuong, S.P. Mackessy, and T.A. Castoe. 2022. Diverse genomic mechanisms facilitated the evolution of the snake venom gene regulatory network. ***Genome Research*** 32: 1058–1073.

9. Turbek, S.P., **D.R. Schield**, E.S.C. Scordato, A. Contina, X. Da, Y. Liu, E. Pagani-Núñez, Q. Ren, C.C.R. Smith, C. Stricker, M. Wunder, D. Zonana, and R.J. Safran. 2022. A migratory divide spanning two continents is associated with genomic and ecological divergence. ***Evolution*** 76: 722–736.

10. Westfall, A.K., B.W. Perry, A.H.M. Kamal, N.R. Hales, J. Kay, M. Sapkota, **D.R. Schield**, M.W. Pellegrino, S.M. Secor, S.M. Chowdhury, and T.A. Castoe. 2022. Identification of an integrated stress and growth response switch that directs vertebrate intestinal regeneration. ***BMC Genomics*** 23: 6.

11. Koochekian, N., A. Ascanio, K. Farleigh, D.C. Card, **D.R. Schield**, T.A. Castoe, and T. Jezkova. 2022. A chromosome-level genome assembly and annotation of the desert horned lizard, *Phrynosoma platyrhinos*, provides insight into chromosomal rearrangements among reptiles. ***GigaScience*** 11: 1–14.

12. M.J. Alaya[*], J.K. Carter[*], A. Fachon[*], S.M. Flaxman[*], M. Gil[*], H. Kenny[*], Z.M. Laubach[*], S.A. Madden[*], M.T. McDermott[*], A. Medina-García[*], R.J. Safran[*], E. Scherner[*], **D.R. Schield**[*], S. Vasquez-Rey[*], J.S. Volckens[*]. 2021. Belonging in STEM: An interactive, iterative approach to welcoming and maintaining a diverse learning community. ***Trends in Ecology and Evolution*** 36: 964–967. [*]Joint primary authors.

13. Farleigh, K., S.A. Vladimirova, C. Blair, J.T. Bracken, N. Koochekian, N. Finger, **D.R. Schield**, D.C. Card, J. Henault, A.D. Leaché, T.A. Castoe, and T. Jezkova. 2021. The effects of climate and demographic history in shaping genomic variation across populations of the Desert Horned Lizard (*Phrynosoma platyrhinos*). ***Molecular Ecology*** 30: 4481–4496.

14. **Schield, D.R.**, E.S.C. Scordato, C.C.R. Smith, J.K. Carter, S.I. Cherkaoui, S. Gombobaatar, S. Hajib, S. Hanane, A.K. Hund, K. Koyama, W. Liang, Y. Liu, N. Magri, A. Rubtsov, B. Sheta, S.P. Turbek, M.R. Wilkins, L. Yu, and R.J. Safran. 2021. Sex-linked genetic diversity and differentiation in a globally distributed avian species complex. ***Molecular Ecology*** 30: 2313–2332.

15. Schortt, J.A., L.E. Timm, N.R. Hales, Z.L. Nikolakis, **D.R. Schield**, B.W. Perry, Y. Liu, B. Zhong, T.A. Castoe, E.J. Carlton, and D.D. Pollock. 2021. Population genomic analyses of schistosome parasites highlights critical challenges facing end-game elimination efforts. ***Scientific Reports*** 11: 6884.

16. **Schield, D.R.**, B.W. Perry, Z.L. Nikolakis, S.P. Mackessy, and T.A. Castoe. 2021. Population genomic analyses confirm male-biased mutation rates in snakes. ***Journal of Heredity*** 112: 221–227.

17. **Schield, D.R.**, B.W. Perry, G.I.M. Pasquesi, R.W. Orton, Z.L. Nikolakis, A.K. Westfall, and T.A. Castoe. 2021. Applications of genomics and related technologies for studying reptile venoms. Pp. 29-42. In: ***Handbook of Venom and Toxins of Reptiles, Second Edition,*** S.P. Mackessy (Ed.), CRC Press, Boca Raton, FL.

18. Nikolakis, Z.L., N.R. Hales, B.W. Perry, **D.R. Schield**, L.E. Timm, Y. Liu, B. Zhong, K.J. Kechris, D.D. Pollock, E. Carlton, and T.A. Castoe. 2020. Patterns of transmission, relatedness, and genetic diversity inferred from whole genome sequencing of archival blood fluke miracidia (*Schistosoma japonicum*). ***PLoS Neglected Tropical Diseases*** 15: e0009020.

19. Perry, B.W., **D.R. Schield**, A.K. Westfall, S.P. Mackessy, and T.A. Castoe. 2020. Physiological demands and signaling mechanisms associated with snake venom production and storage illustrated by transcriptional analyses of venom glands. ***Scientific Reports*** 10: 18083.

20. Perry, B.W., **D.R. Schield**, R.H. Adams, and T.A. Castoe. 2020. Microchromosomes exhibit distinct features of vertebrate chromosome structure and function with underappreciated ramifications for genome evolution. ***Molecular Biology and Evolution*** 38: 904–910.

21. Pasquesi, G.I.M., B.W. Perry, R.P. Ruggiero, M.W. Vandewege, **D.R. Schield**, and T.A. Castoe. Vertebrate lineages exhibit diverse patterns of transposable element regulation and expression across tissues. 2020. ***Genome Biology and Evolution*** 12: 506-521.

22. **Schield, D.R.**, G.I.M. Pasquesi, B.W. Perry, R.H. Adams, Z.L. Nikolakis, A.K. Westfall, R.W. Orton, J.M. Meik, S.P. Mackessy, and T.A. Castoe. 2020. Snake recombination landscapes are concentrated in functional regions despite PRDM9. ***Molecular Biology and Evolution*** 37: 1272-1294.

23. Card, D.C., R.H. Adams, **D.R. Schield**, B.W. Perry, A.B. Corbin, G.I.M. Pasquesi, K. Row, J. Daza, W. Booth, C. Montgomery, S. Boback, and T.A. Castoe. 2019. Genomic basis of convergent island phenotypes in boa constrictors. ***Genome Biology and Evolution*** 11: 3123-3143.

24. Watson, J.A., C.L. Spencer, **D.R. Schield**, B.O. Butler, L.L. Smith, O. Flores-Villela, J.A. Campbell, S.P. Mackessy, T.A. Castoe, and J.M. Meik. Geographic variation in morphology in the Mohave Rattlesnake (*Crotalus scutulatus* Kennicott 1861) (Serpentes: Viperidae): implications for species boundaries. ***Zootaxa*** 4683: 129-143.

25. Perry, B.W, A.L. Andrew, A.H.M. Kamal, D.C. Card, **D.R. Schield**, G.I.M. Pasquesi, M. Pelligrino, S.P. Mackessy, S. Chowdhury, S.M. Secor, and T.A. Castoe. Multi-species comparisons of snakes suggest that insulin and stress response signaling modulate post-feeding intestinal regeneration. ***Proceedings of the Royal Society B*** 286: 20190910.

26. **Schield, D.R.**[*], B.W. Perry[*], R.H. Adams, D.C. Card, T. Jezkova, G.I.M. Pasquesi, Z.L. Nikolakis, K. Row, J.M. Meik, C.F. Smith, S.P. Mackessy, and T.A. Castoe. Allopatric divergence and secondary contact with gene flow – a recurring theme in rattlesnake speciation. ***Biological Journal of the Linnean Society*** 128: 149-169. [*]Joint primary authors.

27. Adams, R.H., **D.R. Schield**, and T.A. Castoe. Recent advances in the inference of gene flow from population genomic data. ***Current Molecular Biology Reports*** 5: 107-115. Invited Article.

28. **Schield, D.R.**, D.C. Card, N.R. Hales, B.W. Perry, G.I.M. Pasquesi, H. Blackmon, R.H. Adams, A.B. Corbin, C.F. Smith, B. Ramesh, J.P. Demuth, E. Betrán, M. Tollis, J.M. Meik, S.P. Mackessy, and T.A. Castoe. 2019. The origins and evolution of chromosomes, dosage compensation, and mechanisms underlying venom regulation in snakes. ***Genome Research*** 29: 590-601.

29. Strickland, J.L., C.F. Smith, A.J. Mason, **D.R. Schield**, M. Borja, G. Casteñeda-Gaytán, C.L. Spencer, L.L. Smith, A. Trápaga, N.M. Bouzid, G. Campillo-García, O.A. Flores-Villela, D. Antonio-Rangel, S.P. Mackessy, T.A. Castoe, D.R. Rokyta, and C.L. Parkinson. Evidence for divergent patterns of local selection driving venom variation in Mojave Rattlesnakes (*Crotalus scutulatus*). ***Scientific Reports*** 8: 17622.

30. Card, D.C., B.W. Perry, R.H. Adams, **D.R. Schield**, A.S. Young, A.L. Andrew, T. Jezkova, G.I.M. Pasquesi, N.R. Hales, M.R. Walsh, M.R. Rochford, F.J. Mazzotti, K.M. Hart, M.E. Hunter, and T.A. Castoe. 2018. Genomic adaptation of invasive Florida Burmese pythons to increased prey availability and thermal stress. ***Molecular Ecology*** 27: 4744-4757.

31. Perry, B.W., **D.R. Schield**, and T.A. Castoe. Evolution: Plasticity versus selection, or plasticity and selection? ***Current Biology*** 28: R1104-R1106.

32. Perry, B.W., D.C. Card, J.W. McGlothlin, G.I.M. Pasquesi, R.H. Adams, **D.R. Schield**, N.R. Hales,

A.B. Corbin, J.P. Demuth, F.G. Hoffman, M.W. Vandewege, R.K. Schott, N. Bhattacharyya, B.S.W. Chang, N.R. Casewell, G. Whiteley, J. Reyes-Velasco, S.P. Mackessy, K.B. Storey, K.K. Biggar, C.N. Passow, C. Kuo, S.E. McGaugh, A.M. Bronikowski, J. deKoning, S.V. Edwards, M.E. Pfrender, P. Minx, E.D. Brodie III, E.D. Brodie, Jr., W.C. Warren, and T.A. Castoe. Molecular adaptations for sensing and securing prey and insight into amniote genome diversity from the garter snake genome. ***Genome Biology and Evolution*** 10: 2110-2129.

33. **Schield, D.R**, D.C. Card, R.H Adams, A.B. Corbin, T. Jezkova, N.R. Hales, J.M. Meik, C.L. Spencer, L.L. Smith, G. Campillo Garcia, N.M. Bouzid, J.L. Strickland, R.W. Bryson Jr., C.L. Parkinson, O. Flores-Viella, S.P. Mackessy and T.A. Castoe. 2018. Cryptic genetic diversity, population structure, and gene flow in Mohave rattlesnakes (*Crotalus scutulatus*). ***Molecular Phylogenetics and Evolution*** 127: 669-681.

34. Adams, R.H., **D.R. Schield**, D.C. Card, and Castoe, T.A. 2018. Assessing the impacts of positive selection on coalescent-based species tree estimation and species delimitation. ***Systematic Biology*** 67: 1076-1090.

35. Pasquesi, G.I.M., R.H. Adams, D.C. Card, **D.R. Schield**, B.W. Perry, A.B. Corbin, J. Reyes-Velasco, R.P. Ruggiero, M.W. Vandewege, J.A. Shortt, and T.A. Castoe. Squamate reptiles challenge paradigms of genomic repeat element evolution set by birds and mammals. ***Nature Communications*** 9: 2774.

36. Card, D.C, **D.R. Schield**, and T.A. Castoe. Plasticity and local adaptation explain lizard cold tolerance. ***Molecular Ecology*** 27: 2173-2175.

37. Adams, R.H., **D.R. Schield**, D.C. Card, A.B. Corbin, and T.A. Castoe. 2017. ThetaMater: Bayesian estimation of population parameter θ from genomic data. ***Bioinformatics*** 34: 1072-1073.

38. Gamble, T., T.A. Castoe, S.V. Nielsen, J.L. Banks, D.C. Card, **D.R. Schield**, G.W. Schuett, and W. Booth. 2017. The discovery of XY sex chromosomes in a boa and python. ***Current Biology*** 27: 2148-2153.

39. Hales, N.R., **D.R. Schield**, A.L. Andrew, D.C. Card, M.R. Walsh, and T.A. Castoe. 2017. Contrasting gene expression programs underlie predator-induced phenotypic plasticity within and across-generations in *Daphnia*. ***Molecular Ecology*** 26: 5003-5015.

40. **Schield, D.R.**, R.H. Adams, D.C. Card, B.W. Perry, G.I.M. Pasquesi, T. Jezkova, D.M. Portik, A.L. Andrew, C.L. Spencer, E.E. Sanchez, M.K. Fujita, S.P. Mackessy, and T.A. Castoe. Insight into the roles of selection in speciation from genomic patterns of divergence and introgression in secondary contact in venomous rattlesnakes. ***Ecology and Evolution*** 7: 3951-3966.

41. Andrew, A.L.*, B. Perry*, D.C. Card, **D.R. Schield**, R.P. Ruggiero, S.E. McGaugh, A. Chowdhary, S.M. Secor T.A. Castoe. 2017. Growth and stress response mechanisms underlying post-feeding regenerative organ growth in the Burmese python. ***BMC Genomics*** 18: 338. *Joint primary authors.

42. Shortt, J.A., D.C. Card, **D.R. Schield**, L. Yang, B. Zhong, **T.A. Castoe**, E.J. Carlton, and D.D. Pollock. 2017. Whole genome amplification and targeted genome sequencing in *Shistosoma japonicum* isolates. ***PLoS Neglected Tropical Diseases*** 11: e0005292.

43. Adams, R.H., **D.R. Schield**, D.C. Card, H. Blackmon, and T.A. Castoe. 2016. *GppFst*: Genomic posterior predictive simulations of FST and dXY for identifying outlier loci from population genomic data. ***Bioinformatics*** 33: 1414-1415.

44. **Schield, D.R**, D.C. Card, J. Reyes-Velasco, A.L. Andrew, C.A. Modahl, S.M. Mackessy, D.D. Pollock, and T.A. Castoe. 2016. A role for genomics in rattlesnake research – current knowledge and future potential. In: ***Rattlesnakes of Arizona***, G.W. Schuett, L.W. Porras, and R.S. Reiserer (Eds.), Eco Books.

45. Card, D.C., **D.R Schield**, R.H. Adams, A.B. Corbin, B.W. Perry, A.L. Andrew, G.I.M. Pasquesi, E.N. Smith, T. Jezkova, S.M. Boback, W. Booth, and T.A. Castoe. 2016. Phylogeographic and population genetic analyses reveal multiple species of Boa and independent origins of insular dwarfism. ***Molecular Phylogenetics and Evolution*** 102: 104-116.

46. Streicher, J.W., J.P. McEntee, L. Drzich, D.C. Card**, D.R. Schield**, U. Smart, C.L. Parkinson, T. Jezkova, E.N. Smith, and T.A. Castoe. 2016. Genetic surfing, not allopatric divergence, explains spatial sorting of mitochondrial haplotypes in highly venomous coralsnakes. ***Evolution*** 70: 1435-1449. Cover Article.

47. Adams. R.H., H.G. Blackmon, J. Reyes-Velasco, **D.R. Schield**, D.C. Card, A.L. Andrew, N. Waynewood, and T.A. Castoe. 2016. Microsatellite landscape evolutionary dynamics across 450 million years of vertebrate genome evolution. ***Genome*** 59: 295-310.

48. **Schield, D.R.**, M.F. Walsh, D.C. Card, A.L. Andrew, R.H. Adams, and T.A. Castoe. 2016. EpiRADseq: genome-wide analysis of shifts in DNA methylation using next-generation sequencing. ***Methods in Ecology and Evolution*** 7: 60-69. Cover Article.

49. Andrew, A.L., D.C. Card, R.R. Ruggiero, **D.R. Schield**, R.H. Adams, D.D. Pollock, S.M. Secor, and T.A. Castoe. 2015. Rapid changes in gene expression direct rapid shifts in intestinal form and function in the Burmese python after feeding. ***Physiological Genomics*** 47: 147-157.

50. **Schield, D.R.**, D.C. Card, J. Reyes-Velasco, T. Jezkova, F.N. Proctor, C.L. Spencer, H.W. Herrmann, S.P. Mackessy, T.A. Castoe. 2014. Incipient speciation and biased gene flow between two lineages of the Western Diamondback Rattlesnake (*Crotalus atrox*). ***Molecular Phylogenetics and Evolution*** 83: 213-223.

51. Jezkova, T., B.R. Riddle, D.C. Card, **D.R. Schield**, M.E. Eckstut, T.A. Castoe. 2014. Genetic consequences of post-glacial range expansion in two co-distributed rodents (genus *Dipodomys*) depend on ecology and genetic marker choice. ***Molecular Ecology*** 24: 83-97.

52. Reyes-Velasco, J., D.C. Card, A.L. Andrew, K.J. Shaney, R.H. Adams, **D.R. Schield**, N. Casewell, S.P. Mackessy, and T.A. Castoe. 2014. Expression of venom gene homologs in diverse python tissues suggests a new model for the evolution of snake venom. ***Molecular Biology and Evolution*** 32: 173-183.

53. Card, D.C., **D.R. Schield**, J. Reyes-Velasco, A.L. Andrew, R.P. Ruggiero, D.D. Pollock, D.F. Tomback, S.J. Oyler-McCance, M.K. Fujita, and T.A. Castoe. 2014. Two low coverage bird genomes and a comparison of reference-guided versus de novo genome assemblies. ***PLoSOne*** 9: e106649.

54. Shaney, K.J., D.C. Card, **D.R. Schield**, R.P. Ruggiero, D.D. Pollock, S.P. Mackessy, T.A. Castoe. *In Press*. Squamate reptile genomics and evolution. In: ***Handbook of Toxinology: Venom Genomics and Proteomics,*** P. Gopalakrishnakone (Ed.), Springer Reference Press, New York, NY.

55. Castoe. T.A., A.P.J. de Koning, K.T. Hall, D.C. Card, **D.R. Schield**, M.K. Fujita, R.P. Ruggiero, J.F. Degner, J.M. Daza, W. Gu, J. Reyes-Velasco, K.J. Shaney, J.M. Castoe, S.E. Fox, A.W. Poole, D. Polanco, J. Dobry, M.W. Vandewege, Q. Li, R. Schott, A. Kapusta, P. Minx, C. Feschotte, P. Uetz, D.A. Ray, F.G. Hoffmann, R. Bogden, E.N. Smith, B.S.W. Chang, F. Vonk, N.R. Casewell, C.V. Henkel, M.K. Richardson, S.P. Mackessy, A.M. Bronikowski, M. Yandell, W.C. Warren, S.M. Secor, and D.D. Pollock. 2013. The Burmese Python genome reveals the molecular basis for extreme adaptation in snakes. ***Proceedings of the National Academy of Sciences, USA*** 110: 20645-20650.

56. **Schield, D.R.** and H.L Waye. 2012. *Thamnophis radix*: tonic immobility. Natural History. ***Herpetological Review*** 43: 352.

Manuscripts Submitted or In Review (2)

1. Farleigh, K., A. Ascanio, M.E. Farleigh, **D.R. Schield**, D.C. Card, M. Leal, T.A. Castoe, and T. Jezkova. Signals of differential introgression in the genome of natural hybrids of Caribbean anoles. *In Review at* ***Molecular Ecology***.

2. Schield, D.R., J.K. Carter, E.S.C. Scordato, I.I. Levin, S.A. Mueller, Z. Gompert, P. Nosil, J.B.W. Wolf, and R.J. Safran. Sexual selection promotes reproductive isolation in barn swallows. *Submitted to* ***Science***.

Grants and Awards

2019	(2/2020 – 2/2023) NSF – Division of Biological Infrastructure – Postdoctoral Research Fellowships in Biology, Research Using Biological Collections Program: *The evolution of mate-choice traits and genomic architecture of speciation in swallows (genus* Hirundo*)*; Drew Schield, PI (**$207,000**).
2019	Charlie Painter Award in Herpetology – Chiricahua Desert Museum – Project Title: *The genomic consequences of hybridization between divergent rattlesnake species (*Crotalus viridis *and* Crotalus scutulatus*)* (**$1,000**).
2017	Outstanding Graduate Research Award – University of Texas at Arlington Department of Biology (**$500**).
2015	Travel award for Society for the Study of Amphibians and Reptiles meeting – Phi Sigma Biological Sciences Honor Society (**$750**).
2015	Research Grant – Phi Sigma Biological Honor Society (**$5,000**).
2015	NSF – Division of Environmental Biology – Systematics Panel: Doctoral Dissertation Improvement Grant: DISSERTATION RESEARCH: *Delineation of populations, species, and genomic adaptations across a widely distributed venomous snake species complex*; Todd Castoe as Co-PI (**$19,695**).
2014	Travel award for Joint Evolution Meetings – Phi Sigma Biological Sciences Honor Society (**$750**).
2014	Sponsored membership – AAAS (2 years).
2013	Research Grant – Phi Sigma Biological Sciences Honor Society (**$1,250**).
2013	Travel award for Joint Evolution Meetings – Phi Sigma Biological Sciences Honor Society (**$750**)
2013	Travel Award – Evolution meeting, Snowbird, UT (**$500**).

2013 Travel Award – Mechanisms of Protein Evolution II meeting, Denver, CO (**$500**).
2012 Enhanced Graduate Teaching Fellowship – University of Texas at Arlington (**$120,000**, over 5 years).
2012 Jay Y. Roshal Award in Biology – University of Minnesota Morris (**$500**).
2011 Undergraduate Research Opportunity Program – University of Minnesota Morris (**$1,700**).
2010 Morris Student Administrative Fellowship – University of Minnesota Morris (**$2,500**).

Selected Presentations and Published Abstracts (72 total)

2023 **Schield, D.R.**, J.K. Carter, E.S.C. Scordato, A.K. Hund, S.A. Mueller, J.B.W. Wolf, and R.J. Safran. Sexual selection and the genetic architecture of reproductive isolation in barn swallows. Gordon Research Conference on Speciation, Barga, Italy.

2023 **Schield, D.R.**, J.K. Carter, E.S.C. Scordato, A.K. Hund, S.A. Mueller, J.B.W. Wolf, and R.J. Safran. Sexual selection and the genetic architecture of reproductive isolation in barn swallows. Gordon Research Seminar on Speciation, Barga, Italy.

2023 **Schield, D.R.**, J.K. Carter, E.S.C. Scordato, A.K. Hund, S.A. Mueller, J.B.W. Wolf, and R.J. Safran. Sexual selection and the genetic architecture of reproductive isolation in barn swallows. Conference of the American Society of Naturalists (Asilomar), Pacific Grove, CA.

2022 **Schield, D.R.** The roles of balancing selection and recombination in rattlesnake venom evolution. Biology of the Pitvipers 4. Rodeo, NM.

2021 **Schield, D.R.**, J.K. Carter, E.S.C. Scordato, and R.J. Safran. Genomic regions underlying divergent traits relevant to speciation in barn swallows. American Ornithological Society meeting (virtual), Advances in the study of reproductive isolation in birds symposium.

2019 **Schield, D.R.**, B.W. Perry, C.F. Smith, J.M. Meik, S.P. Mackessy, and T.A. Castoe. The origins and evolution of chromosomes and the recombination landscape in rattlesnake genomes. Biology of the Pitvipers 3. Rodeo, NM.

2018 **Schield,D.R.**, N.R. Hales, D.C. Card, B.W. Perry, G.I.M. Pasquesi, R.H. Adams, H. Blackmon, J.M. Meik, S.P. Mackessy, and T.A. Castoe. Snake venom gene evolution is linked to unique structural and functional properties of snake genomes. Gordon Research Conference on Venom Evolution, Function, and Biomedical Applications. West Dover, VT.

2018 **Schield, D.R.**, Card, D.C., R.H. Adams, **D.R. Schield**, G.I.M. Pasquesi, B.W. Perry, A.B. Corbin, K. Row, J.M. Daza, W. Booth, C.E. Montgomery, S.M. Boback, & T.A. Castoe. Genomic basis of adaptive island dwarfism in Boa constrictor snakes. Genetics Society of America – Population, Evolutionary, and Quantitative Genetics Meeting. Madison, WI.

2017 **Schield, D.R.**, D.C. Card, R.H. Adams, G.I.M. Pasquesi, B.W. Perry, N.R. Hales, A.L. Andrew, A.B. Corbin, S.P. Mackessy, and T.A. Castoe. Repeated patterns of adaptation along the speciation continuum: insight from studies of North American rattlesnakes. Joint Evolution Meetings 2017. Portland, OR.

2016 **Schield, D.R.**, R.H. Adams, D.C. Card, B.W. Perry, T. Jezkova, A.L. Andrew, G.I.M. Pasquesi, S.P. Mackessy, and T.A. Castoe. Patterns of speciation and delimitation of populations, species, and genomic adaptations in widely-distributed North American rattlesnake lineages. Joint Evolution Meetings 2016. Austin, TX.

2015 **Schield, D.R.**, G.M. Pasquesi, R.H. Adams, D.C. Card, and T.A. Castoe. Patterns of selection and introgression following isolation and secondary contact in a widely-distributed rattlesnake species (*Crotalus atrox*). Society for the Study of Amphibians and Reptiles Meeting. Lawrence, KS.

2015 **Schield, D.R**., M.R. Walsh, D.C. Card, A.L. Andrew, R.H. Adams, and T.A. Castoe. EpiRADseq: a novel technique for the examination of genome-wide epigenetic patterns. Annual Celebration of Excellence by Students (UTA-ACES), Arlington TX.

2014 **Schield, D.R.**, D.C. Card, S.P. Mackessy, and T.A. Castoe. Delineation of populations, species, and genomic adaptations across a widely distributed venomous snake species complex. Ecological Genomics Symposium. Kansas City, MO.

2014 **Schield, D.R.**, D.C Card, J. Reyes-Velasco, C.L. Spencer, T. Jezkova, and T.A. Castoe. Using genome-wide single nucleotide polymorphisms to estimate patterns of gene flow and population structure in Crotalus atrox. Joint Evolution Meetings 2014. Raleigh, NC.

2014 **Schield, D.R.**, D.C Card, J. Reyes-Velasco, F.N. Proctor, T. Jezkova, C.L. Spencer, H-W. Herrmann, S.P. Mackessy and T.A. Castoe. Using genome-wide single nucleotide polymorphisms to estimate patterns of gene flow and population structure in *Crotalus atrox*. Biology of the Pitvipers 2, Tulsa, OK.

2014 **Schield, D.R.**, D.C Card, J. Reyes-Velasco, C.L. Spencer and T.A. Castoe. Using genome-wide single nucleotide polymorphisms to estimate patterns of gene flow and population structure in *Crotalus atrox*. Annual Celebration of Excellence by Students (UTA-ACES), Arlington, TX.

2013 **Schield, D.R.**, Proctor, F.N., Shaney, K.J., Reyes-Velasco, J., Card, D.C., Mackessy, S.P., T.A. Castoe. Investigating gene flow, population genetics, and failed speciation in Western Diamondback Rattlesnakes (*Crotalus atrox*). Joint Evolution Meetings, Snowbird, UT.

2013 **Schield, D.R.**, D.C. Card, K.J. Shaney, Q. Li, M. Yandell, S.P. Mackessy, T.A. Castoe. Differential expansion of select gene families in squamate genomes. Mechanisms of Protein Evolution II. Denver, CO.

2012 **Schield, D.R.** and D.J. Baun. Habituation of anti-predator behavior and development of positive feeding response to an otherwise negative stimulus in *Ambystoma tigrinum*. University of Minnesota Morris Undergraduate Research Symposium. Morris, MN.

Invited Seminars

2023 *Venom, sex, and speciation: Establishing links between the genome and species evolution using population genetic perspectives*. Department of Biology, University of Texas at Arlington, Arlington, TX.

2023 *Venom, sex, and speciation: Establishing links between the genome and species evolution using population genetic perspectives*. Department of Biology, University of Virginia, Charlottesville, VA.

2022 *Establishing links between genome evolution, adaptation, and speciation using population-level perspectives.* Department of Biology, Texas Christian University, Fort Worth, TX.

2022 *Venom, sex, and speciation: Establishing links between the genome and species evolution using population-level perspectives*. Department of Ecology and Evolutionary Biology, University of Colorado Boulder, Boulder, CO.

2022 *The maintenance of adaptive genetic diversity in rattlesnake venom*. European Venom Network (EUVEN).

2022 *The roles of balancing selection and recombination in rattlesnake venom evolution*. Biology Department, Texas A&M University, College Station, TX.

2021 *The roles of balancing selection and recombination in rattlesnake venom evolution*. Evol Doers Discussion Group, University of Nevada Reno, Reno, NV.

2020 *The role of the Z chromosome in barn swallow speciation*. Speciation and Introgression Discussion Group, University of California Berkeley, Berkeley, CA.

2019 *The origins and evolution of chromosomes and the recombination landscape in snake genomes*. Department of Biology Seminar, Miami University, Oxford, OH.

2019 *Snake genomes illustrate links between genome structure, function, and evolution*. Biology Department Graduate Recruitment Seminar, University of Texas at Arlington, Arlington, TX.

2017 *Repeated patterns of adaptation across the species continuum in North American rattlesnakes*. University of Minnesota. St. Paul, MN.

Media Coverage

2022 Official press releases from CU ("To keep up with evolving prey, rattlesnakes tap genetically diverse venom toolbox") and UTA ("New genomic research explains how predator-prey relationships drive extreme variation in snake venom") for our work in Schield et al. 2022 *Nature Ecology and Evolution* on venom evolution, with popular press coverage in (selected examples): *Yahoo! News*, *Foreign Affairs New Zealand*, *Technology.Org*, *EurekAlert*, *Bioengineer.Org*, and *National Science Foundation Research News*.

2021 Article "Lab turns critical eye on itself, aims to retain diverse voices" in *Colorado Arts and Sciences Magazine* covering our interactive process to retain diversity in STEM described in Alaya et al. 2021 *TREE*.

2021 Blog post "Behind the Science: Male-biased mutation rates in snakes" by the *American Genetics Association* covering work in Schield et al. 2021 *J. Heredity*.

2019 Press release on our work in Schield et al. 2019 *Genome Research* on the prairie rattlesnake genome covered by the *UTA College of Science Newsletter*.

2017 Press coverage by *The Scientist* ("Snake Sex Determination Dogma Overturned"), Reddit, and others, of our recent paper (Gamble et al. 2017 *Current Biology*) that provides the first evidence that some snakes have an XY (i.e., mammal-like) sex determination system, despite decades of thought that all snakes have a ZW (i.e., bird-like) system. This paper was also featured by a commentary article in the same edition of the journal: Emerson, J.J. 2017. Evolution: A paradigm shift in snake sex chromosome genetics. *Current Biology* 27: R800-R803.

2017 Press coverage by *Biomedcentral (BMC) Series Blog* – "In the belly of the beast" of our paper in *BMC Genomics* describing the molecular mechanisms underlying organ regenerative growth in pythons (Andrew et al. 2017 *BMC Genomics*).

2015 Press coverage by the *American Society of Physiologists* of our work on python intestinal regenerative growth (Andrew et al. 2015 *Physiological Genomics*), published in the quarterly *APS Newsletter*, and also covered by *UTA College of Science Newsletter*.

2015 *UTA COS Mavwire* featured story on my research and recent award of an NSF Doctoral Dissertation Improvement Grants.

2015 Featured by *UTA Inquiry Magazine* for work on snake genomics and physiological organ remodeling in snakes.

2014 Popular press coverage of our work on the evolution of venom systems in snakes (Reyes-Velasco et al., 2015, *Molecular Biology and Evolution*) by UTA (official press release), *Science Daily*, *Nature World News*, *RedOrbit*, *Digital Journal*, *Science Codex*, *Science World Report*, *French Tribune*, *Planet Earth*, *Design and Trend*, and *Phys.Org*, as well as *UTA COS Mavwire*.

2013 Extensive editorial coverage of our work on the analysis and publication of the first snake genomes, by popular news media (only selected examples included): *NBC News*, *The Daily News*, *Huffington Post*, *ScienceNow*, *Denver News*, *New Scientist*, *American Free Press*, *EurekAlert*, *GenomeWeb*, *Headlines & Global News*, *RedOrbit*, *University Herald*, *Science Recorder*, *Nature World News*, *Mother Nature Network*, *ScienceDaily*, *LiveScience*, *International Business Times*, *Latino Post*, *Radio Canada*, *French Tribune*, *Tehran Times*, and *News Tonight Africa*.

Student Advising and Training

As a Ph.D. student and postdoctoral fellow in the laboratory of Dr. Castoe at the University of Texas at Arlington, I assisted Dr. Castoe in mentoring six undergraduate researchers, **Frances Proctor**, **Zachary Rodrigues**, **Nicole Hales**, **Nour Louzon**, **Ola Moussa**, and **Kristopher Row**, in semi-independent research projects. I trained these students in molecular laboratory techniques, including next-generation library construction and sequencing, and advised them in developing computational approaches to analyze data. Several of these students presented at academic conferences and co-authored peer-reviewed publications, and five of these students have since pursued graduate degrees in biology and related fields. As a postdoctoral researcher, I also mentored to Ph.D. students **Zachary Nikolakis** and **Richard Orton** in population genetic theory, genomic data generation, and analysis. I have also mentored Ph.D. student **Javan Carter** in topics related to phylogenomic and population genomic analyses and population genetic theory, and postbaccalaureate student **Avani Fachon** and Ph.D. student **Heather Kenny Duddela** in molecular lab work techniques as a postdoctoral fellow in Dr. Rebecca Safran's lab at University of Colorado.

Teaching Experience

Instructor Spring 2022 & 2023
University of Colorado Boulder, Boulder, CO
Instructor of record for undergraduate/graduate ***Speciation*** course.
Guest Instructor Summer 2021
University of Colorado Boulder, Boulder, CO
Guest instructor for lesson on population structure for undergraduate ***Evolutionary Genomics*** course.
Guest Lecturer Spring 2018
University of Texas at Arlington, Arlington, TX
Guest lecture – *the molecular biology of translation* for undergraduate ***Genetics*** course.
Guest Lecturer Fall 2014 & 2015
University of Texas at Arlington, Arlington, TX
Guest lecture – *the fundamentals of epigenetics: function, mechanisms, and development* for undergraduate/graduate ***Genomics*** course.
Supplementary Instructor Fall 2014 – Summer 2017
University of Texas at Arlington, Arlington, TX
Supplementary instruction to students in the undergraduate ***Genetics*** course
Graduate Teaching Assistant Fall 2012 – Summer 2017
University of Texas at Arlington, Arlington, TX
Laboratory instructor for semester long undergraduate course ***Ecology and Evolution*** (BIOL1442).

Professional Society Memberships

Society for the Study of Evolution – member (2013 – present)
American Society of Naturalists – member (2020 – present)
American Genetics Association – member (2020 – present)
Society of Systematic Biologists – member (2014 – present)
Snake Genomics Consortium – member (2013 – present)
Society for the Study of Amphibians and Reptiles – member (2011 – present)
American Academy of Arts & Sciences – member (2014-2016)

Service

Program organizer – *Conference of the American Society of Naturalists (Asilomar)*, Pacific Grove, CA
Graduate Mentor – University of Texas at Arlington I-ENGAGE Program (Summer 2014)
Session moderator – *Joint Evolution Meetings 2014*, Raleigh, NC
Graduate student volunteer – *Joint Evolution Meetings 2013,* Snowbird, UT
Vice President – Phi Sigma Biological Honor Society, Beta Phi Chapter (Fall 2013 – Summer 2015)
Ad hoc manuscript reviewer – *Ecology Letters*, *Nature Communications*, *Molecular Biology and Evolution*, *Evolution Letters*, *Systematic Biology*, *Evolution*, *Molecular Ecology*, *Briefings in Bioinformatics*, *Philosophical Translations of the Royal Society B: Biological Sciences*, *Journal of Biogeography*, *Heredity*, *Genome Biology and Evolution*, *Molecular Phylogenetics and Evolution*, *Journal of Heredity*, *BMC Biology*, *BMC Ecology and Evolution*, *G3: Genes*, *Genomes*, *Genetics*, *PLOS One*, *Scientific Reports*, *Genomics*, *Biological Journal of the Linnean Society*, *Chromosome Research*, *Ecology and Evolution*, *Toxicon*, *Zoological Journal of the Linnean Society*, *Journal of Herpetology*, *Phyllomedusa*, *Conservation Genetics*, and *Herpetological Conservation and Biology*

Professional References

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