

Matthew J Michalska-Smith

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Current Positions

Postdoctoral Research Associate

U. Minnesota, Veterinary Population Medicine, Craft Lab

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

Since 2018

Postdoctoral Research Associate

U. Minnesota, Dept. of Plant Pathology, Kinkel Lab

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

Since 2018

Education

University of Chicago, Chicago, IL

Ph.D., Ecology & Evolution

Adviser: Stefano Allesina

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

2013-18

University of Notre Dame, Notre Dame, IN

B.S., Biological Sciences and Theology

2008-12

Experience

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

Laboratory Technician

U. Chicago, Dept. Ecology & Evolution, Allesina Lab

- > Theoretical ecology with an emphasis on networks

2012-13

Publications & Presentations

Publications.....

1. Terrence H Bell, ..., **Matthew Michalska-Smith**, ..., and Etienne Yergeau. Manipulating wild and tamed phytobiomes: Challenges and opportunities. *Phytobiomes Journal*. <https://doi.org/10.1094/pbiomes-01-19-0006-w>.

2. **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>.
3. **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>.
4. 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>.
5. 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>.
6. **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>.
7. 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>.
8. **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>.
9. 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>.
10. **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/journal.pone.0109195>.
11. 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>.
12. 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. Lauren Sullivan, David Moeller, Katie P Sperry, **Matthew J. Michalska-Smith**, and Allison Shaw. Ignoring dispersal variation in network models can both over- and under-predict estimates of landscape connectivity. In Revision at *Conservation Biology*.
2. **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.

^{*} These authors have contributed equally to this publication.

3. **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

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

> 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

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/...](https://global.acs.org/international-center-events/)

25 February 2015

> Webinar: Global Scientific Collaboration: Key to Scientific Success

ICTP-SAIR 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

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 | > Frontiers in Genetics | > PLOS ONE |
| > Ecography | > J. of Forestry Research | > Proceedings of the Royal |
| > Ecology | > J. of Theoretical Biology | Society of London B |
| > Ecology Letters | > Mathematical Biosciences & | > Scientific Reports |
| > Ecosphere | Engineering | > Scientometrics |
| > Environmental Modelling & | > Oikos | |
| Software | > PLOS Computational Biology | |

Skills & Experience

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

Data Visualization: ggplot2

Other: L^AT_EX,  git