

# Tobias Gerhard Mueller

*Community Ecologist, Data Scientist, Educator*

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## Education

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### Ph.D. Entomology

*Scheduled defense: March 2026*

Cornell University | Ithaca, NY

Advised by Scott McArt and Bryan Danforth

### B.S. Environmental Science and Management, with honors

2017

University of California, Davis | Davis, CA

Focus: Ecology, Biodiversity, and Conservation

Departmental Citation for Outstanding Undergraduate Accomplishments, 2017

## Professional Appointments

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### NSF Graduate Research Fellow

2021 - present

Cornell University

- Independently lead research on pesticide toxicology and risk across managed and wild bees, bee microbiomes, and the potential for pesticides to disrupt microbiome formation.
- Created novel methods using automated drone imaging and custom trained object detection neural networks to accurately survey bee nesting aggregations.
- 3 published manuscripts and \$8,778 in research funding. 4 additional manuscripts in prep.

### Extension Outreach Assistantship

2024

Cornell University | NYSIPM

- At the direction of the NY state legislature, I worked alongside NYS IPM and NY DEC creating education materials on neonicotinoid pesticides
- The training I created is now mandatory for all turf and ornamental pesticide applicators in New York state

### Lab Manager & Staff Researcher

2019 - 2021

Vannette Lab | UC Davis

- Managed an environmental microbiology lab: responsible for lab safety training, chemical inventory, purchasing orders, and maintenance of lab equipment
- Led experiments on community formation of flower nectar microbes, antimicrobial nectar proteins, and the impacts of nectar microbes on pollination
- Created a custom identification library using MALDI-TOF mass spectrometry for high throughput identification of unknown microbes to species

### Campus Head Steward

2020 - 2021

## UAW5810 | Postdoc and Academic Researchers Union

- Elected as first UC Davis campus head steward representing approx. 12,000 postdocs and academic researchers
- Met with the majority of UC Davis researchers to explain their rights and help resolve problems

## Field Technician

2019

### Sacramento Yolo County Mosquito Vector Control District

- Implemented Integrated Pest Management (IPM) practices for scouting and treating mosquito source populations
- Provided public outreach to citizens about mosquito abatement practices
- Sampled mosquito populations to quantify the prevalence of West Nile virus

## Staff Researcher

2018 - 2019

### Rosenheim Lab | UC Davis

- Designed, led, and analyzed lab and field experiments to improve California citrus IPM guidelines
- Coordinated research between farmers and agricultural groups including managing a large database of confidential grower crop information and representing the lab at regular extension meetings and conferences

## Undergraduate Research Assistant

2015 - 2017

### Rosenheim Lab | UC Davis

- Conducted multi-year field sampling in alfalfa and cotton across California including behavioral assays of beneficial insects
- Conducted independent research on insect viral-behavioral interactions and the related metabolomic impacts

## Publications

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**Mueller, T.,** Buckner, M. (2025) UAV-based Remote Sensing of Bee Nesting Aggregations with Computer Vision for Object Detection. *BioRxiv*. doi: [10.1101/2025.06.16.659683](https://doi.org/10.1101/2025.06.16.659683), submitted.

Page, M., Davis, J., Glasser, S., Kusi, E., Lindsay, S., McCormick, E., **Mueller, T.**, Ng, WH., Pinilla-Gallego, M., Valdes, L., Van Wyk, J., Weiss, T., Irwin, R., Adler, L., McArt, S. (2025) Mechanisms and Consequences of Plant-Pollinator-Pathogen Interactions. *Annual Review of Ecology, Evolution, and Systematics*. doi: [10.1146/annurev-ecolsys-102723-042847](https://doi.org/10.1146/annurev-ecolsys-102723-042847)

**Mueller, T.**, Baert, N., Muñiz, P., Sossa, D., Danforth, B., McArt, S. (2024) Pesticide risk during commercial apple pollination is greater for honeybees than other managed and wild bees. *Journal of Applied Ecology*. doi: [10.1111/1365-2664.14661](https://doi.org/10.1111/1365-2664.14661)

Francis, J., **Mueller, T.**, Vannette, R. (2023) Dispersal overwhelms variation in host quality in shaping deterministic nectar microbiome assembly. *New Phytologist*. doi: [10.1111/nph.19195](https://doi.org/10.1111/nph.19195)

**Mueller, T.**, Francis, J., Vannette, R. (2023) Nectar compounds can impact the growth of microbes and shift community dynamics in floral nectar. *Environmental Microbiology Reports*. doi: [10.1111/1758-2229.13139](https://doi.org/10.1111/1758-2229.13139)

Kahl, H., **Mueller, T.**, Cass, B., Xi, X., Cluff, E., Rosenheim, J. (2022) Herbivory by European Earwigs (*Forficula auricularia*; Dermaptera: Forficulidae) on Commonly Cultivated California Citrus Species. *Journal of Economic Entomology*. doi: [10.1093/jee/toac030](https://doi.org/10.1093/jee/toac030)

Vannette, R., Hall, G., McMunn, M., **Mueller, T.**, Munkres, I., Perry, D. (2021) Culturable bacteria are more common than fungi in floral nectar and are more easily dispersed by thrips, a ubiquitous flower visitor, *FEMS Microbial Ecology*. doi: [10.1093/femsec/fiab150](https://doi.org/10.1093/femsec/fiab150)

Kahl, H., **Mueller, T.**, Cass, B., Xi, X., Cluff, E., Grafton-Cardwell, B., Rosenheim, J. (2021) Characterizing Herbivory by European earwigs (Dermaptera: Forficulidae) on Navel Orange Fruit. *Journal of Economic Entomology*. doi: [10.1093/jee/toab121](https://doi.org/10.1093/jee/toab121)

Cass, B., Kahl, H., **Mueller, T.**, Xi, X., Grafton-Cardwell, E., Rosenheim, J. (2020) Profile of fork-tailed bush katydid (*Scudderia furcata* Orthoptera: Tettigoniidae) feeding on fruit of clementine mandarins. *Journal of Economic Entomology*. doi: [10.1093/jee/toaa258](https://doi.org/10.1093/jee/toaa258)

Cass, B., Hack, L., **Mueller, T.**, Buckman, D., Grafton-Cardwell, E., Rosenheim, J. (2020) Arthropod infestation levels on mandarins in California. *Journal of Economic Entomology*, 113: 2335–2342. doi: [10.1093/jee/toaa141](https://doi.org/10.1093/jee/toaa141)

**Mueller, T.**, Kahl, H., Cass, B., Grafton-Cardwell, E., Rosenheim, J. (2019) Differential impacts of citrus thrips, *Scirtothrips citri* (Thysanoptera: Thripidae), across sweet orange and mandarin species. *Journal of Economic Entomology*, 112: 2767–2773. doi: [10.1093/jee/toz178](https://doi.org/10.1093/jee/toz178)

Rosenheim, J., Booster, N., Culshaw-Maurer, M., **Mueller, T.**, Kuffel, R., Law, Y., Goodell, P., Pierce, T., Godfrey, L., Hunter, W., Sadeh, A. (2019) Disease, contagious cannibalism and associated population crash in an omnivorous bug, *Geocoris pallens*. *Oecologia*, 190: 69–83. doi: [10.1007/s00442-019-04407-y](https://doi.org/10.1007/s00442-019-04407-y)

## Presentations

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**Mueller, T.**, Calixto, A. (2025) New York State Neonicotinoid Training. SAGES symposium. Geneva, NY. Poster.

**Mueller, T.**, Danforth, B., McArt, S. (2023) Antimicrobial properties of glands in solitary ground nesting bees may control brood cell microbial community. Cornell Jugatae Entomology Research Symposium. Ithaca, NY. Oral Presentation.

**Mueller, T.**, Danforth, B., McArt, S. (2022) Antimicrobial properties of glands in solitary ground nesting bees may control brood cell microbial community. Joint annual meeting, Entomological society of America. Vancouver, CA. Oral Presentation.

**Mueller, T.**, Zhao, C., Sossa, D., Baert, N., McArt, S. (2022) Pesticide risk during apple pollination differs between honeybees and native wild bees. Cornell Jugatae Entomology Research Symposium. Virtual. Oral Presentation.

**Mueller, T.**, Zhao, C., Sossa, D., Baert, N., McArt, S. (2022) Pesticide risk during apple pollination differs between honeybees and native wild bees. American Bee Research Conference. Virtual. Oral Presentation.

**Mueller, T.**, Kahl, H., Cass, B., Rosenheim, J. (2018) Susceptibility to citrus thrips (*Scirtothrips citri*) across citrus species. Conference of the Association of Applied IPM Ecologists, Visalia, CA. Oral Presentation.

Rosenheim, J., Grafton-Cardwell, E., Cass, B., Kahl, H., **Mueller, T.** (2018) Improving pest management for California mandarins. California Citrus Conference, Visalia, CA. Poster.

**Mueller, T.**, Rosenheim, J. (2017) Testing pathways of viral induced cannibalism in *Geocoris pallens*. UC Davis Undergraduate Research Conference, Davis, CA. Poster.

## Fellowships and Grants

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Atkinson Center for Sustainability Graduate Research Grant   \$7,278	2024
Griswold Endowment Grant   \$1,500	2023
Rawlins Award   \$750, \$875	2023, 2025
Cornell Graduate School Conference Grant   \$500, \$500	2023, 2025
NSF Graduate Research Fellowship   \$187,500	2021
Cornell Entomology Fellowship   \$31,000	2021
UC Davis Provost Undergraduate Research Fellowship   \$980	2017
Tracy and Ruth Storer Zoological Scholarship   \$500	2015

## Outreach and Extension

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### **New York State Neonicotinoid Training** 2024

Created and narrated the Introduction to Neonicotinoid Insecticides, a required training for all neonicotinoid pesticide applicators in New York State. Within 6 months it became the most watched extension training created by Cornell and is being adapted to use in other states across the nation.

### **Honeybee lab student engagement** 2025

Led an educational field trip for an undergraduate residential group about beekeeping and honeybee research at the Cornell Dyce Lab for Honeybees.

### **Insectapalooza** 2022-2025

Manned a table with live insects and interactive displays at the annual Cornell Insectapalooza, an entomology open house event with an annual attendance of over 3,000 individuals.

### **Cornell Jugatae Symposium Committee** 2021-2024

Organized guest speakers, presentations, and catering for the Cornell Entomology research symposium with an annual attendance of ~70 individuals.

### **UC Davis Arboretum** 2020

Created outreach materials to educate gardeners on plant-pollinators interactions and planting native pollinator gardens.

### **California Native Plant Society** 2020

Produced educational pamphlets on native butterflies and urban insects of the Sacramento, CA region.

### **Citrus Extension Field Days** 2018-2019

Led educational field days to teach local growers and stakeholder about citrus pests and current research.

### Print Journalism

Interviewed and featured in:

- The Cortland Standard - "Bee-coming a citizen scientist"
- The Cortland Standard - "A 'wild' idea takes root"

### Public Outreach Talks

- Caroline Elementary, Grade 2 — 30 attendees
- Dryden Elementary, Grade 5 — 25 attendees
- Museum of the Earth, Mixed age — 20 attendees
- Southworth Library, Adult — 30 attendees
- Dryden Elementary, Grade 5 — 40 attendees
- St. Mark's High School, Highschool — 30 attendees
- Ithaca Science Center, Mixed age — 25 attendees
- Kendal Retirement Home, Adult — 50 attendees
- Cortland, NY 4H class, Mixed school age — 20 attendees
- Southworth Library Earth Day, Mixed age — 110 attendees
- Caroline Elementary, Grade 2 — 36 attendees
- Ithaca Children's Garden, Elementary — 50 attendees

## Teaching and Mentorship

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### Undergraduate Theses

2024- 2025

Independently mentored two undergraduate thesis projects. Advised project creation, funding acquisition and grant writing, data collection, and analyses.

### Applied Statistics: Biological Experiments in Practice

2025

Teaching assistant for ENTOM 3030: Applied Statistics. Helped a range of students, freshman to graduate students, learn how to design ecological experiments and conduct statistical analyses.

### Field Biology

2023, 2024

Taught the Entomology unit of NTRES 2100: Field Biology. Presented a 1-hour lecture and led 14 hours of hands-on outdoor labs to introduce pollinator networks and calculating species-area curves.

### The Bee Course

2024

Teaching assistant for The Bee Course, a workshop to train interdisciplinary attendees in wild bee identification, systematics, and ecology at the Southwestern Research Station in Portal, AZ.

## Journals Reviewed For

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Journal of Applied Microbiology

Environmental Entomology

Science of the Total Environment

Phytoparasitica

New Phytologist

## Certifications and trainings

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New York State Certified Pesticide Instructor	2024
Part 107 FAA Licensed Drone Pilot	2023
SETAC Pesticide Risk Assessment for Pollinators	2021
UndocuAdvocate Program for Educators	2021