

215 INTERDISCIPLINARY LIFE SCIENCES BLDG • 1000 HILLTOP CIRCLE
UNIVERSITY OF MARYLAND, BALTIMORE COUNTY • BALTIMORE, MD • 21250
BURNSM@UMBC.EDU
WWW.BURNSLAB.UMBC.EDU

MERCEDES BURNS

CURRENT POSITION

Assistant Professor (2017-current)

Department of Biological Sciences

University of Maryland, Baltimore County, Baltimore, MD

EDUCATION

National Science Foundation Postdoctoral Fellow (2014-2017)

Department of Biology

San Diego State University, San Diego, CA

Sponsors: Marshal Hedin (SDSU) and Nobuo Tsurusaki (Tottori University, Japan)

Ph. D. in Behavior, Ecology, Evolution, Systematics program (2008-2014)

Department of Entomology

University of Maryland, College Park, MD

Dissertation: "Phylogenetic exploration of mating system evolution in the eastern North American leiobunine harvestmen (Opiliones: Sclerosomatidae)."

Adviser: Jeffrey W. Shultz

B.A. in Biology, minor in Psychology (2002-2006)

Macalester College

St. Paul, MN

Senior Thesis: "Mate choice mediated by size and chemical defense in *Nyssodesmus python* (Polydesmida: Platyrrhacidae)." Tropical Ecology and Conservation (CIEE) Monteverde, Costa Rica. 2005.

Adviser: Mark A. Davis

RESEARCH GRANTS

Integrative and Organismal Systems Core Grant, \$897,934, "Collaborative Research: Genetics and biomechanics of Non-Newtonian prey capture adhesives across Panarthropoda," National Science Foundation (2022-2026)

UMBC Strategic Award for Research Transition Grant, \$23,277.75, "Divergent genome/subgenome evolution in a facultative parthenogen," University of Maryland Baltimore County (2019-2020)

Postdoctoral Research Fellowship in Biology, \$207,000, "Role of male/female ratios in the evolution of mating systems," National Science Foundation (2014-2017)

Doctoral Dissertation Improvement Grant, \$14,152, "Genital biomechanics and mating system evolution in leiobunine harvestmen (Opiliones: Sclerosomatidae),"

National Science Foundation (2011- 2014)

Graduate Research Fellowship, \$90,000, National Science Foundation (Fall 2010-Spring 2013)

Ann G. Wylie Dissertation Fellowship, \$10,000, University of Maryland Graduate School (Spring 2014)

Summer Research Fellowship, \$5000, University of Maryland Graduate School (2010)

PEER-REVIEWED PUBLICATIONS

GRADUATE COAUTHORS: * / UNDERGRADUATE COAUTHORS: **

Bacon R*, Washington D**, Johnson, MK**, **Burns M.** 2022. The geography of sexual conflict: a meta-analysis. *American Naturalist*. Accepted.

Stellwagen SD, **Burns M.** 2021. Repeat variation resolves a complete aggregate silk sequence of bolas spider *Mastophora phrynosoma*. *Integrative and Comparative Biology* 61(4): 1450-1458.

Brown T*, Tsurusaki N, **Burns M.** 2021. Genomic determination of reproductive mode in facultatively parthenogenetic Opiliones. *Journal of Heredity* 112(1): 34-44.

Karachiwalla Z**, deCarvalho T, **Burns M.** 2020. Spermathecal variation by mating system in temperate harvestmen. *Integrative and Comparative Biology* Accepted. doi: 10.1093/icb/icaa120.

Orr T, **Burns M,** Hawkes K, Holekamp KE... Hayssen V. 2020. It takes two to tango: including a female perspective in reproductive biology. *Integrative and Comparative Biology* 60(3): 796-813. doi: 10.1093/icb/icaa084.

Kahn P**, Cao D, **Burns M,** Boyer S. 2018. Comparison of nuptial gift chemistry reveals convergent evolution correlated with antagonism in mating system. *Ecology and Evolution* 8(14): 7103-7110. doi: 10.1002/ece3.4232

Burns M, Hedin M, Tsurusaki N. 2017. Population genomics and geographical parthenogenesis in Japanese harvestmen (Opiliones, Sclerosomatidae). *Ecology and Evolution* 8(1): 36-52. doi: 10.1002/ece3.3605.

Shoemaker AK**, **Burns M,** Boyer S. 2017. New records of harvestmen (Arachnida, Opiliones) from Minnesota, USA. *Zootaxa* 4273(2): 279-286.

Burns M, Starrett J, Derkarabetian S, Richart CH, Cabrero A, Hedin MC. 2016. Comparative performance of double-digest RAD sequencing across divergent arachnid lineages. *Molecular Ecology Resources*. doi: 10.1111/1755-0998.12575.

Derkarabetian S, **Burns M,** Starrett J, Hedin M. 2016. Population genomic evidence for

multiple refugia in a montane-restricted harvestmen (Arachnida, Opiliones, Sclerobunus robustus) from the southwestern United States. *Molecular Ecology* 25(18): 4611-4631. doi: 10.1111/mec.13789.

Burns M, Tsurusaki N. 2016. Male reproductive morphology across latitudinal clines and under long-term female sex ratio bias. *Integrative and Comparative Biology* 56(1). doi:10.1093/icb/icw017.

Burns M, Shultz JW. 2016. Mechanical properties of male genitalia in Leiobunum harvestmen (Arachnida, Opiliones, Sclerosomatidae). *Journal of Arachnology* 44(2): 199-209. doi: 10.1636/JoA-S-15-010.

Burns M, Shultz JW. 2015. Biomechanical diversity of mating structures among harvestmen species is consistent with a spectrum of precopulatory strategies. *PLoS ONE* 10(9): e0137181. doi:10.1371/journal.pone.0137181.

Burns M, Hedin M, Shultz JW. 2013. Comparative analyses of reproductive structures in harvestmen (Opiliones) reveal multiple transitions from courtship to precopulatory antagonism. *PLoS ONE* 8(6): e66767. doi:10.1371/journal.pone.0066767.

Burns M, Hedin M, Shultz JW. 2012. Molecular phylogeny of the leiobunine harvestmen of eastern North America (Opiliones: Sclerosomatidae: Leiobuninae). *Molecular Phylogenetics and Evolution* 63(2): 291-298.

OTHER PUBLICATIONS

GRADUATE COAUTHORS: * / UNDERGRADUATE COAUTHORS: **

Burns M, Stellwagen SD. 2021. The ties that stick: challenges and future promise in the field of bioadhesives. *Integrative and Comparative Biology* 61(4): 1406-1410.

Burns M. 2020. Virgin births from parthenogenesis: How females from some species can reproduce without males. *The Conversation*. December 15, 2020: <https://theconversation.com/virgin-births-from-parthenogenesis-how-females-from-some-species-can-reproduce-without-males-150496>

Burns M, Raupp M. 2010. Myths from the Undergrowth: Four urban legends about arthropods and the truths behind them! *Groundwork*. August 2010: 6-9.

PRESENTATIONS (Oral Presentation/Poster)

“The 8-legged flowers of Chūbu: Genome and cytotypic distribution of a facultatively parthenogenetic Opiliones species.” Invited plenary session for American Arachnology Society (6/28/2021), virtual.

“The geography of sexual conflict.” Invited symposium on “The power of sexual selection.” (Organizer: Suzanne Alonzo; 6/22/2021) American Society of Naturalists, virtual.

“Dandy-long legs: the art of the marvelously misunderstood Opiliones.” Invited talks with Washington DC Audubon Society (Host: Serenella Linares; 6/10/2021), virtual, and Maryland Natural History Club (Host: Bronwyn Mitchell-Strong; 12/2/2021), virtual.

“Three tales from arachnid genomes: Sequencing, sex, and silk.” Invited talks at University of Colorado Denver (Host: Sara Branco; 3/5/2021), virtual; American Museum and Natural History (Host: Jessica Ware; 3/8/2021), virtual; Johns Hopkins University (Host: Andrew Gordus; 3/25/2021), virtual; University of Nebraska, Lincoln (Host: Eileen Hebets; 4/1/2021), virtual; University of California, Berkeley (Essig Brunch; 4/9/2021), virtual; Gettysburg College (Host: Alex Trillo; 4/13/2021), virtual; Cornell University (Host: Corrie Moreau; 4/19/2021), virtual.

“Reproductive diversity and sexual conflict: opilionid mating from the female perspective.” Invited talks at Penn State University (Host: Tanya Renner; 3/6/2020), State College, and University of California, Davis (Host: Jason Bond; 2/19/2020), CA.

“The Paradox of Sex? Maintenance of sex via geographic heterogeneity and sexual conflict.” Invited talk at the University of Iowa (Host: Maurine Neiman; 10/4/2019), Iowa City, IA.

“Maintenance of sex via geographic heterogeneity and facultative parthenogenesis in a Japanese harvestman.” President’s Symposium (Organizer: Maria Orive), American Genetic Society 2019, Portland, OR.

“Fertilization control via spermathecal morphology: opilionid mating from the female perspective.” Symposium honoring Dr. William Shear (Organizer: Marshal Hedin), American Arachnological Society 2019, Washington and Lee University, Lexington, VA.

“The geography of sex: maintenance of sex through conflict and habitat heterogeneity.” Symposium on “Outstanding Opiliones: Reproductive and Population Biology in Harvestmen” (Organizer: Mercedes Burns). International Arachnological Congress 2019, Christchurch, New Zealand

“The paradox of sex: maintenance of sexual reproduction through conflict.” Invited talks at the University of Pittsburgh (Host: Tia-Lynn Ashman; 10/31/2018) and East Carolina University (Host: Michael Brewer; 11/29/2018).

“Influence of sexual conflict on reproductive mode and fecundity in a facultative parthenogen.” 2018 Jacques Monod Conference on “Sex Uncovered” (Organizer: Tanja Schwander). Roscoff, FRA. 2018 Society for Molecular Biology and Evolution. Yokohama, JPN. 2018 Joint Congress for Evolutionary Biology (Organizer: Casper Van Der Kooi). Montpellier, FRA.

“Sexual conflict and the maintenance of sex in facultative parthenogens.” SSE Spotlight Symposium on “Sex in the Wild” (Organizer: Maurine Neiman). Society for the Study of Evolution 2017, Portland, OR.

“Population genomics and geographic parthenogenesis in Japanese harvestmen (Opiliones, Sclerosomatidae).” Society for Integrative and Comparative Biology 2017, New Orleans, LA. International Arachnological Congress 2016, Golden, CO.

“Reproductive morphology under long-term demographic evolution in an arthropod.” Symposium on the Morphological Diversity of Intromittent Organs (Organizers: Brandon Moore and Diane Kelly). Society for Integrative and Comparative Biology 2016, Portland, OR.

“Variation in the mechanical properties of male genitalia in harvestmen is consistent with mating strategy.”(1) American Association of Anatomists, Evolution and Comparative Anatomy section, Experimental Biology 2015, Boston, MA; (2) American Arachnological Society 2015, Mitchell, SD.

“Comparative analyses of biomechanical reproductive traits in harvestmen support intersexual coevolution via simultaneous mechanisms.” Society for the Study of Evolution 2014, Raleigh, NC.

“Reproductive morphology indicates multiple evolutionary transitions from female enticement to precopulatory antagonism in the leiobunine harvestmen (Opiliones: Sclerosomatidae).” International Congress of Arachnology 2013, Kenting, Taiwan.

***Third place award in papers.**

“Comparative analysis of quantitative reproductive traits indicates precopulatory antagonism in the leiobunine harvestmen.” American Arachnological Society, 2013 Meeting, Johnson City, TN.

“Reproductive morphology and evolution in the leiobunine harvestmen.” Society for the Study of Evolution Joint Meeting 2012, Ottawa, ON, Canada.

“Phylogeny-based comparative analysis of reproductive characters in the North American leiobunine harvestmen (Opiliones: Sclerosomatidae).” American Arachnological Society, 2011 Meeting, Portland, OR.

***Second place award in papers.**

“Phylogeny of eastern North American harvestmen (Opiliones: Sclerosomatidae) and coevolution of male and female reproductive structures.” Entomological Society of America 2010 National Meeting. San Diego, CA.

***President’s Prize award in Student Ten Minute Paper Phylogenetics section.**

“Phylogeny of eastern North American harvestmen (Opiliones: Sclerosomatidae) and coevolution of male and female reproductive structures.” American

Arachnological Society, 2010 Meeting, Greenville, NC.

“Phylogenetic exploration of mating systems in the temperate leiobunine harvestmen.” Eastern Branch Entomological Society of America 2010. Annapolis, MD.

*First place award in posters.

“Phylogenetic exploration of mating systems in the temperate leiobunine harvestmen.” Bioscience Day 2009. University of Maryland, College Park, MD.

*Second place award in posters.

“Mate choice mediated by size and chemical defense in *Nyssodesmus python* (Polydesmida: Platyrrhacidae).” Society for the study of Evolution 2006, Stony Brook, NY.

“Contextual resource defense and territoriality in the sub-alpine ant, *Formica podzolica*.” Mountain Research Station Summer Presentation Series. University of Colorado, Boulder, CO. 2005.

“Effects of Chronic Methamphetamine on Spatial Memory and Dopamine Transporter Levels in Male Rats.” Annual Biomedical Research Conference for Minority Students (ABRCMS) Dallas, Texas. 2004.

AWARDS

Science of Purpose Ideas Challenge, Development, John Templeton Foundation (2020)

Dialogues on Science, Ethics, and Religion (DoSER) Award, American Association for the Advancement of Sciences (2019)

Broadening Participation Travel Award, Society for Integrative and Comparative Biology (2017)

ESO Travel Award, Entomology Department, University of Maryland (2013)

BISI Department Merit Award, University of Maryland (2013)

Jacob K. Goldhaber Travel Award, University of Maryland Graduate School (2011)

BEES Service Award, BEES Program, University of Maryland (2010)

Darwin Fellowship, BEES Program, University of Maryland (2009-2010)

Diversity Fellowship, University of Maryland (2008-2009)

Catherine Lealtad Scholar, Macalester College (2002-2006)

St. Paul Private Companies Scholar, Macalester College (2003-2006)

Benjamin A. Gilman Scholar, Macalester College (2005)

Outstanding Student Employee Award, Macalester College (2005)

Howard Hughes Medical Institute Grant, Macalester College (2003)

TEACHING EXPERIENCE (Class/Seminar)

Spring 2020, 2022 **University of Maryland** **Baltimore, MD**

Instructor

Prepared and delivered syllabus, lectures, and programmatic creation for the novel course BIOL 481: Advanced Topics in Evolution: The Evolution of Sex. Facilitated transition of physical to virtual course during COVID-19 pandemic.

Aug. 2019-Dec. 2019 **University of Maryland** **Baltimore, MD**

Co-instructor

Prepared and delivered lectures, assisted in syllabus and programmatic creation, and computer laboratory assignments for BIOL 483/683: Evolution: From Genes to Genomes elective course.

Fall 2018, 2020 **University of Maryland** **Baltimore, MD**

Co-instructor

Prepared and delivered lectures, assisted in course organization, TA training, and assessments for BIOL 142: Principles of Ecology and Evolution core course. Redeveloped course for virtual delivery during COVID-19 pandemic.

March 15, 2018; Oct. 4, 2018 **University of Maryland** **Baltimore, MD**

Guest Lecturer

Discussed research and strategies for getting involved in STEM internships with UMBC CHEM 102 Honors course. Hosted by Dr. Marie Van Staveren and Dr. Sarah Bass.

April 13, 2018 **University of Maryland** **College Park, MD**

Seminar Lecturer

Delivered seminar on "The Paradox of Sex: Sexual conflict and reproductive mode polymorphisms." Hosted by Dr. David Hawthorne and Dr. Jeffrey W. Shultz.

Oct. 2016 to Apr. 2017 **San Diego State University** **San Diego, CA**

Guest Lecturer

Delivered interactive lectures and received formal review for BIOL 352: Genetics and Evolution course

March 3, 2015 **San Diego State University** **San Diego, CA**

Guest Lecturer

Delivered interactive lecture on phylum Arthropoda with specific focus on Arachnida in BIOL 101: World of Animals

October 20, 2014 San Diego State University San Diego, CA
Guest Lecturer
Delivered lecture on phylum Annelida and facilitated iClicker participation in BIOL 204: Principles of Organismal Biology

Aug. 2013 to Dec. 2013 University of Maryland College Park, MD
Graduate Teaching Assistant
Prepared and taught homework tutorials and assists faculty with grading and homework creation for BSCI 207: Organismal Biology

October 29, 2011 Washington and Lee University Lexington, VA
Seminar Lecturer
Delivered seminar on "Crowbars and Barricades: Genital morphology and mating trait evolution in the eastern North American leiobunine opilionids." Hosted by Dr. Nadia Ayoub.

March 31, 2011 University of Maryland College Park, MD
Guest Lecturer
Delivered lecture on mate choice, mating systems, and sexual selection in insects in ENTM 612: Insect Ecology graduate course

Aug. 2008 to May 2009 University of Maryland College Park, MD
Graduate Teaching Assistant
Prepared lectures, laboratory practicum, and quizzes for laboratory section of BSCI 201-202: Human Anatomy and Physiology

RESEARCH INTERNSHIPS

June 2006 to July 2007 Bureau of Land Management Buffalo, WY
Wildlife Biology Intern
Implemented GIS technology for field surveys for public/private entities and maintained raptor database

Aug. 2005 to Dec. 2005 CIEE Study Abroad Program Monteverde, Costa Rica
Student/Independent researcher
Performed short-term independent research on mating behavior of local millipede species, Nyssodesmus python

May 2005 to Aug. 2005 NSF REU Program University of Colorado Boulder, CO
Research Intern
Mentored by Dr. Michael Breed in ant behavior study at UC Boulder's Mountain Research Station

May 2004 to Aug. 2004 Leadership Alliance Hunter College New York, NY
Research Intern
Performed behavior assays for ongoing methamphetamine research with Dr. Victoria Luine

May 2003 to Jan. 2004 Macalester College Chemistry Department St. Paul, MN
Research Assistant
Mentored by Dr. Rebecca Hoye in natural product synthesis research

OTHER EMPLOYMENT

Sept. 2007 to June 2008 University of Minnesota Minneapolis, MN
Senior Laboratory Technician
Supervised in-session teaching labs. Involved in laboratory preparation, stocking, and supply.

Sept. 2004 to June 2006 Macalester College Animal Facility St. Paul, MN
Caregiver/Student Supervisor
Management of facility animals, upkeep of experiments, laboratory preparation, and initiation of record-keeping.

Jan. 2005 to May 2005 Macalester College Biology Department St. Paul, MN
Laboratory Teacher's Assistant
Prepared and assisted teaching introductory-level cell biology laboratory modules.

SERVICE

2009 BEES Program Awards Committee

2009-2010 BEES Program Social Chair

2009-2011 University of Maryland Entomology Department Insect Zoo Volunteer

2010 Entomology Student Organization Faculty Advisory Committee Representative

2010-2011 Entomology Student Organization Treasurer

2011 Enacted reading group in Phylogenetic Comparative Methods

2011 BEES Program Awards Committee

2011 Graduate Student Government Legislative Action Committee Secretary

2011-2012 Entomology Student Organization President

2011-2012 Graduate Student Government BEES Program Representative

2012-2013 BEES Program Admissions Committee

2013 Leadership Alliance National Meeting Moderator and Poster Judge

2016 SDSU Student Research Symposium Judge

2018 AAS Student Travel Grants Judge

2018 NSF GRFP Evolutionary Biology and Systematics Panelist

2018 Women in STEM Panelist, River Hill High School, Clarksville, MD

2018 Research mentor, BUILD a BRIDGE to STEM summer program, UMBC

2019 NSF IOS Panelist

2019 Senior collaborator on NSF NRT: Interdisciplinary Consortium for Applied Research in Ecology and Evolution (ICARE) (\$2.8 million)

2019-2021 Director, American Arachnological Society

2020 Co-organizer for 2020 American Arachnological Society virtual summer symposium

2020 NSF DEB Panelist

2021 Chair, American Arachnological Society Diversity, Equity, and Inclusion Committee

2022 NSF DBI Panelist

MENTORSHIP AND SYNERGISTIC ACTIVITIES

2004- 2006 Developed and taught laboratory activities for students at the Open School, St. Paul, MN as a part of the Macalester College Diversity in Science Collective

2009-2011 Mentored University of Maryland undergraduate Pratibha Chander (M.S. Epidemiology, Columbia University)

2010-2014 Graduate mentor for four BEES graduate students: Eleanor Stevens-Spadafora, Graziella DiRenzo, Elske Tielens, and Grace Anderson

2012 Mentored University of Maryland graduate Meghan McConnell

2012 Participated in correspondence project with students at San Antonio New Tech High School

2012 Selected participant of UC Davis and Bodega Bay Applied Phylogenetics Workshop

2015 Statistical support for SDSU Master's student Kristen Emata

2015 Mentored SDSU undergraduate Amy Downey

2016 Successful Experiment.com scientific crowdfunding campaign (\$3000)

2017 Mentored SDSU Master's student Brendan Boyer

2017 Organized High Tech High School (San Diego North County) evolutionary biology week activities

2017 Selected participant of University of Oregon Lineage Diversification Workshop

2017-present Mentoring 2 UMBC undergraduates, 4 graduate students, 1 alumnus

2018 UMBC Research and Entrepreneurship Workshop

PROFESSIONAL MEMBERSHIPS

American Arachnological Society

Society for Integrative and Comparative Biology

The Leadership Alliance

Society for the Study of Evolution