Matthew J Michalska-Smith

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Current Positions

Postdoctoral Research Associate
U. Minnesota, Veterinary Population Medicine, Craft Lab — *Since 2018*

› Multistrain disease dynamics in livestock metapopulations
› The effects of network structure on global disease impact

Postdoctoral Research Associate
U. Minnesota, Dept. of Plant Pathology, Kinkel Lab — *Since 2018*

› Network structure of multi-layer microbial interaction networks
› Detecting and quantifying higher-order interactions in endophyte communities

Education

University of Chicago, Chicago, IL
Ph.D., Ecology & Evolution — *2013-18*

Adviser: Stefano Allesina
Dissertation: "Structural Inferences: three cases of linking pattern and process in ecological networks"

University of Notre Dame, Notre Dame, IN
B.S., Biological Sciences and Theology — *2008-12*

Experience

Guest Lecturer
U. Minnesota, College of Veterinary Medicine — *Fall 2020*

› Ecology of Infectious Disease
› Health and Biodiversity

Instructor
U. Chicago, BSD-QBio — *2015-2017*

(Biological Sciences Division Quantitative Biology Boot-camp for incoming graduate students)
› Beginner/Advanced programming in the biological sciences
› Statistics for large datasets

Teaching Assistant
U. Chicago, Biological Sciences Division — *2014-2017*

› Theoretical Ecology (Winter 2017)
› Biodiversity (with laboratory component; Spring 2016)
› Introduction to Scientific Computing (Winter 2014, 2016)
› Ecology & Evolution (with laboratory component; Winter 2015)

Laboratory Technician
U. Chicago, Dept. Ecology & Evolution, Allesina Lab — *2012-13*

› Theoretical ecology with an emphasis on networks

Publications & Presentations

Publications

1. Lauren L Sullivan, **Matthew J. Michalska-Smith**, Katie P Sperry, David A Moeller, and Allison K Shaw. Consequences of ignoring dispersal variation in network models for landscape connectivity. *Conservation Biology*, In Press. https://doi.org/10.1111/cobi.13640.

2. Allison K Shaw, Lauren A White, **Matthew Michalska-Smith**, Elizabeth T Borer, Meggan E Craft, Eric W Seabloom, Emilie Snell-Rood, and Michael Travisano. Lessons from movement ecology for the return to work: modeling contacts and the spread of COVID-19. *PLOS ONE*, 16(1):1–22, 2021. https://doi.org/10.1371/journal.pone.0242955.

3. Michael R Fulcher, Marian L Bolton, Michael D Millican, **Matthew J. Michalska-Smith**, José Pablo Dundore-Arias, Jo Handelsman, Jonathan L Klassen, Kathryn C Milligan-Myhre, Ashley Shade, Benjamin E Wolfe, and Linda L Kinkel. Broadening participation in scientific conferences during the era of social distancing. *Trends in Microbiology*, 28(12):949–952, 2020. https://doi.org/10.1016/j.tim.2020.08.004.

4. Terrence H. Bell, Kevin L. Hockett, Ricardo I. Alcalá-Briseño, Mary Barbercheck, Gwyn A. Beattie, Mary Ann Bruns, John E. Carlson, Taejung Chung, Alyssa Collins, Bryan Emmett, Paul Esker, Karen A. Garrett, Leland Glenna, Beth K. Gugino, María del Mar Jiménez-Gasco, Linda Kinkel, Jasna Kovac, Kurt P. Kowalski, Gretchen Kuldau, Johan H. J. Leveau, **Matthew Michalska-Smith**, Jessica Myrick, Kari Peter, Maria Fernanda Vivanco Salazar, Ashley Shade, Nejc Stopnisek, Xiaoqing Tan, Amy T. Welty, Kyle Wickings, and Etienne Yergeau. Manipulating wild and tamed phytobiomes: Challenges and opportunities. *Phytobiomes Journal*, 3(1):3–21, 2019. https://doi.org/10.1094/pbiomes-01-19-0006-w.

5. **Matthew J. Michalska-Smith** and Stefano Allesina. Telling ecological networks apart by their structure: A computational challenge. *PLOS Computational Biology*, 15(6):e1007076, 2019. https://doi.org/10.1371/journal.pcbi.1007076.

6. **Matthew J. Michalska-Smith**[*], Elizabeth L. Sander[*], Mercedes Pascual, and Stefano Allesina. Understanding the role of parasites in food webs using the group model. *Journal of Animal Ecology*, 87:790–800, 2018. https://doi.org/10.1111/1365-2656.12782.

7. György Barabás, **Matthew J. Michalska-Smith**, and Stefano Allesina. Self-regulation and the stability of large ecological networks. *Nature Ecology & Evolution*, 1(12):1870–1875, 2017. https://doi.org/10.1038/s41559-017-0357-6.

8. Jacopo Grilli, György Barabás, **Matthew J. Michalska-Smith**, and Stefano Allesina. Higher-order interactions stabilize dynamics in competitive network models. *Nature*, 548(7666):210–213, 2017. https://doi.org/10.1038/nature23273.

9. **Matthew J. Michalska-Smith** and Stefano Allesina. And, not or: Quality, quantity in scientific publishing. *PLOS ONE*, 12(6):1–12, 2017. https://doi.org/10.1371/journal.pone.0178074.

10. György Barabás[*], **Matthew J. Michalska-Smith**[*], and Stefano Allesina. The effect of intra- and interspecific competition on coexistence in multispecies communities. *The American Naturalist*, 188(1):E1–E12, 2016. https://doi.org/10.1086/686901.

11. **Matthew J. Smith**, Elizabeth Sander, György Barabás, and Stefano Allesina. Stability and feedback levels in food web models. *Ecology Letters*, 18(6):593–595, 2015. https://doi.org/10.1111/ele.12416.

12. Phillip P. A. Staniczenko, **Matthew J. Smith**, and Stefano Allesina. Selecting food web models using normalized maximum likelihood. *Methods in Ecology and Evolution*, 5(6):551–562, 2014. https://doi.org/10.1111/2041-210X.12192.

13. **Matthew J. Smith**, Cody Weinberger, Emilio M. Bruna, and Stefano Allesina. The scientific impact of nations: Journal placement and citation performance. *PLOS ONE*, 9(10):e109195, 2014. https://doi.org/10.1371%2Fjournal.pone.0109195.

14. Kimbra G. Turner, **Matthew J. Smith**, and Benjamin J. Ridenhour. Whirling disease dynamics: An analysis of intervention strategies. *Preventive Veterinary Medicine*, 113(4):457–468, 2014. https://doi.org/10.1016/j.prevetmed.2013.12.008.

15. Stefano Allesina, Elizabeth Sander, **Matthew J. Smith**, and Si Tang. Superelliptical laws for complex networks. *arXiv preprint*, 2013. https://arxiv.org/abs/1309.7275.

Papers in Progress

1. **Matthew J. Michalska-Smith**, Zewei Song, Seth Spawn, Zoe Hansen, Mitch Johnson, Georgiana May, Elizabeth Borer, Eric Seabloom, and Linda L. Kinkel. Characterizing network structure of resource competition within the endophytic microbiome. In Prep.

2. **Matthew J. Michalska-Smith**, Kimberly L VanderWaal, Montserrat Torremorell, Cesar A Corzo, and Meggan E Craft. Multi-strain disease dynamics on metapopulation networks. In Prep. https://doi.org/10.22541/au.156026839.96630781.

Posters & Presentations

UMN College of Veterinary Medicine Points of Pride Research Day
Saint Paul, MN USA *21 October 2020*
› Video Abstract: The Role of Roles in COVID-19 Transmission

Clinical Trial Modelling Group
St. Paul, MN USA *22 May 2018*
› Invited presentation: The role of roles in COVID-19 transmission: partitioning interactions to inform social distance relaxation in Minnesota

UMN College of Veterinary Medicine Points of Pride Research Day
Saint Paul, MN USA *2 October 2019*
› Poster: The effects of metapopulation structure on multi-strain disease dynamics

Ecological Society of America Annual Meeting
Louisville, KY USA *14 August 2019*
Session: Species Interactions II
› Presentation: Characterizing resource competition network structure within the endophytic microbiome

Ecology and Evolution of Infectious Disease Annual Meeting
Princeton, NJ USA *11 June 2019*
› Poster: The effects of metapopulation structure on multi-strain disease dynamics

EpiQ (Quantitative Epidemiology) Seminar Series
St. Paul, MN USA *17 December 2018*
› Invited presentation: Pattern and process in ecological networks of parasites

Ecological Society of America Annual Meeting
New Orleans, LA USA *6 August 2018*
Session: Communities: Spatial Patterns And Environmental Gradients I
› Presentation: A naïve approach to a longstanding question: Using ordination to identify gradients in ecological data

* These authors have contributed equally to this publication.

Public Dissertation Defense
Chicago, IL USA *2 May 2018*
› Presentation: Structural Inferences: three cases of linking pattern and process in ecological networks

NetSci International School and Conference on Network Science
Indianapolis, IN USA *20 June 2017*
› Presentation: Higher-order interactions stabilize dynamics in competitive network models

Ecological Society of America Annual Meeting
Ft. Lauderdale, FL USA *9 August 2016*
Session: Species Interactions
› Presentation: Identifying unique species roles by characterizing differences in ecological network structure

Dissertation Proposal Hearing
Chicago, IL USA *27 August 2015*
› Presentation: Structure and Stability

Ecological Society of America Annual Meeting
Baltimore, MD USA *12 August 2015*
Session: Theoretical Ecology
› Presentation: Looking locally to see globally

ACS International Center Webinar Series
https://global.acs.org/international-center-events/... *25 February 2015*
› Webinar: Global Scientific Collaboration: Key to Scientific Success

ICTP-SAIFR School on Pathogen Dynamics, Climate and Global Change
IFT-UNESP, São Paulo, Brazil *21 January 2015*
› Presentation: The Scientific Impact of Nations: Journal Placement and Citation Performance

Undergraduate Scholars Conference, College of Science Joint Annual Meeting
Notre Dame, IN USA *4 May 2012*
› Poster: Modeling Seasonal Influenza in Indiana with an Age-Stratified SEIR Model

Honors & Awards

Funding Awarded

$199 136: The effect of contact network structure on the spread of COVID-19
National Science Foundation, Rapid Response Research (RAPID) Grant *2020–2021*
Full Title: RAPID: The effect of contact network structure on the spread of COVID-19: balancing disease mitigation and socioeconomic well-being
`https://www.nsf.gov/awardsearch/showAward?AWD_ID=2030509`

$90 000: Development of a multi-strain modeling framework for endemic swine pathogens
Internal, Univ. Minnesota, Dept. Veterinary Population Medicine Animal Health Capacity Grant *2018–2020*
› wrote grant, but PIs required to be UMN faculty

Other Funding Applications (Not Awarded)

Friend or Foe? Determining ecological interaction type from network structure
National Science Foundation, Graduate Research Fellowship Program *2015*
› Intellectual Merit rated "Excellent" by all three reviewers
› Broader Impact rated "Excellent", "Good", and "Very Good"

The Dynamics of Partially-Specified Biological Systems
National Science Foundation, Graduate Research Fellowship Program *2014*
› Submission rated "Excellent" and "Good" by reviewers

Travel Awards

University of Minnesota BioTechnology Institute *2019*
Univ. Chicago, Biological Sciences Division *2017*

Univ. Chicago, UChicagoGRAD *2016*

Univ. Chicago, Biological Sciences Division Recruitment *2015*

Honors

Schmidt Science Fellowship Finalist *2018*

Dept. of Ed. Graduate Assistance in Areas of National Need (GAANN) Fellow *2015–2017*

NSF Graduate Research Fellowship Program Honorable Mention *2015*

Press

UMN CVM Profiles
Connecting the dots on COVID *January 2021*

UMN CVM Profiles
Perspectives: Connected to COVID-19 *Spring 2020*

Schools & Meetings

Ecological Society of America Annual Meeting
Louisville, KY USA *11-16 August 2019*

Ecology and Evolution of Infectious Disease Annual Meeting
Princeton, NJ USA *10-13 June 2019*

Ecological Society of America Annual Meeting
New Orleans, LA USA *5-10 August 2018*

NetSci International School and Conference on Network Science
Indianapolis, IN USA *20-24 June 2017*

Ecological Society of America Annual Meeting
Fort Lauderdale, FL USA *7-12 August 2016*

Ecological Society of America Annual Meeting
Baltimore, MD USA *9-14 August 2015*

ICTP-SAIFR School on Pathogen Dynamics, Climate and Global Change
IFT-UNESP, São Paulo, Brazil *12-23 January 2015*

Non-adaptive selection: explaining macroscopic laws in ecology and evolution
EPFL CIB, Lausanne, Switzerland *7-11 July 2014*

Professional Community Engagement

Ecological Society of America:

- Member since 2015 (Theoretical and Disease Ecology Sections)
  - Judge for Lotka and Volterra awards for best theoretical ecology student Presentation/Poster (2018 2019)
- Reviewer of 21 posters for the 2020 ESA Annual Meeting

Peer-Reviewing

- BioScience
- Ecography
- Ecology
- Ecology Letters
- Ecosphere
- Environmental Modelling & Software
- Frontiers in Genetics
- Frontiers in Ecology and Evolution
- iScience
- J. of Forestry Research
- J. of The Royal Society Interface
- J. of Theoretical Biology
- Mathematical Biosciences & Engineering
- Oikos
- PLOS Computational Biology
- PLOS ONE
- Proceedings of the Royal Society of London B
- Scientific Reports
- Scientometrics

Skills & Experience

Programming: R (including the `tidyverse` suite of packages), python, julia, C

Data Visualization: `ggplot2`

Other: LaTeX, git