

James Starrett, Ph.D.
 University of California, Davis
 Department of Entomology and Nematology
 Davis, CA 95616
 (619) 395-2100
 jamesstarrett10@gmail.com

EDUCATION

- **Ph.D. in Genetics, Genomics, and Bioinformatics** **2012**
 University of California, Riverside
 Evolutionary Genetics Track
 DISSERTATION: *Molecular Evolution of Silk Genes in Mesothela and Mygalomorph Spiders, with Implications for the Early Evolution and Functional Divergence of Silk*
- **M.S. in Evolutionary Biology** **2006**
 San Diego State University
 THESIS: *Heat Shock Protein 70 Evolution in Duguetia Spiders and their Relatives, with Implications for Molecular Adaptation to Desert Life*
- **B.S. in Biology** **2003**
 San Diego State University

ACADEMIC APPOINTMENTS

- **Assistant Project Scientist** **2018 - present**
 University of California, Davis (Supervisor: Jason Bond)
 Department of Entomology and Nematology
- **Postdoctoral Fellow** **2016 - 2018**
 Auburn University (Supervisor: Jason Bond)
 Department of Biological Sciences
- **Postdoctoral Fellow** **2014 - 2016**
 San Diego State University (Supervisor: Marshal Hedin)
 Department of Biology
- **Postdoctoral Researcher** **2012 - 2014**
 University of California, Riverside (Supervisors: John Gatesy & Cheryl Hayashi)
 Department of Biology

FUNDING & AWARDS

- **NSF Division of Environmental Biology (Co-PI) - \$587,000** **2019**
 COLLABORATIVE RESEARCH (DEB-1937604): Phylogenomics, spatial phylogenetics and conservation prioritization in trapdoor spiders (and kin) of the California Floristic Province
- **National Geographic Research and Exploration Grant (PI) - \$18,270** **2016**
 RESEARCH: Conserving Evolutionary Processes in the San Francisco Bay Area
- **United States Patent Application 20150038680** **2015**
 Hayashi CY, Ayoub NA, Starrett J

RESEARCH: Spider silk dragline polynucleotides, polypeptides and methods of use thereof

- **UCR Distinguished Graduate Fellowship in Biology - \$7,500** **2010**
 - **UCR Dissertation-Year Fellowship Award - \$7,200** **2010**
 - **NSF Doctoral Dissertation Improvement Grant (Co-PI) - \$15,000** **2009**
- DISSERTATION RESEARCH: Spider silk evolution across ancient & recent phylogenetic divergences
- **UCR Biology Newell Travel Grant Award - \$810** **2008**
 - **SDSU Field Station Program Graduate Student Research Award - \$2,500** **2006**
 - **Sigma Xi Grant in Aid of Research - \$790** **2004**

PUBLICATIONS

[Google scholar profile](#)

20. Newton LG, **Starrett J**, Hendrixson BE, Derkarabetian S, Bond JE (2020) Integrative species delimitation reveals cryptic diversity in the southern Appalachian *Antrodiaetus unicolor* (Araneae: Antrodiaetidae) species complex. *Molecular Ecology*. In press.
19. Derkarabetian S, **Starrett J**, Tsurusaki N, Ubick D, Castillo S, Hedin M (2018) Phylogenomic revision of Travunioidea (Arachnida, Opiliones, Laniatores) using sequence capture of ultraconserved elements. *ZooKeys*. 760: 1-36.
18. **Starrett J**, Hayashi C, Derkarabetian S, Hedin M (2018) Cryptic elevational zonation in trapdoor spiders (Araneae, Antrodiaetidae, *Aliatypus janus* complex) from the California southern Sierra Nevada. *Molecular Phylogenetics and Evolution*. 118: 403-413.
17. Gaudry MJ, Jastroch M, Treberg JR, Hofreiter M, Paijmans JLA, **Starrett J**, Wales N, Signore AV, Springer MS, Campbell KL (2017) Inactivation of thermogenic UCP1 as a historical contingency in multiple placental mammal clades. *Science Advances*. 3(7): e1602878.
16. **Starrett J***, Derkarabetian S*, Hedin M, Bryson RW, McCormack JE, Faircloth B (2017) High phylogenetic utility of an ultraconserved element probe set designed for Arachnida. *Molecular Ecology Resources*. 17(4): 812-823. *equal contribution
15. Burns M, **Starrett J**, Dekarabetian S, Richart CH, Cabrero A, Hedin M (2017) Comparative performance of double-digest RAD sequencing across divergent arachnid lineages. *Molecular Ecology Resources*. 17(3): 418-430.
14. Derkarabetian S, Burns M, **Starrett J**, Hedin M (2016) Population genomic evidence for multiple Pliocene refugia in a montane-restricted harvestman (Arachnida, Opiliones, *Sclerobunus robustus*) from the southwestern United States. *Molecular Ecology*. 25(18): 4611-4631.
13. Springer MS, Emerling CA, Fugate N, Patel R, **Starrett J**, Morin PA, Hayashi C, Gatesy J (2016) Inactivation of cone-specific phototransduction genes in rod monochromatic cetaceans. *Frontiers in Ecology and Evolution*. 4: 61.
12. Springer MS, **Starrett J**, Morin PA, Hayashi C, Gatesy J (2016) Inactivation of *C4orf26* in toothless placental mammals. *Molecular Phylogenetics and Evolution*. 95: 34-45.
11. **Starrett J**, Derkarabetian S, Richart C, Cabrero A, Hedin M (2016) A new monster from southwest Oregon forests: *Cryptomaster behemoth* sp. nov. (Opiliones, Laniatores, Travunioidea). *ZooKeys*. 55: 11-35.
10. Leavitt DH, **Starrett J**, Westphal MF, Hedin M (2015) Multilocus sequence data reveal dozens of putative cryptic species in a radiation of endemic California mygalomorph spiders (Araneae, Mygalomorphae, Nemesiidae). *Molecular Phylogenetics and Evolution*. 91: 56-67.
9. Xu S, Xu Z, **Starrett J**, Hayashi C, Wang X (2014) Cross-plane thermal transport in micrometer-thick spider silk films. *Polymer*. 55(7): 1845-1853.

8. **Starrett J**, Hedin M, Ayoub N, Hayashi CY (2013) Hemocyanin gene family evolution in spiders (Araneae), with implications for phylogenetic relationships and divergence times in the infraorder Mygalomorphae. *Gene*. 524(2): 175-186.
7. **Starrett J**, Hayashi CY (2013) Mosaic evolution of silk genes in *Aliatypus* trapdoor spiders (Mygalomorphae, Antrodiaetidae). *Journal of Molecular Evolution*. 76(4): 216-227.
6. Hedin M, **Starrett J**, Hayashi C (2013) Crossing the uncrossable: Novel trans-valley biogeographic patterns revealed in the genetic history of low dispersal mygalomorph spiders (Antrodiaetidae, *Antrodiaetus*) from California. *Molecular Ecology*. 22(2): 508-526.
5. Hedin M, **Starrett J**, Akhter S, Schönhöfer AL, Shultz JW (2012) Phylogenomic resolution of Paleozoic divergences in harvestmen (Arachnida, Opiliones) via analysis of next-generation transcriptome data. *PLoS ONE*. 7(8): e42888.
4. **Starrett J**, Garb JE, Kuelbs A, Azubuike UO, Hayashi CY (2012) Early events in the evolution of spider silk genes. *PLoS ONE*. 7(6): e38084.
3. Satler JD, **Starrett J**, Hayashi CY, Hedin M (2011) Inferring species trees from gene trees in a radiation of California trapdoor spiders (Araneae, Antrodiaetidae, *Aliatypus*). *PLoS ONE*. 6(9): e25355.
2. **Starrett J**, Waters E (2007) Positive natural selection has driven the evolution of the Hsp70s in *Diguetia* spiders. *Biology Letters*. 3(4): 439-444.
1. **Starrett J**, Hedin M (2007) Multilocus genealogies reveal multiple cryptic species and biogeographical complexity in the California turret spider *Antrodiaetus riversi* (Mygalomorphae, Antrodiaetidae). *Molecular Ecology*. 16(3): 583-604.

SCIENTIFIC PRESENTATIONS

- “The frightening world of spider genomics.”
UC Davis Genome Center Halloween Symposium, **Invited Seminar** October 2019
- “Phylogenetic analysis of Nearctic *Schizocosa* (Araneomorphae, Lycosidae), with implications for the evolution of traits under sexual selection.”
American Arachnological Society, 43rd annual meeting (Lexington, VA) June 2019
- “Phylogenomic investigation of the *Schizocosa ocreata* group”
American Arachnological Society, 42nd annual meeting (Ypsilanti, MI) June 2018
- “High phylogenetic utility of an ultraconserved element probe set designed for Arachnida.”
20th International Congress of Arachnology (Golden, CO) July 2016
- “Revision of the genus *Cryptomaster* (Laniatores, Travunioidea) using molecular and morphological data.”
American Arachnological Society, 39th annual meeting (Mitchell, SD) June 2015
- “Molecular Evolution of Silk Genes in Mesothela and Mygalomorph Spiders, with Implications for the Early Evolution and Functional Divergence of Silk.”
Biology Departmental Seminar (SDSU), **Invited Seminar** October 2014
San Diego Zoo Institute for Conservation Research (Escondido, CA), **Invited seminar** July 2013
- “Early events in the evolution of spider silk genes.”
Ecology, Evolution and Organismal Biology (UCR), **Invited seminar** May 2013
Genetics, Genomics, and Bioinformatics Symposium (UCR) September 2011
American Arachnological Society, 35th annual meeting (Portland, OR) July 2011
- “Silk gene transcripts from mesothela and mygalomorph spiders and the early evolution of spidroins.”
Genetics, Genomics, and Bioinformatics Symposium (UCR) September 2010

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| Annual Joint Society Evolution Conference (Portland, OR) | June 2010 |
| • “Spider hemocyanin sequences reveal complex evolutionary dynamics of blood proteins and have high phylogenetic utility.” | |
| Genetics, Genomics, and Bioinformatics Symposium (UCR) | September 2009 |
| American Arachnological Society, 33 rd annual meeting (Russellville, AR) | June 2009 |
| • “Silk gland transcripts from <i>Liphistius malayanus</i> (Araneae, Mesothelae) reveal an early diversification of silk genes in spiders.” | |
| Genetics, Genomics, and Bioinformatics Symposium (UCR) | September 2008 |
| American Arachnological Society, 32 nd annual meeting (Berkeley, CA) | June 2008 |
| • “Phylogeography of the California Turret Spider, <i>Atypoides riversi</i> .” | |
| Evolution, Ecology and Organismal Biology Gradfest (UCR) | March 2008 |
| • “Heat Shock Protein 70 evolution in the desert dwelling <i>Diguetia</i> spiders.” | |
| Genetics, Genomics, and Bioinformatics Symposium (UCR) | September 2007 |
| • “Concordant genealogies reveal a complex biogeographic history in the California Turret Spider, <i>Atypoides riversi</i> .” | |
| Annual Joint Society Evolution Conference (Fort Collins, CO) | June 2004 |
| • “Biogeographic History of California <i>Atypoides</i> .” | |
| American Arachnological Society, 27 th annual meeting (Denver, CO) | July 2003 |
| Undergraduate Research Symposium (SDSU) | March 2003 |

TEACHING & MENTORING EXPERIENCE

Instructor of Record:

Life and Death on the Web: Silk, venom, predation, and the secret lives of spiders Spring 2019

FRS 002, UCD: First year seminar, responsibilities included giving lectures on spider biology, leading paper discussions, and teaching methods of spider collecting, preservation, and identification. Class size 11 undergraduates.

Genetics and Evolution Spring 2015

Biol 352, SDSU: responsibilities included giving lectures, creating exams, assisting with coordination of activity sections, and assigning grades. Lecture material covered transmission and population genetics. Class size ~150 Biology major undergraduates.

Guest lecturer/discussion leader:

Biogeography Seminar March 2013

EEOB 282, UCR: guest discussion leader for graduate level seminar on biogeography

Evolution October 2012

Biol 105, UCR: guest lecturer on species and speciation.

Teaching Assistant:

Evolution (Biol 105, UCR): Fall 2007, Fall 2011.

Molecular Phylogenetics & Evolution (Biol 118, UCR): Spring 2011.

Genomics & Bioinformatics (Biol 119 lab, UCR): Spring 2009.

Intro to Ecology & Evolution (Biol 5C lab, UCR): Spring 2008, Fall 2008.

Intro to Organismal Biology (Biol 5B lab, UCR): Winter 2008, Winter 2009.

World of Animals (Biol 101 lab, SDSU): Fall 2005-Spring 2006.

Biology Undergraduate student mentor:

Jordan Colby (UCD), Jessica Nguyen (UCD), Ashley Bui (UCD *senior practicum), Stephanie Castillo (SDSU), Janelle Prothro (UCR), Fanny Chan (UCR), Marissa Panyawai (UCR), Richard Liao (UCR), John Brown (UCR), Amanda Kuelbs (UCR), Chinonyerem Oguguo (UCR), Ugochi Azubuike (UCR)

Students learned molecular techniques in the laboratory and gained experience in the field collecting specimens. Additionally, students learned about scientific study design and presented their research at professional scientific meetings. Students were from diverse cultural and ethnic backgrounds.

Biology Graduate student mentor:

Laura Caicedo-Quiroga (visitor - UV), Xavier Zahnle (AU, UCD), Lacie Newton (AU, UCD), Rebecca Godwin (AU, UCD), Nicole Garrison (AU), Charles Stephen (AU), Shahan Derkarabetian (SDSU), Allan Cabrero (SDSU), Casey Richart (SDSU), Brandon Boyer (SDSU)

Trained students in molecular techniques for next generation sequencing (e.g., target enrichment, RADseq) and read processing/data analysis. Provided critiques and edits for talks, grant proposals, and manuscripts.

PROFESSIONAL SERVICE & PUBLIC OUTREACH

Ad hoc Journal Reviewer: *Proceedings of the National Academy of Sciences USA*, *Molecular Phylogenetics and Evolution*, *Invertebrate Systematics*, *Journal of Arachnology*, *Arachnology*, *New Zealand Journal of Biology*, *PLoS One*, *Proceedings of the Royal Society B*, *Journal of Biogeography*, *BMC Evolutionary Biology*, *Molecular Ecology*, *PeerJ*

UC Davis 105 th Picnic Day, Bohart Museum of Entomology	April 2019
Displayed and answered questions about spiders for over 900 members of the public who passed through the exhibits.	
UC Davis, Bohart Museum of Entomology, Bohart Day of Arachnids	March 2019
Displayed live and preserved arachnids, lead learning activities about spider silk and sensory systems, and answered questions about spider biology for a public audience.	
“Turret spiders launch sneak attacks from tiny towers” by Josh Cassidy (KQED), Discussed the biology of the California Turret Spider (<i>Antrodiaetus riversi</i>) with public media author for a video & article in their science & nature web series, <i>Deep Look</i> .	January 2019
https://www.kqed.org/science/1936465/turret-spiders-launch-sneak-attacks-from-tiny-towers	
Auburn University College of Veterinary Medicine	April 2018
Participated in the annual Open house. Displayed arachnids and insects for a public audience of all ages.	
Auburn University Museum of Natural History	September 2017
Participated in the annual Open House on Homecoming Saturday. Live and preserved arachnids were displayed for a public audience of all ages, and questions regarding arachnid biology and biodiversity were addressed.	
International training workshop on myriapods and arachnids in southeast Asia. Institute of Ecology and Biological Resources, Hanoi, Vietnam	September 2016
Gave lectures on next generation sequencing methods and Opiliones systematics and evolution to students from different countries in southeast Asia. Also trained students in collection methods and identification of arachnids and myriapods.	
CNN interview	February 2016
Discussed the discovery and description of <i>Cryptomaster behemoth</i> , a new species of Opiliones.	
http://www.cnn.com/2016/02/02/us/monster-arachnid-oregon-irpt/index.html	
Science fair judge, St. Catherine of Alexandria, Riverside, CA	January 2014 January 2013

Read and scored science fair reports & poster presentations by junior high students.	
Gary and Jerri-Ann Jacobs High Tech High School in Point Loma	November 2013
Exhibited live spiders and silk samples, as well as fielded questions about spider research from a group of students during their visit to UCR. These students had very little exposure to biological sciences and came from diverse backgrounds.	
Riverside Long Night of Arts and Innovation	October 2013 October 2012
Assisted Dr. Cheryl Hayashi in presenting research on spider silk and exhibited live spiders to a public audience.	
High Desert Nature Museum, Yucca Valley, CA	August 2011
Presented information on spider biology to public audience with Dr. Cheryl Hayashi. Discussed silk research and exhibited live spiders.	
Southern California Conference for Undergraduate Research, Pepperdine University	November 2010
Posters were presented by two undergraduate students on research conducted in the lab under my mentorship. Assisted with poster ideas, formatting, and editing.	
Graduate Student President of Genetics, Genomics, and Bioinformatics Program at UCR	2010 - 2011
Organized meetings, recruitment day, and social events for GGB graduate students.	
Friends of Riverside Public Library	May 2010
Presented information on spider biology and silk research to public audience at Riverside City Hall.	
CNN Local Edition	March 2010
Participated with Dr. Cheryl Hayashi in a taped segment that aired on the southern California regional CNN channel. Discussed topics on spider biology and human applications of spider silk and exhibited live spiders.	

BIOINFORMATICS WORKSHOPS

Bioinformatics Genome Assembly Workshop (University of California, Davis)	December 2018
Evaluated tools for assembly and annotation of genomes in non-model organisms.	
Bioinformatics Bootcamp (Auburn University)	June 2017
Learned Linux command line, data annotation, methods for genome/transcriptome assembly, and data visualization tools.	
Next generation sequencing for phylogenetics and phylogeography (Duke University)	July 2014
Learned different NGS techniques, coalescent based phylogenetic analysis methods, and strategies for different evolutionary genetic questions.	
Next generation data analysis (IIGB, University of California, Riverside)	May 2011
Learned methods for transcriptome assembly and digital expression analysis.	

RESEARCH EXPERIENCE

Comparative genomics and phylogenomics in wolf spiders	2018 - Present
Supervisor: Jason Bond, UCD	
Phylogenomic investigation of courtship behavior in wolf spiders	2016 - 2018
Supervisor: Jason Bond, AU	
Phylo/population genomics of arachnids	2014 - 2016
Supervisor: Marshal Hedin, SDSU	
Investigation of genes of adaptive significance using target enrichment	2014 - 2014
Supervisors: John Gatesy and Cheryl Hayashi, UCR	
Analysis of thermal conductivity properties of silk proteins	2012 - 2013

Supervisor: Cheryl Hayashi, UCR	
Molecular evolution and digital gene expression of silk genes	2006 - 2012
Advisor: Cheryl Hayashi, UCR	
Phylogeography of Great Basin sky island plants	Spring 2007
Advisor: Seung-Chul Kim, UCR	
Heat shock protein evolution in desert spiders	2004 - 2006
Advisor: Elizabeth Waters, SDSU	
Identification of southern California ants	2002 - 2006
Supervisor: Robert Fisher, US Geological Survey, San Diego, CA	
Biogeography of California mygalomorph spiders	2001 - 2004
Advisor: Marshal Hedin, SDSU	

FIELD EXPERIENCE

I have been involved with numerous field expeditions in many different regions of North America, as well as Japan and Vietnam, and have collected in a wide variety of habitats (forests, oak woodlands, deserts, caves). Collection regions include:

- California (Sierra Nevada & White Mountains, Coast Ranges, Bay Area)*
- Appalachian Mountains, Eastern Coastal Plains, Florida*
- Great Plains (USA and Canada)*
- Desert Southwest USA*
- Ozark Mountains*
- Pacific Northwest USA
- Japan (Honshu, Shikoku, Kyushu)
- Vietnam (MeLinh Station for Biodiversity, National Parks: Tam Dao Ba Vi, Cuc Phuong)
- * - Collection team leader or solo collecting

MUSEUM EXPERIENCE

University of California, Davis, Bohart Museum of Entomology	2018 - Current
Cataloging, identifying, and preserving wolf spiders and other arachnids. Photographing live and preserved <i>Schizocosa</i> specimens for database. Dissecting and harvesting tissues for genomic and transcriptomic studies. Training undergraduates in specimen curation (photographing, preservation, tissue harvesting). Participated in open house and other museum related outreach events (see Outreach above).	
Auburn University Natural History Museum	2016 - 2018
Curation of wolf spider collection for genomic and morphological studies. Cataloged, identified, and preserved for genomic work >1K individuals representing all described species of <i>Schizocosa</i> that were collected from across North America. Participated in open house events exhibiting specimens and live arachnids for the public (see Outreach above).	
San Diego State Terrestrial Arthropod Collection	2014 - 2016
Curation of opiliones, spiders, and other arachnids from North America and Japan for genomic and morphological studies. Assisted with adding specimens to the Symbiota Collections of Arthropods Network database.	