

PETER JOSEPH FLYNN

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EDUCATION

University of Chicago

PhD in Evolutionary Biology

Advisor: Dr. Corrie Moreau

Dissertation: Redefining the expanding diversity and co-evolutionary patterns in viral and bacterial communities within ants

College Teaching Certificate, Spring 2021

Chicago, IL

GPA: 4.00

Graduation: November 2022

Yale University

Bachelor of Science in Ecology and Evolutionary Biology, 2014

New Haven, CT

Cumulative GPA: 3.63

PROFESSIONAL APPOINTMENTS

NSF Postdoctoral Fellow in Biology Harvard University, OEB Department

Apr 2024-present

Postdoctoral Fellow Harvard University, Organismic & Evolutionary Biology

Dec 2022-Apr 2024

PEER-REVIEWED PUBLICATIONS

9. **Flynn, P. J.** and Moreau, C.S. (2024), Viral diversity and co-evolutionary dynamics across the ant phylogeny. *Molecular Ecology*. <http://doi:10.1111/MEC.17519>
8. **Flynn, P. J.**, D'Amelio, C., Russell, J.A., and Moreau, C.S. (2021), Localization of bacterial communities in gut compartments across *Cephalotes* turtle ants. *Applied and Environmental Microbiology*, 87(8): e02803-20. doi:10.1128/AEM.02803-20
7. **Flynn, P. J.** and Moreau, C.S. (2019), Assessing the diversity of endogenous viruses throughout ant genomes. *Frontiers in Microbiology*, 10: 1139. doi:10.3389/fmicb.2019.01139
6. Dennis, P.W.*, **Flynn, P. J.***, de Souza, W.M., Singer, J.B., Moreau, C.S., Wilson, S.J. and Gifford, R.J. (2018), Insights into circovirus host range from the genomic fossil record. *Journal of Virology*, 92(16): 1-9. doi:10.1128/JVI.00145-18 *authors contributed equally
5. Queenan A.M., Dowling D.J., Cheng, W.K., Fae, K., Fernandez J., **Flynn, P.J.**, Joshi S., Brightman, S.E., Ramirez J., Serroyen, J., Wiertsema S., Fortanier, A., van den Dobbelen, G., Levy, O., and Poolman, J. (2018). Increasing FIM2/3 antigen-content improves efficacy of Bordetella pertussis vaccines in mice in vivo without altering vaccine-induced human reactivity biomarkers in vitro. *Vaccine*, 37(1): 80-89. doi:10.1016/j.vaccine.2018.11.028
4. Sanchez-Schmitz, G., Stevens, C.R., Bettencourt, I.A., **Flynn, P.J.**, Schmitz-Abe, K., Metser G., Hamm D., Jensen, K.J., Benn, C., and Levy, O. (2018). Microphysiologic human tissue constructs reproduce autologous age-specific BCG and HBV primary immunization in vitro. *Frontiers in Immunology*, 9: 1-19 doi:10.3389/fimmu.2018.02634
3. **Flynn, P. J.** (2017), Digest: Using transcriptomics to map parental care behavior in burying beetles. *Evolution*, 71(8): 2132–2133. doi:10.1111/evo.13301
2. Percy, A, Gibson, M, Balmagia, J, Berkey, J, **Flynn, P.** and Viljoen, S. (2013). Disturbance effects on a South African river and the impact on the Mutale River *Crocodylus niloticus* population. Proceedings of the 22nd Working Meeting of the IUCN-SSC Crocodile Specialist Group. IUCN: Gland, Switzerland. pgs 186-191 2013 Proceedings
1. **Flynn, P. J.** (2012). "Zaglossus bartoni" (On-line), Animal Diversity Web. animaldiversity.org/Zaglossus-bartoni

PUBLICATIONS UNDER REVIEW

3. de Medeiros, B, Cai, **Flynn, P. J.**, Yan, Y, Duan, X, Marinho, L, Anderson, C, and Davis, CD. (2024), In Review at *Nature Ecology and Evolution*. A universal barcode for the tree of life.

2. **Flynn, P. J.**, Ramalho, M., and Moreau, C.S. (2024), In Review at *Myrmecological News*. Bacterial communities and ants: what is true for one group, may not be the same for the other.
1. **Flynn, P. J.**, Gamboa, A., and Pinter-Wollman, N. (2024), In Review at *Animal Microbiome*. Social organization and physical environment shape the microbiome of harvester ants.

PUBLICATIONS IN PREP

3. **Flynn, P. J.** and Moreau, C.S. *In Prep*. Phage–bacteria network analysis and its implication for the understanding of ant community dynamics.
2. **Flynn, P. J.**, Kehoe, J†, de Medeiros, B, and Davis, CC. *In Prep*. Fine-scale phylogenetic and ecological taxa identification using the VarKoder tool.
1. **Flynn, P. J.**, Medina-Tirado, I†, and Davis, CC. *In Prep*. Exploring the historical ecology of insect-plant-microbial symbioses through herbarium specimens.

† Undergraduate mentee contributed to writing this publication.

SELECTED TALKS

12. **Flynn, P.J.** ‘Redefining the expanding diversity and co-evolutionary patterns in viral and bacterial communities within ants’. Ecological Entomology Symposium at Harvard Museum of Comparative Zoology; Cambridge, MA. April 15, 2024. Presentation.
11. **Flynn, P.J.** ‘Exploring historical ecology of insect-plant-microbial symbioses through herbarium specimens’. Harvard University Herbaria Seminar Series; Cambridge, MA. October 15, 2023. Invited Seminar.
10. **Flynn, P.J.** ‘Viral diversity and co-evolutionary dynamics across the ant phylogeny.’ Harvard OEB; Cambridge, MA. January 15, 2023. Invited Presentation.
9. **Flynn, P.J.** ‘Exploring the unprecedented diversity and co-evolutionary patterns within the ant virosphere’. The Biology of Genomes; Cold Spring Harbor, New York. May 10, 2022. Invited Presentation.
8. **Flynn, P.J.** ‘A comparative evolutionary analysis of endogenous viruses throughout Insecta’. Grainger Bioinformatics Center Annual Symposium; Virtual. January 10, 2021. Presentation.
7. **Flynn, P.J.**, D’Amelio, C., Russell, J.A., and Moreau, C.S. ‘Localization of bacterial communities in gut compartments across *Cephalotes* ants’. Entomology Meeting 2020; Virtual. November 17, 2020. Presentation.
6. **Flynn, P.J.**, D’Amelio, C., Russell, J.A., and Moreau, C.S. ‘Localization of bacterial communities in gut compartments across *Cephalotes* ants’. Society of Systematic Biologists Standalone Meeting 2020; Gainesville, Florida. January 4, 2020. Poster.
5. **Flynn, P.J.**, D’Amelio, C., Russell, J.A., and Moreau, C.S. ‘Localization of bacterial communities in gut compartments across *Cephalotes* ants’. Evolution Meeting 2019; Providence, Rhode Island. June 22, 2019. Presentation.
4. **Flynn, P.J.**, ‘Lightning Talk: Understanding the Viromes of Ants’. 4th Annual Viromics Workshop 2019; Columbus, Ohio. May 7, 2019. Presentation.
3. **Flynn, P.J.** ‘Comparative assessment of endogenous viruses throughout ant genomes’. Entomological Society of America Meeting 2018; Vancouver, BC Canada. November 10, 2018. Presentation.
2. **Flynn, P. J.** and Sanchez-Schmitz, G. (2016). ‘In Vitro Vaccination Of A Microphysiologic Human Tissue-Construct’. Judah Folkman Research Day, Boston, MA. Poster and Presentation.
1. **Flynn, P. J.**(2014). ‘The Phylogeographic patterns of *Ixodes scapularis* populations throughout the Northeastern United States’. Senior Symposium, New Haven, CT. Presentation.

TEACHING EXPERIENCE

Winter 2022 – Teaching Assistant for *Biological Evolution* at UChicago
Autumn 2021 – Teaching Assistant for *Ecology and Conservation* Field Course Section at UChicago
Spring 2021 – College Teaching Certificate from UChicago Teaching Center
Autumn 2020 – Course Teaching Assistant for *Ecology and Conservation* at UChicago
Autumn 2020 – Lab Teaching Assistant for *Ecology and Conservation* at UChicago
Autumn 2019 – Teaching Assistant for *Introductory Entomology* at UChicago

GRANTS, FELLOWSHIPS, AND HONORS

NSF Postdoctoral Fellowship in Biology (\$249,000), 2023-2027
University of Chicago Henry Hinds Fund Award (\$2500), 2021-2022
William Rainey Harper Fellowship Nominee, 2021
Grainger Bioinformatics Center at the Field Museum Award (\$6375), 2020
NSF Graduate Research Fellowship (\$138,000), 2016-2020
Pritzker Lab at the Field Museum Research Award (\$4000), 2019
OSU Travel Award: Viromics Workshop (\$500), 2019
University of Chicago, Evolutionary Biology Summer Travel Award (\$1400), 2018
University of Chicago Henry Hinds Fund Award (\$2500), 2018
University of Chicago, Evolutionary Biology Summer Travel Award (\$1250), 2017
Pritzker Lab at the Field Museum Research Award (\$4000), 2017
Boston Children's Hospital On-the-Spot Recognition Award (\$500), 2016
NSF International Research Experience for Students Research Fellowship (\$2500), 2014

RESEARCH EXPERIENCES

Postdoctoral Researcher in Davis Laboratory December 2022-present
Harvard University, Cambridge, MA

- My current postdoctoral research is looking to better understand the evolutionary history of plants and insects using herbarium specimens with novel genomic methodologies and understand complex microbial interactions within a plant-insect-microbe parasitic ecosystem.
- Learned novel methods in plant and insect phylogenetics, innovative approaches to historical ecological modeling, museum genomics, and microbial evolution.

PhD Researcher in Moreau Laboratory Sept 2016-Nov 2022
University of Chicago and Field Museum of Natural History, Chicago, IL

- Investigated the role of viral and bacterial microbes in ants using an integrative approach to explore the ecological factors that structure microbial communities through comparative genomics, NGS techniques, and evolutionary analyses. To do this, I explored endogenization of viruses within ant genomes, examined viral and bacterial communities within Neotropical ants along a fragmented habitat gradient, and assessed fine-scale bacterial communities within the digestive tract of *Cephalotes* ants.
- Learned several computer languages including Python, R, Unix, and Bash to aid in my analyses.

Research Assistant in Levy Laboratory June 2014-June 2016
Boston Children's Hospital, Boston MA

- Researched innate and adaptive immune mechanisms of newborns and adults using a microphysiological in vitro model system. We discovered that this in vitro model system mimics human newborn mimics human newborn responses to immunization with HBV and BCG vaccines.
- Achieved fluency in laboratory techniques including ELISA, cell culture, phlebotomy, and flow cytometry.

Undergraduate Researcher in Diuk-Wasser Laboratory Sept 2013-May 2014
Yale University, New Haven CT

- Examined eco-epidemiological factors of tick-borne diseases and the phylogeography of *Ixodes scapularis* in the Northeastern US. We found high levels of genetic diversity at a regional scale with evidence of a recent geographic expansion throughout the Northeast.
- Mastered molecular biology techniques including qPCR and RT-PCR and software including Geneious, MEGA, MacClade and GIS.

Resident Ecologist Intern in Kruger National Park May 2013-August 2013
Skukuza, South Africa

- Investigated community ecology and wildlife management in Kruger National Park for the summer through the International Research Experience for Students Program.
- Performed independent research project on bat species diversity and vegetation structure within Kruger National Park. I discovered that there is a relationship between bat guild composition and large-scale vegetation structure.

Undergraduate Researcher in Near Laboratory

Jan 2011-Jan 2014

Yale University, New Haven CT

- Researched the phylogeography of *Lepomis megalotis* throughout the US. We found no phylogenetic differences among the geographic variants of *L. megalotis*.
- Learned molecular genetic techniques including DNA extraction, DNA sequencing, PCR, and software skills including PAUP*, JMP, and MrBayes.

VOLUNTEER WORK AND OUTREACH

LGBTQ+ Staff and Faculty Employee Resource Group (QERG) of Harvard, 2024-present, *Executive Committee*
Harvard OEB Diversity, Inclusion and Belonging Committee, 2023-present, *Committee Member*
Harvard OEB REU Summer Program Admissions Committee, 2022-present, *Postdoctoral Fellow Representative*
Committee on Evolutionary Biology Graduate Student Admissions, 2021-2022, *PhD Student Representative*
Indiana Dunes Learning Center, Citizen Science, 2021-2022, *Resident Scientist*
Darwin Cluster Keystone Mentor Program, 2020-2022, *Mentor*
CEB DEI Committee, 2020-2022, *Member*
UChicago LGBT Mentorship Program, *Mentor* 2018-present
UChicago Biological Sciences Diversity Committee, *Member* 2017-present
Dozin' with the Dinos at the Field Museum, *Presenter Scientist* 2017-present
LGBT at the Field Museum Group, 2016-2022, *Working Group*
Meet-A-Scientist at the Field Museum, 2016-2022, *Volunteer*
LGBT OStem at the University of Chicago, 2016-2022 *Member*
Journal of Emerging Investigators, 2015-2017 *Mentor*

WORKSHOPS

Unraveling The Threads of Plant-Herbivore Coevolution GRC, 2025 (upcoming)
Inclusive Pedagogy Workshop Series, 2021
Exploring Race and Racism Anti-Racism Workshop Series, 2020
Fundamentals of Teaching in Science and Engineering Workshop Series, 2018-2020
OSU 4th Annual Viromics Workshop, 2019
Ant Course: French Guiana, 2018
Viral Bioinformatics & Genomics Training Course at the University of Glasgow, 2017
Computational Biology at the Field Museum Workshop, 2017
Marine Biological Laboratories Quantitative Biology Bootcamp, 2016

MEMBERSHIPS

Ecological Society of America
International Union for the Study of Social Insects, North American Section
American Society for Microbiology
Society of Systematic Biologists
Field Museum Women in Science
Society for the Study of Evolution
Entomological Society of America

REVIEWED JOURNALS

Frontiers in Plant Science, Molecular Biology and Evolution, Environmental Microbiology, Current Opinion in Insect Science, Frontiers in Microbiology, Journal of Evolutionary Biology, The Science of Nature (Naturwissenschaften)

SKILLS

Languages & Software: R, Bash (Command Line), Python, FigTree, BEAST, MrBayes, Mesquite, GIS, PhyloSeq, ggplot2, Vegan, Geneious, MEGA, QIIME2, RAxML, GitHub, Microbial Bioinformatic Pipelines

Lab Skills: molecular biology techniques (PCR, qPCR, RT-PCR, DNA/RNA extraction), protein analysis (immunoblotting), high throughput sequencing techniques (shotgun metagenomic, 16S rRNA amplicon, RNA-Seq), ELISA, cell culture, and flow cytometry

REFERENCES

Dr. Corrie Moreau

Martha N. and John C. Moser Professor of Arthropod Biosystematics and Biodiversity, Cornell University
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PhD advisor

Dr. Charles Davis

Professor, Department of Organismic and Evolutionary Biology, Harvard University
cdavis@oeb.harvard.edu
Postdoctoral Fellowship Advisor

Dr. Cathy Pfister

Professor, Department of Ecology and Evolution, University of Chicago
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PhD Committee Member

Dr. Maureen Coleman

Associate Professor, Department of the Geophysical Sciences, University of Chicago
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PhD Committee Member

Dr. Eric Larsen

Instructional Professor, Biological Sciences Division, University of Chicago
eclarsen@uchicago.edu
PhD Teaching Mentor