

Ming Liu

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Education

University of Oxford

DPhil in Zoology, Thesis Title: EVOLUTION OF PHENOTYPIC DIVERSITY (EXAMINED BY PROF ALAN GRAFEN FRS AND PROF RYOSUKE IRITANI)

• Supervisors: Prof Stuart A. West and Dr Guy A. Cooper

Oxford, United Kingdom

Oct 2019 - Jan 2024

National Taiwan University

MS in Entomology, Thesis Title: MULTITASKING AND THE EVOLUTION OF OPTIMAL CLUTCH SIZE IN FLUCTUATING ENVIRONMENT (THESIS SCORE: A+; EXAMINED BY PROF ZAC HSIEH, PROF TAKESHI MIKI, AND PROF HUI-YU WANG)

• Supervisors: Prof Sheng-Feng Shen and Prof Chun-Che Chang

Taipei, Taiwan

Feb 2016 - Feb 2018

National Taiwan University

BS in Entomology (GPA: 3.82/4.3, RANK:2/23)

• Undergrad member of Insect Neurobiology Lab (Prof En-Cheng Yang; 2013-2015) and Insect Population Lab (Prof Toshinori Okuyama; 2015-16)
• Best in class for: Insect Taxonomy & Lab (ENT 2010), Microbiology (PPM1007), Genetics (ENT2002), and Mathematics for Life Scientists (LS5073)

Taipei, Taiwan

Sep 2011 - Jan 2016

Publications

- **Liu, M.***, Piskovsky, V., Tomanek, I., Brown, D., Foster, K. R.* (2026). Species diversity typically reduces ecological stability. Under review in *Science*.
- Tomanek, I., **Liu, M.**, Piskovsky, V., Foster, K. R.* (2026). Diversity reduces ecological stability both in theory and in practice. In prep for *PNAS*.
- 1. **Liu, M.***, Scott, T. W., Shillcock, G., Pull, C. D., West, S. A. (2026). The evolution and consequences of social immunity. Accepted in *PNAS*.
- 2. Dixit, T., **Liu, M.**, Riederer, J. M., Walker, J. M., Blair, C. J., Lund, J., Moya, C., Spottiswoode, C. N. (2026). Categorical versus continuous signatures of identity in a host-parasite coevolutionary arms race. *PLoS Biology* 24 (2), e3003667.
- 3. **Liu, M.†**, Hung, T.-M.†, Wu, S.†, Liu, M., Mai, J., Jang, Y.-S., Huang, C.-C., Hsu, C.-Y., Wei, C.-H., Tuanmu, M.-N., Chen, I.-C.*, Shen, S.-F.* (2026). Benign environment promote thermal trait diversity. *Nature Communications* 17 (738).
- 4. **Liu, M.***, Bell-Roberts, L., Botero, C., Cornwallis, C. K., West, S. A. (2025). Environmental predictability in phylogenetic comparative analysis: how to measure it and does it matter? *Global Ecology and Biogeography* 34 (8), e70108.
- 5. **Liu, M.***, Wild, G., West, S. A. (2023). Equilibria and oscillations in cheat-cooperator dynamics. *Evolution Letters* 7 (5), 339-350.
- 6. Shen, S.-F.*, Reeve, H. K., Emlen, S. T., **Liu, M.**, Rubenstein, D. R. (2023). Group size and the resolution of insider-outsider conflict in animal societies. *Animal Behaviour* 205, 107-116.
- 7. Tsai, C.-Y.*, Huang, H.-T., **Liu, M.**, ..., Wu, C.-J., Liu, W.-T.* (2023). Associations of fine particulate matter exposure with sleep disorder indices in adults and mediating effect of body fat. *Atmospheric Pollution Research* 14 (10), 101886.
- 8. Lin, Y.-H.†, Chen, Y.-Y.†, Rubenstein, D. R., **Liu, M.**, Liu, M., Shen, S.-F.* (2023). Environmental quality mediates the ecological dominance of cooperatively breeding birds. *Ecology Letters* (14226).
- 9. **Liu, M.***, West, S. A., Wild, G. (2022). The evolution of manipulative cheating. *eLife* 11 (80611).
- 10. Cooper, G. A.*, **Liu, M.**, Peña, J., West, S. A. (2022). The evolution of mechanisms to divide labour in microorganisms. *Nature Communications* 13 (195).
- 11. Cooper, G. A.*, Frost, H., **Liu, M.**, West, S. A. (2021). The evolution of division of labour in structured and unstructured groups. *eLife* 10 (71968).
- 12. **Liu, M.***, West, S. A., Cooper, G. A. (2021). Relatedness and the evolution of mechanisms to divide labour in microorganisms. *Ecology and Evolution* 11(21): 14475-14489.
- 13. **Liu, M.**, Rubenstein, D. R., Cheong, S.-A., Shen, S.-F.* (2021). Antagonistic effects of long- and short-term environmental variation on species coexistence. *Proceedings of the Royal Society B: Biological Sciences* 288 (1958), 20211491.
- 14. Tibbetts, E. A.*, **Liu, M.**, Laub, E. C., Shen, S.-F. (2020). Complex signals alter recognition accuracy and conspecific acceptance thresholds. *Philosophical Transactions of the Royal Society B: Biological Sciences* 375(1802), 20200482.
- 15. **Liu, M.**, Rubenstein, D. R., Liu, W.-C., Shen, S.-F.* (2019). A continuum of biological adaptations to environmental fluctuation. *Proceedings of the Royal Society B: Biological Sciences* 286(1912), 20191623.
- 16. **Liu, M.**, Rubenstein, D. R., Cheong, S.-A., Shen, S.-F.* (2018). Multitasking and the evolution of optimal clutch size in fluctuating environments. *Ecology and Evolution* 8(17), 8803-8817.

*: Correspondence, †: Co-first authorship

Experience

University of Oxford

Oxford, United Kingdom

POSTDOCTORAL RESEARCHER (PI: PROF KEVIN R. FOSTER FRS)

Oct 2023 -

- Develop mathematical models and microbial experiments addressing the diversity–stability relationship in community ecology.

University of Oxford

Oxford, United Kingdom

TEACHING AND TRAINING

Oct 2019 -

- Tutor on bet-hedging, oscillating dynamics, parental care, and the debate on kin selection (1-3 students per session)
- Lead the scientific writing course (12-15 master students)
- Host math TA sessions, undergrad journal clubs, and bacteriology practicals (20-40 students)
- EMBO lab leadership course for postdocs (30 training hours)

Awards & Achievements

SHORTLISTED IN FACULTY RECRUITMENT BY THE DEPARTMENT OF LIFE SCIENCE, NATIONAL TSING HUA UNIVERSITY, TAIWAN

Oct 2024

OFFERED DATA ANALYST POSITION BY THE NATIONAL ENVIRONMENT AGENCY, SINGAPORE

Apr 2024

BEST SLIDE AWARD FROM EUROPEAN MEETING OF PHD STUDENTS IN EVOLUTIONARY BIOLOGY (EMPSEB 28)

Jun 2023

TRAVEL AWARD FROM INTERNATIONAL SOCIETY OF BEHAVIORAL ECOLOGY (ISBE 2022)

Aug 2022

OXFORD-TAIWAN AND OXFORD-NATURALMOTION GRADUATE SCHOLARSHIPS

2019 - 23

UNDERGRADUATE RESEARCH SCHOLARSHIP FROM MINISTRY OF SCIENCE AND TECHNOLOGY OF TAIWAN

2014 - 15

PRESIDENTIAL AWARDS FROM NATIONAL TAIWAN UNIVERSITY

2012 - 13

Skills

MATHEMATICAL AND COMPUTATIONAL MODELLING

- Construct individual-based and stochastic simulations with genetic algorithms and Gillespie algorithms (C and Python)
- Derive analytical and numerical solutions for evolutionary and ecological theories (Mathematica and Python)

QUANTITATIVE ANALYSIS

- Machine learning and time series analysis (Python and R)
- Phylogenetic comparative analysis with frequentist and Bayesian approaches (R)

REPRODUCIBLE RESEARCH AND VISUAL COMMUNICATION

- Project visualization and management (Quarto and Jupyter Notebook)
- Digital illustration and image processing (Adobe Creative Cloud)
- Linux-based server setup and management (bash and Ubuntu)

Selected presentations

CONTRIBUTED TALKS

- European society of evolutionary biology (ESEB, 2025); Barcelona, Spain
- Human microbiome: diversity, selection and adaptation (2025); Banff, Canada
- Leeds 2024 eco-evolutionary dynamics workshop (L24EEDs); Leeds, United Kingdom
- International society of behavioral ecology (ISBE, 2016 & 2022); Exeter, United Kingdom; Stockholm, Sweden

INVITED TALKS

- Graduate exhibition lecture at University of Oxford (2025); Oxford, United Kingdom
- CBER seminar at University College London (2025); London, United Kingdom
- Complexity science seminar at Nanyang Technological University (2024); Singapore
- Monthly webinar of Taiwanese Entomologists in the World (2021); Online
- Symposium of adapting to new challenges: evolution in humans, animals, and plants (2019); Taipei, Taiwan

Services

- **Student Supervision:** PhD student rotation (Apr - Jul 2024), Undergrad project (Nov 2017 - Feb 2018), Private tutor (science, biology, and chemistry with Taiwanese or AP materials; 2012 - 18)
- **Peer Review:** Nature, Science, Nature Communications, and many others. (see ORCID for full record)
- **Outreach:** Co-organised a modern microbiology station for Oxford Open Doors (Sep 2025).
- **Other Activities:** Oxford University Taiwanese Student Society (President; 2020 - 21), Oxford University Underwater Exploration Group (IT officer; 2025 - 26), Oxford University Photography Society (Treasurer; 2020 - 22), Photo One Taipei (Selected artist for portfolio review; 2019), Kenting National Park (compulsory service; 2018-19)