Morgan Olmstead
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RESEARCH INTERESTS

Genetic engineering, agricultural pests, insects as feed and food, insect microbiomes, functional genomics, insect behavior, and sequencing technologies.

EDUCATION

North Carolina State University, Raleigh, NC **Aug 2023 – Present**
Ph.D. in Entomology, Genetic Pest Control Focus
Advisor: Dr. Marcé Lorenzen
Genetics and Genomics Fellowship
Interdisciplinary Perspectives on Genes and Genomes Graduate Minor (IPGG)
Genetic Engineering and Society (GES) Interdisciplinary Minor

University of New Hampshire, Durham, NH **Aug 2016 – Jun 2018**
M.S. in Integrative and Organismal Biology
Advisor: Dr. Carrie Hall
Thesis: "The microbiome of four North American *Nicrophorus* species (Coleoptera: Silphidae): Implications for parental care behavior in insects"

Ohio University, Athens, OH **Aug 2012 – May 2016**
B.S. in Biological Sciences
Minor in Anthropology
Certificate in Global Health

RESEARCH AND TEACHING EXPERIENCE

North Carolina State University, Raleigh, NC **Aug 2023 – Present**
Graduate Student, Dr. Marcé Lorenzen, Entomology
- Exploring selfish genetic elements in *Tribolium castaneum* agricultural pest
- Engineering yellow mealworm (*Tenebrio molitor)* for traits in the Insects as Food and Feed industry

U.S. Department of Agriculture – ARS, CGAHR, Manhattan, KS **Nov 2020 – Jun 2023**
Research Technician, Stored Product Insect and Engineering Research
- Generated long-read sequencing data with Oxford Nanopore technology; transcriptome and functional genomics sequencing and variant analysis studies on yellow mealworm strains (*Tenebrio molitor*); shotgun metagenomic and pathogen studies in yellow mealworms, naval orange worm (*Amyelois transitella*), and Diptera; various extraction and sequencing kits and protocols
- Manually annotated insect genes(*Rhyzopertha dominica)*
- Ran behavioral assays with *T. molitor* larvae infected with *Bt* toxin, bioassays of *Tribolium castaneum* reproduction on alternative diets, and bioassays of mites commonly found in stored grain
- Developed rearing protocols for superworm (*Zophobas morio),* lesser mealworm (*Alphitobius diaperinus)*, and banded crickets (*Gryllodes sigallatus)*; and maintained rearing of yellow mealworms (*Tenebrio molitor)*, Indian meal moths (*Plodia interpunctella*), red flour beetles (*T. castaneum),* rice weevils (*Sitophilus oryzae),* and lesser grain borer (*R. dominica)*
- Collaborated with other departments within the USDA, APHIS, FDA, and USAID as well as companies and universities on projects involving using Insects as Food and Feed
- Performed lab management duties such as purchasing and keeping track of accounting with purchase card, sat on a hiring committee, and mentored undergraduate and graduate students

Vanderbilt University Medical Center, Nashville, TN **Aug 2018 - Aug 2020**
Research Assistant II, VANTAGE sequencing core

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- Extracted DNA and RNA from FFPE samples utilizing Covaris extraction methods
- QC of DNA and preparation of genomic and RNA libraries such as WGS, exomes, mRNA and rRNA depletion transcriptome libraries, and single cell sequencing using 10x
- Prepared and loading of Illumina sequencing instruments, utilized BluePippin for size selection
- Trained lab members on library preparation, QC instrumentation, and sequencer loading

Vanderbilt University, Nashville, TN
Volunteer, Dr. Ann Tate, Dept Biological Sciences **Oct 2019 - Feb 2020**

- Conducted metabolism tests using respirometry techniques on *T. castaneum*

University of New Hampshire **Aug 2016 - Jul 2018**
Graduate Student, Dr. Carrie Hall, Dept Biological Sciences

- Researched the effect of microbial symbionts on insect reproductive behavior of *Nicrophorus marginatus* (Coleoptera: Silphidae) and classified microbial communities of five *Nicrophorus* spp.
- Developed a dissection protocol to identify and remove tissues from beetle specimens, including reproductive tissues of both males and females, salivary glands, and digestive tissues
- Extracted and purified DNA from microorganisms found within beetle tissue
- Analyzed 16s and ITS microbiome data using the software program QIIME 2 and supplementally in R
- Studied the effects of microbial communities on parental care behavior and offspring development through the administration of antibiotics and analyzed the behavioral metrics in R

University of New Hampshire Biology Department, Durham, NH **Aug 2016 - May 2018**
Teaching Assistant, Introduction to Biology, Evolution, Biodiversity, and Ecology; Forensic Biology

- Taught methods used in ecology research, including collection and identification of animals and plants, research design, writing reports, and basic statistics utilizing excel
- Graded lab reports and homework, helped prepare lessons and quizzes for the lab course

Center of Science and Industry, Columbus, OH **Jun 2015 - Nov 2015**
Experience Programs Teacher

- Performed scientific experiments for guests and guided guests through their own experiments

Ohio University **Fall 2015**
Volunteer, Dr. Kelly Johnson, Dept of Biological Sciences

- Collected and identified aquatic insects at family level

Ohio University Anthropology Department, Athens, OH **Aug 2014 - Dec 2014**
Peer-Led Team Learning Teacher, Introduction to Biological Anthropology

- Created supplementary material for students in lab including class activities
- Managed and executed exam review sessions

PUBLICATIONS

1. **Olmstead, M.L.,** VanDonge, K.N., Swistek, S.E., Shultz, P.T., Cohnstaedt, L.W., Oppert, B.S. (In Prep). Microbiome and pathogens of filth flies collected from Chicken and Dairy farms for use as protein supplement in animal feed.
2. VanDonge, K.N., Swistek, S.E., **Olmstead, M.L.,** Mota-Peynado, A., Ewing, R.D., Mitzel, D., Oppert, B.S., Cohnstaedt, L.W., Shults, P.T. (2024). Safety of wild-caught *Musca domestica* for use as protein supplement in animal feed. *Journal of Economic Entomology.* https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toad239/7517006
3. Oppert, B. et al. (2023). The Genome of the Yellow Mealworm, *Tenebrio molitor:* it's Bigger Than You Think. *Genes 14*(12). https://www.mdpi.com/2073-4425/14/12/2209
4. Leierer, D., **Olmstead, M**., Oppert, B. (2023). Sequencing to identify pathogens in *Tenebrio molitor.*

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Implications in insects farmed for food and feed. *Frontiers in Insect Science 3.* https://www.frontiersin.org/articles/10.3389/finsc.2023.1059046/full

5. Oppert, B. et al. (2022). The Genome of *Rhyzopertha dominica* (Fab.) (Coleoptera: Bostrichidae)*:* Adaptation for Success. *Genes 13*(3), 446. https://www.mdpi.com/2073-4425/13/3/446

CONFERENCE PRESENTATIONS

Oral presentation

1. **BASF Nora Spring Review** **Mar 2024**
   Morgan Olmstead
   "CYP450 Gene Expression in Honeybees (*Apis mellifera)*"
2. **Plant and Animal Genome Conference** **Jan 2023**
   Application of New Genomic Tools and Techniques in Arthropods workshop (Invited talk)
   Morgan Olmstead, Brenda Oppert, Jose Morales-Ramos, Guadalupe Rojas, and Marcé Lorenzen
   "Building a Bigger Beetles for Insects as Food and Feed
3. **Entomological Society of America Conference** **Oct 2021**
   Advancing Insect Genomics through the Ag100Pest and i5K initiative symposium
   Morgan Olmstead, Brenda Oppert
   "Developing genetic resources for insect livestock in food application"
4. **Ohio University Global Health Certificate Presentation** **Spring 2016**
   Morgan Olmstead
   "Pregnancy Traditions of Lhotshampa Refugee Population"

Poster presentation

1. **Entomological Society of America Conference** **Oct 2021**
   Morgan Olmstead, Dewey Leierer, and Brenda Oppert
   "Utilization of a behavioral monitoring device to analyze movement and predict mortality in *Tenebrio molitor* exposed to *Bacillus thuringiensis* toxin"
2. **Graduate Research Conference,** University of New Hampshire **Apr 2018**
   Morgan Olmstead, Jeff Foster, and Carrie Hall
   "Characterization of burying beetle (*Nicrophorus* spp.) microbiomes: Insights into the ecology and evolution of four North American species"
3. **Entomological Society of America Conference** **Nov 2017**
   Morgan Olmstead, Jeff Foster, and Carrie Hall
   "Evidence for an evolutionary arms race: Behavioral compensation for endosymbiotic sex-ratio manipulation"

PROFESSIONAL DEVELOPMENT

Leadership

Leader of Entomology Graduate Program Peer Review Group, KSU **Spring 2023**
Diversity, Equity, and Inclusion member with USDA **2022 – 2023**
Secretary of Anthropology Club, Ohio University **2014 - 2015**

Professional Affiliations

Entomological Society of America (member) **2017 - Pres**

Peer Review Manuscripts

(2) manuscript reviews for journal, PeerJ **Various**

Training and Workshops

ConGen 2022 **Sep 2022**

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2-week virtual workshop on the conceptual and practical aspects of population genetics, conservation genetics, and molecular ecology presented by University of Montana.

VectorBase Workshop **Jun 2022**
Hands-on training for VectorBase databases and utilizing RNA-seq data from published datasets; held during Arthropod Genomics Symposium at Notre Dame

Vanderbilt University Microbiome Boot Camp **Nov 2019**
Workshop on microbiome experimental design and hands-on learning with QIIME 2

New England Biolabs Molecular Biology Workshop **Jul - Aug 2018**
Two weeks-long molecular biology workshop held at Smith College

MEDIA APPEARANCES/INTERVIEWS

Ohio University Arts and Sciences Alumni Spotlight **Aug 2017**
"Happy Beginnings | Alum Enjoys Beetles Research in Grad School"

AWARDS AND GRANTS

Genetic Engineering Society Minor Fellowship (~17k)	**Fall 2024**
Genetics and Genomics Scholar Fellowship, NCSU (~32k)	**2023-2024**
USDA Employee Individual Special Acts or Service Awards (5)	**Various**
Sigma Xi, Grants-in-Aid of Research ($937), UNH	**May 2017**
Travel Award, UNH	**Fall 2017**
Ohio University Gateway Scholarship	**2012-2016**
College of Arts and Sciences Scholar, OU	**2012**

OUTREACH AND MENTORSHIP

Mentorship

Molly Edeburn, undergrad at KSU **Jun 2022 – Jun 2023**
Teaching skills in entomological bioassays, insect rearing, molecular benchtop, and experimental design.

Dewey Leierer, undergrad/PhD student at KSU **May 2021 – Jun 2023**
Continued mentorship of undergraduate into PhD status including training in genomic techniques, writing, paper submissions, and several presentations.

Kortnee VanDonge, Veterinary Scholar Kansas State University **Summer 2022**
Taught DNA extraction techniques and QC, experimental design techniques. Ended in poster presentation and eventual publication of results.

Sabrina Swistek, Veterinary Scholar student at Mississippi State **Summer 2022**
Taught DNA extraction techniques and QC, experimental design techniques. Ended in poster presentation.

Adam Wallenfang, Biological Research Technician at USDA **Spring 2022**
Taught mRNA library preparation using Lexogen kit, qPCR of Illumina libraries for sequencing.

Abby Perkins, undergrad at KSU **Oct 2021 - May 2022**
Taught experimental design and reading of entomological bioassays. Ended in poster presentation.

Valerie Nguyen, master's student at KSU **Fall 2021**
Advice and training on Illumina amplicon sequencing and analysis. Ended in poster presentation.

Outreach and volunteering

Science Olympiad hosted at NCSU **Jan 2024**
Graded tests

FFA Insect Spectacular Event with USDA **Jun 2023**
Gave children and adults tours of the USDA facility

K-State Open House **Apr 2023**
Demonstrated USDA research on mealworms and Styrofoam for Manhattan, KS community

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Careers in government panel for KSU graduate students **Apr 2023**

Member on panel for graduate students to ask questions about working for the government

Dover Middle School STEAM Academy **Feb 2017 - Apr 2017**

Aided Ph.D. student in creating activities for middle schoolers in experimentation relating to the scientific method, utilizing insects and bacterial colonies

Historic Fort Steuben and Welcome Center **Summer 2013**

Tour guide for the historic fort and archaeology dig in Steubenville, OH