

## Annette Ostling

Ecology and Evolutionary Biology  
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### **Education**

- PhD *University of California, Berkeley*, Energy and Resources, December 2004  
Advisor: Prof. John Harte  
Dissertation Title: Development and tests of two null theories of ecological communities: a fractal theory and a dispersal-assembly theory.
- MS *University of Illinois, Urbana-Champaign*, Physics, 1999  
Advisor: Prof. Robert Leigh  
Dissertation Title: The propagator for graviton modes in supergravity on  $AdS_5 \times S^5$
- AB *Columbia University*, Physics, 1994

### **Professional Experience**

- Associate Director*, Michigan Institute for Computational Discovery and Engineering (MICDE), University of Michigan, 2016-2019.
- Miller Institute Visiting Professor*, Integrative Biology, University of California, Berkeley (Feb-Mar 2016) (hosted by David Ackerly)
- Visiting Researcher*, Center for Macroecology, Evolution, and Climate, University of Copenhagen (Fall 2015-Spring 2016)
- Associate Professor*, Department of Ecology and Evolutionary Biology, University of Michigan. 2014-present.
- Assistant Professor*, Department of Ecology and Evolutionary Biology, University of Michigan. 2006-2014.
- Faculty Associate*, Program in the Environment, University of Michigan, Fall 2008 to 2015.
- Council on Science and Technology Postdoctoral Fellow*, Department of Ecology and Evolutionary Biology, Princeton University, Mentor: Simon Levin. December 2004- June 2006.

### **Fellowships and Academic Awards**

- Princeton Univ. Council on Science and Technology Postdoctoral Teaching Fellowship. 2004-2006.
- UC Berkeley President's Postdoctoral Fellowship Program: Finalist. 2004.
- EPA STAR Graduate Fellowship. 2003-2004.
- Santa Fe Institute Complex Systems Summer School Fellowship. 2001.
- Department of Education GAAN Fellowship. 1995-1996.
- NSF Graduate Fellowship Competition: Commended. 1996.
- NSF REU Summer Program, UC Irvine Physics Department. 1993.

### **Grants**

- LSA Associate Professor Support Fund (\$100,000) Building theory of the consequences of large-scale biodiversity loss. (July 1, 2016 – June 30, 2018).

- NSF Advancing Theory in Biology (ATB) (\$478,668.00) Niche versus neutral structure in populations and communities. (September, 2010– September, 2016)
- XSEDE (680,000 computing hours on Condor Pool at Purdue), Niche versus neutral structure in populations and communities. January 1, 2013- January 1, 2014.
- IBM Equipment Grant through the University of Michigan (\$28,635) A teaching initiative in ecological modeling and computation, and the development of a new tool for community ecology research. (June, 2011)
- Rackham Graduate School (\$17,000) The impact of spatial structure on the evolution of species interactions. (September, 2008 – September, 2009)
- NSF Advance at the University of Michigan, Elizabeth Caroline Crosby Research Grant (\$15,000) Towards a General Theory of Fitness-Equalized Communities. (October, 2006 – December, 2007)

### Publications

(\* , \*\* , \*\*\* =Postdoc, Graduate Student, Undergraduate Student (respectively) advised by Ostling)

#### *In Review/Revision*

- Rael, R\* , R D'Andrea\*\* , G Barabás\*\* , and **A Ostling** (In Revision) Emergent niches lead to greater differences between niche and neutral species abundance distributions. *Ecology*. [pdf](#)
- Ostling, A**, J K Lake\* , G Chong\*\*\* , J Winters\*\*\* , X Li\*\*\* , C Weinberger\*\*\* , and R Rael\* (In Revision) Test of a size-structured neutral theory of biodiversity. *Ecology*. [pdf](#) [supp](#)
- D'Andrea, R\*\* and **A Ostling** (In Review) Niche differentiation does not guarantee higher species diversity, longer lifetimes, or lower extinction rates. *Ecology*.

#### *In Press or Published (36 total)*

- D'Andrea, R\*\* and **A Ostling** (2016) Challenges in linking trait patterns to niche processes. *Oikos* 125:1369. DOI: [10.1111/oik.02979](https://doi.org/10.1111/oik.02979).
- Fukami T, Mordecai EA, and Ostling A (2016) A framework for priority effects. *Journal of Vegetation Science* 27: 655-657. DOI: [10.1111/jvs.12434](https://doi.org/10.1111/jvs.12434)
- D'Andrea, R\*\* and **A Ostling** (2016) Can clustering in genotype space reveal "niches"? *American Naturalist* 187:130-135. DOI:[10.1086/684116](https://doi.org/10.1086/684116)
- Barabás, G\*\* , L Pásztor, G Meszéna and **A Ostling** (2014) Community-wide sensitivity analysis: theory and application. *Ecology Letters* (Ideas & Perspectives piece) 17:1479-1494  
DOI:[10.1111/ele.12350](https://doi.org/10.1111/ele.12350) [pdf](#)
- Marquet PA, AP Allen, JH Brown, J Dunne, BJ Enquist, J Gillooly, PA Gowaty, JL Green, D Storch, J Harte, SP Hubbell, J O'Dwyer, J Okie, M Ritchie, **A Ostling**, and GB West (2014) On theory in ecology. *Bioscience* 64:701-710. DOI:[10.1093/biosci/biu098](https://doi.org/10.1093/biosci/biu098) [pdf](#)
- Barabás, G\*\* , G Meszéna, and **A Ostling** (2014) Fixed point sensitivity analysis of interacting structured populations. *Journal of Theoretical Biology* 92:97-106. DOI:[10.1016/j.tpb.2013.12.001](https://doi.org/10.1016/j.tpb.2013.12.001) [pdf](#)
- Messinger, S\*\* and **A Ostling** (2013) Predator evolution in space: Novel effects of predator and prey ecology on the predator's attack rate. *Theoretical Population Biology* 89:55-63. DOI: [10.1016/j.tpb.2013.08.003](https://doi.org/10.1016/j.tpb.2013.08.003) [pdf](#) [supplemental animation 1](#) [supplemental animation 2](#) [supplemental animation 3](#)
- Barabas, G\*\* and **A Ostling** (2013) Community robustness in periodic environments for discrete-time dynamics. *Ecological Complexity* 15:122-130. DOI: [10.1016/j.ecocom.2013.07.001](https://doi.org/10.1016/j.ecocom.2013.07.001) [pdf](#)

- Barabás, G<sup>\*\*</sup>, R D'Andrea<sup>\*\*</sup>, R Rael<sup>\*</sup>, G Meszéna, and **A Ostling** (2013) Emergent neutrality or hidden niches? *Oikos* 122:1565-1572. [pdf](#) DOI: [10.1111/j.1600-0706.2013.00298.x](https://doi.org/10.1111/j.1600-0706.2013.00298.x), reply DOI: [10.1111/j.1600-0706.2013.00790.x](https://doi.org/10.1111/j.1600-0706.2013.00790.x)
- Sedio, B<sup>\*\*</sup> and **A Ostling** (2013) How specialized must natural enemies be to facilitate coexistence among plants? *Ecology Letters* 16:995-1003 [pdf](#) DOI: [10.1111/ele.12130](https://doi.org/10.1111/ele.12130) *Online publication date: June, 2013* (Note Sedio is advised by C. Dick, but I served on his dissertation committee and was his main advisor for this theoretical paper.)
- D'Andrea, R<sup>\*\*</sup>, G Barabás<sup>\*\*</sup>, and **A Ostling** (2013) Revising the tolerance-fecundity tradeoff, or On the consequences of discontinuous resource use. *American Naturalist* 181: E91-E101. DOI: [10.1086/669902](https://doi.org/10.1086/669902) [pdf](#) [supp\\_appA](#) [supp\\_appB](#) [supp\\_appC](#) [supp\\_appD](#)
- Messinger, S<sup>\*\*</sup> and **A Ostling** (2013) The influence of host reproduction, host death, and pathogen virulence on the evolution of pathogen transmission in a spatial context. *Evolutionary Ecology* 27:353-380. DOI: [10.1007/s10682-012-9594-y](https://doi.org/10.1007/s10682-012-9594-y) [pdf](#) *Online publication: August, 2012.*
- Barabás, G<sup>\*\*</sup>, R D'Andrea<sup>\*\*</sup>, and **A Ostling** (2013) Species packing in nonsmooth competition models. *Theoretical Ecology* 6: 1-19. DOI: [10.1007/s12080-011-0151-z](https://doi.org/10.1007/s12080-011-0151-z) [pdf](#) *Online publication: January, 2012.*
- Zhang, D Y, B Y Zhang, K Lin, X Jiang, Y Tao, S Hubbell, F He, and **A Ostling** (2012) Demographic tradeoffs determine species abundance and diversity. *Journal of Plant Ecology* 5:82-88. DOI: [10.1093/jpe/rtr039](https://doi.org/10.1093/jpe/rtr039) [pdf](#)
- Ostling, A** (2012b) Large-scale spatial synchrony and the stability of forest biodiversity revisited. *Journal of Plant Ecology* 5:52-63. DOI: [10.1093/jpe/rtr035](https://doi.org/10.1093/jpe/rtr035) [pdf](#) *Recommended by Faculty of 1000.*
- Barabás, G<sup>\*\*</sup>, G Meszéna, and **A Ostling** (2012) Community robustness and limiting similarity in periodic environments. *Theoretical Ecology* 5:265-282. DOI: [10.1007/s12080-011-0127-z](https://doi.org/10.1007/s12080-011-0127-z) [pdf](#) *Online publication date: May 2011.*
- Ostling, A** (2012a) Do fitness-equalizing tradeoffs lead to neutral communities? *Theoretical Ecology* 5:181-194. DOI: [10.1007/s12080-010-0107-8](https://doi.org/10.1007/s12080-010-0107-8) [pdf](#) [supplementary material](#) *Online publication date: Jan, 2011.*
- Brym, Z T<sup>\*\*\*</sup>, J K Lake<sup>\*</sup>, Allen, D, and **A Ostling** (2011) Plant functional traits suggest novel ecological strategy for an invasive shrub in an understory woody plant community. *Journal of Applied Ecology* 48: 1098-1106. DOI: [10.1111/j.1365-2664.2011.02049.x](https://doi.org/10.1111/j.1365-2664.2011.02049.x) [pdf](#)
- Lake, J K<sup>\*</sup>, and **A Ostling** (2009) Comment on: Functional Traits and Niche-Based Tree Community Assembly in an Amazonian Forest. *Science* 324:1015-c. [pdf](#) [kraft reply](#) [original kraft article](#)
- Messinger, S<sup>\*\*</sup> and **A Ostling**. (2009) The consequences of spatial structure for pathogen evolution. *The American Naturalist* 174:441-454. [pdf](#)
- Morlon, H, White, E, Etienne, R, Green, J, **Ostling, A**, Alonso, D, Enquist, B, He, F, Hurlbert, A, Magurran, A, Maurer, B, McGill, B, Olf, H, Storch, D, and T Zillio (2009) Taking species abundance distributions beyond individuals. *Ecology Letters* 12:488-501. [pdf](#)
- O'Dwyer, J P, J K Lake<sup>\*</sup>, **A. Ostling**, V M Savage, and J L Green (2009) An integrative framework for stochastic, size-structured community assembly. *PNAS* 106:6170-6175. [pdf](#) [supplemental](#) *Recommended by Faculty of 1000.*
- Ballantyne, F, D Menge, **A Ostling**, and P Hosseini. (2008) Nutrient recycling affects autotroph and ecosystem stoichiometry. *American Naturalist* 171: 511-523. [pdf](#)
- Alonso, D<sup>\*</sup>, **A Ostling**, and R Etienne. (2008) The assumption of symmetry and species abundance

- distributions. *Ecology Letters* 11:93-105. [pdf](#) [sup1](#) [sup2](#) (Note authorship on this paper was ordered by our relative contributions.)
- McGill, B, R S Ettiene, J Gray, D Alonso, M J Anderson, H K Benecha, M Dornelas, B J Enquist, J L Green, F He, A Hurlbert, A E Magurran, P A Marquet, B A Maurer, **A Ostling**, C U Sokyan, K Ugland, and E White (2007) Species abundance distributions: Moving beyond single prediction theories to integration within an ecological framework. *Ecology Letters* 10: 995-1015. [pdf](#)
- Carey, S, **A Ostling**, J Harte, and R del Moral. (2007) Impact of curve construction and community dynamics on the species-time relationship. *Ecology* 88: 2145-2153. [pdf](#)
- Ostling, A** (2005) Neutral theory tested by birds. *Nature* 436: 635. (News and Views) [pdf](#)
- Harte, J, E Conlisk, **A Ostling**, J L Green, and A B Smith. (2005) A theory of spatial-abundance and species-abundance distributions in ecological communities at multiple spatial scales. *Ecological Monographs* 75: 179-197. [pdf](#)
- Harte, J, **A Ostling**, J L Green, and A P Kinzig. (2004) Climate Change and Extinction. *Nature* 430: Brief Communications. [pdf](#)
- Ostling, A**, J Harte, J L Green, and A P Kinzig. (2004) Self-similarity, the power-law form of the species-area relationship, and a probability rule: A reply. *The American Naturalist* 163: 627-633. [pdf](#)
- Brose, U, **A Ostling**, K Harrison, and N D Martinez. (2004) Unified spatial scaling of species and their trophic interactions. *Nature* 428:167-171. [pdf](#)
- Green, J L, and **A Ostling**. (2003) Endemics-area relationships: the influence of species dominance and spatial aggregation. *Ecology* 84: 3090-3094. [pdf](#)
- Ostling, A**, J Harte, J L Green, and A P Kinzig. (2003) A community-level fractal property produces power-law species-area relationships in nature. *Oikos* 103: 218-224. [pdf](#)
- Green, J L, J Harte, and **A Ostling**. (2003) Species richness, endemism and abundance patterns: tests of two fractal models in a serpentine grassland *Ecology Letters* 6: 919-928. [pdf](#)
- Harte, J, T Blackburn, and **A Ostling**. (2001) Self-similarity and the relationship between abundance and range size. *The American Naturalist* 157:374-386. [pdf](#)
- Green, J L, J Harte, and **A Ostling**. (2001) Global warming, temperature homogenization and species extinction, in *Biotic Homogenization*, Lockwood, J. and M. McKinney, editors, Kluwer Academic/Plenum Publishers (2001). [pdf](#)
- Ostling, A**, J Harte, and J L Green. (2000) Self-similarity and clustering in the spatial distribution of species -Technical Comment. *Science* 290:671a. [pdf](#) [Condit article](#)
- Sardesai M, C Figge, M Bodner, M Crosby, J Hansen, J A Quillfeldt, S Landau, **A Ostling**, S Vuong, and G L Shaw. (2001) Reliable short-term memory in the trion model: toward a cortical language and grammar. *Biological Cybernetics* 84:173-182.

### Invited Talks

- Applied and Interdisciplinary Mathematics Seminar, University of Michigan, October 2016
- Network for Ecological Theory Integration, Santa Fe Institute, September 2016
- Status and Evaluation of Theory in Ecology, ESA Symposium, August 2016
- Section for Ecology and Evolution seminar, University of Copenhagen, April 2016
- Miller Institute Lunch Talk, Miller Institute, UC Berkeley, March 2016
- Advancing Ecological Theory for Conservation Biology, ESA Symposium, August 2014

Theory vs. empiricism in the advancement of science, ESA Ignite Session, August 2014  
 Michigan State University Kellogg Biological Station, April 2013.  
 University of Connecticut, Department of Ecology and Evolutionary Biology, March 2013.  
 Gordon Conference on Metabolic Ecology, July 2012.  
 Oakland University, Michigan, October 2011.  
 International Symposium for Biodiversity and Theoretical Ecology, Sun Yat Sen University, Guangzhou, China, May 2011.  
 Case Western Reserve University, Department of Biology, March 2011.  
 University of Copenhagen, Center for Macroecology, Climate, and Conservation, September 2010.  
 University of California, Los Angeles, Department of Biomathematics, May 2010.  
 National Center for Ecological Analysis and Synthesis (NCEAS) EcoLunch, May 2008.  
 Department of Environmental Science, Policy, and Management, University of California, Berkeley, 2005.  
 Department of Ecology and Evolutionary Biology, University of Michigan, 2005.  
 Institute of Ecosystem Studies, Milbrook, NY, 2004.  
 Young Scientists Symposium on Spatial Ecology, Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, 2004.  
 McGill Centre for Bioinformatics. McGill University, Canada, 2004.  
 75<sup>th</sup> Anniversary Symposium of the Rocky Mountain Biological Laboratory: Gunnison Basin as a Model Ecosystem, Mt. Crested Butte, CO, 2003.  
 Meeting of the Association for Tropical Biology. Panama City, Panama, 2002.  
 Institute for Theoretical Physics, UC Santa Barbara, Program on Statistical Physics and Biological Information, 2001.

### **Symposia Organized**

*Towards a trait-based understanding of coexistence under competition for light in forest communities* (J. Lake co-organizer). Organized Oral Session at the Annual Meeting of the Ecological Society of America 2010.

[http://eco.confex.com/eco/2010/preliminaryprogram/session\\_5346.htm](http://eco.confex.com/eco/2010/preliminaryprogram/session_5346.htm)

*Niche versus neutral: a look at an iconic idea in community ecology, its challenger, and the middle ground, Parts I and II* (co-organizer with N. Sanders and J. Lake). Symposium and Organized Oral Session at the Annual Meeting of the Ecological Society of America, 2006.

<http://www.esa.org/memphis/daySchedule4.php>

**Invited Workshops** (Gave at least informal presentations at each. Led body size and neutral theory subgroup at *Unifying Current Theories of Ecology* working group.)

*Information and Entropy in Biological Systems*, National Institute for Mathematical and Biological Sciences (NIMBIOS), TN in April 2015

*Network for Ecological Theory Integration*, Chile, October 2014, Santa Fe Institute, September 2016.

*UKPopNet Biodiversity Up-scaling Workshop*, University of Leeds, UK, 2009.

*Towards a Unified Theory of Biodiversity*. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA, 2007, 2008.

*Unifying Current Theories of Ecology*. Santa Fe Institute, Santa Fe, New Mexico, 2006.

*Tools and fresh approaches for species abundance distributions.* National Center for Ecological Analysis and Synthesis (Working Group), Santa Barbara, CA, 2006, 2007, 2008.

### **Contributed Talks and Posters at National or International Meetings**

My lab has contributed over 30 talks to National or International Meetings since 2008. A complete list is available upon request.

### **Student and Postdoctoral Mentoring**

Current Postdoc: Dexiecuo Ai

#### Former Personnel:

*Postdocs:* Rosalyn Rael (Postdoctoral Fellow, Tulane University), [Jeffrey Lake](#) (Assistant Professor, Adrian College, MI), [David Alonso](#) (Research Scientist, Center for Advanced Studies of Blanes, Spain).

*Graduate Students:* Rafael D'Andrea (Postdoctoral Fellow, University of Illinois), György Barabás (Postdoctoral Fellow, University of Chicago), Judy Wan, Brian Sedio (not advised, but Ostling lab affiliate, Tupper Fellow, Smithsonian Tropical Research Institute), [Susanna Messinger](#) (Yale University, Gaylord Donnelly Postdoctoral Fellowship)

*Undergraduates:* Josh Winters (Engineering CS concentration, EEB minor, Just started position as Software Engineer, Silicon Laboratories, but continues to consult for lab), Devin Riley (Math concentrator, Statistics minor), Cody Weinberger (University of Chicago), Kyle Anderson (Graduate Student, International Agricultural Development MS Program, UC Davis), Xinxin Li (Graduate Student, Environmental Health, UNC Chapel Hill), Jingyuan Li, Daniel Cummins, Chang Gong (Graduate Student, Department of Computational Medicine & Bioinformatics, University of Michigan), Petrina Smith, Todd Baker, Sreya Vempatti, [Zachary Brym](#) (Graduate Student, Department of Biology, Utah State), Carlin Ziska (Program Coordinator and Resource Specialist, Peace Corps), Andrea Maguire (Graduate Student, Plant Biology, Michigan State University).

*Highschool students:* Shan Kothari (Graduated from MSU), Kristin Hayden

### **Teaching**

*Modeling for Ecology and Evolutionary Biology.* Department of Ecology and Evolutionary Biology, University of Michigan, Winter 2012, 2013, 2014, 2015.

*General Ecology.* Department of Ecology and Evolutionary Biology, University of Michigan, Winter 2008-2014 (3 terms co-instructor, 4 terms sole instructor).

*Population and Community Ecology.* Department of Ecology and Evolutionary Biology, University of Michigan, (co-taught with Mercedes Pascual) Fall 2006, (sole instructor) Fall 2008, (sole instructor) Fall 2014.

*Population and Community Ecology* (lecturer, lead instructors S. Levin and A. Dobson). Department of Ecology and Evolutionary Biology, Princeton University. 3 lectures in Fall, 2005 and 1 lecture in Fall, 2004.

*Quantitative Aspects of Global Environmental Problems* (graduate student instructor, lead instructor J. Harte) Energy and Resources Group, University of California, Berkeley, Spring 2003.

Physics Courses ranging from *Practical Physics: How Things Work- A Course for Nonscientists* to *General Field Theory* (graduate student instructor). Department of Physics, University of Illinois at Urbana-Champaign. 6 semesters during 1995-1999.

### **External Service/Editorial/Referee Activities**

Currently Chair of the Theoretical Ecology Section of the Ecological Society of America (ESA).

Currently an Editor for *Ecology Letters*. Will serve as Associate Editor for *Theoretical Population Biology*, with term beginning January 1<sup>st</sup>, 2017.

Reviewed for *American Naturalist*, *Ecography*, *Ecological Complexity*, *Ecology*, *Ecology Letters*, *Evolutionary Ecology*, *Journal of Theoretical Biology*, *Journal of Statistical Physics*, *Journal of Vegetation Science*, *Journal of Zoology*, *Nature*, *Oecologia*, *Oikos*, *PLoS Computational Biology*, *PLoS ONE*, *Proceedings of the National Academy of Sciences*, *Science*, *Proceedings of the Royal Society B*, *Theoretical Population Biology*, and *Trends in Ecology and Evolution*.

Served on 3 NSF panels: 2009 Population and Community Ecology Panel, 2011 Advancing Theory in Biology Panel, 2012 Population and Community Ecology Pre-proposal Panel.

### **Outreach**

Summer 2011, 2012. Ran week-long focus group on Ecology for University of Michigan's Women in Science and Engineering (WISE) Girls in Sciences and Engineering (GISE) summer camp.