Samuel R. Hirst

University of South Florida Department of Integrative Biology hirsts@usf.edu +1-801-696-7796
margreslab.com Samuel Hirst SamuelRHirst

Education

Ph.D. **University of South Florida**, Tampa, FL, USA — 2021 —
- Integrative Biology: Ecology and Evolution

B.S. **Brigham Young University**, Provo, UT, USA — 2017 — 2021
- Major: Genetics, Genomics, and Biotechnology
- Minors: Spanish, Business, and Music

Funding

National Science Foundation Graduate Research Fellowship (GRFP) — 2023 – 2026
in the amount of $167,000

Western North American Naturalist Natural History Research Grant — 2023
entitled "Testing for life history changes in venom composition in the Baja California Rattlesnake (*Crotalus enyo*)" in the amount of $2,500

University of South Florida Department of Integrative Biology Graduate Research Fellowship — 2021 – 2022
in the amount of $21,276

BYU Life Sciences College Undergraduate Research Award — 2021
entitled “Sequencing, Assembly and Annotation of the Red Diamond Rattlesnake Genome" in the amount of $1,500

Publications (Contributed equally†, corresponding author*)

5. **Hirst SR***, VanHorn CM, Franz-Chávez H, Vásquez-Cruz V, Kelly-Hernández A, Rosales-García RA, Castañeda-Gaytán G, Borja M, Parkinson CL, Strickland JL, Margres MJ. *In review*. Area-Induced Changes in Competition Drive Rapid Venom Complexity Evolution Across Island Rattlesnakes. *Western North American Naturalist*.

4. **Hirst SR***, Beer MA, VanHorn CM, Rautsaw RM, Franz-Chávez H, Lopez BR, Ramirez Chaparro R, Rosales-García RA, Vásquez-Cruz V, Kelly-Hernández A, Salinas Amézquita SA, López Martínez DE, Perez Fiol T, Rubio Rincón A, Whittington AC, Castañeda-Gaytán G, Borja M, Parkinson CL, Strickland JL, Margres MJ*. *Accepted*. Area-Induced Changes in Competition Drive Rapid Venom Complexity Evolution Across Island Rattlesnakes. *Evolution*.

3. Mochales Riaño G*, **Hirst SR**, Talavera A, Burriel-Carranza B, Pagone V, Estarellas M, Busschau T, Boissinot S, Hogan MP, Tena-Garcés J, Pla D. 2025. Chromosome-level reference genome for the medically important Arabian horned viper (*Cerastes gasperettii*). *GigaScience*. 10.1101/2024.07.29.605543

2. Neri-Castro E*; Borja M; Castañeda-Gaytán G; Alagón A; Strickland JL; Parkinson CL; Gutierrez-Martínez A; Rodriguez-López B; Zarzosa V; Lomonte B; Saviola AJ; Fernández J; Smith CF; Hansen KC; Pérez-Robles A; Castañeda-Pérez A; **Hirst SR**; Olvera F; Fernández-Badillo L; Sigala J; Jones J; Montaño-Ruvalcaba C; Ramírez-Chaparro R; Acosta-Campaña G; Margres MJ. 2025. Venom variation and ontogenetic changes in the *Crotalus molossus* complex: insights into composition, activities, and antivenom neutralization. *Comparative Biochemistry and Physiology, Part C*. 110129. 10.1016/j.cbpc.2025.110129

1. **Hirst SR***, Rautsaw RM, VanHorn CM, Beer MA, McDonald PJ, Rosales-García RA, Lopez BR, Rubio Rincón A, Franz-Chávez H, Vásquez-Cruz V, Kelly-Hernández A, Storfer A, Borja M, Castañeda-Gaytán G, Frandsen PB, Parkinson CL,

Strickland JL, Margres MJ*. 2024. Where the 'Ruber' Meets the Road: Using the Genome of the Red Diamond Rattlesnake to Unravel the Evolutionary Processes Driving Venom Evolution. *Genome Biology and Evolution*. 16(9). 10.1093/gbe/evae198

Natural History Notes & Range Expansions

2. **Hirst SR***†, Vásquez-Cruz V†, Kelly-Hernández A, Franz-Chavez H, Rincon AR, Salinas Amézquita AS, Grunwald C, Borja M, Castañeda-Gaytán G, Strickland JL, Margres MJ. 2023. Hunchback of Isla Piojo: First Record of Putative Kyphosis in the Spiny Chuckwalla (Sauromalus hispidus). *Bulletin of the Chicago Herpetological Society*. 58(11):177-178.

1. Franz-Chavez H, Ramirez-Chaparro R, Perez-Fiol T, Lopez-Martinez D.E, Rautsaw R.M, **Hirst SR**, Rodriguez-Lopez B, Borja M, Castaneda-Gaytan G, Strickland JL, Parkinson CL, Reyes-Velasco J, Margres MJ. 2023. Mexican Geographical Distribution Notes 6: New Herpetological Records for Islands in the Gulf of California. *Bulletin of the Chicago Herpetological Society* 58(8):129-130.

Awards & Honors

University of South Florida Annual Graduate Student Research Symposium 2025
Best poster award, Health and Life Sciences category, "Venomous Archipelagos: Integrating Adaptability and Island Biogeography Theory to Assess Persistence in the Anthropocene" in the amount of $500.00

Natural Toxins e-Conference 2022
Bronze award for oral presentation "Neutral or not: identifying drivers of venom evolution" in the amount of $75.00

Invited Talks

3. Hirst SR. 2025. Venomous Archipelagos: Using Island Biogeography to Predict Functional Trait Evolution in Fragmented Landscapes. Departmental Seminar. University of South Alabama. Mobile, AL, USA

2. Hirst SR. 2025. Connecting pattern and process: Using rattlesnake venoms to integrate evolution with foundational ecological theories of species richness. Integrative Biology Graduate Open House. University of South Florida. Tampa, FL, USA

1. Hirst SR. 2023. Venenos en víboras de penínsulas y archipiélagos: Determinando los factores que contribuyen a la evolución de veneno. Departmental Seminar. Universidad Veracruzana, Veracruz, MX.

Presentations

4. Hirst SR, Margres MJ. 2025. Venomous Archipelagos: Integrating Adaptability and Island Biogeography Theory to Assess Persistence in the Anthropocene. University of South Florida Annual Graduate Student Research Symposium. Poster Session. University of South Florida, Tampa, FL, USA.

3. Hirst SR, Margres MJ. 2023. Complex problems need complex solutions: polygenic trait evolution from multiple evolutionary mechanisms in the Red Diamond Rattlesnake (*Crotalus ruber*). Evolution Conference. Albuquerque Convention Center, Albuquerque, NM, USA.

2. Hirst, S. R.; Margres, M.J. 2022. Neutral or not: identifying drivers of venom evolution. Pathogens and Natural Toxins e-Conference. Virtual.

1. Hirst, S.R.†; Tolman, E.†; Frandsen, P.B. 2020. Comparing the effectiveness of eDNA sampling of water to bulk sample ethanol supernatant for the assessment of freshwater macroinvertebrate communities. Entomological Society of America Meeting. Poster Session. Virtual

Teaching

University of South Florida, Tampa, FL, USA 2021 – 2023

- *General Physiology Lab* – Labratory Teaching Assistant (Spring 2023)
- *Principles of Biology* – Teaching Assistant (Fall 2021, Spring 2022, Spring 2023)

Brigham Young University, Provo, UT, USA 2018 – 2021

- *Introduction to Jazz* – Teaching Assistant (Summer 2018, Winter 2021)

Guest Lectures

2. Community Ecology and Island Biogeography. BSC 2011, Bio II. 2024. University of South Florida. Tampa, FL, USA

1. Snake Diversity: Caenophidia. BSC 4933/6932, Herpetology. 2022. University of South Florida. Tampa, FL, USA

Mentorship

Ethan Weinstock (B. S. student, University of South Florida)	2024 –
Grace Mandese (B. S. student, University of South Florida)	2024 –
Cameron M. VanHorn (B. S. student, University of South Florida)	2022 – 2024

Manuscript Review

npj Biodiversity	2025
Genome Biology	
Toxicon	2022

General Service

Scientific expert for U.S. Fish and Wildlife Services: Species status assessment of the Eastern Diamondback Rattlesnake (*Crotalus adamanteus*) 2023

Technical Skills

Field	**Laboratory**	**Computational**
International field work	Dissection/tissue collection	Unix, R, Python scripting
Venomous snake handling	DNA/RNA purification	Supercomputing
Snake venom extraction	DNA/RNA quantification	Bioinformatics
Spanish fluency	DNA/RNA library prep	Statistics
	ATAC-Seq	
	Next-generation sequencing	
	RP–HPLC	