

SIDDHARTH S. GOPALAN, Ph.D.

Curriculum Vitae

Department of Biology | University of Texas at Arlington

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Professional Positions

Postdoctoral Research Associate

June 2025 – Present

Advisor: Dr. Todd Castoe

University of Texas at Arlington, TX

Graduate Research Assistant

September 2023 – May 2025

University of Texas at Arlington, TX

Graduate Teaching Assistant

September 2020 – May 2023

University of Texas at Arlington, TX

Education

Doctor of Philosophy (Ph.D.) in Quantitative Biology

May 2025

Dissertation title: *Snake venoms as models for understanding the origins and evolution of gene regulatory networks*

University of Texas at Arlington, TX

Advisor: Dr. Todd Castoe

Bachelor of Science (B.Sc.) in Genome Biology

April 2020

University of Toronto, ON Canada

Additional Major: Ecology and Evolutionary Biology

Advisors: Dr. Luke Mahler, Dr. Belinda Chang

Publications

1. Kim C., S.N. Smith, **S.S. Gopalan**, S.R. Kerwin, K. Ballard, B.W. Perry, C.F. Smith, A.J. Saviola, R.H. Adams, S.P. Mackessy, and T.A. Castoe. Unique physiological and regulatory activity drives divergent toxin and non-toxin gene expression in rattlesnake accessory venom glands. 2025. *In press at Toxicon*.
2. Westfall A.K., **S.S. Gopalan**, J.C. Kay, T.S. Tippetts, M.B. Cervantes, K. Lackey, S.M. Chowdhury, M.W. Pellegrino, and T.A. Castoe. Single-cell resolution of intestinal regeneration in pythons without crypts illuminates conserved vertebrate regenerative mechanisms. 2024. ***Proceedings of the National Academy of Sciences*** 121: e2405463121.
3. **Gopalan, S.S.**, B.W. Perry, Y.Z. Francioli, D.R. Schield, H.D. Guss, J.M. Bernstein, K. Ballard, C.F. Smith, A.J. Saviola, R.H. Adams, S.P. Mackessy, and T.A. Castoe. Diverse gene regulatory mechanisms alter rattlesnake venom gene expression at fine evolutionary scales. 2024. ***Genome Biology and Evolution*** 16: evae110.

4. Westfall, A.K.*, **Gopalan, S.S.***, B.W. Perry, R.H. Adams, A.J. Saviola, S.P. Mackessy, and T.A. Castoe. Single-cell heterogeneity in snake venom expression is hardwired by co-option of regulators from progressively activated pathways. 2023. **Genome Biology and Evolution** 15: evad109. [*joint first authors]
5. 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. The roles of balancing selection and recombination in the evolution of rattlesnake venom. 2022. **Nature Ecology and Evolution** 6: 1367-1380.
6. **Gopalan, S.S.**, B.W. Perry, D.R. Schield, C.F. Smith, S.P. Mackessy, T.A. Castoe. Origins, genomic structure and copy number variation of snake venom myotoxins. 2022. **Toxicon** 216: 92-106.
7. Perry, B.W., **S.S Gopalan**, G.I.M. Pasquesi, D.R. Schield, A.K. Westfall, C.F. Smith, I. Koludarov, P.T. Chippindale, M.K. Pellegrino, E.B. Chuong, S.P. Mackessy, T.A. Castoe. 2022. Snake venom gene expression is coordinated by novel regulatory architecture and the integration of multiple co-opted vertebrate pathways. **Genome Research** 32: 1058-1073.

Selected Presentations and Published Abstracts

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|------|---|
| 2025 | Ballard, K., S.S. Gopalan , S.N. Smith, S.R. Kerwin, B.W. Perry, S.P. Mackessy, A.J. Saviola, R.H. Adams, T.A. Castoe. Natural variation in snake venoms across a species gradient reveals an underappreciated role for miRNAs in venom expression modulation. UTA Biology Graduate Student Annual Research Symposium, Arlington, TX |
| 2025 | Smith, S.N., S.S. Gopalan , B.W. Perry, Y.Z. Francioli, K. Ballard, S. Kerwin, C.F. Smith, A.J. Saviola, R.H. Adams, S.P. Mackessy, and T.A. Castoe. Convergent co-option of novel gene regulatory networks underly snake venom variation. Joint Evolution Meeting, Athens, GA. |
| 2025 | Gopalan, S.S. , S.N. Smith, B.W. Perry, K. Ballard, Y.Z. Francioli, C. Kim, E. Betran, J.P. Demuth, D.C Card, M.W. Pellegrino, S.R. Kerwin, S.P. Mackessy, S. Seshagiri, and T.A. Castoe. Snake venom gene rewiring by transposable elements highlights how new cis-regulatory elements arise. Joint Evolution Meeting, Athens, GA. |
| 2025 | Gopalan, S.S. , S.N. Smith, B.W. Perry, K. Ballard, Y.Z. Francioli, C. Kim, E. Betran, J.P. Demuth, D.C Card, M.W. Pellegrino, S.R. Kerwin, S.P. Mackessy, S. Seshagiri, and T.A. Castoe. The diversification of viperid venom genes highlights genomic mechanisms underlying transposon-mediated cis-regulatory element evolution. UTA College of Science Discover Student Research Symposium, Arlington, TX. |
| 2024 | Gopalan, S.S , S.N Smith, B.W. Perry, Y.Z Francioli, S.R Kerwin, C.F. Smith, R.H Adams, A.J. Saviola, S.P. Mackessy, and T.A. Castoe. Who needs CRISPR: integrating fine-scale evolutionary variation and cellular variation to test hypotheses for gene regulatory network function. 3 rd Joint Congress on Evolutionary Biology, Montreal, Canada. |
| 2023 | Gopalan, S.S , A.K. Westfall, B.W. Perry, S.P. Mackessy, and T.A. Castoe. Identifying regulatory interactions within the snake venom gland using single-cell sequencing methods. Phi Sigma Graduate Conference, Arlington, TX. |
| 2022 | Perry, B.W, S.S. Gopalan , G.I.M. Pasquesi, D.R. Schield, A.K. Westfall, C.F. Smith, I. Koludarov, P.T. Chippindale, M.W. Pellegrino, E.B. Chuong, S.P. Mackessy, and T.A. Castoe. The evolutionary origins of snake venom gene regulatory architecture. Joint Evolution Meeting 2022. Cleveland, OH. |

- 2021 Vogel, D., A. Mukkala, [and 124 others including **S.S Gopalan**]. HERON: Demonstrating a Novel Biological Platform for Small Satellite Missions. Small Satellite Conference. Logan, UT.

Awards and Funding

- 2025 RISE 100 Postdoctoral Hire Award, University of Texas, Arlington (**\$60,000 USD**)
 2025 5th place poster – Discover Student Research Symposium, University of Texas, Arlington (**\$200 USD**)
 2024 UTA Graduate School Travel Grant for Joint Evolution Meeting (**\$750**)
 2023 1st place talk – Biology Graduate Research Conference, University of Texas, Arlington (**\$500 USD**)
 2020 Graduate Teaching Fellowship – University of Texas, Arlington (~**\$24,000 USD/year**, 5 years)
 2020 University of Toronto FAS Top Doctoral Fellowship (~**\$26,300 CAD/year**, 4 years; *declined*)
 2020 NSERC CGS-M (**\$17,500 CAD**; *declined*)
 2020 NSERC Undergraduate Student Research Award (**\$5,625 CAD**)
 2019 University of Toronto Excellence Award (**\$6,000 CAD**)
 2018 New College In-Course Scholarship (**\$1,500 CAD**)
 2017 New College In-Course Scholarship (**\$1,500 CAD**)
 2016 University of Toronto President's Entrance Scholarship (**\$2,000 CAD**)

Invited Talks

- 2024 *Reptiles of Dogwood Canyon Audobon Center*. Dogwood Canyon Audobon Center, Cedar Hill, TX.

Invited Peer Reviews

BMC Genomics, Journal of Heredity, Evolution Letters

Media Coverage

- 2024 Press coverage of our paper Westfall et al. 2024 in *Proceedings of the National Academy of Sciences* by academic outlets such as **UTA News** and **NSF Stories** and popular science outlets such as **EurekAlert**, **MSN**, **Mirage**, **Time Magazine**, and others.
- 2024 Our article Gopalan et al. 2024 in *Genome Biology and Evolution* was selected for a highlight article by editors: <https://doi.org/10.1093/gbe/evae137>
- 2022 Press coverage of our paper Schield et al. 2022 in *Nature Ecology and Evolution* from **CU** and **UTA** outlets and in popular science outlets including **Yahoo! News**, **Foreign Affairs New Zealand**, **Technology.Org**, **EurekAlert**, **Bioengineer.Org**, and **National Science Foundation Research News**, and others.
- 2022 Press coverage of our work in Perry et al. 2022 in *Genome Research*, including news stories from **UTA** outlets (UTA Newsletter, Coll. Of Science Newsletter), and popular science news outlets including **ScienceDaily**, **GenomeWeb**, **Nature World News**, **Phys.org**, **Thinking Port**, **Swift Telecast**, **Technology Networks**, **Mirage**, and others.

Student Advising and Training

As a Ph.D. student, I assisted Dr. Todd Castoe in the training of two new Ph.D. students (**Kaas Ballard** and **Claire Kim**); advising them on computational analyses and training them in wet-lab techniques for their semi-independent research projects. Their research has been presented at scientific conferences and will lead to both of their first publications in the lab. I also advised one post-doctoral trainee (**Sierra Smith**) in computational and laboratory methods.

Teaching Experience

Graduate Teaching Assistant September 2020 – May 2023

University of Texas, Arlington

Laboratory section instructor for undergraduate courses **Cell and Molecular Biology** (BIOL 1441) and **Evolution and Ecology** (BIOL 1442).

Professional References

Dr. Todd Castoe – Ph.D. advisor

Professor – Department of Biology

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Dr. Luke Frishkoff – undergraduate advisor; Ph.D. committee member

Assistant Professor – Department of Biology

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Dr. Mark Pellegrino – Ph.D. committee member

Associate Professor – Department of Biology

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