William Randolph Shoemaker

NSF Postdoctoral Fellow
The Abdus Salam International Centre for Theoretical Physics
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Education

Indiana University Bloomington 2014-2020

Ph.D. Major: Biology – Evolution, Ecology, and Behavior Program

Minor: Bioinformatics

Advisor: Dr. Jay T. Lennon

James Madison University 2010-2014

B.S. Major: Biology

Advisor: Dr. Reid N. Harris

Professional Experience

The Abdus Salam International Centre for Theoretical Physics (ICTP)

NSF Postdoctoral Fellow, Quantitative Life Sciences 2022 - Present

Advisor: Dr. Jacopo Grilli

University of California, Los Angeles

NSF Postdoctoral Fellow, Department of Ecology and Evolutionary Biology 2020 - 2022

Advisor: Dr. Nandita R. Garud

Preprints and In Review

Shoemaker, W.R. and J. Grilli. Macroecological patterns in coarse-grained microbial communities. bioRxiv doi: https://doi.org/10.1101/2023.03.02.530804. 2023.

Schwartz, D.A., **W.R. Shoemaker**, Magalie, A., Weitz, J., and J.T. Lennon. Coevolution with a seed bank. bioRxiv doi:https://doi.org/10.1101/2023.02.08.527722. 2023.

Shoemaker, W.R. A macroecological perspective on genetic diversity in the human gut microbiome. bioRxiv doi: https://doi.org/10.1101/2022.04.07.487434. 2022.

Publications

Wolff, R., **W.R. Shoemaker**, and N.R. Garud. Ecological Stability Emerges at the Level of Strains in the Human Gut Microbiome. *mBio*. **e02502-22**. 2023.

Shoemaker, W.R., E. Polezhaeva, K.B. Givens, and J.T. Lennon. Seed Banks Alter the Rate and Direction of Molecular Evolution in Bacillus subtilis. *Genetics*. **iyac071**. 2022.

Shoemaker, W.R. and J.T. Lennon. Predicting Parallelism and Quantifying Divergence in Microbial Evolution Experiments. *mSphere*. **e00672-21**. 2022.

Hughey, M.C., E.A. Rebollar, R.N. Harris, R. Ibáñez, S.C. Loftus, L.L. House, M.C. Bletz, D. Medina, M.K. Riley, **W.R. Shoemaker**, M.C. Swartwout, and L.K. Belden. An experimental test of disease resistance function in the skin-associated bacterial symbiont communities of three tropical amphibian species. *FEMS Microbiol. Ecol.* 98, fiac023. 2022.

Shoemaker, W.R., D. Chen, and N.R. Garud. Comparative Population Genetics in the Human Gut Microbiome. *Genome Biol. Evol.* **14,** evab116. 2022.

Shoemaker, W.R., S.E. Jones, M.E. Muscarella, M.G. Behringer, B.K. Lehmkuhl, and J.T. Lennon. Microbial population dynamics and evolutionary outcomes under extreme energy-limitation. *Proc. Natl. Acad. Sci. U.S.A.* **118,** 33. 2021.

Shoemaker, W.R., E. Polezhaeva, K.B. Givens, and J.T. Lennon. Molecular evolutionary dynamics of energy-limited microorganisms. *Mol. Biol. Evol.* **38,** 4532–45. 2021.

Long, H., W. Sung, S. Kucukyildirim, E. Williams, S. Miller, W. Guo, C. Patterson, C. Gregory, C. Strauss, C. Stone, C. Berne, D. Kysela, **W.R. Shoemaker,**, M. Muscarella, H. Luo, J.T. Lennon, Y.V. Brun, and M. Lynch. Evolutionary determinants of genome-wide nucleotide composition. *Nat. Ecol. Evol.* **2,** 237-240. 2018.

Shoemaker, W.R., and J.T. Lennon. Evolution with a seed bank: the population genetic consequences of microbial dormancy. *Evol. Appl.* **11,** 60–75. 2018.

Kuo, V., **W.R Shoemaker**, M.E. Muscarella, and J.T. Lennon. Whole genome sequence of the soil bacterium *Micrococcus* sp. KBS0714. *Genome. Announc.* **5,** e00697-17. 2017.

Shoemaker, W.R., K.J. Locey, and J.T. Lennon. A macroecological theory of microbial biodiversity. *Nat. Ecol. Evol.* **1,** 0107. 2017.

Rebollar, E.A., S.J. Simonetti, **W.R. Shoemaker,**, and R.N Harris. Horizontal and Pseudo-environmental Transmission of the Antifungal Probiotic Bacterium Janthinobacterium lividum on Green Frog (*Lithobates clamitans*) Tadpoles. *Appl. Environ. Microbiol.* **82,** 2457-2466. 2016.

Shoemaker, W.R., M.E. Muscarella, and J.T. Lennon. Genome Sequence of the Soil Bacterium *Jantinobacterium sp.* KBS0711. *Genome. Announc.* **3,** e00689-15. 2015.

Grants

Graduate Research Excellent Grant (GREG). Society for the Study of Evolution - Rosemary Grant Advanced Award. PI: W.R. Shoemaker, co-PI: J.T. Lennon. $3,472. 2018.

NASA Astrobiology Early Career Collaboration Award. *Microbial dormancy and adaptation to energy-limitation.* PI: W.R. Shoemaker, co-PIs: J.T. Lennon, V. Orphan. $5,000. 2017.

SSE Education and Outreach Committee Grant. *Generating a novel summer course in evolutionary biology for Indiana high school students.* PI: L. Cole, co-PIs: W.R. Shoemaker, D. Schwab. $1,000. 2017.

Fellowships, Honors, and Awards

Postdoctoral Research Fellowship in Biology. National Science Foundation. 2020 - Present

Floyd Microbiology Fellowship, Indiana University, Bloomington, IN, USA. 2016, 2017, 2019

Louise Constable Hoover Fellowship, Indiana University, Bloomington, IN, USA. 2017

The Women's Welsh Clubs of America Scholarship, Rocky River, OH 2014-2020

Talks

Experimental macroecology in microbial systems. APS March Meeting 2023. Las Vegas, Nevada, USA. 2023.

Experimental Macroecology. Eco-evolutionary Dynamics of Microbial Communities Across Scales. The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy. 2022.

The population dynamics and evolutionary outcomes of energy-limited microorganisms. MicroSeminar. Online. 2020.

Posters

Shoemaker, W.R. and Grilli, J. The stochastic logistic model predicts coarse-grained patterns of diversity across disparate environments. Mathematical modelling of microbiomes. Max Planck Institute for Evolutionary Biology. Plön, Germany. 2022.

Shoemaker, W.R.. A macroecological perspective on genetic diversity in the human gut microbiome. International Symposium on Microbial Ecology, Lausanne, Switzerland. 2022.

Shoemaker, W.R., Polezhaeva, E., Givens, K.B., and Lennon, J.T. Seed banks alter the molecular evolutionary dynamics of *Bacillus subtilis*. American Physical Society March Meeting, Chicago, Illinois, USA. 2022.

Shoemaker, W.R., Polezhaeva, E., Givens, K.B., and Lennon, J.T. Microbial evolution under energy-limitation. Gordon Research Conference: The Structure, Ecology and Evolution of Interactions Within Microbial Populations, Andover, New Hampshire, USA. 2019.

Shoemaker, W.R. and Lennon, J.T. How parallel are evolution experiments? Gordon Research Seminar: Microbial Population Biology, Andover, New Hampshire, USA. 2019.

Shoemaker, W.R., Locey, K.J., and Lennon, J.T. Connecting global biodiversity predictions to molecular thermodynamics. Boston University Theory in Biology, Boston, Massachusetts, USA. 2018.

Shoemaker, W.R. and Lennon, J.T. Dormancy constrains the rate and direction of adaptive evolution. Population, Evolutionary and Quantitative Genetics Conference, Madison, Wisconsin, USA. 2018.

Shoemaker, W.R. and Lennon, J.T. The contribution of dormancy to microbial evolution. Society for Molecular Biology and Evolution, Austin, Texas, USA. 2017.

Shoemaker, W.R. and Lennon, J.T. The genetic structure of energy limited populations. International Symposium on Microbial Ecology, Montreal, Quebec, Canada. 2016.

Shoemaker, W.R., Locey, K.J., and Lennon, J.T. Constraint-based predictions for the distribution of abundances of microorganisms. Midwest Ecology and Evolution Conference, Bloomington, Indiana, USA. 2015.

Organizer: Symposia, Workshops, Conferences, Reading groups

Evolutionary Genetics in Natural Microbial Populations (Co-organized with Nandita R. Garud and Michael J. McDonald). Society for Molecular Biology and Evolution 2021.

Quantitative Experimental Approaches in Microbial Evolution and Ecology. World Microbe Forum 2021.

Microbial Evolutionary Dynamics Reading Group. Indiana University, Bloomington, IN, USA. 2018.

Quantitative Evolutionary Dynamics Reading Group. UCLA, Los Angeles, CA, USA. 2020-2021.

Environmental Genomics Group. Indiana University, Bloomingtonm, IN, USA. 2015-2017.

Participant: Workshops, Roundtables, Synthesis Groups

Eco-evolutionary Dynamics of Microbial Communities Across Scales. The Abdus Salam International Centre for Theoretical Physics. Trieste, Italy. 2022.

Microbial Interactions at Multiple Scales. Santa Barbara Advanced School Of Quantitative Biology. Kavli Institute for Theoretical Physics. University of California, Santa Barbara. USA. 2021.

Quantitative Approaches in Ecosystem Ecology. The Abdus Salam International Centre for Theoretical Physics. Trieste, Italy. 2020.

Evolutionary Quantitative Genetics 2016. National Institute for Mathematical and Biological Synthesis (NIMBioS). University of Tennessee, Knoxville, USA. 2016.

Anvi'o workshop. University of Montreal, Montreal, Quebec, Canada. 2016.

Teaching

Co-Instructor. Numerical Optimization. Quantitative Life Sciences Diploma Program. *ICTP.* Fall 2022.

Associate Instructor. BIOL-L 111 Foundations of Biology: Diversity, evolution, and ecology. *Indiana University.* Fall 2014, 2019, Spring 2020.

Associate Instructor. BIOL-L 113 Biological Laboratory. *Indiana University.* Fall 2018.

Associate Instructor. BIOL-L 318 Evolution. *Indiana University.* Spring 2018.

Co-Instructor. BIOL-Z 620 Quantitative Biodiversity. *Indiana University.* Spring 2017.

Mentorship

Mentor. Undergraduate honors thesis. Sarah Bald (now Ph.D. student at Boston University). *UCLA.* 2021-2022.

Mentor. Bruins-In-Genomics (B.I.G.) Summer Undergraduate Research Program. *UCLA.* 2021.

Undergraduate Mentor. Mentees: Peyton Thomas, Jessica Zellinger. *Indiana University.* 2015 – 2018.

NSF REU Mentor. Mentee: Jared Brewer. Indiana University. 2016.

Public Outreach

Volunteer. Letters to a Pre-Scientist. 2018 - 2022.

Volunteer. Skype a Scientist. 2019 - 2022.

Organizer and co-Instructor. Foundations in Science and Mathematics.. 2016 – 2018.

High School STEM Mentor Jim Holland Summer Science Research Program. Mentee: Dakayla Calhoun. 2015.

Science Radio Hour & Journal Club Host Disentangling the Bank. WXJM. Harrisonburg, Virginia, USA. 88.7 FM. 2012-2014

Professional Service

Quantitative Life Sciences Postdoc Representative, ICTP. 2023 - Present.

UCLA Postdoc Union Leadership Committee, UAW 5810. 2020 - 2022.

EEB Program Representative, Indiana Graduate Workers Coalition. 2018-2020.

Reviewer: mBio, Applied and Environmental Microbiology, PLOS Computational Biology, PCI Evolutionary Biology, Royal Society Open Science, BMC Biology, Trends in Genetics, Nature Communications.

Professional Society Membership

American Physical Society (APS)

American Society of Microbiology (ASM)

Genetics Society of America (GSA)

Society for Molecular Biology and Evolution (SMBE)

Society for the Study of Evolution (SSE)