

CURRICULUM VITA

Name: Courtney Murdock
Current: Title: Associate Professor
College: College of Agriculture and Life Sciences
Department/Unit: Entomology
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BACKGROUND

Education

Year	Degree	Institution
2009	Ph.D., Disease Ecology	School of Natural Resources and Program in the Environment, University of Michigan, MI, U.S.A.
2002	B.S., Biology, Spanish Minor	University of Michigan, MI, U.S.A.

Academic ranks

Assistant Professor:	October 2014 to May 2020
Associate Professor:	May 2020 - present

Primary departmental/unit program area

Vector-borne disease, research, and teaching

Areas of expertise

Ecology and evolution of infectious diseases, vector ecology / biology, medical entomology, population ecology, mosquito-pathogen interactions, pest control, statistical and mechanistic modeling

PROFESSIONAL EXPERIENCE

Year	Experience
May 2020-present	Associate Professor (60% Research, 40% Teaching), Department of Entomology, Cornell University
2014-May 2020	Assistant Professor (60% Infectious Diseases; 40% Odum School of Ecology; 75% Research, 25% Instruction), Department of Infectious Diseases, College of Veterinary Medicine, Odum School of Ecology, University of Georgia.
2010-2014	Postdoctoral Researcher, Center for Infectious Disease Dynamics, Department of Entomology, Pennsylvania State University.
2009-2010	Postdoctoral Researcher, Center for Infectious Disease Dynamics, Department of Biology, Pennsylvania State University.

Sabbaticals and study leaves

None.

HONORS & AWARDS

2018	University of Georgia's Life Science nominee for the Blavatnik Young Scholars
2017	University of Georgia's Life Science nominee for the Blavatnik Young Scholars
2017	John M. Bowen Award for Excellence in Animal / Biomedical Research
2008	Winner of best student paper at the Midwest Fish and Wildlife Conference
2008	Superior Graduate Student Teaching Award

2006-2008 NIH Interdisciplinary Perspectives of Infectious Diseases Training Grant

ACADEMIC RESPONSIBILITIES

Professional affiliations

2019-present Ecological Society of America
2017-present NSF RCN VectorBite
2015-present American Society of Tropical Medicine and Hygiene
2017-2020 Center of Ecology of Infectious Diseases, University of Georgia
2017-2020 Center of Vaccines and Immunology, University of Georgia
2016-2020 Center for Tropical Emerging and Global Diseases, University of Georgia
2016-2020 Riverbasin Center, University of Georgia

Professional service

Editorial board appointments: *Ecohealth* (Review Editor, 2017-present)

Review for scholarly journals and publishers (54 total publications as an Assistant Professor): Nature Communications, Ecology Letters, PLoS Pathogens, Trends in Parasitology, Functional Ecology, Scientific Reports, Philosophical Transactions of the Royal Society B, Proceedings of the Royal Society of London Series B, Journal of Animal Ecology, Ecology, Climate Change, Evolutionary Applications, American Naturalist, BMC Evolutionary Biology, BMC Ecology, Heredity, Oikos, PLoS One, PLoS Neglected Tropical Diseases, Malaria Journal, Biology Letters, International Journal of Parasitology, Global Change Biology, Parasites & Vectors, Ecosphere, American Journal of Tropical Medicine and Hygiene, Basic and Applied Ecology, Journal of Medical Entomology, International Journal of Environmental Research and Public Health, Journal of Thermal Biology, Acta Parasitologia, Journal of Parasitology, and International Journal of Insect Science.

Service for international programs:

2019: Judge for Young Investigator Awards at the annual American Society for Tropical Medicine and Hygiene Meeting, Baltimore, MD (*November*)
2019: Technical expert in the World Health Organization Technical Consultation on the spread of *Anopheles stephensi*, the Indian urban malaria vector, into Africa, Geneva, Switzerland
2016-present: Trainer (trapping methods, mosquito identification, and storage protocols) for the entomological surveillance program on St. Kitts and Nevis.

Granting agencies panels and reviews:

2019: Early stage investigator invited reviewer for NIAID Vector Biology Study Section (*October*)

University service

2019: Reviewer for the University of Georgia Global Research Collaboration Grants
2019: Interdisciplinary Life Science Program Candidate interviewer
2018: Reviewer for the University of Georgia Global Research Collaboration Grants
2018: Interdisciplinary Life Science Program Candidate interviewer
2017: Reviewer for the University of Georgia Global Research Collaboration Grants
2017: Interdisciplinary Life Science Program Candidate interviewer
2016: Interdisciplinary Life Science Program Candidate interviewer
2015: Interdisciplinary Life Science Program Candidate interviewer
2015: Ecology and Evolution of Infectious Diseases Annual Meeting Steering Committee member

Departmental service

2018: Academic Professional Search Committee
2018-present: Department of Infectious Diseases Undergraduate Curriculum Committee

2018-present: Odum School of Ecology Committee for the Dean
 2017: Presentation Judge Odum School of Ecology Graduate Student Symposium
 2017-2018: Odum School of Ecology Diversity Committee
 2016: Poster Judge Department of Infectious Diseases Annual Retreat
 2016-present: NRT-IDEAS NSF Training Program Steering Committee member

Outreach / extension service

Local community services and relations:

2018: Presentation on working with BSL-3 pathogens in mosquitoes in ACL-3 containment to the Biosafety Community Liaison Committee
 2017: Olli@UGA general public lecture on arbovirus and mosquito awareness
 2015-present: Actively engaging citizens of Athens Clarke County in mosquito awareness through Athens mosquito surveillance – provide quarterly reports on the presence / absence and abundance of mosquito species sampled on citizens' properties.

Teaching and advising responsibilities

Summary of Courses Taught (all courses co-taught, 50% responsibility each term)

Course	Institution	Title	Term	Enrollment	Credit Hours
IDIS 8900*	UGA	Special Topics in Infectious Diseases: Global Change & Vector-borne Diseases	Fall 2016	7	1
ECOL / BIOL 4150 / 6150	UGA	Population Biology of Infectious Diseases	Spring 2016	23	4
IDIS 8900*	UGA	Special Topics in Infectious Diseases: Global Change & Vector-borne Diseases	Spring 2017	6	1
ECOL 3500 / 3505 H	UGA	Ecology	Spring 2017	195	4
IDIS / ECOL* 8240	UGA	Global Change and Vector-borne Diseases	Spring 2018	10	1
ECOL / BIOL 4150 / 6150	UGA	Population Biology of Infectious Diseases	Spring 2018	40	4
ECOL 3500 / 3505 H	UGA	Ecology	Spring 2019	96	4
IDIS / ECOL* 8240	UGA	Global Change and Vector-borne Diseases	Spring 2019	11	1
ECOL / IDIS 8510	UGA	Fundamentals in Disease Biology	Fall 2019	20	4
ECOL / BIOL 4150 / 6150	UGA	Population Biology of Infectious Diseases	Spring 2020		4
IDIS / ECOL* 8240	UGA	Global Change and Vector-borne Diseases	Spring 2020		1

*New course developed

Guest lectures

ECOL 8510 Fundamentals in Disease Biology (Fall 2016, 2017)
 2 lectures: The effects of antigenic variation and immunity on malaria transmission
 ECOL 8510 Fundamentals in Disease Biology (Spring 2017)
 1 lecture: Vector-virus Interactions
 ECOL / BIOL 4150 / 6150 Population Biology of Infectious Diseases (Spring 2015)
 1 lecture: Vector-borne Disease

Undergraduate student projects (20 undergraduates, 1 DVM student):

*indicates students were co-authors on published, under review, or pending papers

- Emily Pearson, undergraduate research credit (Fall 2019)
- Prachi Patel, undergraduate research credit (Fall 2019)
- Courtney Schreiner, NSF REU student (Summer 2019)
- Taryn Waite, NSF REU student (Summer 2019)
- Clara Tucker, NSF REU student (Summer 2019)
- Lilith South, undergraduate research credit (Spring 2018 – Spring 2019)
- Sydney Habegger, undergraduate research credit (Summer 2018 – Spring 2019)
- Jenna Scott, undergraduate research volunteer (Spring 2018)
- Jenna Lea, undergraduate research credit (Spring 2018)
- Emily Cook, Georgia Veterinary Scholars program (Summer 2017)
- Lindsey Jones*, NSF REU student (Summer 2017)
- Carl Hintz*, NSF REU student (Summer 2017)
- Alyzeh Orakzia*, undergraduate research volunteer (Summer 2017)
- Olivia Volkert, undergraduate research credit (Summer 2017)
- Ugo Ugonabo, undergraduate research credit (Summer 2017)
- Abigail Lecroy, undergraduate research credit (Spring 2017 – Spring 2018)
- Nicole Solano*, NSF REU student (Summer 2016)
- Temitayo Andanlawo*, NSF REU student (Summer 2016)
- Harry Owen*, undergraduate research credit (Spring 2016 – Spring 2017)
- Kavya Balaji*, undergraduate research credit (Fall 2016 – Spring 2018)
- Hannah Feltner, undergraduate research volunteer (Fall 2016)
- Taylor McClanahan*, NSF REU student (Summer 2015)

Senior thesis advisory committee member (3)

- Lilith South, University of Georgia (Spring 2019)
- Kavya Balaji*, University of Georgia (Spring 2018)
- Harry Owen*, University of Georgia (Spring 2016)

Doctoral students directed (5)

*indicates students are co-authors on published, under review, or pending papers

- Nicole Solano*, University of Georgia. Odum School of Ecology. 2017-present. Co-chair with John Drake. Supported through IDEAS NSF funding and grant 1. Expected graduation Spring 2022.
- Philip Newberry*, University of Georgia. Odum School of Ecology. 2017-present. Co-chair with Michael Strand. Supported through IDEAS NSF funding and an UGA Presidential fellowship. Expected graduation Spring 2022.
- Blanka Tesla*, University of Georgia. Infectious Diseases. 2015-present. Co-chair with Melinda Brindley. Supported through start-up funds and NSF-RAPID (grant 7). Expected graduation Spring 2020.
- Kerri Miazgowicz*, University of Georgia. Infectious Diseases. 2015-present. Co-chair with Melinda Brindley. Supported through start-up funds and a NSF-GRFP fellowship. Expected graduation December 2020.
- Michelle Evans*, University of Georgia. Odum School of Ecology. 2015-present. Co-chair with John Drake. Supported through a NSF-GRFP fellowship and an UGA Presidential fellowship. Expected graduation December 2020.

Masters students directed (0)

Postdoctoral Research Associates supervised (2)

- Ashutosh Pathak. Postdoctoral research associate (2015-2016; now an Assistant research scientist). Supported at UGA by a National Institutes of Health R01 (grant 9), National Institutes of Health R21 (grant 6), and UGA start-up funds.
- Christine Reitmayer. Postdoctoral research associate. 2016-2018. Supported at UGA by a National Institutes of Health R21 (grant 6).

Laboratory rotation students hosted (6 PhD)

- Judith Reyes, Interdisciplinary Life Science program (Fall 2019)
- Marco Notorangelo, Interdisciplinary Life Science program (Fall 2016)
- Jennifer Cyr, Interdisciplinary Life Science program (Fall 2015)
- Kerri Miazgowiec, Interdisciplinary Life Science program (Fall 2015)
- Michelle Evans, Odum School of Ecology (Fall 2015)
- Christine Huertas, Interdisciplinary Life Science program (Summer 2015)

Masters advisory committee member (0 committees)

Doctoral advisory committee member (4 committee)

- Alec Thompson, University of Georgia, College of Veterinary Medicine, Department of Population Health (in progress)
- Maria Theissen, University Georgia, Odum School of Ecology (in progress)
- Isabella Ragonese, University of Georgia, Odum School of Ecology (in progress)
- Talya Shragai, Cornell University, Department of Entomology (in progress)

SCHOLARLY ACTIVITIES

Grants

\$4,428,220 total funds earned

\$1,264,722 received for my research program

Totals include indirect and direct costs

Grants Received (totals include indirect and direct costs)

1. 2017-2018: **Ceva Industry Sponsored Project.** *Modeling the effects of Vectra3D on mosquito population dynamics and heartworm prevalence.* Courtney Murdock (PI). Total Award: \$37,837. **Role: PI.**
2. 2017-2018: **UGA Grants on the Edge.** *Determining the relative importance of genetic and environmental variation on the capacity of Aedes albopictus to transmit arboviruses.* Courtney Murdock (PI), Melinda Brindley (Co-I), Kelly Dyer (Co-I). Total Award: \$10,000. **Role: PI.**
3. 2017-2018: **FAPEMIG-UGA Research Mobility Grant.** *Effects of environmental temperature on the mosquito-Zika interaction.* Courtney Murdock (PI), Tiago Mendes (Co-PI), Melinda Brindley (Co-PI), Laila Nuhn (Co-PI). Total Award: \$15,000; Amount to Murdock: \$7500. **Role: PI.**
4. 2016-2019: **Department of Defense.** *Using VacSim delivery to enhance malaria vaccine efficacy.* Don Harn (PI), Lisa Schollenberg (Co-I), Courtney Murdock (Co-I), Don Champagne (Co-I). Total Award: \$1,017,724; Amount to Murdock: \$152,658. **Role: Co-I.**
5. 2016-2018: **National Institutes of Health R21.** *The role of African Green monkeys in the epidemiology of dengue and chikungunya on St. Kitts, West Indies.* Patrick Kelly (PI), Courtney Murdock (Co-I), Dana Vanlandingham (Co-I). Total Award: \$319,919; Amount to Murdock: \$80,330. **Role: Co-I.**
6. 2016-2018: **National Institutes of Health R21.** *Acoustic mating signals in the dengue vector Aedes aegypti.* Lauren Cator (PI), Courtney Murdock (Co-I), Laura Harrington (Co-I). Total Award: \$386,923; Amount to Murdock: \$234,927. **Role: Co-I.**

7. 2016-2018: **National Science Foundation RAPID Award.** *Environmental drivers of Zika transmission and control.* Courtney Murdock (PI), Melinda Brindley (Co-PI), Erin Mordecai (Co-PI), Matt Bonds (Co-PI). Total Award: \$200,000. **Role: PI.**
8. 2016-2017: **UGA Grants on the Edge Award.** *Characterizing the thermal performance of chikungunya in American Aedes mosquitoes and implications for transmission.* Courtney Murdock (PI), Melinda Brindley (Co-I). Total Award: \$10,000. **Role: PI.**
9. 2015-2019: **National Institutes of Health R01.** *Influence of environmental temperature on malaria transmission and prospective vector control.* Matthew B. Thomas (PI), Anthony James (Co-I), Courtney Murdock (Co-I). Total Award: \$2,025,467; Amount to Murdock: \$531,470. **Role: Co-I.**
10. 2011-2013: **National Institutes of Health R21.** *Effects of temperature on mosquito immunity and vector competence.* Matthew B. Thomas (PI), Courtney Murdock (Co-I), Andrew F. Read (Co-I), Diana Cox-Foster (Co-I). Total Award: \$405,350.

Grants Pending

11. **National Institutes of Health standard R01.** *Redefining thermal suitability for urban malaria transmission in the context of humidity.* Courtney Murdock (PI) and Mercedes Pascual (Co-I). Total Award: \$3,868,829. (submitted 10/05/2019 – scored in the 9th%).
12. **National Institutes of Health standard R21.** *The role of environmental temperature in shaping malaria transmission to the mosquito: implications for transmission and control.* Ash Pathak (PI), Courtney Murdock (co-I), and Dennis Kyle (Co-I). Total Award: \$412,500 (submitted 6/14/2020).
13. **National Institutes of Health standard R21.** *Predicting environmental suitability for Anopheles stephensi, an invading malaria vector in Ethiopia.* Mike Wimberly (PI), Courtney Murdock (co-I), and Sadie Ryan (co-I). Total award: \$412,500 (submitted 6/14/2020)

Publications (underlined names indicate trainees, * invited)

Book chapters (0):

1. Reitmayer, C., Evans, M., Miazgowiec, K., Newberry, P., Tesla, B., Solano, N., and **Murdock, C. C.** Vector-virus interactions (in press). In *Population Biology of Vector-borne Diseases* (eds. Drake, J. and Strand, M.) Oxford University Press.
2. Evans, M., Newberry, P., and **Murdock, C.C.** Carry-over effects of the larval environment in mosquito-borne disease systems (in press). In *Population Biology of Vector-borne Diseases* (eds. Drake, J. and Strand, M.) Oxford University Press.

Peer-reviewed journal articles (37 total):

3. Ferreira, P.G., Tesla, B., Horácio, E.C., Nahum, L.A., Brindley, M.A., Mendes, T.A., and **Murdock, C.C.** Temperature dramatically shapes mosquito gene expression with consequences for mosquito-Zika virus interactions (2020). *Frontiers in Microbiology*.
4. Johansson, M. et al. An open challenge to advance probabilistic forecasting for dengue epidemics (2019). *Proceedings of the National Academy of Sciences of the United States of America*.
5. Pathak, A.K., Shiau, J.C., Thomas, M.B., and **Murdock, C.C.** Field relevant variation in ambient temperature modifies density-dependent establishment of *Plasmodium falciparum* gametocytes in mosquitoes (2019). *Frontiers in Microbiology*.
6. Valentine, M.J., **Murdock, C.C.**, and P.J. Kelly. Sylvatic cycles of arboviruses in non-human primates (2019). *Parasites & Vectors*.
7. Evans, M., Hintz, K., Jones, L., Shiau, J., Solano, N., Drake, J., and **Murdock, C.C.** Microclimate and larval habitat predict adult *Aedes albopictus* abundance in urban areas (2019). *American Journal of Tropical Medicine and Hygiene*.
8. Pathak, A., Shiau, J. C., Thomas, M. B., and **Murdock, C. C.** Cryogenically preserved red blood cells support gametocytogenesis of *Plasmodium falciparum* *in vitro*, gametogenesis, and sporogony in mosquitoes (2018) *Malaria Journal*.

9. Kaul, R., Evans, M. V., **Murdock, C. C.**, and Drake, J. M. Spatio-temporal spillover risk of yellow fever in Brazil. *Parasites & Vectors* (2018).
10. Tesla, B., Demakovsky, L.R., Mordecai, E.A., Bonds, M.H., Ngonghala, C., Brindley, M.A., & **Murdock, C.C.** Temperature drives Zika virus transmission. Evidence from empirical and mathematical models. *Proceedings of the Royal Society of London Biological Sciences* (2018)
11. Tesla, B., Demakovsky, L.R., Mordecai, E.A., Rodriguez, A., Bonds, M.H., Brindley, M.B., and **Murdock, C.C.** Estimating the effects of variation in viremia on mosquito susceptibility, infectiousness, and Ro of Zika in *Aedes aegypti*. *PLoS Neglected Tropical Diseases* (2018)
12. Evans, M.V., Shiau, J.C., Solano, N., Brindley, M.A., Drake, J.M., and **Murdock, C.C.** Carry-over effects of urban larval environments on the transmission potential of dengue-2 virus. *Parasites & Vectors* (2018).
13. Evans, M. V., **Murdock, C. C.** & Drake, J. M. Anticipating emerging mosquito-borne flaviviruses in the USA: What comes after Zika? *Trends in Parasitology*, doi:https://doi.org/10.1016/j.pt.2018.02.010 (2018).
14. Johnson, L. R., Gramacy, R. B., Cohen, J., Mordecai, E., **Murdock, C.**, Rohr, J., Ryan, S. J., Stewart-Ibarra, A. M. & Weikel, D. Phenomenological forecasting of disease incidence using heteroskedastic gaussian processes: A dengue case study. *Annals of Applied Statistics* **12**, 27-66, doi:10.1214/17-AOAS1090 (2018).
15. Willard, K. A., Demakovsky, L., Tesla, B., Goodfellow, F. T., Stice, S. L., **Murdock, C. C.** & Brindley, M. A. Zika virus exhibits lineage-specific phenotypes in cell culture, in *Aedes aegypti* mosquitoes, and in an embryo model. *Viruses* **9**, doi:10.3390/v9120383 (2017).
16. Mordecai, E., Cohen, J., Evans, M. V., Gudapati, P., Johnson, L. R., Lippi, C. A., Miazgowicz, K., **Murdock, C. C.**, Rohr, J. R., Ryan, S. J., Savage, V., Shocket, M., Ibarra, A. S., Thomas, M. B. & Weikel, D. P. Detecting the impact of temperature on transmission of Zika, dengue, and chikungunya using mechanistic models. *PLoS Neglected Tropical Diseases* **11**, e0005568, doi:https://doi.org/10.1371/journal.pntd.0005568 (2017).
17. **Murdock, C. C.**, Evans, M. V., McClanahan, T. D., Miazgowicz, K. L. & Tesla, B. Fine-scale variation in microclimate across an urban landscape shapes variation in mosquito population dynamics and the potential of *Aedes albopictus* to transmit arboviral disease. *PLoS Neglected Tropical Diseases* **11**, e0005640, doi:10.1371/journal.pntd.0005640 (2017).
18. ****Shragai, T.**, Tesla, B., **Murdock, C.** & Harrington, L. C. Zika and chikungunya: Mosquito-borne viruses in a changing world. *Annals of the New York Academy of Sciences* **1399**, 61-77, doi:10.1111/nyas.13306 (2017).
19. ****Murdock, C. C.**, Luckhart, S. & Cator, L. J. Immunity, host physiology, and behaviour in infected vectors. *Current Opinion in Insect Science* **20**, 28-33, doi:https://doi.org/10.1016/j.cois.2017.03.001 (2017).
20. Evans, M. V., Dallas, T. A., Han, B. A., **Murdock, C. C.** & Drake, J. M. Data-driven identification of potential zika virus vectors. *eLife* **6**, e22053, doi:10.7554/eLife.22053 (2017).
21. Shapiro, L. L. M., **Murdock, C. C.**, Jacobs, G. R., Thomas, R. J. & Thomas, M. B. Larval food quantity affects the capacity of adult mosquitoes to transmit human malaria. *Proceedings of the Royal Society B: Biological Sciences* **283**, doi:10.1098/rspb.2016.0298 (2016).
22. **Murdock, C. C.**, Sternberg, E. D. & Thomas, M. B. Malaria transmission potential could be reduced with current and future climate change. *Scientific Reports* **6**, 27771, doi:10.1038/srep27771 (2016).
23. ****Pincebourde, S.**, **Murdock, C. C.**, Vickers, M. & Sears, M. W. Fine-scale microclimatic variation can shape the responses of organisms to global change in both natural and urban environments. *Integrative and Comparative Biology*, doi:10.1093/icb/icw016 (2016).
24. Laubach, Z. M., Perng, W., Lombardo, M., **Murdock, C.** & Fofopopoulos, J. Determinants of parental care in mountain white-crowned sparrows (*Zonotrichia leucophrys oriantha*). *The Auk* **132**, 893-902, doi:10.1642/AUK-15-9.1 (2015).

25. Cator, L. J., Pietri, J. E., **Murdock, C. C.**, Ohm, J. R., Lewis, E. E., Read, A. F., Luckhart, S. & Thomas, M. B. Immune response and insulin signalling alter mosquito feeding behaviour to enhance malaria transmission potential. *Scientific Reports* **5** (2015).
26. **Murdock, C. C.**, Adler, P. H., Frank, J. & Perkins, S. L. Molecular analyses on host-seeking black flies (diptera: Simuliidae) reveal a diverse assemblage of *Leucocytozoon* (Apicomplexa: Haemospororida) parasites in an alpine ecosystem. *Parasites & Vectors* **8**, 343, doi:10.1186/s13071-015-0952-9 (2015).
27. Moller-Jacobs, L., **Murdock, C.** & Thomas, M. Capacity of mosquitoes to transmit malaria depends on larval environment. *Parasites & Vectors* **7**, 593 (2014).
28. Hughes, G. L., Dodson, B. L., Johnson, R. M., **Murdock, C. C.**, Tsujimoto, H., Suzuki, Y., Patt, A. A., Cui, L., Nossa, C. W., Barry, R. M., Sakamoto, J. M., Hornett, E. A. & Rasgon, J. L. Native microbiome impedes vertical transmission of *Wolbachia* in *Anopheles* mosquitoes. *Proceedings of the National Academy of Sciences U. S. A.* **111**, 12498-12503 (2014).
29. **Murdock, C. C.**, Blanford, S., Luckhart, S. & Thomas, M. B. Ambient temperature and dietary supplementation interact to shape mosquito vector competence for malaria. *Journal of Insect Physiology*. **67**, 37-44 (2014).
30. **Brock, P. M., **Murdock, C. C.** & Martin, L. B. The history of ecoimmunology and its integration with disease ecology. *Integrative and Comparative Biology* **16** (2014).
31. **Murdock, C. C.**, Blanford, S., Hughes, G. L., Rasgon, J. L. & Thomas, M. B. Temperature alters *Plasmodium* blocking by *Wolbachia*. *Scientific Reports* **4** (2014).
32. **Murdock, C. C.**, Foufopoulos, J. & Simon, C. P. A transmission model for the ecology of an avian blood parasite in a temperate ecosystem. *PLoS ONE* **8**, e76126, doi:10.1371/journal.pone.0076126 (2013).
33. **Murdock, C. C.**, Moller-Jacobs, L. L. & Thomas, M. B. Complex environmental drivers of immunity and resistance in malaria mosquitoes. *Proceedings of the Royal Society B: Biological Sciences* **280**, doi:10.1098/rspb.2013.2030 (2013).
34. Cator, L. J., George, J., Blanford, S., **Murdock, C. C.**, Baker, T. C., Read, A. F. & Thomas, M. B. “Manipulation” without the parasite: Altered feeding behaviour of mosquitoes is not dependent on infection with malaria parasites. *Proceedings of the Royal Society B: Biological Sciences* **280**, doi:10.1098/rspb.2013.0711 (2013).
35. Paaijmans, K. P., Heinig, R. L., Seliga, R. A., Blanford, J. I., Blanford, S., **Murdock, C. C.** & Thomas, M. B. Temperature variation makes ectotherms more sensitive to climate change. *Global Change Biology* **19**, 2373-2380 (2013).
36. Dietz, M. S., **Murdock, C. C.**, Romero, L. M., Ozgul, A. & Foufopoulos, J. Distance to a road is associated with reproductive success and physiological stress response in a migratory landbird. *The Wilson Journal of Ornithology* **125**, 50-61, doi:10.1676/11-201.1 (2013).
37. **Murdock, C. C.**, Paaijmans, K. P., Bell, A. S., King, J. G., Hillyer, J. F., Read, A. F. & Thomas, M. B. Complex effects of temperature on mosquito immune function. *Proceedings of the Royal Society B-Biological Sciences* **279**, 3357-3366, doi:10.1098/rspb.2012.0638 (2012).
38. **Murdock, C. C.**, Paaijmans, K. P., Read, A. F., Cox-Foster, D. & Thomas, M. B. Rethinking vector immunology: The role of environmental temperature in shaping resistance. *Nature Reviews Microbiology* **10**, 869-876 (2012).
39. **Murdock, C. C.**, Olival, K. J. & Perkins, S. L. Molecular identification of host feeding patterns of snow-melt mosquitoes (diptera: Culicidae): Potential implications for the transmission ecology of Jamestown canyon virus. *Journal of Medical Entomology* **47**, 226-229, doi:10.1603/me09137 (2010).
40. Foxman, B., Goldberg, D., **Murdock, C.**, Xi, C. & Gilsdorf, J. R. Conceptualizing human microbiota: From multicelled organ to ecological community. *Interdisciplinary Perspectives on Infectious Diseases* **2008**, doi:10.1155/2008/613979 (2008).

Submitted and pending manuscripts (8 total)

1. Miazgowicz, K., Mordecai, E., Ryan, S., Hall, R., Owen, J., Adanlawo, T., Balaji, K., and **Murdock, C. C.** Mosquito species and age influence thermal performance of traits relevant to malaria transmission (under revision) *Proceedings of the Royal Society London Series B*. <https://www.biorxiv.org/content/10.1101/769604v1>
2. Ngonghala, C.N., Mordecai, E.A., Tesla, B.*, Demakovsky, L.R.*, Brindley, M.A., Ryan, S.J., **Murdock, C.C.**, and Bonds, M.H. Effects of temperature on Zika dynamics and control (under review). *PNAS*. <https://www.biorxiv.org/content/10.1101/855072v2>
3. Wimberly, M. and **Murdock, C.C.** Utilizing remotely sensed data to predict fine-scale variation in mosquito microclimate, mosquito density, and arbovirus transmission potential. (under review). *PLoS Neglected Tropical Diseases*.
4. Reitmayer, C., Pathak, A., Cator, L. J., Harrington, L. C., Brindley, M. A., and **Murdock, C. C.** Female mate selection in *Aedes aegypti* determines the immune performance and vector competence of their offspring for dengue virus (to be submitted August 2020) *Proceedings of the Royal Society B-Biological Sciences*.
5. Miazgowicz, K., Ryan, S., and **Murdock, C.C.** Rate summation fails to capture mosquito life history and malaria transmission characterized across constant environmental conditions. (to be submitted September 2020). *Ecology Letters*

Conference abstracts (not listed; 27 total oral and poster presentations)

Dr. Murdock has presented her research extensively at both national and international scientific meetings, including the Ecological Society of America, the American Society of Tropical Medicine and Hygiene, the Entomological Society of America, and the Ecology and Evolution of Infectious Diseases.

Technical reports

None.

Book reviews None.

Popular articles None.

Creative contributions other than Formal Publications

Online Databases

2016-present: Accumulating data that will eventually be contributed to the VectorBehavior in Transmission Ecology Research Coordination Network (VectorBiTE RCN) online platform. This RCN seeks to build collaborative networks of researchers working in vector-borne diseases to provide them with better tools and resources to better explore how variation in vector behavior and life history drive transmission dynamics. This RCN will provide an online database for published data on vector trait (including behavior and life history) variation (VecTrait) and for recording the spatially and temporally explicit presence / absence abundance data and density and dynamic data (VecDyn): <http://vectorbite.org/databases/>.

Conferences and Symposia Organized

- 2015: Participated in the organization of the annual Ecology and Evolution of Infectious Diseases Conference, Athens GA
- 2015: *Vector-borne Pathogens Session*. International One Health Congress, Amsterdam, Netherlands (Organizers: Rick Ostfeld and **Courtney Murdock**)
- 2013: *Thermal Biology of Mosquito Vectors of Disease: Ecology and Epidemiological Consequences*. Entomological Society of America MUVE Symposium in Austin, TX (Organizers: **Courtney Murdock** and Michael Reiskind).
- 2010: Coordinator for the Center for Infectious Disease Dynamics Seminar Series, Pennsylvania State University, State College, PA

- 2008: *Understanding the Human Microbiome* Symposium, University of Michigan, Ann Arbor MI (graduate student coordinator)
- 2008: Leader of a student group coordinating the American Congress of Epidemiology Conference, Tucson, AZ
- 2007: *Understanding the Human Microbiome* Symposium, University of Michigan, Ann Arbor MI (graduate student coordinator)

Collaborative Working Groups and Workshops

- 2019: World Health Organization Technical Consulting Meeting on the invasion of *Anopheles stephensi* into Africa. Geneva, Switzerland. Role: Organizers: Jan Kolaczinski; Role: Technical expert.
- 2019: *Assessing the Power of Rate Summation to Predict Performance in a Thermally Fluctuating Environment*. VectorBiTE RCN, Trento, Italy. Organizers: **Courtney Murdock** and Erin Mordecai.
- 2018: *Vector Life History Trade-offs and Consequences for Transmission*. VectorBiTE RCN, Alisomar, CA. Organizers: **Courtney Murdock**, Lauren Cator, Leah Johnson.
- 2017: *Assessing the Power of Rate Summation to Predict Performance in a Thermally Fluctuating Environment*. VectorBiTE RCN, Imperial College, UK. Organizers: **Courtney Murdock** and Erin Mordecai)
- 2017: *Human and Animal Health, Bioinformatics and Genomics Research Development Workshop*, Tiradentes, Brazil. Organizers Rafaella Fortnini Grenfell, Role: Participant.
- 2016: *Ecological Immunology: Applied to Vector Biology and Vector-borne Diseases* TriCEM Workshop, Raleigh, NC. Organizers Brian Lazzaro and Lyric Bartholomay, Role: Participant.

Convention Papers

*post-baccalaureate students, graduate students, and post-doctoral researchers and **undergraduate students advised by Dr. Murdock

Keynote and Plenary Addresses (3)

- 2019: 13th Annual NIAID Fellows Workshop, **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., Pathak, A., Shiau, J.***, Thomas, M.B., Reitmayer, C., Cator, L., and Harrington, L. *The role of the environment in shaping host-pathogen interactions, life history, and vector-borne diseases*. Baltimore, MD.
- 2017: American Society for Microbiology, *Microbes and Climate Change*, **Murdock, C.C.**, Thomas, M., Evans, M.*, Miazgowicz, K.*, and Tesla, B.* *Estimating vector-borne disease transmission in a human-modified world*, New Orleans, LA
- 2013: Society of Invertebrate Pathology, **Murdock, C.C.**, Paaajmans, K., Blanford, S., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *The role of environmental variability in shaping insect immunity and resistance*, Pittsburg, PA

Invited Symposium and Conference Talks (22)

- 2019: **Murdock, C.C.** and Pathak, A.*. *Estimating malaria transmission in an environmentally variable world: implications for control*. March Malaria Madness Meeting, Gainesville, University of Florida, FL.
- 2018: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, H., Brindley, M. *Temperature drives Zika virus transmission: evidence from empirical and mathematical models*. American Society of Tropical Medicine and Hygiene, New Orleans, LA.
- 2018: **Murdock, C.C.**, Evans, M.*, Miazgowicz, K.*, Tesla, B.*, Shiau, J.***, McClanahan, T.***, Solano, N***. *Estimating arbovirus transmission in the city: variation in microclimate and effects on*

- vectorial capacity* MPE3 Urban Environmental Sustainability in a Smart and Connected World. Athens, GA.
- 2018: *Invited speaker*, Experimental Biology Meeting, SCVP-ASIP Joint Symposium, *Vector-borne Diseases: Bridging Scales*. **Murdock C.C.**, Tesla, B.*, Evans, M.*, Miazgowicz, K.*, Shiau, J.***, Mordecai, E., and Brindley, M. *Experimental approaches to studying impacts of global climate change on mosquito-borne disease transmission* San Diego, CA (upcoming April 2018)
- 2018: *Invited speaker*, Population Biology of Vector-borne Diseases, *The effects of environmental variation on vector-virus interactions*, **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Bonds, M., Ngonghala, C., and Brindley M., University of Georgia, Athens, GA.
- 2018: *Invited speaker*, North American Black Fly Association Meeting, **Murdock, C.C.**, Evans, M.*, McClanahan, T.***, Miazgowicz, K.*, and Tesla, B.* *Estimating arbovirus transmission in the city: variation in microclimate and effects on vectorial capacity*, University of Georgia, Athens GA.
- 2017: *Invited speaker*, American Society of Tropical Medicine and Hygiene, *Science is Real: the Impacts of Climate Change on Vector-borne Diseases*. Miazgowicz, K.* and **Murdock, C.C.**, *Estimating vector-borne disease transmission in a variable world*, Baltimore, MD.
- 2017: *Invited speaker*, Entomological Society of America, *Insect Microclimates in a Changing World*. Evans, M.*, Jones, L.***, Solano, N.***, Drake, J., and **Murdock, C.C.** *Fine-scale microclimate variation across an urban landscape shaped both mosquito population dynamics and arbovirus transmission potential*, Denver, CO.
- 2017: Ecology and Evolution of Infectious Diseases, **Murdock, C.C.**, Evans, M.*, McClanahan, T.***, Miazgowicz, K*, and Tesla, B.* *Fine-scale variation in microclimate affects mosquito population dynamics and arbovirus transmission potential*, University of California, Santa Barbara, CA.
- 2017: Impact of Environmental Changes on Infectious Diseases, **Murdock, C.C.**, Evans, M.*, McClanahan, T.***, Miazgowicz, K*, and Tesla, B.* *Fine-scale variation in microclimate affects mosquito population dynamics and arbovirus transmission potential*, Triestes, Italy.
- 2017: *Invited Speaker*, Center for the Ecology of Infectious Diseases Annual Retreat, **Murdock, C.C.**, Thomas, M., Evans, M.*, Miazgowicz, K*, McClanahan, T.***, and Tesla, B.* *Estimating vector-borne disease transmission in an environmental variable world*, University of Georgia, Athens GA.
- 2016: *Invited speaker*, Science of Veterinary Medicine Symposium, **Murdock, C.C.** and Brindley, M. *Environmental drivers of Zika transmission and control*, University of Georgia, Athens GA.
- 2016: *Invited speaker*, International Congress of Entomology, *Ecoimmunology: Trade-offs in Immunity and Life History*, **Murdock C.C.**, Cator, L., George, J., Blanford, S., Pieteri, J., Ohm, J., Lewis, E., Luckhart, S., Baker, T., Read, A., and Thomas, M. *"Manipulation," but not as we know it: altered feeding behavior of mosquitoes is not dependent on malaria infection*, Orlando, FL
- 2016: *Invited speaker*, Cities, Climate Forcing, and Infectious Disease Dynamics, **Murdock, C.C.**, Miazgowicz, K.*, and Evans, M.* *Estimating vector-borne disease transmission in a variable world*, Delhi, India
- 2016: *Invited speaker*, Society of Integrative and Comparative Biology, *Beyond the Mean: Biological Impacts of Changing Patterns of Temperature Variation*, **Murdock, C.C.**, Thomas, M., Miazgowicz, K.*, Evans, M.*, McClanahan, T.***, and Tesla, B.* *Estimating vector-borne disease transmission in a thermally variable environment*, Portland, OR
- 2015: Impact of Environmental Changes on Infectious Diseases, **Murdock, C.C.**, Sternberg, E., and Thomas, M. *Diverse environmental drivers of malaria infection in Anopheles mosquitoes*, Sitges, Spain.
- 2015: *Co-chair*, International One Health Congress 2015, *Vector-borne Pathogens*, **Murdock, C.C.**, Sternberg, E., and Thomas, M. *Diverse environmental drivers of malaria infection in Anopheles mosquitoes*, Amsterdam, Netherlands.
- 2015: Parasitology and Vector Biology Meeting, Center for Tropical Global Emerging Diseases, **Murdock C.C.**, Sternberg, E., and Thomas, M. *Diverse environmental drivers of malaria infection in Anopheles mosquitoes*, University of Georgia, Athens GA.

- 2013: *Invited speaker*, Entomological Society of America, MUVE Symposium, *Thermal Biology of Mosquito Vectors of Disease: Ecology and Epidemiological Consequences*, **Murdock, C.C.**, Austin, TX.
- 2013: The European Science Foundation – European Molecular Biology Organization Meeting, *Integrated Insect Immunology: From Basic Biology to Environmental Applications*, **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Rethinking vector immunity: the role of the environment in shaping resistance*, Pultusk, Poland.
- 2013: *Invited speaker*, Research Coordination Network Ecoimmunology, **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, Blossin, Germany
- 2012: *Invited speaker*, International Consortium for Neglected Tropical Diseases, **Murdock C.C.**, Blanford, S., and Thomas, M. *Temperature has complex effects on mosquito immunity* London, United Kingdom

Invited Seminars at Universities and Institutes (20)

- 2019: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., Pathak, A.*, Shiau, J.***, Thomas, M.B., Reitmayer, C.*, Cator, L., and Harrington, L. *The role of the environment in shaping host-pathogen interactions, life history, and vector-borne diseases*. Cornell University, Ithaca, NY
- 2019: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., M., Evans, M.*, Solano, N.***, Shiau, J.***, Miazgowicz, K.*, McClanahan, T.***, Reitmayer, C.*, Cator, L., and Harrington, L. *In sickness and in health: mosquito love songs, mating behavior, and vector-borne disease transmission*. University of Illinois, Champaign, IL
- 2019: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., M., Evans, M.*, Solano, N.***, Shiau, J.*, Miazgowicz, K.*, McClanahan, T.***, *The role of the environment in shaping host resistance, life history, and vector-borne disease transmission*. University of Georgia, Odum School of Ecology, Athens GA
- 2019: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., M., Evans, M.*, Solano, N.***, Shiau, J.*, Miazgowicz, K.*, McClanahan, T.***, Reitmayer, C.*, Cator, L., and Harrington, L. *In sickness and in health: mosquito love songs, mating behavior, and vector-borne disease transmission*. University of Chicago, Chicago, IL.
- 2018: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, M., Evans, M.*, Solano, N.***, Shiau, J.***, Miazgowicz, K.*, McClanahan, T.***, Owen, H*. *Estimating vector-borne disease transmission in a human-modified world*. Clemson University, Clemson, SC.
- 2018: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., M., Evans, M.*, Solano, N.***, Shiau, J.***, Miazgowicz, K.*, McClanahan, T.***, Reitmayer, C.*, Cator, L., and Harrington, L. *In sickness and in health: mosquito love songs, mating behavior, and vector-borne disease transmission*. University of Georgia, Environmental Health, Athens, GA.
- 2018: **Murdock, C.C.**, Tesla, B.*, Demakovsky, L.*, Mordecai, E., Ryan, S., Ngonghala, C., Bonds, Brindley, M., M., Evans, M.*, Solano, N.***, Shiau, J.***, Miazgowicz, K.*, McClanahan, T.***, Reitmayer, C.*, Cator, L., and Harrington, L. *In sickness and in health: mosquito love songs, mating behavior, and vector-borne disease transmission*. North Carolina State University, Raleigh, NC
- 2018: **Murdock, C.C.** *The role of African green monkeys in the epidemiology of dengue and chikungunya transmission in St. Kitts, West Indies*, Ross University School of Veterinary Medicine, St. Kitts & Nevis

- 2017: **Murdock, C.C.**, Sternberg, E., Thomas, M., Miazgowicz, K.*, Evans, M.*, McClanahan, T.**, and Tesla, B. *Estimating vector-borne disease transmission in an environmental variable world*, Emory University, Atlanta, GA.
- 2016: **Murdock, C.C.**, Miazgowicz, K.*, Cator, L., Thomas, M., Evans, M.*, McClanahan, T.**, and Tesla, B.*, *The role of mosquitoes in vector-borne disease transmission*, Kennisaw State University, Kennisaw, GA
- 2015: **Murdock, C.C.**, Thomas, M., James, T., Brindley, M., Miazgowicz, M.*, Evans, M.*, McClanahan, T.**, and Tesla, B.*, *Influence of the environment on vector-borne disease transmission and control*, University of Georgia, Center for Tropical Emerging and Global Diseases, Athens GA.
- 2015: **Murdock, C.C.**, Sternberg, E., Thomas, M., Hughes, G., Rasgon, J., Evans, M.*, Miazgowicz, K.*, McClanahan, T.**, and Tesla, B.*, *Influence of the environment on vector-borne disease transmission and control*, Ross University School of Veterinary Medicine, St. Kitts and Nevis.
- 2015: **Murdock, C.C.**, Sternberg, E., Thomas, M., Miazgowicz, K.*, Evans, M.*, McClanahan, T.**, and Tesla, B. *Estimating vector-borne disease transmission in an environmental variable world*, University of Georgia, Department of Entomology, Athens GA.
- 2015: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, Georgia Regents University, Augusta, GA.
- 2015: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, Imperial College, Silwood Park campus, Ascot, United Kingdom.
- 2015: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, University of Georgia, Department of Infectious Diseases, University of Georgia, Athens GA
- 2014: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, Connecticut Agricultural Experiment Station, New Haven, CT.
- 2014: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, University of Georgia, Odum School of Ecology, University of Georgia, Athens GA.
- 2013: **Murdock, C.C.**, Paaijmans, K., Bell, S., Blanford, S., Moller-Jacobs, L., King, J., Hughes, G., Rasgon, J., Hillyer, J., Read, A., and Thomas, M. *Role of the environment in shaping host immunity and resistance: insights from the malaria system*, Department of Pathobiology, College of Veterinary Medicine, University of Wisconsin, Madison, WI.
- 2012: **Murdock, C.C.**, Paaijmans, K., Blanford, S., and Thomas, M. *Temperature has complex effects on mosquito innate immune function*, Imperial College, South Kensington campus, London, United Kingdom.

PROFESSIONAL OVERVIEW AND OBJECTIVES

The deadliest organism on the planet next to humans is the mosquito due to the many diseases it transmits. Among mosquito transmitted diseases, malaria is the leading killer, resulting in approximately 216 million cases and 500,000 deaths annually primarily in children under the age of 5. In addition to malaria, recent emerging infectious diseases (dengue, chikungunya, and Zika) are mosquito-borne

viruses. The ecology of the arthropod vector is central to the transmission of vector-borne diseases within wildlife and human populations and consequently, vector-borne disease transmission is strongly driven by variation in both abiotic and biotic environmental variables. Yet, we know very little mechanistically about how environmental variation impacts mosquito and pathogen fitness, the mosquito-pathogen interaction, transmission risk, disease dynamics, or the efficacy of interventions that target mosquito populations. These knowledge gaps significantly impair our ability to understand the factors governing disease emergence or re-emergence, the effects of climate and land use change on disease risk, and the success of novel interventions targeting the mosquito across variable environments. A consistent theme of my research has been the application of ecological and evolutionary theory to inform which knowledge gaps are crucial to fill, to improve the performance of predictive models of vector-borne disease transmission, as well as our disease management strategies. Research conducted in my group typically span multiple scales of ecological organization (from within-host processes up to population and community-level dynamics). Consequently, our research is trans-disciplinary and integrative, adopting theory and techniques from the fields of ecology, evolutionary biology, behavioral ecology, genetics, virology, parasitology, medical entomology, statistics, immunology, and mathematical modeling. My approach involves carefully designed, rigorous experiments in the lab and under semi-field conditions, combined with field studies and modeling to provide insight into relevant mechanisms driving mosquito-borne disease transmission in the field. I am very passionate about mentoring students at all levels of education and maintaining a diverse and inclusive research / teaching environment.