

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

M.S. / 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

Research

Grants

\$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

Publications

1. 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. doi: 10.1371/journal.pone.0242955.
2. 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*, 35(3):944–954, 2021. doi: 10.1111/cobi.13640.
3. **Matthew J. Michalska-Smith**, Zewei Song, Seth Spawn, Zoe Hansen, Mitch Johnson, Georgiana May, Elizabeth Borer, Eric Seabloom, and Linda L. Kinkel. Network structure of resource use and niche over-

- lap within the endophytic microbiome. *The ISME Journal*, pages 1–12, 2021. doi: 10.1038/s41396-021-01080-z.
4. 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. doi: 10.1016/j.tim.2020.08.004.
 5. 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, Xiaoping Tan, Amy T. Welty, Kyle Wickings, and Etienne Yergeau. Manipulating wild and tamed phytobiomes: Challenges and opportunities. *Phytobiomes Journal*, 3(1):3–21, 2019. doi: 10.1094/pbiomes-01-19-0006-w.
 6. **Matthew J. Michalska-Smith** and Stefano Allesina. Telling ecological networks apart by their structure: A computational challenge. *PLOS Computational Biology*, 15(6):e1007076, 2019. doi: 10.1371/journal.pcbi.1007076.
 7. **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. doi: 10.1111/1365-2656.12782.
 8. 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. doi: 10.1038/s41559-017-0357-6.
 9. 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. doi: 10.1038/nature23273.
 10. **Matthew J. Michalska-Smith** and Stefano Allesina. And, not or: Quality, quantity in scientific publishing. *PLOS ONE*, 12(6):1–12, 2017. doi: 10.1371/journal.pone.0178074.
 11. 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. doi: 10.1086/686901.
 12. **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. doi: 10.1111/ele.12416.
 13. 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. doi: 10.1111/2041-210X.12192.
 14. **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. doi: 10.1371/journal.pone.0109195.
 15. 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. doi: 10.1016/j.prevetmed.2013.12.008.

Papers in Progress.....

1. **Matthew J. Michalska-Smith**, Kimberly VanderWaal, and Meggan E Craft. Host movement reshapes local disease dynamics in metapopulations. In Prep. doi: 10.22541/au.156026839.96630781.

Non-peer-reviewed Publications.....

1. José Pablo Dundore-Arias, Michael R Fulcher, Marian L Bolton, Michael D Millican, **Matthew J. Michalska-Smith**, and Linda L Kinkel. hybrid virtual meeting brings together global community of microbiome researchers. *Phytopathology News*, 54(6):5, 2020.
2. Michael R Fulcher, Marian L Bolton, Michael D Millican, **Matthew J. Michalska-Smith**, José Pablo Dundore-Arias, and Linda L Kinkel. Virtual conference idea café suggests aps is positioned to benefit from increased remote participation options. *Phytopathology News*, 54(10):6–7, 2020.
3. Stefano Allesina, Elizabeth Sander, **Matthew J. Smith**, and Si Tang. Superelliptical laws for complex networks. *arXiv preprint*, 2013. <https://arxiv.org/abs/1309.7275>.

Talks.....

Clinical Trial Modelling Group (Invited)

St. Paul, MN USA 22 May 2018

> Invited: The role of roles in COVID-19 transmission: partitioning interactions to inform social distance relaxation in Minnesota

Ecological Society of America Annual Meeting

Louisville, KY USA 14 August 2019

Session: Species Interactions II

> Characterizing resource competition network structure within the endophytic microbiome

EpiQ (Quantitative Epidemiology) Seminar Series (Invited)

St. Paul, MN USA 17 December 2018

> 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

> A naïve approach to a longstanding question: Using ordination to identify gradients in ecological data

Public Dissertation Defense

Chicago, IL USA 2 May 2018

> 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

> 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

> Identifying unique species roles by characterizing differences in ecological network structure

Dissertation Proposal Hearing

Chicago, IL USA 27 August 2015

> Structure and Stability

Ecological Society of America Annual Meeting

Baltimore, MD USA 12 August 2015

Session: Theoretical Ecology

> Looking locally to see globally

* These authors have contributed equally to this publication.

ICTP-SAIFR School on Pathogen Dynamics, Climate and Global Change

IFT-UNESP, São Paulo, Brazil

21 January 2015

> The Scientific Impact of Nations: Journal Placement and Citation Performance

Poster Presentations.....

UMN College of Veterinary Medicine Points of Pride Research Day

Saint Paul, MN USA

2 October 2019

> The effects of metapopulation structure on multi-strain disease dynamics

Ecology and Evolution of Infectious Disease Annual Meeting

Princeton, NJ USA

11 June 2019

> The effects of metapopulation structure on multi-strain disease dynamics

Undergraduate Scholars Conference, College of Science Joint Annual Meeting

Notre Dame, IN USA

4 May 2012

> Modeling Seasonal Influenza in Indiana with an Age-Stratified SEIR Model

Other 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

ACS International Center Webinar Series

<https://global.acs.org/international-center-events/...>

25 February 2015

> Webinar: Global Scientific Collaboration: Key to Scientific Success

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

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

Teaching

Guest Lecturer

U. Minnesota, College of Veterinary Medicine

Fall 2020

> Ecology of Infectious Disease

> Health and Biodiversity

Instructor

U. Chicago, BSD-QBio

(Biological Sciences Division Quantitative Biology Boot-camp for incoming graduate students)

- > Beginner/Advanced programming in the biological sciences
- > Statistics for large datasets

2015-2017



Teaching Assistant

U. Chicago, Biological Sciences Division

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

2014-2017



Press

UMN CVM Profiles

Connecting the dots on COVID

January 2021

UMN CVM Profiles

Perspectives: Connected to COVID-19

Spring 2020

Professional Community Engagement

MIDAS (Models of Infectious Disease Agent Study) Network:

- > Member since 2021

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

American Phytopathological Society:

- > Co-organized session ("Idea Café: Virtual Scientific Conferences: Making them work for you!") for 2020 annual meeting

Peer-Reviewing

- | | | |
|--------------------------------------|-------------------------------------|---------------------------------|
| > BioScience | > Evolution | > Engineering |
| > Ecography | > Frontiers in Genetics | > Oikos |
| > Ecological Complexity | > Functional Ecology | > PLOS Computational Biology |
| > Ecology | > Int'l J. of Infectious Disease | > PLOS ONE |
| > Ecology Letters | > iScience | > Proc. of the Royal Society of |
| > Ecosphere | > J. of Forestry Research | London B |
| > Environmental Modelling & Software | > J. of The Royal Society Interface | > Scientific Reports |
| > Frontiers in Ecology and | > J. of Theoretical Biology | > Scientometrics |
| | > Mathematical Biosciences & | |

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

Skills & Experience

Programming:  (including the tidyverse suite of packages);  python;  julia; C

Data Visualization: ggplot2; Shiny interactive, online applications

Other: \LaTeX ;  git