Andrea J. (Ray) Etter

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230 Marsh Life Sciences Building, 109 Carrigan Dr.
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Education

Purdue University — West Lafayette
Interdisciplinary Life Sciences PhD program; Food Science Department — 2011-Dec 2017
Advisor: Dr. Haley F. Oliver

Dissertation: "Determining variation in virulence, persistence, and stress tolerance among *Salmonella enterica* and *Listeria monocytogenes* from food and food-associated environments"

Maranatha Baptist University — Watertown, WI
BS Biology; Molecular Biology emphasis (Summa Cum Laude) — 2007- 2011

Appointments

University of Vermont — Burlington, VT
Assistant Professor, Department of Nutrition and Food Sciences — 2019-present
Affiliated faculty:

-Gund Institute for the Environment
-Animal Biosciences PhD Program
-Cellular and Molecular Biology Interdisciplinary PhD Program
-Food Systems PhD program

Research

The University of Vermont, Nutrition and Food Sciences Department — Burlington, VT

USDA NIFA-AFRI Seed Grant (PI) — 2020-2022

Identifying Gene Expression Profiles Associated with Enhanced Stress Tolerance in Outbreak and Non-Outbreak Associated *Salmonella enterica.* ($200,000). *Award No: 2019-06903*

George Walker Milk Fund (Co-PI) — Jan-Dec 2021

Understanding mechanisms of *Listeria monocytogenes* persistence and sanitizer tolerance in small dairies ($19,158)

VT Agricultural Experiment Station: — 2019-present

Prevalence of *Salmonella enterica* in backyard chicken flocks in VT and associated husbandry characteristics

Purdue University — West Lafayette
USDA-NIFA-AFRI predoctoral Fellowship — 2015-2017

Stress Tolerance, Attachment Capacity, and Virulence of *Salmonella* Heidelberg Outbreak-Related Food Isolates Compared to Non Outbreak-Related Strains. $45,324. *Award No.: 2017-67011-26041*

Dissertation: — 2013-2017

"Determining variation in virulence, persistence, and stress tolerance among *Salmonella enterica* and *Listeria monocytogenes* from food and food-associated environments"

Teaching

University of Vermont, Nutrition and Food Science Department

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NFS 195 Deadly Food: outbreak investigations — Spring 2021, 2020

Designer, Instructor. How U.S. public health officials discover, investigate, and solve foodborne outbreaks. This course introduces common pathogens and foods involved in outbreaks in the U.S., the laboratory and investigative methods officials use to solve the outbreaks, and the government agencies involved. The second half of the semester focused on case studies of famous outbreaks.

BCore 011: Biology — Fall 2020

Taught 50-student lecture section with mixed modes (online and in-person)

NFS 254 Global Food Safety (3 credits) — Fall 2019

Designer, Instructor. An overview of food safety issues, policies, and opportunities around the globe, with a focus on bacterial, viral, and parasite-based food safety challenges. Grad & upper-level undergraduate combined.

Shoreline Community College, Associate Faculty — Summer 2018

BIOL260 (Microbiology lecture and lab)

Instructor of record. Developed and taught lectures and labs for 20 students for summer quarter.

Purdue University, Graduate Assistant — 2011-2017

USWPD Short Course on Food Technology and Food Safety — June 2015, 2016

Designed and led 2016 project to compare total microbial count, coliform load, and yeast and mold counts on fresh produce obtained from local farmer's markets and grocery stores. Worked with Afghan faculty to adapt it for use in their transitional food technology program. Co-designed and led additional laboratory trainings in food science, produce safety, and microbiology in 2015-2016.

<u>Co-instructor (with Dr. Haley Oliver)</u>

Introduction to Peer Review and Proposal Writing in Food Safety — Spring 2017

Developed and taught discussion and writing-based course on developing skills in literature analysis and scientific writing through peer review of published literature on food safety and development of an original pre-proposal in a food safety research area.

Food Microbiology (FS 36200) and graduate miniseries (FS 55301) — Fall 2015

Lectured, assisted in redesigning courses to run simultaneously, developed new assignments, updated lecture materials, tests, and quizzes, held office hours, and graded student assignments and assessments.

<u>Teaching Assistant</u>

General Microbiology Lab (BIOL 43900) — Fall 2013, 2014

Assisted students with laboratory protocols, held weekly help sessions (2014) and office hours by appointment, graded laboratory notebooks and student laboratory papers, and advised students on developing and completing their final projects.

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Microbiology (BIOL 22100) Grading assistant — Spring 2013
Responsible for entering student quiz grades into online grading repository (Blackboard) and assisting with grading student exams

Purdue's Annual Aseptic Processing and Packing Workshop — 2014-2016

Maranatha Baptist University
Supplemental Instructor: Anatomy and Physiology 1 & 2 — 2009- 2011

Peer-Reviewed Publications

Assisi, C., Forauer, E. C. Oliver, H.F., and **Etter, A.J.** Genomic and transcriptomic analysis of biofilm formation in persistent and transient *Listeria monocytogenes* from the retail deli environment does not yield insight into persistence mechanisms. Published online Nov 23, 2020. PubMed PMID: 33227214 — 2020

Forauer, Emily C. Wu, S.T. **Etter, A.J.** *Listeria monocytogenes* in the retail deli environment: a review. *Food Control.* 119 (2021) 1074343. https://doi.org/10.1016/j.foodcont.2020.107443 (Published online August 2020) — 2021

Etter, A.J., West, A.M., Burnett, J.L., Wu, S.T., Veenhuizen, D., Ogas, R.A., Oliver, H.F. 2019. *Salmonella* Heidelberg food isolates associated with a foodborne outbreak have enhanced stress tolerance capabilities. *Appl. Environ. Microbiol*. 85(16): .PMID: 31175193 — 2019

Etter, A.J.,* Hammons, S.R.,* Simmons, C., Roof, S, Wu, T., Cook, P.W., Katubig, A., Stasiewicz M.J., Wright, E., Worchocki, S., Thesmar, H.S., Hollingworth, J., Wiedmann, M., and Oliver, H.F. 2017. Enhanced sanitation standard operating procedures (SSOPs) have limited impact on *Listeria monocytogenes* prevalence in retail delis. *J. Food Prot.* 80(11): 1903-1912. PMID: 29053419 ***These authors contributed equally to this work.** — 2017

Hammons, S. R., **Etter, A.J.,** Wang, J., Wu, T., Ford, T., Howard, M.T., and Oliver H.F. 2017. Evaluation of third-party deep cleaning as a *Listeria monocytogenes* control strategy in retail delis. *J. Food Prot.* 80(11): 1913-1923. PMID: 29053422 — 2017

Wang, J.,* **Ray, A.J.,*** Hammons, S.R., and Oliver, H.F. Persistent and transient *Listeria monocytogenes* strains from retail deli environments vary in their ability to adhere and form biofilms and rarely have *inlA* premature stop codons. *Foodborne Pathog. Dis.* 2015; 12(2): 151-158. PMID: 25569840. ***These authors contributed equally to this work** — 2015

Accepted Abstracts

De Cicco, M., and **Etter, A. J.** 2020. "Prevalence of *Salmonella Enterica* in Backyard Chickens in Vermont and Survey of Owners' *Salmonella* knowledge and Biosecurity Practices." Technical Talk. International Association for Food Protection Annual Meeting. Cleveland, OH. — October 2020

Forauer, E., Cushman, L., Gilmour, S. and **Etter, A.J**. "Mature Biofilms of *Listeria Monocytogenes* isolated from Vermont Dairy Production Environments Are Resistant to QACs in Nutrient Rich Media." Technical Talk. International Association for Food Protection Annual Meeting. Cleveland, OH — October 2020

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Etter, A.J., Oliver, H.F. Outbreak-Associated *Salmonella* Heidelberg Have Higher Baseline Expression of Genes Encoding Heat Shock Proteins, Stress Tolerance Mechanisms, & Virulence Systems at 37°C. Poster. International Association for Food Protection Annual Meeting, Salt Lake City, UT — July 2018

Ray, A. J., Oliver, H.F. Virulence Genes and Multi-Drug Efflux Pumps Are Differentially Expressed in *Salmonella* Heidelberg Exposed to Heat Shock. Technical talk. International Association for Food Protection Annual Meeting, Tampa, FL. — July 2017

West, A. M., **Ray, A.J.**, and H. F. Oliver. Outbreak-associated *Salmonella* Heidelberg food isolates have enhanced biofilm formation under stress conditions. Poster presentation. International Association for Food Protection Annual Meeting, Tampa, FL. — July 2017

Ray, A. J., Oliver, H.F. A Majority of *Salmonella* Heidelberg Outbreak-Associated Food Isolates Have Enhanced Heat Resistance. Technical talk. International Association for Food Protection Annual Meeting, St. Louis, MO. — July 2016

Hammons, S.R., **Ray**, **A.J.,** Wang, J., Oliver, H. F. Environmental testing models identify retail delis with highly prevalent *Listeria monocytogenes* contamination that can be reduced with enhanced SSOPs. International Symposium on Problems in Listeriosis XIX, Paris, France. — June 2016

Ray, A.J., Hammons, S.R., Wang, J., and H.F. Oliver. Deep cleans reduce persistence of *Listeria monocytogenes* in retail delis. Technical Talk. International Association for Food Protection Annual Meeting, Portland, Oregon. — July 2015

Wang, J., **Ray, A.J.**, and Oliver, H.F. Phenotypic characterization of persistent and transient *Listeria monocytogenes* strains from retail delis. Technical Talk. International Association for Food Protection Annual Meeting, Indianapolis, Indiana. (Presenter) — July 2014

Datasets

Etter, A.J., Oliver H.F. Comparison of gene expression profiles for heat-shocked and non-heat shocked stationary phase samples from heat tolerant isolates R1-0006 and R1-0007 and reference strain SL476. NCBI-GEO. https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE103418 — 2017

Preprints (not peer-reviewed)

De Cicco, M, Larsen, K.M., **Etter, A.J**. Assessing *Salmonella enterica* Prevalence and Owner Knowledge and Practices for Backyard Flocks of Chickens in Vermont. *Submitted to Zoonoses and Public Health.* DOI: 10.13140/RG.2.2.20578.35529 — 2020

Invited Book Chapters

Assisi, C., **Etter, A.J**., and Oliver, H.F. 2018. Use and Impacts of Whole Genome Sequencing. p. 309-322. *In* Ricke et al. (ed.), Food and Feed Safety Systems and Analysis. Press (Elsevier), London. — 2017

Invited Presentations

Etter, A. J. *Salmonella* Outbreaks: from the Backyard Flock to the Processing Plant. Biology and Environmental Sciences Interdepartmental Seminar. University of North Carolina, Ashville (virtual). — October 2020

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Etter, A.J. *Salmonella* Heidelberg Food Isolates Associated with the 2013-2014 Foster Farms Outbreak Have Enhanced Stress Tolerance Capabilities and Increased Expression of Stress Tolerance Systems, MDR Efflux Pumps, and Virulence Genes. CDC-DFWED seminar series (web presentation). — May 2018

Etter, A.J. and West, A.M. Outbreak-associated *Salmonella* Heidelberg have increased tolerance to stress. Remote USDA-FSIS presentation. — December 2017

Ray, A.J. Transcriptome of outbreak-associated *Salmonella* Heidelberg in stationary phase and during heat shock. Talk. USDA-ARS, FSIS Food Safety Meeting. Shepherdstown, WV — February 2017

Other Presentations

Etter, A.J. Navigating the Job Market: expectations, reality, and tips. International Association of Food Protection Student PDG meeting. *Online.* — October 2020

Ray, A.J., and Oliver, H.F. RNA-sequencing of stationary phase *S.* Heidelberg isolates at 56 vs 37C. Poster presentation. USDA Center for Food Safety Engineering at Purdue annual meeting. Purdue University, West Lafayette. — October 2016

Ray, A.J., and Oliver, H.F. A majority of *Salmonella* Heidelberg isolates associated with the 2013-2014 Foster Farms outbreak have enhanced heat resistance. Poster presentation. USDA Center for Food Safety Engineering at Purdue annual meeting. Purdue University, West Lafayette. — November 2015

Ray, A.J., Hammons, S.R., Wang, J., Oliver, and H.F. Virulence-attenuating *inlA* mutations are rare in *Listeria monocytogenes* isolates from retail delis. Poster presentation. USDA Center for Food Safety Engineering at Purdue annual meeting. Purdue University, West Lafayette. — November 2014

Ray, A.J., Hammons, S. R., Wang, J., and Oliver, H. F. *Listeria monocytogenes* isolates from retail deli surfaces rarely contain virulence-attenuating *inlA* mutations. Poster presentation. NNEAFF Farm to Fork Symposium, University of Illinois, Urbana-Champaign. — October 2014

Ray, A.J., Hammons, S.R., Wang, J., and Oliver, H.F. Deli SNaPshots: assessing the virulence risk of *Listeria monocytogenes* in retail delis. Poster presentation Purdue Office of Interdisciplinary Graduate Programs Spring Reception. Purdue University, West Lafayette. — March 2014

Grants, Fellowships and Awards

George Walker Milk Fund (Co-PI). Gift funds. "Understanding mechanisms of *Listeria monocytogenes* persistence and sanitizer tolerance in small dairies ($19,158). — Jan-Dec 2021

USDA NIFA-AFRI Seed Grant (PI). USDA National Institute of Food and Agriculture-Agriculture and Food Research Initiative. "Identifying Gene Expression Profiles Associated with Enhanced Stress Tolerance in Outbreak and Non-Outbreak Associated *Salmonella enterica."* ($200,000). *Award No: 2019-06903* — 2020-2022

USDA NIFA-AFRI Seed Grant (PI of record). "Elderberry consumption and human health: a preliminary investigation into effects on indirect calorimetry, insulin sensitivity, and microbiome." Subcontracted majority out to original PI, Patrick Solverson. ($194,003). *Award No: 2020-67018-30851* — 2020-2022

Predoctoral Research Fellowship: USDA National Institute of Food and Agriculture-Agriculture and Food Research Initiative (NIFA-AFRI). $45,324. *Award No.: 2017-67011-26041* — 2016-2018

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J. Mac Goepfert Developing Scientist Awards: Technical Talk Award. July 2017
Award for best graduate student oral presentation at IAFP's Annual Meeting. This award and the accompanying $1500 cash prize recognize excellent graduate student research and presentation ability.

Purdue Interdisciplinary Life Sciences Travel Scholarship 2015
Scholarship for travel to the IAFP Annual Meeting

University of Washington Scholarship to Summer Institute in Statistical Genetics 2013
Covered tuition and $400 in travel expenses for three short courses on applying the R platform to statistical analysis

National Science and Mathematics Access to Retain Talent (SMART) Grant 2009-2011
Federal grant for 3rd-5th year undergraduate students with GPA >3.0 and eligibility for Pell Grant.

Dr. Robert Hanneman Memorial Scholarship 2010
MBU scholarship for exemplary upperclassmen in the sciences

Mentee's Awards

IAFP Student Professional Development Group 3 Minute Thesis competition Judges Choice Awardee—**Melissa De Cicco** 2020

IAFP Student Travel scholarship—Emily Forauer 2020

Mentoring

Graduate students:

Eurydice Aboagye (Food Systems PhD; thesis advisor); *accepted for fall 2020, but deferred a year due to Covid-19* Fall 2021

Emily Forauer (MS student; thesis adviser) 2019-present

Lukas Emerson-Mason (MS student; thesis advisor; defended Dec 2019) Sp-Fa 2019

Undergraduate research assistants:

Lauren Smathers () Spring 2021

Alannah Garrison (Molecular Genetics) Fall 2020

Victoria Rodenburg (Nutrition and Food Sciences) Fall 2020

Jennilee Stocker (Nutrition and Food Sciences) Spring 2020

Katalin Larsen (Microbiology) Spring 2020

Aislinn Gilmour (Microbiology & Molecular Genetics; Honor's Thesis) Su 2019-Curr

Melissa de Cicco (Animal Science, Microbiology) Su-Fall 2019

Lara Cushman (Microbiology & Molecular Genetics) Su-Fall 2019

Caitlinn Lineback (Food Science) Fall 2017

Raeya Ogas (Pre-Pharmacy) Summer 2017

Deklin Veenhuizen (Food Science) Spring 2017

Alyssa M. West (Food Science, Honors student) 2015-2016

Alex Katubig (Biological Sciences, Pre-Med) 2014-2015

Erin Christian (Nursing) Spring 2014

Daniel Moore (Food Science) Fall 2014

Thesis committees:

Stina Sickmueller (NFS Accelerated Master's Program; committee member) 2021

Ashma Chakrawarti (Animal Biosciences PhD; committee member) 2020-

Cari Reynolds (Animal Bioscience PhD; committee member) 2020-

Jessica Gavell (NFS Accelerated Masters Program; thesis committee member) Spring 2020

Sofia Maranto (NFS Honor's Thesis; member) Fall 2019

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Academic Advising:

19 undergraduate NFS and DNFS students	Fall 2020
8 undergraduate NFS and DNFS students	Spring 2020
10 undergraduate NFS and DNFS students	Fall 2019
12 undergraduate NFS and DNFS students	Spring 2019

Internal Service

Academic committees:

Honors College Council	Fall 2020
Studies Committee, UVM	2019-2020
Food Systems Project and Thesis/Student Development and Evaluation Committee	Fall 2019-present

Ad hoc committees:

Facilitator for College of Agriculture and Life Sciences (CALSX) strategic planning brainstorming sessions — Spring 2021

- ***Diversity goal***—led group of 10 faculty and staff in 2.5-hr brainstorming session on increasing diversity training and diverse populations in CALS
- ***Research goal***—led group of 10 faculty and staff in 2.5-hr brainstorming session on increasing number and size of grants coming to CALSX faculty and increasing extension integration into CALSX
- ***Student goal***—led group of 10 faculty and staff in 2.5 hr brainstorming session on increasing recruitment and retention of students, optimizing course offerings to attract non-traditional students, increasing philanthropy and corporate sponsorship, and optimizing connections with extension and external partners

Nutrition and Food Sciences representative on committee to develop a Biosecurity minor in UVM-CALS — 2019

External Service

Grant Review

Invited grant reviewer for Ontario Agri-Food Research Initiative grant program (OMAFRA). Ontario, Canada. — 2021

Invited grant reviewer for the Polish National Science Center (OPUS-19 and SONATA BIS-10 programs) — 2020

Invited grant reviewer for the French National Research Agency (ANR) — 2020

Journal and Abstract reviews

Journal of Food Protection Editorial Board — 2020-2022
3- year term; agreement to peer review up to 12 papers/year

Ad hoc Reviewer Foodborne Pathogens and Disease — 2019-current

Abstract reviewer for ASM MICROBE 2019; reviewed 62 abstracts — 2019

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Miscellaneous service

International Association for Food Protection Developing Future Food Safety Professionals PDG — 2018

Convenor for "Help! I'm New Management. How do I Convince My Colleagues Food Safety is Important?" Roundtable at IAFP 2018

Proposed and co-developed webinar "Starting Bioinformatics from Zero as a Biologist with Jessica Chen. Presented along with Jessica Chen and Peter Cook. Seminar had 176 attendees — 2018

International Association for Food Protection Food Hygiene and Sanitation PDG — 2018

Moderator for Spanish-language webinar "Cleaning, Sanitizing and the Seven Steps of Sanitation" presented by Frank De La Guardia Venzal. Spanish-language webinar had 340 attendees.

International Association for Food Protection Meat and Poultry PDG — 2017

Convener for "A Paradigm Shift in Understanding and Controlling *Salmonella* of the Future" Symposium at IAFP 2017

Professional Affiliations

International Association for Food Protection Student Member, member — 2014-current

Dairy Safety and Quality PDG
Advanced Molecular Analytics PDG
Developing Food Safety Professionals PDG
Retail and Food Service PDG
Meat and Poultry PDG
Student Professional Development Group (PDG)

Institute of Food Technologists Student Association — 2015-2016

Outreach & Volunteering

Summer of Science Virtual Teen Science Cafes (UVM extension) — Summer 2020

"Bacteria and Backyard Chickens - How Much *Salmonella* Is There?"

Skype a Scientist program

7th grade class,	Spring 2021
9th grade class, 3rd grade class	Fall 2020
3rd grade class (2x)	Spring 2020
4th grade, 2nd grade, 4th grade, 8th grade classes	Fall 2019
K-2 grade class, 8th grade class, 4th grade class	Spring 2019

English as a Second Language tutor, Seattle Central College — 2017-2018

Center for Food Safety Engineering booth at SpringFest (Purdue University) — 2014-2016

Leaf plating to show microbial diversity and illustrate food safety challenges

Judge for Summer Undergrad Research Fellowship Poster Competition — Summer 2015

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Professional Development

Center for Teaching and Learning courses

Team Time: learn about breakout rooms	January 2021
Active Learning in Remote Synchronous Classes	January 2021
Teaching in the Mixed Modality	Summer 2020
Teaching with Teams	Summer 2020
Teaching in the In-Person Modality	Summer 2020

Python for Everybody Coursera Series (University of Michigan)

Using Databases with Python (Certificate No. 9NX4CHPAMWWM)	February 2018
Using Python to Access Web Data (Certificate No. 7P7H2CE6EAQ8)	February 2018
Python Data Structures (Certificate No. UT43JTH3FYKK)	January 2018
Introduction to Python (Certificate No. YJSQA8HQXYZN)	December 2017

Graduate Teaching Certificate — Completed May 2016

Teacher development program by the Center for Instructional Excellence at Purdue. Required nine hours of instructional development, classroom observations (both observing and being observed by experienced teachers), two semesters of teaching experience, use of Early Feedback and End-of-Semester feedback, and reflective essays on student and faculty feedback.

Purdue Bioinformatics Core: Differential Gene Expression using RNA-Seq Workshop — March 2016

Half day hands-on workshop on analyzing RNA-seq data using Tophat and Cufflinks in the Unix environment of the Purdue computing core.

Purdue Computational Interdisciplinary Graduate Programs: Next Generation Sequencing Workshop — December 2015

Hands-on introduction to RNA-sequencing data analysis using the Purdue computing core resources in Unix on the Purdue computing core.

Conference for Pre-Tenure Women (Purdue University) — Summer 2015

Effective Teaching Workshop, (Purdue University) by Drs. Brent and Felder — February 2015

1.5 day interactive workshop on effective teaching techniques including course planning, active learning, learning styles, grading, and classroom management.

Purdue Women in Science (WISP) program — 2013-2014

Seminars on professional development and career options in science

Graduate School Professional Development Series: — 2012-2017

Ace Your Interview	Feb. 2017
Making the Most of Your Presentation	Sept. 2014
Success in Graduate School	Feb. 2014
Funding Your Graduate Education	Aug. 2012
Speed Networking	Feb. 2012
Essentials of a Graduate Student Portfolio, Part II	Feb. 2012
Essentials of a Graduate Student Portfolio, Part I	Jan. 2012
Grant and Proposal Writing Strategies	Jan. 2012

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Languages

French: beginner	2020-current
Spanish: proficient	2010-current
Python: beginner	2017-current
Unix: competent	2016-current
R statistics: competent	2013-current