Sydney Millerwise

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Summary
Sydney's research integrates nutritional ecology, insect immunology, and life history theory to investigate how resource availability and population density shape physiological tradeoffs in traits such as reproduction, migration, and immune defense in locusts. Using both laboratory and field approaches, she examines how factors like nutrition and population density influence immune responses and allocation to life history traits. She is seeking postdoctoral positions beginning summer 2027 in entomology, physiology, ecology, or evolutionary biology, with the goal of advancing insect pest management through research that integrates insect physiology with sustainable agricultural practices.

Education

Arizona State University — Expected graduation: May 2027
Ph.D. in Environmental Life Sciences — *Tempe, AZ*
"*Evaluating the effect of population density on immune mechanisms, life history, and exposure to viruses in major agricultural pest locust species*"

Arizona State University — May 2022
B.S. Sustainability (summa cum laude) — *Tempe, AZ*
Minor Biological Science, certificate in Cross-sector Leadership

Publications

Cease, A. J., Talal, S., Osgood, G., Pulver, T., **Millerwise, S. C.,** Overson, R. P., & Harrison, J. F. (2024). Energetic constraints on multi-day flights in migratory locusts. **Journal of Experimental Biology, 251**, 251191. https://doi.org/10.1242/jeb.251191

Millerwise, S. C., Talal, S., Pulver, P., Goethe, E., Osgood, G., Cossey, E., Overson, R., Harrison, J., & Cease, A. (2025). High-protein diets shorten female but not male lifespans and have minimal effects on egg production in the migratory locust. **Ecological and Evolutionary Physiology, 98**(2), 83–95. https://doi.org/10.1086/735836

Millerwise, S. C., Lund, M. C., Schimidlin, K., Kraberger, S., Pinter-Wollman, N., & Varsani, A. (2024). Coding-complete genomes of an iridovirus and two parvoviruses identified in lab-reared social spiders (Stegodyphus dumicola). **Microbiology Resource Announcements, 13**(11), e00739-24. https://doi.org/10.1128/mra.00739-24

Brosemann, J. K., Overson, R. P., Cease, A. J., **Millerwise, S. C**., & Le Gall, M. (2023). Nutrient supply and accessibility in plants: Effect of protein and carbohydrates on Australian plague locust (Chortoicetes terminifera) preference and performance. **Frontiers in Insect Science, 3**, 1110518. https://doi.org/10.3389/finsc.2023.1110518

Awards

- Graduate and Professional Student Association (GPSA) Graduate College Graduate Research Support Program ($2000)
- GPSA Graduate Student Organization event grant (funding SOLS grad student mental health committee social event) ($1,500)
- Best oral presentation, Behavioral Plasticity Research Institute Symposium (May, 2023)
- 2nd place Grad student poster competition, Arizona Physiological Society (October, 2022)
- Sustainable Undergraduate Research Experience (SURE) Outstanding Poster Award (May 2020)
- Runner-Up SURE Student of the Year (May 2020)
- Next Generation Service Corps Overall Leadership Award. *For exhibiting the values of respect, responsibility, integrity, and selflessness as the Innovation Committee Chair* (December 2019)

Skills

- **Data & Analysis:** RStudio (analysis, visualization, statistics) | Tidyverse (data wrangling) | Excel (advanced) | Statistical modeling (GLMs, mixed models, survival analysis)
- **Visualization & Graphics:** ImageJ (intermediate) | Adobe Illustrator (intermediate)
- **Bioinformatics:** Geneious Prime (developing) | Bash/command line (developing) | Python (developing) | Git (developing) | DIAMOND BLASTx (developing) | MEGAHIT (developing) | Cenote-Taker3 (developing) | Pharokka/Phold (developing) | MVIP (developing) | Genome annotation (i5K) (developing)
- **Field:** Sweepnetting | Plot-based plant sampling methods | Experimental design
- **Biochemical Assays:** Phenoloxidase | Prophenoloxidase | Bradford protein quantification | Cell staining and counting with hemocytometer | Dissection | lipid extraction

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- **Lab Familiarity:** PCR | DNA extraction (Roche High Pure Viral Nucleic Acid Kit) | Rolling circle amplification (TempliPhi™) | Streak-plate bacterial isolation | Liquid media preparation

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Research Experience

PhD student June 2022-present

Co-Advisors: Dr. Arianne Cease & Dr. Jon Harrison, School of Life Sciences, Arizona State University, Tempe, AZ,USA.

- Collected wild locusts and ran field experiments in collaboration with the local plant protection agency across two field seasons in Tizimín, Yucatán, Mexico.
- Extracted viral DNA from field-collected samples and conducted field dissections of the Central American Locust for transcriptomic analysis.
- Collaborated with a molecular virology lab to annotate and identify viral Operational Taxonomic Units from field samples.Used bioinformatic workflows on the SOL supercomputer to annotate and identify viral Operational Taxonomic Units field samples.
- Designed and run lifetime-long experiments manipulating population density and macronutrient consumption to study tradeoffs in life history traits including migration (flight in wind tunnels), reproduction, and immune function.

Teaching assistant

- Introductory Biology Lab, Fall 2022
  - Graded course materials and exams, designed lab content
- Animal Physiology Lecture/recitation, Spring 2024
  - Developed 3 physiology recitations for a 400-student animal physiology class, taught introductory biology lab following American Physiological Society best practices for teaching undergraduate physiology.
  - Graded course materials and exams, managed Canvas page

Research assistant Spring and fall 2023, fall 2024, spring 2025

- Trained and supervised undergraduate teams to care for locusts, collect data, operate flight mills for laboratory experiments
- Set up insect immune function measurement protocols for the lab including using ImageJ and phase contrast microscopes for hemocyte staining and counting, prophenoloxidase and pheloxidase assays.
- Trained undergraduate to use macroscopic imaging and ImageJ to measure morphological differences between solitary and gregarious locusts in collaboration with USDA-APHIS-PPQ-Science & Technology-Insect management and Molecular laboratory.
- Measured metabolic rates of several different tissue types dissected from field collected ants using an Agilent XF HS Mini Analyzer.

Undergraduate Researcher

- *Macronutrient consumption and lifetime reproductive capacity of the Migratory Locust (Locusta migratoria)* Supervisors: Dr. Stav Talal and Dr. Arianne Cease. Global Locust Initiative Laboratory, Arizona State University, Tempe, AZ, USA. April 2021– May 2022
  - Maintained locust colonies, including artificial diet preparation, husbandry, life-stage and sex identification, and support for flight-tunnel trials. Trained and supervised four undergraduate assistants in experimental procedures, data collection, and weekly colony care.
- *Linking plant choice to nutrient content for pest of cereal crops, the Australian Plague locust (Chortoicetes terminifera)*. Supervisors: Dr. Marion Le Gall, Dr. Rick Overson, and Dr. Arianne Cease. Global Locust Initiative Laboratory, Arizona State University, AZ, USA. January 2020- April 2021
  - Designed and conducted multi-month laboratory and greenhouse experiments on locust reproduction, host-plant choice, nutrition, and behavior. Managed data collection across life-history, feeding, and physiological assays; performed chemical analyses (Bradford, phenol–sulfuric); created clear figures using R; and analyzed data in R, ImageJ, and JMP.

Professional and volunteer experiences

Behavioral Plasticity Research Institute Student Leadership Committee August 2024- Current

- Organize and send out cross-institute newsletter

Treasurer, School of Life Sciences E-board March 2023- March2024

- Meet with School of Life Sciences faculty to advocate for graduate student interests and manage SOLs Executive Board budget.
- Successfully helped members apply for $1,500 in event grant funds.
- Interpreted survey data from 100+ graduate students on how graduate students experience the School of Life Sciences and used those data to make suggestions to improve graduate support.

Grant Reviewer | Graduate Research Support Program August 2022-May 2024

Review student applications for funds supporting research, pilot studies, or to cover publication fees.

Facilities Representative | ASU School of Life Sciences Executive board October 2022- March 2023

- Met with School of Life Sciences Facilities & Safety committee to advocate for graduate student interests

Research and Policy intern | M3 Agriculture January 2022- May 2022

- Coordinating stakeholder symposium including growers, industry boards, researchers, and extension agents to discuss the future role of sterile insect release in area-wide pest management strategies in the Pacific Northwest.
- Publishing a Working Group Report on the National Information Management & Support System to create a permanent resource to house cross-sector communication between participants in the annual stakeholder symposium.

Page | Arizona House of Representatives January 2019– January 2020

- Assisted representatives and constituents while attending, observing, and assembling the Ways and Means Committee meetings and daily floor sessions.

Project lead (Valley Metro) | GreenLight Solutions- Sustainability consulting September 2019- May 2020

- Led a team of six students to analyze peer-reviewed journals studying the impact of climate change on heat in Phoenix, how different cities mitigate heat in urban environments, and then synthesized the findings in a series of reports for Valley Metro's Sustainability team.

Innovation Committee Chair | ASU Next Generation Service Corps August 2019 – May 2020

- Led team to design program changes in ASU Public Service Academy's Next Generation Service corps structure for the over 500 person program including personal identity training at an annual symposium, ways to make events more inclusive and sustainable, and ways to improve volunteer student leader training and experiences.

Society presentations

S.C. Millerwise, Arvind Varsani, Michael C Lund, Simona Kraberger, Matthew D. De Koch, Henry Javier Chan Tun, Tamir Lichaa, Dylan Tussey, Travis Hitchner, Lonnie Black, Michael Garvey, Jonah Brosemann, Mario Poot Pech, Jon Harrison, and Arianne Cease "Effect of population density and locust phase on morphology and viruses associated with Central American Locusts, Schistocerca piceifrons" **National Grasshopper Management Board meeting**. February 2025, Aurora Colorado.

S.C. Millerwise, Arvind Varsani, Michael C Lund, Simona Kraberger, Matthew D. De Koch, Henry Javier Chan Tun, Mario Poot Pech, Jon Harrison, and Arianne Cease "Effect of population density and locust phase on viruses associated with Central American Locusts, Schistocerca piceifrons" **Entomological Society of America**, Phoenix AZ, USA. November 2024.

S.C. Millerwise, S. Talal, P. Pulver, E. Goethe, G. Osgood, E. Cossey, R.P. Overson, J.F. Harrison, A.J. "Food, aging, and babies; how macronutrient balance affects Migratory Locust (Locusta migratoria) lifespans and lifetime reproduction" **International Congress of Orthopterology**, Merida, Yucatán, Mexico. October 2023.

S.C. Millerwise, S. Talal, P. Pulver, E. Goethe, G. Osgood, E. Cossey, R.P. Overson, J.F. Harrison, A.J. "Lifespans and lifetime reproductive performance affected by dietary macronutrient balance". **Behavioral Plasticity Research Institute Symposium**, Houston, TX, May 2023.

S.C. Millerwise, S. Talal, P. Pulver, E. Goethe, G. Osgood, E. Cossey, R.P. Overson, J.F. Harrison, A.J. "Dietary macronutrient balance affects reproductive performance across locust lifespans", Student competition 10-minute paper, **Entomological Society of America Annual Meeting**, November, 2022

S.C. Millerwise, J.K. Brosemann, R.P. Overson, A.J. Cease, and M. Le Gall. "Choosing a meal: crop physicochemical properties and meal preferences of the Australian plague locust (*Chortoicetes terminifera*)" **Behavioral ecology, presentation, The Society for Integrative & Comparative Biology**, Phoenix, AZ, USA. January 2022.

S.C. Millerwise, J.K. Brosemann, R.P. Overson, A.J. Cease, and M. Le Gall. "What drives host plant choice? Linking Australian plague locust (*Chortoicetes terminifera*) host plant preference to seedling cereal crop physicochemical properties." Undergrad Plant-Insect Ecosystems, Student competition 10-minute paper, **Entomological Society of America**, Denver, CO, USA. November 2021.

Invited talks and scientific outreach

"Hopocalypse control: science vs locust swarms". **Science on Tap Tempe**. Arizona State University, Tempe, AZ, USA. July 2025.

Global Locust Initiative showcase table for the **Society of Environmental Journalists Conference** 2025. Arizona State University, Tempe, AZ, USA. May 2025.

"Viruses: Here, There, Everywhere," **ASU Open Door tableting event,** Arizona State University, Tempe, AZ, USA. February 2025.

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"Efecto de la densidad de población y de la fase de la langosta sobre los virus asociados a la langosta centroamericana, Schistocerca piceifrons." (Effect of population density on viruses associated with the Central American Locust) **Technological Institute of Tizimin**. Tizimin, Yucatán, Mexico. October, 2024.

"Locust Research, response, and resilience." **Chandler Nature Center Coffee and Curiosity Speaker Series.** Chandler, AZ, USA. February 2023.

"The value of biological occurrence records and citizen science." Guest Lecture, **Sustainable Ecosystems**. Arizona State University, Tempe, AZ, USA. January 2022

"Honors Projects for General Biology I" **Guest Lecture General Biology for honors students,** Arizona State University, Tempe, AZ, USA. February 2022.

References

Dr. Arianne Cease - acease[@]asu.edu
Dr. Jon Harrison - j.harrison[@]asu.edu