

# ALISHA A. SHAH

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CV updated: March 2023

## PROFESSIONAL APPOINTMENTS

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2022 – present      Assistant Professor – Kellogg Biological Station, Department of Integrative  
Biology, Michigan State University  
2021 – 2022      Postdoctoral Research Associate – University of Montana  
2019 – 2020      NSF Postdoctoral Research Fellow in Biology – University of Montana

## EDUCATION

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2018                  Ph.D., Zoology – Colorado State University  
2007                  B.A., Biology – University of Texas at Austin

## RESEARCH GRANTS & FELLOWSHIPS

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### *Major grants*

2022                  NSF RAPID grant (Lead PI) (\$200,000)  
2019                  MPG Ranch Research Grant (Co-PI) (\$32,000)  
2019-2021        NSF Postdoctoral Research Fellowship in Biology – PRFB (\$138,000)  
2016-2017        NSF Doctoral Dissertation Improvement Grant – DDIG (\$19,760)  
2011-2015        NSF Graduate Research Fellowship – GRFP (\$138,000)

### *Minor grants*

2022                  Michigan Natural Features Inventory (Co-PI) (\$10,000)  
2019                  Rocky Mountain Cooperative Ecosystems Studies Unit (\$6,000)  
2018                  U. of Wyoming-National Park Service Grant (Co-PI) (\$5,000)  
2018                  SICB Grants-in-Aid-of-Research (\$1,000)  
2017, 2018        Colorado State University Biology Department Travel Award (\$2,000)  
2016                  Turner Designs Travel Award (\$500)

## PUBLICATIONS

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20.    **Shah AA**; Hotaling S; Lapsansky A; Malison RL; Birrell JH; Keeley T (**undergraduate mentee**); Giersch, JJ; Tronstad LM; Woods HA. 2023. Warming undermines emergence success in a threatened alpine stonefly: a multi-trait perspective on vulnerability to climate change. *Functional Ecology* *In press*.
19.    Birrell JH, Frakes JI, **Shah AA**, & Woods HA. 2022. Mechanisms underlying thermal breadth differ by species in insects from adjacent but thermally distinct streams—A test of the climate variability hypothesis. *Journal of Thermal Biology*, 103435.
18.    Harvey JA, ..... **Shah AA**, ..... Chown SL\*\*\*. Scientists' warning on climate change and insects. 2022. *Ecological Monographs* e1553. \*\*\*For full author list please see [article](#).

17. Malison RL, Frakes JI, Andreas AL, Keller PR, Hamant E, **Shah AA**, Woods HA. 2022. Plasticity of salmonfly (*Pteronarcys californica*) respiratory phenotypes in response to changes in temperature and oxygen. *Journal of Experimental Biology* 225(18).
16. Mauro AA, **Shah AA**, Martin PR, Ghalambor CK. 2022. An integrative perspective on the mechanistic basis of context-dependent species interactions. *Integrative and Comparative Biology* 62(2): 164-178.
15. Woods HA, Legault G, Kingsolver JG, Pincebourde S, **Shah AA**, Larkin BG. 2022. Thermal ecology of ectotherms in plant-generated microclimates: aspen leaf miners are limited by cold but at risk from warming climates. *Ecological Monographs* 92(4): e1544.
14. Green MD, Tronstad LM, Giersch JJ, **Shah AA**, Fallon CE, Blevins E, Kai TR, Muhlfeld CC, Finn DS, Hotaling, S. 2021. Stoneflies in the genus *Lednia* (Plecoptera: Nemouridae): sentinels of climate change impacts on mountain stream biodiversity. *Biodiversity & Conservation* 8: 1-25
13. Frakes JI (**graduate mentee**), Birrell JH (**graduate mentee**), **Shah AA**, Woods HA. 2021. Water flow increases heat and hypoxia tolerance of an aquatic insect. *Biology Letters* 17(5), 20210004.
12. Hotaling S\*, **Shah AA\*** (**\*co-lead authors**), Dillon ME, Giersch JJ, Tronstad LM, Finn DS, Kelley JL. 2021. Supercooling points of alpine stoneflies (Plecoptera: Nemouridae) vary across species, habitats, and populations in the Rocky Mountains. *Western North American Naturalist* (81(1), 54-62.
11. **Shah AA**, Havird JC, Woods HA, Encalada A, Flecker AS, Funk WC, Guyasamin JC, Kondratieff B, Poff NL, Thomas SA, Zamudio K, Ghalambor CK 2020. Temperature-dependence of metabolic rate in tropical and temperate aquatic insects: support for the Climate Variability Hypothesis in mayflies but not stoneflies. *Global Change Biology* 27(2) 297-311.
10. Birrell JH (**graduate mentee**), **Shah AA**, Hotaling S, Giersch JJ, Williamson CE, Jacobsen D, Woods HA. 2020. Insects in high elevation streams: life in extreme environments imperiled by climate change. *Global Change Biology* 26(12): 6667-6684.
9. **Shah AA\***, Bacmeister EM\* (**\*co-lead authors, undergrad mentee**), Rubalcaba JG, Ghalambor CK. 2020. Divergence and constraint in the thermal sensitivity of aquatic insect swimming performance. *Current Zoology* 66(5): 555-564.
8. Hotaling S\*, **Shah AA\*** (**\*co-lead authors**), Tronstad LM, Giersch JJ, Finn DS, Dillon ME, Kelley JL. 2020. Mountain stoneflies may tolerate warming streams: evidence from organismal physiology and gene expression. *Global Change Biology* 26 (10): 5524-5538.
7. **Shah AA**, Dillon ME, Hotaling S, Woods HA. 2020. High elevation insect communities face shifting ecological and evolutionary landscapes. *Current Opinion in Insect Science* 41: 1-6.
6. Havird JC, Neuwald JL, **Shah AA**, Mauro A, Marshall CA, Ghalambor CK. 2020. Distinguishing between active plasticity due to thermal acclimation and passive plasticity due to Q<sub>10</sub> effects: Why methodology matters. *Functional Ecology* 34: 1015-1028.

5. Havird JC, **Shah AA**, Chicco AJ. 2019. Powerhouses in the cold: Mitochondrial function during thermal acclimation in montane mayflies. *Philosophical Transactions of the Royal Society B* 375(1790), 20190181.
4. Polato NR\*, Gill BA\*, **Shah AA\* (\*co-lead authors)**, Gray MM, Casner KL, Barthelet A, Messer PW, Simmons M, Guayasamin JM, Encalada AC, Kondratieff BC, Flecker AS, Thomas SA, Ghalambor CK, Poff NL, Funk WC, Zamudio KR. 2018. Narrow thermal tolerance and low dispersal drive diversification along tropical elevation gradients. *Proceedings of the National Academy of Sciences* 115(49): 12471-12476.
3. **Shah AA**, Encalada A, Flecker AS, Funk WC, Gill BA, Guyasamin JC, Kondratieff B, Poff NL, Thomas SA, Zamudio K, Ghalambor CK. 2017. Climate variability predicts thermal limits of aquatic insects across elevation and latitude. *Functional Ecology* 31(11): 2118-2127.
2. **Shah AA**, Funk WC, Ghalambor CK. 2017. Thermal acclimation ability varies in temperate and tropical aquatic insects from different elevations. *Integrative & Comparative Biology* 57(5): 977-987.
1. **Shah AA\***, Ryan MJ, Bevilacqua E, Schlaepfer MA. 2010. Prior experience alters the behavioral response of prey to a nonnative predator. *Journal of Herpetology* 44: 185-192.  
**(\*undergraduate)**

*Manuscripts in advanced preparation*

**Shah AA**; Hamant E (**undergraduate mentee**); Rubalcaba JV; Larkin, B, Forbes, A, Woods, HA. Thermal experience explains temperature sensitivities in a parasitoid - host interaction: implications for community response to climate change. *In prep.*

VanDenBerg E (**REU mentee**); Jaynes, K; **Shah AA**. Thermal acclimation differs in native vs. highly invasive anuran congeners. *In prep.*

## **HONORS & AWARDS**

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- 2020 NSF STEM Diversity travel award to International Congress on Entomology in Helsinki, Finland (*conference cancelled due to COVID-19, rescheduled for July 2022*).
- 2018 *Raymond B. Huey Award* for Best Oral Student Presentation in the Division of Ecology & Evolution at Society for Integrative & Comparative Biology Meeting, San Francisco, CA.
- 2017 School of Global Environmental Sustainability Fellowship, Colorado State University
- 2015 1<sup>st</sup> Place Best Poster in Ecology at Colorado State University Graduate Student Showcase

## **INVITED SEMINARS / SYMPOSIA**

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- 2023 Seminar speaker: Department of Biological Sciences, University Notre Dame, **\*\*Invited by graduate students\*\***
- 2023 Seminar speaker: Department of Integrative Biology, University of Colorado, Denver, (Host: Michael Moore)

- 2023 Seminar speaker: Department of Biology, University of Western Ontario, Ontario, Canada (Host: Brent Sinclair)
- 2022 Seminar speaker: Department of Integrative Biology, University of California, Berkeley (Host: Caroline Williams)
- 2022 Seminar speaker: Department of Integrative Biology, University of Guelph, Ontario, Canada (Host: Alex Smith)
- 2021 Seminar speaker: Department of Ecology, Montana State University (Host: Lindsey Albertson)
- 2020 Speaker for symposium, “Bottom-up and top-down in insect food webs” at the International Congress on Entomology, Helsinki, Finland (*conference cancelled due to COVID-19, rescheduled for July 2022*).
- 2019 Seminar speaker: Department of Organismal Biology, Ecology, & Evolution, University of Montana (Host: Art Woods)
- 2018 Seminar speaker: Section of Integrative Biology, University of Texas at Austin (Host: Justin Havird)
- 2016 Seminar speaker: Colegio de Ciencias Biológicas y Ambientales, Universidad San Francisco de Quito, Ecuador (Hosts: Andrea Encalada & Juan Guayasamin)
- 2015 Speaker for symposium, “Quantifying ecological traits to predict species, community and ecosystem responses to changing environments.” Society for Freshwater Sciences. Milwaukee, WI.

## CONFERENCE PRESENTATIONS

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### *Oral Presentations*

- 2022 Shah A.A. et al. “How vulnerable are meltwater stoneflies? It depends on which traits you measure” Joint Aquatic Sciences Meeting. Grand Rapids, MI.
- 2021 Shah A.A., Hamant E., and Woods, H.A. “Species interactions and climate change: Does thermal tolerance determine winners and losers?” Society for Integrative & Comparative Biology. Virtual Meeting.
- 2019 Shah, A.A\*. “Climate variability and thermal tolerance in aquatic insects: Can they stand the heat?” International Biogeographical Society. Quito, Ecuador.  
**\*Organizer and chair of symposium, “Architects of Variation: How Climate & Physiology Shape Patterns of Biodiversity”**
- 2018 Shah, A.A. and Ghalambor, C.K. “Do temperature-mediated predator-prey interactions affect mayfly range-limits?” Society for Integrative & Comparative Biology. San Francisco, CA. **1<sup>st</sup> Place: Ray Huey Award for Best Student Oral Presentation**

- 2017 Shah, A.A. and Ghalambor, C.K. "Does climate variability explain thermal tolerance? A comparison of thermal breadths in aquatic insects across elevation & latitude." Society for Integrative & Comparative Biology. New Orleans, LA.
- 2014 Shah, A.A. and Ghalambor, C.K. "Comparing acclimation ability in temperate and tropical aquatic insects." Joint Aquatic Sciences Meeting. Portland, OR.
- 2013 Shah, A.A., Funk, W. C., Poff, N.L., and Ghalambor, C.K. "Patterns of thermal tolerance in an Ecuadorian mayfly." Society for Freshwater Sciences. Jacksonville, FL.
- 2012 Shah, A.A., Harrington, R.A. "Evolutionary and ecological variability in organismal trait response with altitude and climate." Colorado State University Annual River Retreat. Bellvue, CO.
- 2011 Shah, A.A. "Oxygen-limited thermal tolerance in aquatic insects in temperate and tropical stream habitats: are there differences in vulnerability?" Effects of Climate Change on Vulnerable Traits Conference. Alfred Wegener Institute, Bremerhaven, Germany

*Poster Presentations*

- 2014 Shah, A. A. "Hot bugs, cold bugs: assessing vulnerability to climate change." Graduate Student Showcase. Colorado State University, Fort Collins, CO.  
**1<sup>st</sup> Place: Best Poster in Ecology**
- 2012 Shah, A.A. and Ghalambor, C.K. "Comparing acclimation ability and thermal performance curves of low and high elevation aquatic insect populations." Society for Freshwater Sciences. Louisville, KY.

**TEACHING**

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- 2022 Course co-instructor – Career Development for Graduate Students (IBIO 801)  
2022 Course instructor – PATHWAYS Career Development (Spring, MSU)  
2017, 2018 Primary course instructor – Animal Behavior summer course (CSU)  
2012, 2017, Lab teaching assistant – Introduction to Ornithology (CSU)

**UNDERGRADUATE MENTORSHIP**

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\* = went on to pursue research at the graduate level

*Michigan:* Evelyn VanDenBerg (REU)

*Montana:* Rachel Bingham, Phil Douchensky, James Frakes\*, Emily Hamant, Tylor Keeley

*Colorado:* Eva Bacmeister\*, Ben Choat\*, Odd Jacobsen, Ashley Janich\*, Leighton King\*, Lauren Kremer\*, Scott Morton\*, Lauren Nagle, Dalton Oliver, Jon Suh, Gus Waneka\*

*Ecuador:* Juan Dueñas, Javier Fajardo\*, Luis Granizo, Marisa Rojas\*

\*\*\* Student independent project titles and awards removed for brevity \*\*\*

## SERVICE

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- 2022-present Kellogg Biological Station Pond Lab Manager
- 2022 Kellogg Biological Station Weekly Seminar Committee (Chair)
- 2022 Kellogg Biological Station Culture and Inclusion Committee (Faculty representative)
- 2020 Panel participant – Participated in discussion about the postdoc experience and answer career questions by graduate students, Washington State University, Pullman, WA
- 2020 Judge – Evaluated student oral presentations for *Raymond B. Huey Best Student Oral Presentation* competition, SICB, Austin TX.
- 2019 Postdoc job workshop organizer – Set up a semester-long workshop for postdocs to share and discuss job applications. Organized lectures from faculty to provide insight and tips. U. of Montana, Missoula, MT.
- 2019 Symposium chair – Organized and chaired symposium “Architects of Variation: How Climate & Physiology Shape Patterns of Biodiversity” at International Biogeographical Society. Quito, Ecuador
- 2019 Ad-hoc Reviewer – NSF Postdoctoral Fellowships in Biology (Broadening participation)

\*\*\* Service during graduate school years removed for brevity \*\*\*

Peer reviewer – *Austral Ecology*, *Biological Journal of the Linnean Society*, *Ecosphere*, *Environmental Entomology*, *Evolution*, *Freshwater Science*, *Frontiers in Ecology & the Environment*, *Functional Ecology*, *Journal of Thermal Biology*, *Global Ecology & Biogeography*, *Molecular Ecology*, *PeerJ*, *Trends in Ecology and Evolution*

Professional affiliate – Society for Integrative and Comparative Biology, Society for Freshwater Sciences; Sigma Xi, Graduate Women in Science, Society for the Advancement of Biology Education Research

## OUTREACH

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### *Promoting diversity in STEM*

- 2021 DEI panelist for Montana agency and university staff (organized by the Rocky Mountain CESU program)
- 2019 – 2021 STEM outreach program developer – Created a program to teach Native American middle school children about stream ecology and biomonitoring using aquatic insects, Missoula, MT. (Program featured in our local paper, *The Missoulian*: [https://missoulian.com/news/local/um-launches-stem-camp-for-native-american-students/article\\_7f9deb40-7ffc-599f-9221-ee7a6af227c9.html](https://missoulian.com/news/local/um-launches-stem-camp-for-native-american-students/article_7f9deb40-7ffc-599f-9221-ee7a6af227c9.html))

- 2020 Developed a recurring information session for lab group to discuss racism in STEM and formulate an action plan to create and implement an anti-racist lab culture, University of Montana.
- 2019 – 2020 Science tutor – Helped middle and high school refugee children from African countries living in Missoula, Montana, with science and math homework through *Soft Landings Missoula*, a refugee resettlement organization.
- 2019 Science fair mentor – Mentored 6<sup>th</sup> grade students from Flathead Indian Reservation with science fair projects, Ronan, MT.

*Public outreach*

- 2022 Plenary speaker for K-12 Outreach Program at Michigan State University – gave scientific talk to mid-west K-12 teachers who are learning how to bring current science into their classrooms.
- 2020 Bugs & Brews – Invited to speak at Missoula, MT insect museum to general public about research (cancelled due to COVID-19)
- 2015 STEM summer camp instructor – Designed and taught a 2-week stream ecology summer program for 4<sup>th</sup>- 7<sup>th</sup> grade students, Rivendell School, Fort Collins, CO.
- 2014 K-12 Guppy kits – Co-developed a module to teach evolution using live guppies in classroom. Wrote and narrated a video about guppies in Trinidad for use in the program.
- 2013 National Geographic Society Biodiversity Festival – Taught citizen scientists how to ID aquatic insects, Estes Park, CO.

**COLLABORATORS (Grants and manuscripts)**

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Amanda Cicchino, Beatrice Dewenter, Michael Dillon, Jason Dunham, Andrea Encalada, Deb Finn, Alex Flecker, Brenna Forester, W. Chris Funk, Cameron Ghalambor, Joe Giersch, Juan Guayasamin, Justin Havird, Scott Hotaling, Ben Kefford, Joanna Kelley, Andrea Landeira-Dabarca, Erin Landguth, LeRoy Poff, Juan Rubalcaba, Steve Thomas, Lusha Tronstad, Wilco Verberk, David Walters, H. Art Woods, Kelly Zamudio.