

# SENAY YITBAREK, Ph.D.

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## RESEARCH INTERESTS

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I am interested in incorporating spatial structure into the epidemiology, ecology, and evolution of infectious diseases. I test evolutionary and ecological theory by utilizing experimental evolution of laboratory populations, mathematical modeling of disease spread, and empirical studies of disease invasions. My research contributes to infectious disease biology by jointly considering pathogen evolution and epidemiological dynamics within spatially structured host populations.

## EDUCATION

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2016 Ph.D., Biology – Ecology and Evolution, University of Michigan Ann Arbor

2011 M.S., Biology – Ecology and Evolution, University of Michigan Ann Arbor

2008 B.A., Natural Resources – Ecology, University of California Berkeley

## ACADEMIC POSITIONS

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2017 - **Postdoctoral Fellow**, National Science Foundation Postdoctoral Fellowship in Biology, Department of Integrative Biology. University of California Berkeley.

## FELLOWSHIPS, HONORS, AND GRANTS

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2017 **Postdoctoral Research Fellowship in Biology**, National Science Foundation

- 2016 **Rackham One-Term Dissertation Fellowship**, University of Michigan
- 2016 **IDEAS Research Exchange**, Princeton University
- 2015 **Invasion Ecology Research Exchange**, Colorado State University
- 2013 **Rackham Graduate Student Research Grant**, University of Michigan
- 2013 **Tinker Travel Grant**, University of Michigan
- 2013 **Rackham International Research Award**, University of Michigan
- 2011 **Rackham Summer Block Grant**, University of Michigan
- 2011 **Rackham Merit Fellowship**, University of Michigan
- 2010 **Rackham Travel Grant**, University of Michigan
- 2010 **Alliances for Graduate Education and the Professoriate**
- 2007 **Ronald E. McNair Scholarship Grant**, University of California
- 2007 **Stronach Post-Baccalaureate Prize**, University of California
- 2006 **Latin American Studies Travel Grant**, University of California
- 2006 **US-Brazil Consortium** on Agroecology and Rural Development, USDA
- 2005 **Miller Scholarship Grant**, University of California

## **PUBLICATIONS** (\* Denotes shared first authorship)

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### **PEER-REVIEWED JOURNAL ARTICLES**

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

**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\***. 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, *Ronald E. McNair Research Journal* 15: 143-162.

## **MANUSCRIPTS IN REVIEW**

**Yitbarek, S.,** Perfecto I., Vandermeer J.H. Homage to the homeland: ecological dominance of the little fire ant *W. auropunctata* varies between its native and introduced range. *In Review at the American Naturalist*

**Yitbarek, S.,** Philpott S.P. Dominance hierarchies drive local twig-nesting ant abundance patterns in a tropical agroecosystem. *In Review at Biotropica*

## **MANUSCRIPTS IN PREPARATION (Available Upon Request)**

**Yitbarek, S.,** Vandermeer J.H., Perfecto I. Parasite mediated competition facilitates invasion. *BioRxiv*

## **PRESENTATIONS**

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### **INVITED TALKS**

**S. Yitbarek.** Space invaders: “Houston, we found the electric fire ant”. Arecibo Observatory, Puerto Rico, **April 2014.**

## **ORAL PRESENTATIONS**

**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, Ft. Lauderdale, FL. **August 2016.**

**Yitbarek, S.** Reduction of species coexistence through mixing in a spatial competition model. Ecological Society of America, 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, Pittsburgh, PA. **August 2010.**

## **TEACHING AND MENTORING EXPERIENCE**

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## TEACHING

- 2014 **Guest lecturer**, Deep Time: The Science of Origins (**Honors 242**).  
University of Michigan Ann Arbor.  
Taught students about the origins of life including discussion on RNA evolution, origins of organic molecules, and fossil records.
- 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.
- 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 **University of California**. I supervised two undergraduate students in their independent research projects using experimental evolution to study disease dynamics.
- 2011-16 **University of Michigan**.
- I supervised one undergraduate honors student.
  - I mentored two undergraduates from Puerto Rico in Tropical field biology/community ecology.
  - 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, Moore house 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

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- 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 coinfection 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 test theories of community structure using ant species.
- 2008-10 **Masters research**: Department of Ecology & Evolutionary Biology, University of Michigan Ann Arbor.  
Advisor: John H. Vandermeer  
Research: *The combined effect of exogenous and endogenous variability on the spatial distribution of ant communities*. I conducted field experiments in a temperate forest reserve located 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:** Ronald E 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

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- 2017     **Panelist, ESA SEEDS 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 scientists. In collaboration with partner sections, I developed ideas to increase and strengthen diversity within ESA as a society.
- 2016     **Founding member, International Association of Black Ecologists**  
Serving the professional, social, and cultural interests of black ecologists.
- 2015-16   **Volunteer, Bio-blitz at D-Town Farm in Detroit, Michigan**  
Visit a 5-acre organic farm in Detroit to help guide small groups of 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

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### 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-QUE<sup>2</sup>ST) for first and second year college students from backgrounds under-represented in ecology and evolutionary biology.

**SOCIETY MEMBERSHIP:** Ecological Society of America, The Society for the Study of Evolution.

## **WORKSHOP ATTENDED**

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- 2017      **Vector Behavior in Transmission Ecology**, Imperial College in London, UK.  
**Infectious Disease Evolution Across Scales**, New Orleans, Louisiana.
- 2014      **Animal Social Networks**, NIMBios at University of Tennessee, Knoxville.

## **MISCELLANEOUS SKILLS**

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**Computer:** Python, Matlab, R, Mathematica, Markdown, HTML, Adobe Photoshop, MicroSoft Office Suite.

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





