

**Sarah Budischak**

Assistant Professor of Biology  
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*Appointments*

**Assistant Professor of Biology.** W.M. Keck Science Department of Claremont McKenna, Pitzer and Scripps Colleges. July 2018-Present.

**Postdoctoral Research Associate. Princeton University.** Department of Ecology and Evolutionary Biology. March 2015 – July 2018.

**Writing in Science and Engineering Teaching Fellow. Princeton University.** 2016-2017.

**Postdoctoral Research Associate. The University of Georgia.** Odum School of Ecology.  
August 2014 - February 2015

*Education*

**Ph.D. University of Georgia.** *With Honors.* 2014. Odum School of Ecology.  
*The causes and consequences of parasite co-infection: insights from community ecology.*

**University of Montana.** Division of Biological Sciences, Organismal Biology and Ecology.  
Transferred to UGA with advisor's lab in 2010.

**M.S. Virginia Polytechnic Institute and State University.** 2007. Wildlife Ecotoxicology and Physiological Ecology lab. Department of Fish and Wildlife Conservation.  
*Reciprocal effects of trematode parasites and malathion on developing pickerel frogs.*

**B.S. Davidson College.** 2005. *cum laude*, Biology Major, Chemistry Minor.

*Peer-reviewed Publications*

1. Tombak, K.J., **S.A. Budischak**, S. Hauck, L.A. Martinez, and D.J. Rubenstein. 2020. The non-invasive measurement of faecal immunoglobulin in African equids. *International Journal for Parasitology: Parasites and Wildlife* 12:105-112. <https://doi.org/10.1016/j.ijppaw.2020.05.005>
2. Ezenwa, V.O., A.E. Jolles, **S.A. Budischak**, B.R. Beechler, and E. Gorsich. 2020. Causes and consequences of parasite interactions in African buffalo. *Wildlife Disease Ecology: Linking Theory to Data and Application*. Eds: K. Wilson, A. Fenton, and D. Tompkins.
3. Gehman, A.M., C. Keogh, D. Satterfield, A. McKay, and **S.A. Budischak**. 2019. Collect infection data to improve ecological understanding. *Ecosphere*. <https://doi.org/10.1002/ecs2.2770>
4. van Leeuwen, A., **S.A. Budischak**, A.L. Graham, and C. Cressler. 2019. Parasite resource manipulation drives bimodal variation in infection duration. *Proceedings of the Royal Society B* 286: 20190456. doi: <https://doi-org.ccl.idm.oclc.org/10.1098/rspb.2019.0456>
5. Dallas, T., A.M. Gehman, A.A. Aguirre, **S.A. Budischak**, J.M. Drake, M.J. Farrell, R. Ghai, S. Huang, and I. Morales-Castilla. 2019. Contrasting latitudinal gradients of body size in helminth parasites and their hosts. *Global Ecology and Biogeography*. doi: 10.1111/geb.12894
6. **Budischak, S.A.**, C. Hansen, Q. Caudron, R. Garnier, T.R. Kartzinel, I. Pelczer, C. Cressler, A. van Leeuwen, and A.L. Graham. 2018. Feeding immunity: physiological and behavioral responses to infection and resource limitation. *Frontiers in Immunology* 8:1914.
7. **Budischak, S.A.**, A.E. Wiria, F. Hamid, L.J. Wammes, L. van Lieshout, E. Sartono, T. Supali, M. Yazdanbakhsh, and A.L. Graham. 2018. Resource competition drives infection severity in human malaria-hookworm co-infections. *Ecology Letters* 21:536-545
8. **Budischak, S.A.**, and C. Cressler. 2018. Fueling defense: effects of resources on the ecology and evolution of tolerance to parasite infection. *Frontiers in Immunology* 9:2453. doi: 10.3389/fimmu.2018.02453
9. **Budischak, S.A.**, D. O'Neal, A.E. Jolles, and V.O. Ezenwa. 2018. Differential host responses to parasitism shape divergent fitness costs of infection. *Functional Ecology* 32:324-333.

10. T.A. Dallas, A.A. Aguirre, **S.A. Budischak**, C. Carlson, V.O. Ezenwa, B. Han, S. Huang, P.S. Stephens. 2018. Gauging support for macroecological patterns in helminth parasites. *Global Ecology and Biogeography*. doi: 10.1111/geb.12819
11. Leung, J.M., **S.A. Budischak**, H.T. Chung, C. Hansen, R. Bowcutt, R. Neill\*, M. Shellman\*, P. Loke, and A.L. Graham. 2018. Rapid environmental effects on gut nematode susceptibility in rewilded mice. *PLOS Biology* 16:e2004108.
12. Beechler, B.R., A.E. Jolles, **S.A. Budischak**, P.L.A.M. Corstjens, V.O. Ezenwa, M. Smith\*, R. Spaan, G. van Dam, and M. Steinauer. 2017. Host immunity, nutrition and coinfection alter longitudinal infection patterns of schistosomes in a free ranging African buffalo population. *PLOS Neglected Tropical Diseases* 11: e0006122.
13. Austin, L.V.\*, **S.A. Budischak**<sup>1</sup>, J. Ramadhin\*, E.P. Hoberg, A. Abrams, A.E. Jolles, and V.O. Ezenwa. 2017. A comparison of two methods for quantifying parasitic nematode fecundity. *Parasitology Research* 116:1597-1602.
14. Henley, W., J.J. Schmerfeld, **S.A. Budischak**, C.M. Hall, R.J. Neves, S. Ciparis, and J.W. Jones. 2016. Freshwater mussel (Unionidae) abundance and diversity upstream and downstream of a superfund site on the North Fork Holston River, Saltville, Virginia. *Journal of Shellfish Research*, 35:875-883.
15. **Budischak, S.A.**, A. Abrams, E. Hoberg, A.E. Jolles, and V.O. Ezenwa. 2016. Experimental insight into the process of parasite community assembly. *Journal of Animal Ecology*, 85:1222-1233.
16. P.R. Stephens, S. Altizer, K.F. Smith, A.A. Aguirre, J.H. Brown, **S.A. Budischak**, J.E. Byers, J.T. Davies, J.M. Drake, V.O. Ezenwa, M.J. Farrell, J.L. Gittleman, B.A. Han, S. Huang, R.A. Hutchinson, P.T. Johnson, C.L. Nunn, D. Onstad, A. Park, G.M. Vazquez-Prokopec, J.P. Schmidt, and R. Poulin. 2016. The macroecology of infectious diseases: a new perspective on global-scale drivers of pathogen distributions and impacts. *Ecology Letters* 19:1159-1171.
17. **Budischak, S.A.**, Art Abrams, Eric Hoberg, A.E. Jolles, and V.O. Ezenwa. 2015. A combined parasitological molecular approach for noninvasive characterization of parasitic nematode communities in wild hosts. *Molecular Ecology Resources* 15:1112-1119.
18. **Budischak, S.A.**, K. Sakamoto, L.C. Megow\*, K.R. Cummings, J.F. Urban, Jr, and V.O. Ezenwa. 2015. Resource limitation alters the consequences of co-infection for hosts and parasites. *International Journal for Parasitology* 45:455-463.
19. **Budischak, S.A.**, A.E. Jolles, and V.O. Ezenwa. 2013. Direct and indirect costs of co-infection in the wild: linking GI parasite communities, host hematology, and immune function. *International Journal for Parasitology: Parasites and Wildlife* 1:2-12.
20. Hopkins, W.A., C. Bodinof, **S.A. Budischak**, and C. Perkins. 2013. Nondestructive indices of mercury exposure in three species of turtles occupying different trophic niches downstream from a former chloralkali facility. *Ecotoxicology* 22:22-32.
21. Bergeron, C.M., K.M. Bodinof, **S.A. Budischak**, H. Wada, J.M. Unrine, and W.A. Hopkins. 2011. Counterbalancing effects of maternal mercury exposure during different stages of early ontogeny in American toads. *Science of the Total Environment* 409:4746-4752.
22. **Budischak, S.A.**, L.K. Belden, and W.A. Hopkins. 2009. Relative toxicity of malathion to trematode-infected and noninfected *Rana palustris* tadpoles. *Archives of Environmental Contamination and Toxicology* 56:123-128.
23. **Budischak, S.A.**, L.K. Belden, and W.A. Hopkins. 2008. The effects of malathion on embryonic development and latent susceptibility to trematode parasites in ranid tadpoles. *Environmental Toxicology and Chemistry* 27:2496-2500.
24. Hester, J. M., **S.A. Budischak**, and M.E. Dorcas. 2008. The Davidson College Box Turtle Mark-Recapture Program: Urban Herpetological Research Made Possible by Citizen Scientists. In R. E. Jung and J. C. Mitchell (eds.), *Urban Herpetology*. Herpetological Conservation V.3, Society for the Study of Amphibians and Reptiles. Salt Lake City, UT.

25. **Budischak, S.A.**, J.M. Hester, S.J. Price, and M.E. Dorcas. 2006. Natural history of *Terrapene carolina* (box turtles) in an urbanized landscape. *Southeastern Naturalist* 5:191-204.
26. Ripperton, J.G., P.A. Peroni, and **S.A. Budischak**. 2006. Effects of burial on seed germination and seedling performance in white campion (*Silene latifolia*). *Journal of the North Carolina Academy of Science* 122:29-38.

\* co-authors are undergraduate mentees

<sup>1</sup>corresponding author

### *Grants and Funding*

Habitat and coinfection as drivers of heterogeneity in cross-scale wildlife infectious disease processes. Co-Primary Investigator (Co-PI). National Science Foundation (NSF), Ecology and Evolution of Infectious Diseases Program, Division of Environmental Biology (DEB). 2019-2025 (Total funded: \$2,477,421; subaward at Claremont Colleges: \$556,106)

DNA Barcoding Workshop. Professional Development Network Award. Claremont Colleges 2019-2020. (Funded, \$2500)

NSF Research Coordination Network (RCN): Infectious Disease Evolution Across Scales Research Exchange. Cressler Lab, University of Nebraska. 2016

NSF RCN: Infectious Disease Evolution Across Scales Travel Award. 2015

NSF RCN: Ecoimmunology Graduate Travel Award. 2014.

NSF EEID Travel Award – EcoHealth conference in Kunming, China. October 2012

Odum School of Ecology Small Grant. 2011. (\$1,500)

NSF Doctoral Dissertation Improvement Grant. 2010. (\$14,923)

Burroughs Wellcome Ecology and Evolution Travel Scholarship. 2010

SICB Annual Meeting 2010 Student Travel Support. 2010

Montana Ecology of Infectious Diseases IGERT Small Grant. 2009. (\$2,500)

Ecology and Evolution of Infectious Diseases Graduate Travel Award. 2009, 2010

David C. Grant Travel Award. 2005

### *Fellowships*

**Writing in Science and Engineering Teaching Fellowship.** Princeton University. 2016 - 2018.

**NSF Integrative Graduate Education & Research Traineeship (IGERT) Fellowship.** Montana-Ecology of Infectious Diseases. University of Montana. 2008-2010

**NSF Research Experience for Undergraduates (REU) Fellowship.** University of Florida. 2004

**NSF Research Experience for Undergraduates (REU) Fellowship.** Davidson College. 2003

### *Awards*

**University of Georgia Robert C. Anderson Memorial Award.** For alumna research excellence. 2016

**Woods Hole Immunoparasitology Meeting Presentation Award.** April 2015.

**University of Georgia Award of Excellence.** Honor for top 1% of graduating class. 2014

**Solitary Glove Service Award, Odum School of Ecology.** April 2014

**UGA Graduate School Emerging Leaders Program.** 2013

**NSF Innovation in Graduate Education Challenge.** Second Place Winning team. 2013  
*Retaining Women in STEM Careers: Graduate Students as the Building Blocks of Change.*

**Odum School of Ecology Frank Golley Memorial Scholarship.** For leadership and academics. 2013

**Odum School of Ecology Best Student Paper Award.** 2013

**Ecohealth Best Student Presentation Award.** 2012

**Environmental Toxicology & Chemistry Best Student Paper Award.** 2008

**Richard L. Hoffman Award.** Virginia Herpetological Society best student presentation award. 2007

**BBB – Biological Honor Society.** 2002-2005

**ODK - National Leadership Honor Society.** Member 2005 - Present

### *Teaching and Mentoring*

**Claremont Colleges**

- *Disease Ecology and Evolution* (Biol 184). Instructor. New upper-level course with lab. Fall 2018, 2019
- *Introductory Biology II* (Biol44L). Lecture and Laboratory Instructor. Spring 2019, 2020
- Advisor to 16 senior thesis students
- Mentor to 18 research students

#### **Princeton University**

- *Writing an Effective Scientific Research Article*. Instructor. Graduate/postdoc seminar. 2016
- Princeton Writing Center Undergraduate Research Mentoring Team member. 2017
- General/generalized linear and mixed modeling in R. Lecture for Ecology graduate students. 2016
- Mentor to 5 Senior Thesis students, one independent research student, and three REU students.
- Negative Spiral of Infection. *Immune Systems: Molecules to Populations*. Guest lectures 2015, 2017

#### **University of Georgia**

- Co-Instructor and course designer. *Infectious films: Separating Fact from Fiction*. 2013
- Independent research mentor for 3 REU students, one UGA veterinary student, and 12 UGA undergraduates, including serving as a Senior Thesis committee member for one.
- EcoReach president, instructor & curriculum development. Outreach in K-12 schools. 2011-2014
- Introduction to Ecoimmunology. *Physiological Ecology*. Guest lecturer. 2014
- Climate Change and Disease. *Global Climate Change*. Guest lecturer. 2013, 2014
- Quantifying Animal Behavior. *Animal Behavior*. Guest lecturer. 2013, 2014

#### **University of Montana**

- *Statistical Thinking* - Designed active learning experiment in Animal Physiology. 2010
- Independent research mentor for an REU student

#### **Virginia Tech**

- *Conservation Biology*. Teaching Assistant. 2007
- *Vertebrate Field Biology*. Teaching Assistant. 2006, 2007
- *Vertebrate Physiological Ecology*. Teaching Assistant. 2006
- *Pedagogy in Natural Resources*. Teaching Assistant. 2006
- *Principals of Fisheries and Wildlife Management*. Teaching Assistant. 2005
- Independent research mentor for 2 undergraduate students.

#### **Davidson College**

- Biology Department. Laboratory Teaching Assistant. Biostatistics, Bio 112. 2002-2005
- Chemistry Department. Laboratory Teaching Assistant and Tutor. 2003-2005

#### *Service*

##### At the 5C's:

**W.M. Keck Science Department Executive Committee.** Elected 2019-present.

**W.M. Keck Science Department – Ad Hoc Committee on Course Evaluations.** Fall 2020.

**W.M. Keck Science Department Curriculum Committee.** 2019-present.

**Pitzer College Judicial Council.** 2019-present.

**W.M. Keck Seminar Series Co-organizer.** Fall 2018-Spring 2020

**Search Committee Member. W.M. Keck Science Department.** Visiting Biol44 Instructor. Fall 2018.

**Presentation to Pitzer Board of Trustees.** Beyond the norm: variation and the spread of infectious diseases. Spring 2020.

**PAS Faculty in Residence Seminar.** *Predicting Pandemics*. Pitzer College. Spring 2020

**Scripps This Summer.** *Meet a Disease Ecologist*. Summer 2020.

**PRAXIS in a Pandemic:** How we will teach you art, photography, media studies, language and science in your living room. Pitzer College. Panelist representing Keck Science. Summer 2020.

**Writing Tips and Tricks from Your Pitzer Professors.** Contributed writing tip video. Summer 2020.

**Faculty Voices: Pitzer faculty reimagine the virtual classroom.** Interviewee. Summer 2020.

Beyond the 5C's:

**President /Vice President.** Ecological Society of America, Disease Ecology Section. Elected 2019-2021 (position rotated from VP to President in August 2020)

**Organized “Infectious Lessons” symposium** on teaching disease ecology and evolution for the Ecological Society of America annual meeting in August 2020. My work included formally proposing the session to ESA, finding speakers, and chairing the session. The session has been postponed until 2021 meeting due to the pandemic.

**Secretary-Treasurer.** Ecological Society of America, Disease Ecology Section. Elected 2016- 2019

**Student Poster Judge.** Society for Integrative and Comparative Biology. Division of Ecoimmunology and Disease Ecology. 2019.

**Reviewer** for: American Naturalist, Biology Letters, Canadian Journal of Zoology, Environmental Toxicology & Chemistry, Evolution, Functional Ecology, International Journal for Parasitology, Journal of Animal Ecology, Molecular Ecology Resources, Parasitology, Pathogens, PLOS Biology, PLOS One, Proceedings of the Royal Society – B, Royal Society Open Science, Veterinary Pathology

*Invited Talks*

Fueling defense? Resources and macroparasite (co)infections. University of Arkansas. Fall 2019.

Disease Ecology across scales. Harvey Mudd College. Spring 2019

Disease ecology across scales. Keck Science Department, Claremont Colleges. 2017

Disease ecology across scales: a physiological perspective. Univ. of North Carolina Asheville. 2017

Disease ecology across scales: a resource-based perspective. Univ. of Connecticut. 2017

Disease ecology across scales: a resource-based perspective. Montclair State Univ. 2017

Context dependent costs of co-infection. Univ. of Florida, Distinguished REU Alumna Speaker. 2015

Parasitism from the savanna to Savannah. Colorado College, Department of Biology. 2014

Consequences of parasite co-infection. Univ. of California Davis, School of Veterinary Medicine. 2014

Consequences of parasite co-infection. Princeton Univ., Dept. of Ecology & Evolutionary Biology. 2014

*Professional Meetings*

**Ecological Society of America, Annual Meeting,** Annual Meeting (virtual), 2020.

**Ecology and Evolution of Infectious Diseases, Annual Conference,** 2019. Princeton, NJ.

**Society for Integrative and Comparative Biology Annual Meeting,** 2019

S.A. Budischak, A.L. Graham and C. Cressler. Fueling Defense; Resources & the Evolution of Tolerance to Macroparasite Infection. (invited symposium talk)

**McNair Scholars Research Conference,** University of New Mexico, 2018

D. Payne\*, S.A. Budischak, C. Thomason, A.L. Graham. Growth stunting and intestinal parasites in wild mice. (Poster)

**Miramontes Arts and Sciences Program Welcome Back Undergraduate Research Symposium,** University of Colorado Boulder, 2018

D. Payne\*, S.A. Budischak, C. Thomason, A.L. Graham. Growth stunting and intestinal parasites in wild mice. (3 minute ‘Flash’ presentation)

**Woods Hole Immunoparasitology Meeting,** 2016

S.A. Budischak, C. Hansen, A. Salamatian\*, D. Navarrete\*, H. Priddy\*, A.L. Graham. Complex interactions among nutrition, condition and immunity during *Trichuris muris* infection. (poster)

**Ecology and Evolution of Infectious Diseases, Annual Conference,** 2016

S.A. Budischak, A.E. Wiria, F. Hamid, L.J. Wammes, L. van Lieshout, E. Sartono, T. Supali, M. Yazdanbakhsh, A.L. Graham. Resource competition drives infection severity in human malaria-hookworm co-infections. (talk)

**Ecology and Evolution of Infectious Diseases, Annual Conference,** 2015 (poster)

S.A. Budischak, A.E. Jolles, V.O. Ezenwa. Host responses shape the divergent fitness costs of infection.

**Woods Hole Immunoparasitology Meeting,** 2015

S.A. Budischak, A.E. Jolles, V.O. Ezenwa. Experimental and longitudinal evidence for fitness costs of helminth infection in African buffalo. (talk)

**Ecological Society of America, Annual Meeting, 2014** (poster)

S. A. Budischak, A.E. Jolles, V.O. Ezenwa. A tale of two worms: parasite species identity determines fitness cost of infection.

**Research Coordination Network – Ecoimmunology Annual Meeting, 2014** (talk)

S.A. Budischak, K. Sakamoto, L.C. Megow\*, K. Cummings, J.F. Urban, V.O. Ezenwa. Resources influence immune-mediated interactions among co-infecting parasites.

**Ecological Society of America, Annual Meeting, 2013** (talk)

S.A. Budischak, K. Sakamoto, J.F. Urban Jr., V.O. Ezenwa. Consequences of co-infection for hosts and parasites: importance of host nutrition and parasite species identity.

**Ecology and Evolution of Infectious Diseases Annual Conference, 2013** (poster)

S.A. Budischak, K. Sakamoto, J.F. Urban Jr., V.O. Ezenwa. Resource limitation alters the consequences of coinfection for both hosts and parasites.

**NSF/NIH Ecology and Evolution of Infectious Disease PI Meeting, 2013** (poster)

S.A. Budischak, K. Sakamoto, J.F. Urban Jr., V.O. Ezenwa. Resource limitation alters the consequences of coinfection for both hosts and parasites.

**One Health Symposium: Breaking Barriers and Crossing Scales, 2013** (poster)

S.A. Budischak, K. Sakamoto, J.F. Urban Jr., V.O. Ezenwa. Resource limitation alters the consequences of coinfection for both hosts and parasites.

**EcoHealth, 4th Biennial Conference, 2012** (talk)

S.A. Budischak, K. Sakamoto, J.F. Urban Jr., V.O. Ezenwa. Causes and consequences of parasite community composition.

**Society for Integrative and Comparative Biology Annual Meeting, 2011** (talk)

S.A. Budischak, A.E. Jolles, V.O. Ezenwa. Untangling GI parasite communities: the importance of species identity and richness.

**NSF/NIH Ecology of Infectious Diseases PI Meeting, 2010** (talk)

S.A. Budischak, A.E. Jolles, V.O. Ezenwa. Direct and indirect costs of co-infection in the wild: linking GI parasite communities, host hematology, and immune function.

**Ecology and Evolution of Infectious Diseases Annual Conference, 2009** (poster)

S.A. Budischak, A.E. Jolles, V.O. Ezenwa. Untangling GI parasite communities: the importance of species identity and richness.

**Ecological Society of America Annual Meeting, 2008** (talk)

Budischak, S.A., L.K. Belden, W.A. Hopkins. Effects of embryonic exposure to malathion on embryonic development and latent susceptibility to parasites.

**Virginia Herpetological Society Fall Symposium, 2007** (talk)

Budischak, S.A., L.K. Belden, W.A. Hopkins. Effects of embryonic exposure to malathion on hatching success and latent susceptibility to parasites.

**Introduction to Wildlife Diseases in the Mid-Atlantic Region, 2006**

Annual Summer Workshop of the Virginia Chapter of The Wildlife Society.

**Association of Southeastern Biologists, 2005** (posters)

Budischak, S.A., J.G. Ripperton, P.A. Peroni. The effects of seed age on viability, germination, and seedling performance in white campion (*Silene latifolia*).

Budischak, S.A., J.M. Hester, S.J. Price, M.E. Dorcas. Natural history of *Terrapene carolina* (box turtles) in an urbanized landscape.

*Professional Development*

**Infectious Disease Evolution Across Scales - RCN. 2015-Present**

Network facilitating cross-scale disease research.

**Macroecology of Infectious Diseases - RCN. 2014-Present**

Collaborative research investigating global patterns of parasite infection and disease emergence.

**Claremont Center for Teaching and Learning (CTL) and other teaching workshops:**

HIVE 5C Faculty Event: Surfing Waves of Uncertainty. 8/2020

Course Design Institute. 3-day intensive workshop. 7/2020

Facilitating engaged learning in virtual classes workshop (Minerva Schools). 6/2020

Agile Teaching For Whatever's Next. 6/2020  
Intermediate Zoom workshop (Scripps). 3/2020  
Latinx student CTL lunch. 10/2019  
Gateway courses. 10/2019  
Advising Undergraduate Researchers. 2/2019  
Creating a Supportive Classroom. 10/2018  
The Transparent Teaching Toolkit. 8/2018

**Southern California PKAL regional network meeting.** "Teaching Every Student: Practical Tools for STEM Education" (3/2019): I attended workshops on Inclusive Office Hours and Addressing Challenges of Inclusive Teaching.

**QUBES – Swirl for Teaching R in Undergraduate Biology.** Faculty Mentoring Network course. Fall 2019

**Teal dot training** (Bystander engagement) - 8/2019

**SCORE Allyship Training:** Supporting transgender & non-binary students - 4/2019

**Entering Mentoring participant.** NSF sponsored training course for REU mentors. 2013

**ESA Introductory and Advanced Structural Equation Modeling Workshops.** 2013

**Ecology and Evolution of Infectious Diseases Workshops.** Three-day workshops focused on developing skills to model and analyze ecological and evolutionary data. 2009, 2010

**College Teaching.** Graduate pedagogy course on teaching at the college-level. 2011

**Pathways to Scientific Teaching Workshop.** Three-day workshop on developing learner-centered curricula and teaching interdisciplinary science courses. 2009