

SENAY YITBAREK, Ph.D.

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RESEARCH INTERESTS

I am generally interested in the role of spatial structure driving the ecology and evolution of infectious diseases and biological invasions. I test evolutionary and ecological theory by utilizing experimental evolution of laboratory populations, mathematical modeling of disease spread, and empirical studies of natural populations. My research contributes to infectious disease biology by jointly considering pathogen evolution and ecological feedbacks within spatially structured host populations.

EDUCATION

- 2016 Ph.D., Biology – Ecology and Evolutionary Biology, University of Michigan
Advisor: Dr. John H. Vandermeer
- 2011 M.S., Biology – Ecology and Evolutionary Biology, University of Michigan
Advisor: Dr. John H. Vandermeer
- 2008 B.A., Agricultural Ecology, University of California Berkeley
Advisor: Dr. Miguel Altieri
- 2006 Agricultural Exchange Program in Brazil, Federal University of Santa Catarina
- 2005 A.A., General Studies, Riverside Community College

ACADEMIC POSITIONS

2017 – present. **National Science Foundation Postdoctoral Fellowship in Biology**, Department of Integrative Biology. University of California Berkeley.
Advisor: Dr. Mike Boots

FELLOWSHIPS, HONORS, AND GRANTS

- 2019 **Gordon Research Conference Carl Storm Fellowship**, \$ 600
- 2018 **Vector Behavior in Transmission Ecological Research Network**, \$2000
- 2017 **Postdoctoral Research Fellowship in Biology**, National Science Foundation \$207,000.
- 2016 **Rackham One-Term Dissertation Fellowship**, University of Michigan \$10,200
- 2016 **IDEAS Research Exchange**, Princeton University \$3000
- 2015 **Invasion Ecology Research Exchange**, Colorado State University \$3000

- 2013 **Rackham Graduate Student Research Grant**, University of Michigan \$3000
- 2013 **Tinker Travel Grant**, University of Michigan \$1500
- 2013 **Rackham International Research Award**, University of Michigan \$6000
- 2011-15 **Rackham Summer Block Grant**, University of Michigan \$10,000 total.
- 2011 **Rackham Merit Fellowship**, University of Michigan \$63,252
- 2010 **Rackham Travel Grant**, University of Michigan \$ 1500
- 2010 **Alliances for Graduate Education and the Professoriate Grant**,
University of Michigan \$ 2500
- 2007 **Ronald E. McNair Scholarship Grant**, University of California Berkeley \$ 5000
- 2007 **Stronach Post-Baccalaureate Prize**, University of California Berkeley \$ 25000
- 2006 **Latin American Studies Travel Grant**, University of California Berkeley \$ 15000
- 2006 **US-Brazil Consortium** on Agricultural Ecology, USDA \$ 6000
- 2005 **Miller Scholarship Grant**, University of California Berkeley \$ 5000

PUBLICATIONS (* Denotes shared first authorship)

Yitbarek, S., Vandermeer, J.H. 2017. Reduction of species coexistence through mixing in a spatial competition model. *Theoretical Ecology*. 10: 443-450

Yitbarek, S., Vandermeer, J.H., and Perfecto, I. 2017. From insinuator to dominator: a unique mechanism for an exotic ant. *Diversity and Distributions*. 23:820-827

Vandermeer, J.* and **S. Yitbarek***(shared authorship). 2012. Self-organized spatial pattern determines biodiversity in spatial competition. *J. Theor.Biol.* 300: 48-56

Yitbarek, S., Vandermeer, J.H., and Allen, D. 2011. The Combined Effects of Exogenous and Endogenous Variability on the Spatial Distribution of Ant Communities in a Forested Ecosystem. *Ecol. Entomol.* 40: 1067-1073

Yitbarek, S. 2008. Reconsidering Invasive Grass and Mowing Impacts on Native Arthropod Populations in a Restored Grassland, *McNair Research Journal* 15: 143-162.

MANUSCRIPTS IN REVIEW/PRE-PRINTS

Yitbarek, S., Philpott S.P. (2018) Dominance hierarchies drive local twig-nesting ant abundance patterns in a tropical agroecosystem. *BioRxiv*. (doi:10.1101/442632)

Yitbarek, S., Vandermeer, J.H., I. Perfecto (2017). Parasite mediated competition facilitates invasion. *BioRxiv*. (doi: 10.1101/16725)

PRESENTATIONS

INVITED TALKS

2014: Arecibo Observatory, Puerto Rico

2019: The California Academy of Sciences, San Francisco

2019: Department of Botany, University of Wisconsin Madison

2019: Department of Ecology and Evolutionary Biology, Tulane University

2019: The Joint Berkeley Initiative for Microbiome Sciences, UC Berkeley

2019: Department of Entomology, UC Riverside

ORAL PRESENTATIONS

Yitbarek, S. Spatial competition of bacteriophages across different environments. Ecology Society of America Annual Meeting, New Orleans, LA. **August 2018**

Yitbarek, S. The Shuri Effect: A new generation of black ecologists? Ecology Society of America Annual Meeting, New Orleans, LA. **August 2018**

Yitbarek, S. Disease dynamics in invasive ants: The role of parasites in the global spread of the little fire ant *Wasmannia auropunctata*. Ecological Society of America Annual Meeting, Ft. Lauderdale, FL. **August 2016.**

Yitbarek, S. Reduction of species coexistence through mixing in a spatial competition model. Ecological Society of America Annual Meeting, Baltimore, MD. **August 2015.**

Yitbarek, S. Assembling Meta-Communities: Self-organized spatial mosaics maintain biodiversity. Summer Institute Symposium, Ann Arbor MI. **August 2011.**

Yitbarek, S. Ants in Space: Competitive intransitivity promotes mosaic pattern formation. EEB Theoretical Ecology Seminar, Ann Arbor, MI. **September 2010**

Yitbarek, S. Aquatic Subsidies Along a Sand Dune Ecosystem. University of Michigan Biological Station, Ann Arbor, MI. **August 2008.**

POSTER PRESENTATIONS

Yitbarek, S. Parasite mediated competition facilitates ant invasions. Ecology and Evolution of Infectious Disease, Santa Barbara, CA. **August 2017.**

Yitbarek, S. The combined effects of exogenous and endogenous variability on the spatial distribution of ant communities in a forested ecosystem. Ecological Society of America Annual Meeting, Pittsburgh, PA. **August 2010.**

TEACHING AND MENTORING EXPERIENCE

GUEST LECTURE

- 2015 **Guest lecturer**, Life decoded: Genomics in Society (**Bio 144**)
University of Michigan Ann Arbor.
- Taught undergraduates about evolution of insect reproductive systems.
- 2014 **Guest lecturer**, Deep Time: The Science of Origins (**Honors 242**).
University of Michigan Ann Arbor.
- Taught undergraduates about the origins of life including discussion on RNA evolution, origins of organic molecules, and fossil records.

COURSES

- 2015 **Teaching Assistant**, Life decoded: Genomics in Society (**Bio 144**).
University of Michigan Ann Arbor.
- Led weekly discussion sessions to non-biology majors, developed exams and evaluated student performances.
- 2014 **Teaching Assistant**, Deep Time: The Science of Origins (**Honors 242**).
University of Michigan Ann Arbor.
- Led weekly discussion sessions to LSA honors students covering materials in physics, astronomy, biology, and history of science.
- 2013 **Teaching Assistant**, Intro Biology (**EEB 173**). University of Michigan.
- Led weekly lab sessions to train students in basic lab skills including cloning by Plasmid & PCR. Developed exams and evaluated student performance.
- 2012 **Workshop Instructor**, Socio-Ecological Role-Playing Game. ECOSUR (Mexico)
- Co-taught a workshop on socio-ecological board gaming with indigenous farmers in Chiapas, Mexico. Developed quizzes and evaluated gaming strategies.
- 2011 **Teaching Assistant**, Intro Biology (**EEB 101**). University of Michigan.
- Led weekly discussion sessions to non-biology majors, developed exams, evaluated student performance.
- 2010 **Teaching Assistant**, Ecology and Evolution of Infectious Diseases (**EEB 315**).
- University of Michigan. Lectured at weekly review sessions, developed exams, evaluated student performance.

MENTORING

- 2017-18 **University of California, Berkeley**.
- I supervised two undergraduate students in their independent research projects using experimental evolution to study host-parasite interactions.

2011-16 **University of Michigan, Ann Arbor.**

- I supervised one undergraduate honors student in spatial modeling.
- I mentored two undergraduates from Puerto Rico in tropical field biology.
- I mentored one undergraduate student in invasion biology.

2008-12 **Diversity Recruitment Partnership, University of Michigan**

- I advised and mentored undergraduate students from Howard university, Morehouse College, Tuskegee university, University of Missouri at St. Louis, and the University of Puerto Rico about graduate school opportunities. I helped students design field projects and analyze their data at the E.S. George Reserve.

RESEARCH EXPERIENCE

2017 **Postdoctoral Research**, Department of Integrative Biology, University of California Berkeley.

Advisor: Mike Boots

- Research: *Disease evolution: The consequences of spatial structure and co-infection on virulence evolution*. I am utilizing experimental evolution and mathematical modeling approaches to understand co-infection dynamics in spatially structured host populations.

2011-16 **Doctoral research**: Department of Ecology & Evolutionary Biology, University of Michigan Ann Arbor.

Advisor: John H. Vandermeer

- Research: *Population level consequences of spatial networks: Species coexistence and implications for invasive species*. I developed spatial network models to understand species coexistence patterns and conducted field experiments in Mexico and Puerto Rico to study biological ant invasions.

2008-10 **Master's research**: Department of Ecology & Evolutionary Biology, University of Michigan Ann Arbor.

Advisor: John H. Vandermeer

- Research: *The combined effects of exogenous and endogenous variability on the spatial distribution of ant communities*. I conducted field experiments in a temperate forest reserve in Michigan that examined the role of biotic and abiotic factors in determining the distribution of ground foraging and arboreal ant species.

2006-7 **Undergraduate Research**: McNair Scholars Program, the University of California Berkeley.

Advisor: Stephen Welter

- Research: *The role of invasive species management on the diversity of native arthropod communities*. I conducted field experiments to assess the impacts of mowing of invasive plants species on native arthropod communities.

SCIENCE OUTREACH AND SERVICE

- 2018 **Member, Committee Diversity and Education, Ecological Society of America**
Developing a Strategic Plan and educational programming related to raising public awareness and understanding of ecology.
- 2017 **Panelist, Ecological Society of America Annual Meeting, New Orleans, Strategies for Ecology, Education, Diversity, and Sustainability Minority Ecologists Forum**
As a panel member, representing the Black Ecologists Section in the Ecological Society of America (ESA), I shared my experiences on my career path as a minority scientist. In collaboration with partner sections, I developed ideas to increase and strengthen diversity within ESA as a society.
- 2016-present **Founding member and Current Chair, Black Ecologists Section**
Serving the professional, social, and cultural interests of black ecologists.
- 2015-16 **Volunteer, Bio-blitz at D-Town Farm in Detroit, Michigan**
Conducted biological surveys on a 5-acre organic farm owned by the Detroit Black Farmers to help guide small groups of African-American students in identifying variety of species present on the farm.
- 2009-10 **Ambassador, National Center for Institutional Diversity**
Talked to undergraduates at Penn State University (PA) and Eastern Michigan University (MI) about applying to and thriving in graduate school.

PROFESSIONAL SERVICE AND MEMBERSHIPS

COMMITTEE WORK

- 2016 **Early Career Scientist Symposium Scientific Committee, University of Michigan**
Graduate student representative of early career scientific committee on the topic of eco-evolutionary community assembly processes. Assisted in nominating and selecting symposium speakers, programming symposium, and facilitating discussion among panel and audience members.
- 2011 **Graduate Student Representative, EEB Diversity Committee**
Helped write NSF-funded summer research program (ED-QUEST) for first and second-year college students from backgrounds under-represented in ecology and evolutionary biology.

REVIEWER:

PLOS ONE, Journal of Animal Ecology, Ecology

SOCIETY MEMBERSHIP:

Ecological Society of America, The Society for the Study of Evolution

SYMPOSIA ORGANIZED

- 2018 **“Averting The Tragedy of the Commons: Critical feedbacks across scales from Microbes to Humans”**, Ecological Society of America Annual Meeting, New Orleans
- 2018 **“Evolutionary Epidemiology Across Multiple Scales”**, Joint Congress on Evolutionary Biology, Montpellier.

WORKSHOPS ATTENDED

- 2018 **NextProf Science: Future Faculty Workshop**, Ann Arbor, Michigan.
- 2017 **Vector Behavior in Transmission Ecology**, Imperial College in London, UK.
Infectious Disease Evolution Across Scales, New Orleans, Louisiana.
- 2014 **Animal Social Networks NIMBios**, Knoxville, Tennessee.

MISCELLANEOUS SKILLS

Computer: Python, Matlab, R, Mathematica, Markdown, HTML

Languages: Tigrinya (Native), Dutch (Native), English (Proficient), German (Proficient), Spanish (Proficient), Portuguese (Proficient).