

Karl A. Roeder

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BIOSKETCH

I am an ecological entomologist whose research combines field observations with lab experiments to test hypotheses on how species are distributed and interact across space and through time. As the world changes, I aim to understand and predict how organisms will be affected and strive to share my discoveries with both the public and scientific communities.

EDUCATION

- 2019 PhD, Ecology and Evolutionary Biology
University of Oklahoma
Dissertation: *“The World Below: How Resources and Habitat Influence Insect Communities Across Space and Through Time”*
Advisor: Dr. Michael Kaspari
- 2010 MS, Entomology
Texas A&M University
Thesis: *“Dietary Effects on the Performance and Body Composition of the Generalist Insect Herbivore, Heliothis virescens (Lepidoptera: Noctuidae)”*
Advisor: Dr. Spencer Behmer
- 2007 BS, Entomology
Texas A&M University
- Specialized training courses*
- 2021 SETAC Pesticide Risk Assessment for Pollinators
- 2020 Ohio State University Ground Beetle Course
- 2015 California Academy of Sciences Ant Course
- 2015 Sable Systems: An Introduction to Animal Respirometry
- 2014 University of Oklahoma Graduate Teaching Academy

EMPLOYMENT

Professional Appointments

- 2020-Present GS-12 Research Entomologist, USDA-ARS at Brookings, SD.
- 2019-2020 Postdoctoral Researcher, University of Illinois at Urbana-Champaign.

2011-2013 Research Technician, Brackenridge Field Lab at the University of Texas.

Graduate Teaching Assistant

2013, 2015 Principles of Ecology, University of Oklahoma.

2008-2009 General Entomology, Texas A&M University.

2007-2008 Insect Physiology, Texas A&M University.

Graduate Research Assistant

2014-2019 University of Oklahoma.

2007-2009 Texas A&M University.

Graduate Curatorial Assistant

2016-2017 Sam Noble Oklahoma Museum of Natural History.

FUNDING

Grants & Contracts:

2021 USDA Plains Area Director Internship, \$2360

2019-2020 “Multifunctional woody polycultures increase insect biodiversity and food web stability”, UIUC Research Board, \$28000

2018 “The ants of Oklahoma project”, The Alongside Wildlife Foundation Grant, \$400

2016-2019 OU College of Arts and Sciences Grants, \$2000

2016 Oklahoma Department of Agriculture, Food, and Forestry – Agricultural Pest Survey (Red Imported Fire Ant Portion), \$1500

2015-2017 OU Graduate Student Senate Research and Travel Grants, \$1200

2014-2019 OU Department of Biology Travel Grants, \$1500

Fellowships & Scholarships:

2018 Nancy L. Mergler Dissertation Fellowship, \$15000

2015-2018 OU Biological Station Summer Fellowships, \$8000

2015 OU Adams Academic Year Scholarships, \$1000

2014 Graduate Assistance in Areas of National Need Fellowship (GAANN) and supplemental funds, \$32,500

2014-2019 L.G. Hill Zoology Excellence Scholarship Fund, \$2365

Awards:

2017 OU Biology Graduate Student Best Paper Award, \$500

2008 Texas A&M Annual Graduate Student Forum, 3rd place, \$150

PUBLICATIONS

ORCID: orcid.org/0000-0002-2628-5003

Google Scholar: scholar.google.com/citations?user=YbstjDEAAA&hl=en

Peer-reviewed:

23. **Roeder, KA**, BR Benson, MD Weiser, and M Kaspari. Accepted. Testing the role of body size and litter depth on invertebrate diversity across six forests in North America. *Ecology*.
22. **Roeder, KA**, DV Roeder, and J Bujan. 2021. Ant thermal tolerance: a review of methods, hypotheses, and sources of variation. *Annals of the Entomological Society of America* 114(4): 459-469.
21. **Roeder, KA**, J Bujan, MD Weiser, KM de Beurs, and M Kaspari. 2021. Thermal traits predict the winners and losers under climate change: an example from North American ant communities. *Ecosphere* 12(7): e03645.
20. **Roeder, KA**, V Penuela, DJ Levey, and J Resasco. 2021. Testing effects of invasive fire ants and disturbance on ant communities of the longleaf pine ecosystem. *Ecological Entomology* 46(4): 964-972.
19. Helms IV, JA, **KA Roeder**, SE Ijelu, I Ratcliff, and NM Haddad. 2021. Bioenergy landscapes drive trophic shifts in generalist ants. *Journal of Animal Ecology* 90(3): 738-750.
18. Bujan, J, **KA Roeder**, KM de Beurs, MD Weiser, and M Kaspari. 2020. Thermal diversity of North American ant communities: cold tolerance but not heat tolerance tracks ecosystem temperature. *Global Ecology and Biogeography* 29(9): 1486-1494.
17. Hoback, WW, J Jurzenski, K Farnsworth-Hoback and **KA Roeder**. 2020. Invasive saltcedar and drought impact ant communities and isopods in south-central Nebraska. *Environmental Entomology* 49(3): 607-614.
16. Bujan, J, **KA Roeder**, SP Yanoviak, and M Kaspari. 2020. Seasonal plasticity of thermal tolerance in ants. *Ecology* 101(6): e03051.
*Featured in the *Bulletin of the Ecological Society of America* 101(3): e01708.
15. **Roeder, KA**, RM Prather, AW Paraskevopoulos, and DV Roeder. 2020. The economics of optimal foraging by the red imported fire ant. *Environmental Entomology* 49(2): 304-311.
14. Welte, EAR, **KA Roeder**, KM de Beurs, A Joern, and M Kaspari. 2020. Nutrient dilution and climate cycles underlie declines in a dominant insect herbivore. *Proceedings of the National Academy of Sciences of the United States of America* 117(13): 7271-7275.
*Featured by NPR, Science, The Guardian, and over 70 news outlets.
*Cozzarelli Prize Finalist from PNAS
13. Kaspari, M, J Bujan, **KA Roeder**, KM de Beurs, and MD Weiser. 2019. Species energy and thermal performance theory predict 20-year changes in ant community abundance and richness. *Ecology* 100(12): e02888.
*Featured in the *Bulletin of the Ecological Society of America* 101(1): e01623.
12. **Roeder, KA**, DV Roeder and M Kaspari. 2018. The role of temperature in competition and persistence of an invaded ant assemblage. *Ecological Entomology* 43(6): 774-781.
11. Prather, RM, **KA Roeder**, NJ Sanders, and M Kaspari. 2018. Using metabolic and thermal ecology to predict temperature dependent ecosystem activity: a test with prairie ants. *Ecology* 99(9): 2113-2121.
10. **Roeder, KA**, DV Roeder and M Kaspari. 2018. Disturbance mediates homogenization of above and belowground invertebrate communities. *Environmental Entomology* 47(3): 545-550.

*Featured by the Entomological Society of America, Entomology Today, and 7 news outlets.

*People's Choice award from the Entomological Society of America.

9. **Roeder, KA** and DV Roeder. 2017. The *Pheidole* (Hymenoptera: Formicidae) of Oklahoma: New species records and distributional notes. *Check List* 13(2): 2071.
 8. Kaspari, M, **KA Roeder**, B Benson, MD Weiser, and NJ Sanders. 2017. Sodium co-limits and catalyzes macronutrients in a prairie food web. *Ecology* 98(2): 315-320.
 7. **Roeder, KA** and M Kaspari. 2017. From cryptic herbivore to predator: stable isotopes reveal consistent variability in trophic levels in an ant population. *Ecology* 98(2): 297-303.
- *Awarded Best Research Paper by a Biology Graduate Student at the University of Oklahoma
6. **Roeder, KA** and DV Roeder. 2016. A checklist and assemblage comparison of ants (Hymenoptera: Formicidae) from the Wichita Mountains Wildlife Refuge in Oklahoma. *Check List* 12(4): 1935.
 5. **Roeder, KA** and DV Roeder. 2015. New Record of the Ant Subfamily Pseudomyrmecinae (Hymenoptera: Formicidae) from Oklahoma. *Southwestern Naturalist* 60(4): 373-374.
 4. **Roeder, KA**, DV Roeder, JD Kouri, and JA Helms IV. 2015. A New Latitudinal Record for the Ant Genus *Leptogenys* (Hymenoptera: Formicidae) in North America. *Southwestern Entomologist* 40(3): 653-656.
 3. **Roeder, KA** and ST Behmer. 2014. Lifetime consequences of food protein-carbohydrate content for an insect herbivore. *Functional Ecology* 28: 1135-1143.
 2. **Roeder, KA**, I Kuriachan, SB Vinson, and ST Behmer. 2010. Evaluation of a novel microbial inhibitor for caterpillar artificial diets. *Journal of Insect Science* 10:197.
 1. Wharton, RA, **KA Roeder**, and MJ Yoder. 2008. A monograph of the genus *Westwoodia* (Hymenoptera: Ichneumonidae). *Zootaxa* 1855:1-40.

In review/revision:

- Roeder, DV, AW Paraskevopoulos, and **KA Roeder**. Thermal tolerance regulates foraging behavior of ants.
- **Roeder, KA** and AN Harmon-Threatt. Crop diversity increases ant diversity and ant-mediated ecosystem services.
- Roeder, DV, AW Paraskevopoulos, and **KA Roeder**. Temporal plasticity of thermal tolerance in ants: short and long-term fluctuations with temperature.

In prep for submission in FY22:

- **Roeder, KA**, M Dorland, S Drey, E Miller, and JD Daniels. Importance of color for artificial caterpillars as sentinel prey.
- **Roeder, KA**, JD Daniels, and CN Nielsen. Thermal tolerance of western corn rootworm: critical thermal limits, knock-down resistance, and chill-coma recovery.
- **Roeder, KA**, JA Helms IV, DV Roeder, and AN Harmon-Threatt. Stable isotope relationships between reproductive and worker ant castes: a new way to compare community structure.
- **Roeder, KA** and AN Harmon-Threatt. Effects of storage preservatives on carbon and nitrogen stable isotope signatures of invertebrates.

PRESENTATIONS

Invited seminars:

- **Roeder, KA.** 2021. Ant thermal tolerance: patterns across space and through time. South Dakota State University.
- **Roeder, KA.** 2020. A future for insect biodiversity in agricultural landscapes. USDA-ARS Brookings, SD.
- **Roeder, KA.** 2018. Temperature, traits, and the trophic ecology of ants. University of Oklahoma Biological Station.
- **Roeder, KA.** 2016. From Nature to Numbers: Understanding ecological patterns and processes in a changing world. University of Oklahoma Biological Station.

Oral and poster presentations:

Presenting author

- **Roeder, KA** and DV Roeder. 2021. Temporal plasticity of thermal tolerance in ants: short and long-term fluctuations with temperature. Annual Meeting of the Entomological Society of America.
- **Roeder, KA**, DV Roeder and M Kaspari. 2020. People's Choice award winner for Environmental Entomology: Disturbance mediates homogenization of above and belowground invertebrate communities. Annual Meeting of the Entomological Society of America.
- **Roeder, KA** and AN Harmon-Threatt. 2020. Crop diversity increases ant diversity and their provided ecosystem services. Annual Meeting of the Entomological Society of America.
- **Roeder, KA**, J Bujan, MD Weiser and M Kaspari. 2018. 20-year changes in abundance and richness of North American ant communities: a nonlinear response to temperature. Annual Meeting of the Entomological Society of America.
- **Roeder, KA**, DV Roeder and M Kaspari. 2018. The role of temperature in competition and persistence of an invaded ant assemblage. Annual Meeting of the Entomological Society of America.
- **Roeder, KA**, DV Roeder and M Kaspari. 2017. Thermal and nutritional niche partitioning promotes species coexistence in an invaded ant assemblage. Ecological Society of America Annual Meeting.
- **Roeder, KA**, DV Roeder and M Kaspari. 2017. Temperature, diet and size determine the impact of an invasive ant on an urban ant assemblage. Southwestern Association of Naturalists Annual Meeting.
- **Roeder, KA** and M Kaspari. 2016. Trophic ecology of a polymorphic invasive ant: parsing within and between colony contributions. Annual Meeting of the Entomological Society of America/International Congress of Entomology.
- **Roeder, KA** and M Kaspari. 2016. Understanding variation in the trophic ecology of a polymorphic invasive ant. EcoMunch, University of Oklahoma.
- **Roeder, KA** and M Kaspari. 2016. Trophic ecology of a polymorphic invasive ant: parsing within and between colony contributions. Central Ecology and Evolution Conference.

- **Roeder, KA** and DV Roeder. 2016. Ants: A neglected, but important component of Oklahoma's biodiversity. Oklahoma Biodiversity Network.
- **Roeder, KA**. 2014. Developing protocols for sizing and counting invertebrates. Experimental Macroecology Meeting, University of Oklahoma.
- **Roeder, KA**. 2013. Lifetime consequences of food protein-carbohydrate content for an insect herbivore. EcoMunch, University of Oklahoma.
- **Roeder, KA** and ST Behmer. 2008. Lifetime consequences associated with varying macronutrient levels over a single generation for *Heliothis virescens*. Annual Meeting of the Entomological Society of America.
- **Roeder, KA**. 2008. Lifetime consequences associated with varying macronutrient levels over a single generation for *Heliothis virescens*. Eleventh Annual Graduate Student Forum, Texas A&M University.

Co-author

- Helms IV, JA, **KA Roeder**, SE Ijelu, I Ratcliff, and NM Haddad. 2020. Ecological opportunity and the trophic niches of social insects in bioenergy landscapes. Ecological Society of America Annual Meeting.
- Prather, RM, **KA Roeder**, NJ Sanders and M Kaspari. 2018. Using metabolic and thermal ecology to predict temperature dependent ecosystem activity: a test with prairie ants. Ecological Society of America Annual Meeting.
- Roeder, DV and **KA Roeder**. 2018. Seasonal variation in thermal tolerance of the red harvester ant, *Pogonomyrmex barbatus*. Southwestern Association of Naturalists Annual Meeting.
- Paraskevopoulos, AW, **KA Roeder** and DV Roeder. 2018. Temperature regulates foraging behavior and net energy gain in the red harvester ant, *Pogonomyrmex barbatus*. Southwestern Association of Naturalists Annual Meeting.
- Paraskevopoulos, AW, **KA Roeder** and DV Roeder. 2018. Temperature regulates foraging behavior and net energy gain in the red harvester ant, *Pogonomyrmex barbatus*. National Conference on Undergraduate Research.
- Paraskevopoulos, AW, **KA Roeder** and DV Roeder. 2017. Temperature regulates foraging behavior in the red harvester ant, *Pogonomyrmex barbatus*. Oklahoma Academy of Sciences, Technical meeting.
- Weiser, MD, J Bujan, **KA Roeder** and M Kaspari. 2017. Thermal physiology and ant diversity: Using a coordinated research network approach to predict assemblage dynamics. Ecological Society of America Annual Meeting.
- Roeder, DV and **KA Roeder**. 2017. Variation in thermal tolerance of two native ant species in response to seasonal shifts in temperature. Southwestern Association of Naturalists Annual Meeting.
- Roeder, DV and **KA Roeder**. 2016. Flooding mediates homogenization of above and below ground invertebrate communities. Oklahoma Academy of Sciences, Technical meeting.
- Menard, K and **KA Roeder**. 2016. Oklahoma Entomology Revitalized: the effects of the National Science Foundation's Collection in Support of Biological Research Grant on the Sam Noble Oklahoma Museum of Natural History. Entomological Collections Network Annual Meeting.

- McConnell, AS, ST Behmer, **KA Roeder**, and AJ Zera. 2008. Macronutrient regulation of a polymorphic insect differing in morphological, physiological and life history traits. Annual Meeting of the Entomological Society of America.
- **Roeder, K**, M Yoder, K Dole, J Dubois, K Zhaurova, T Catanach and R Wharton. 2006. Handling the components of a monograph, using *Westwoodia* (Hymenoptera: Ichneumonidae) as an Example. NSF/PEET VI meeting.

SERVICE AND DEVELOPMENT

Professional affiliations and service:

Membership

- 2014-Present Ecological Society of America
 2014-Present Entomological Society of America
 2014-Present International Union for the Study of Social Insects

Committees/Advisory Panels/Working Groups

- 2021-Present US National Native Bee Monitoring Research Coordination Network (RCN)
 2021-Present USDA SCINet Pollinator Working Group
 2019-Present Entomological Society of America: Early Career Professionals Representative to the North Central Branch
 2019-Present National Ecological Observatory Network (NEON): Ground Beetle Technical Working Group

Editorial

- 2016-2017 Section and quality editor for Check List.

Manuscript review

Annals of the Entomological Society of America, Biological Control, Biology Letters, Check List, Current Research in Insect Science, Ecological Applications, Ecological Entomology, Ecology, Ecology and Evolution, Entomologia Experimentalis et Applicata, Environmental Entomology, European Journal of Entomology, Functional Ecology, Global Change Biology, Insectes Sociaux, Insect Conservation and Diversity, Insects, Journal of Animal Ecology, Journal of Applied Ecology, Journal of Asia-Pacific Entomology, Journal of Economic Entomology, Journal of Insect Behavior, Journal of Insect Physiology, Journal of Insect Science, Myrmecological News, PeerJ, PLoS ONE, Rangeland Ecology and Management, Scientific Reports.

Grant review

UK Research and Innovation Future Leaders Fellowship, Florida State Postdoctoral Grant Workshop.

Institutional service:

Graduate student advising

- 2021 Anna Paraskevopoulos (University of Colorado Boulder - PhD Committee member)

Undergraduate student advising

- 2022 Karlee Albert (USDA-ARS – Undergraduate Research)
- 2021 Matthew Dorland (USDA-ARS – Plains Area Director Internship)
- 2021 Emily Miller (USDA-ARS – Undergraduate Research)
- 2021 Skylar Drey (USDA-ARS – Undergraduate Research)
- 2020 Elizabeth Stewart (University of Illinois at Urbana-Champaign – Undergraduate Research)
- 2019 Anthony Guaman (University of Illinois at Urbana-Champaign – Animal Biology Summer Research Fellow)
- 2019 Zoe Trujillo (University of Illinois at Urbana-Champaign – Animal Biology Summer Research Fellow)
- 2018 Sarah Swiston (University of Oklahoma Biological Station – Undergraduate Research Apprentice)
- 2017 Anna Paraskevopoulos (Cameron University – Undergraduate Research co-advised with Dr. Diane Roeder)
- 2017 Bianca Prentiss (University of Oklahoma – Undergraduate Honors committee)
- 2016 Josh Kouri (University of Oklahoma – REU)
- 2008 Ashley McConnell (Texas A&M University – REU)

United States Department of Agriculture – Agricultural Research Service

- 2021 Member of research scientist hiring committee – Research Entomologist (GS-12/13 level)
- 2020 Member of research scientist hiring committee – Research Entomologist (GS-12/13 level)
- 2020 Member of biological science technician hiring committee (GS-7/8 level)

University of Oklahoma Zoological Association of Graduate Students

- 2018 Seminar committee representative
- 2017 Graduate host for seminar speaker Dr. Nathan Sanders
- 2016 Graduate host for seminar speaker Dr. Corrie Moreau
- 2016 Graduate student representative for Sam Noble Oklahoma Museum of Natural History & Department of Biology hiring committee
- 2015-2017 Faculty meeting representative
- 2014 Undergraduate studies representative
- 2013 Graduate student senate representative
- 2013-2019 Member

Texas A&M University Entomology Graduate Student Organization

- 2008 Treasurer
- 2007 Graduate student council representative
- 2007-2010 Member

Outreach and citizen science:

- 2021 Beneficial Insects in Agroecosystems, USDA Virtual Field Day, Brookings, SD
- 2021 Insects in Agroecosystems, USDA Virtual Field Day, Brookings, SD
- 2017-2019 Biodiversity Outside Your Door: The Ants of Oklahoma Citizen Science Project, Lawton, OK
- 2017 Terra Verde Elementary School Science Enrichment, Norman, OK
- 2016 Spike's Spooktacular Fall Fest Outreach Event, Sam Noble Museum of Natural History, Norman, OK
- 2016 South Central Climate Science Center Outreach Event, Kingston, OK
- 2015 Madill High School Biology Field Days, Kingston, OK
- 2014-2017 Oklahoma BioBlitz, Ant biodiversity expert and surveys, OK
- 2012 Insect Fiesta Outreach Event, University of Texas, Austin, TX

Professional References

Dr. Sharon Schneider

USDA-ARS NCARL

Research Leader

Phone: (605) 693-5201

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Dr. Alexandra Harmon-Threatt

University of Illinois at Urbana-Champaign

Associate Professor of Entomology

Phone: (217) 333-3108

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Dr. Michael Kaspari

University of Oklahoma

Presidential Professor of Biology

Phone: (405) 325-3371

Email: mkaspari@ou.edu

Dr. Robert Plowes

University of Texas, Brackenridge Field Laboratory

Research Scientist

Phone: (512) 471-2825

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Dr. Spencer Behmer

Texas A&M University

Professor of Entomology

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