

Emily P. Van Syoc

Department of Biology

The Pennsylvania State University

vansyoc@psu.edu | @emily_vansyoc | <https://orcid.org/0000-0002-9984-534X>**EDUCATION**

Doctor of Philosophy Integrative & Biomedical Physiology and Clinical & Translational Science Huck Institute of Life Sciences, The Pennsylvania State University	University Park, PA 2019-2023
Master of Science Soil Science Department of Ecosystem Science and Management, University of Wyoming	Laramie, WY 2016-2019
Bachelor of Science Animal Science, Minor in Sustainable Agriculture California Polytechnic State University (Cal Poly) San Luis Obispo	San Luis Obispo, CA 2012-2016

RESEARCH EXPERIENCE

Pennsylvania State University Postdoctoral Scholar Principal Investigator: Seth Bordenstein	University Park, PA 2023-current
Pennsylvania State University Predoctoral Fellow/Graduate Research Assistant Principal Investigators: Erika Ganda and Connie J. Rogers	University Park, PA 2019-2023
Penn State College of Medicine & Milton S. Hershey Medical Center Internship in Clinical & Translational Sciences Principal Investigator: Steven Hicks	Hershey, PA 2022
WEST Ecological Services & Wyoming Geographical Information Center Data Science Intern Supervisor: Trent McDonald	Laramie, WY 2019
University of Wyoming Graduate Teaching Assistant Principal Investigator: Linda T.A. van Diepen	Laramie, WY 2016-2019
Cal Poly Undergraduate Research Principal Investigator: Mark Horney	San Luis Obispo, CA 2015-2016

FELLOWSHIPS AND RESEARCH GRANTS

Predoctoral Fellowship USDA National Institute of Food and Agriculture AFRI	\$180,000 2021-2023
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Research Grant	\$3,000
Penn State College of Agriculture Graduate Student Competitive Grant Program	2022
Predoctoral Training Fellowship	2 years of support
Integrative Analysis of Metabolic Phenotypes (IAMP) T32DK120509	2020-2022
Graduate Student Grant	\$25,000
USDA Western Sustainable Agriculture and Education	2018-2019

AWARDS AND HONORS

Carolee Bull Leadership Award	2023
Penn State One Health Microbiome Center	
Community Building Travel Award	2022
Penn State One Health Microbiome Center	
Paul Hand Graduate Student Research Achievement Award	2022
Penn State College of Agriculture	
1st place Oral Presentation	2022
Penn State Huck Life Sciences Symposium	
Best Poster	2021
Penn State Physiology Retreat	
2nd place Poster	2021
Penn State Huck Life Sciences Symposium, Computational Biology section	
Honorable Mention	2017
NSF Graduate Research Fellowship	

PEER REVIEWED PUBLICATIONS

**Bean is a previous name*

Van Syoc, E., Weaver, E., Rogers, C.J., Silverman, J.D., Ramachandran, R., Ganda, E. **2022.** Metformin modulates the gut microbiome in broiler breeder hens. *Frontiers in Physiology*. 13(1000144). DOI: 10.3389/fphys.2022.1000144.

- Special issue: Avian Physiology – *Avian Microbiome; from embryonic development to adulthood*

Van Syoc, E., Albeke, S., Scasta, D., Van Diepen, L.T.A. **2022.** Quantifying the immediate response of the soil microbial community to grazing intensities on irrigated pastures. *Agriculture Ecosystems & Environment*. 326(107805). DOI: 10.1016/j.agee.2021.107805

- Special issue: *The outsized stewards; engaging soil microbial diversity in agroecosystems*

Van Syoc, E.,** Carrillo Gaeta, N.**, Ganda, E. **2021.** Choice of commercial DNA extraction method does not affect 16S sequencing outcomes in cloacal swabs. *Animals*. 11(5) 1372. DOI: 10.3390/ani11051372

- **Contributed equally

Gaeta, N., **Bean, E.***, Miles, A.M., Goncalves de Carvalho, D.U.O., Aleman, M.A.R., Carvalho, J.S., Gregory, L., Ganda, E. **2020**. A cross-sectional study of dairy cattle metagenomes reveals increased antimicrobial resistance in animals farmed in a heavy metal contaminated environment. *Frontiers in Microbiology*. 11(2801). DOI: 10.3389/fmicb.2020.590325

PUBLICATIONS IN REVIEW AND/OR PREPRINT

Van Syoc, E., Damani, J., DiMattia, Z., Ganda, E., Rogers, C.J. The effects of Bifidobacterium probiotic supplementation on blood glucose; a systematic review and meta-analysis of preclinical and clinical evidence. *Advances in Nutrition*. In review. Manuscript ID: ADVANCES-23-0141R1

Van Syoc, E., Nixon, M., Silverman, J.D., Luo, Y., Gonzalez, F.J., Patterson, A.D., Ganda, E. The gut mycobiome has a consistent relationship with type 2 diabetes mellitus and metformin treatment across populations. Preprint DOI: 10.1101/2023.05.25.542255

DiMattia, Z., Damani, J., **Van Syoc, E.**, Rogers, C.J. Effect of probiotic supplementation on intestinal permeability in overweight and obesity: A systematic review of randomized controlled trials and preclinical studies. *Advances in Nutrition*. In review. Manuscript ID: ADVANCES-23-0298

Siddique, A., Roomana, A., Ali, A., Andleeb, S., Ullah, N., Mohiuddin, M., Akbar, S., Imran, M., **Van Syoc, E.**, Yue, M., Ganda, E., Rahman, A. Indigenous probiotics *Lactobacillus reuteri* and *Enterococcus faecium* exhibit positive growth performance and disease prevention against extended-spectrum cephalosporin and fluoroquinolones resistant *Salmonella enterica* in broiler chicks. *PloS ONE*. In review. Preprint DOI: 10.1101/2023.07.10.548416

MANUSCRIPTS IN PREPARATION

Van Syoc, E., Turbitt, W., Xu, Y., Koo, I., Patterson, A., Ganda, E., and Rogers, C.J. Weight Gain Alters the Metabolomics Profile in the Tumor Microenvironment in the 4T1 Mammary Tumor Model.

Van Syoc, E., Rogers, C.J., Ganda, E. Metformin and probiotics supplementation modulates the gut microbiome in diet-induced obesity.

Bierly, S.A., **Van Syoc, E.**, Westphalen, M.F., Miles, A.M., Gaeta, N.C., Felix, T.L., Hristov, A.N., Ganda, E.G. Alterations of rumen and fecal microbiome in growing beef and dairy steers fed rumen-protected Capsicum oleoresin.

Fonseca, A., Kenney, S., **Van Syoc, E.**, Bierly, S., Dini-Andreote, F., Silverman, J., Boney, J., Ganda, E. Longitudinal characterization of the effects of probiotics and essential oils on broilers' microbiome and performance.

Lecton, J., Hamilton, J., Miles, A., **Van Syoc, E.**, Martinez, M., Silverman, J., Barragan, A., Ganda, E. Effects of different treatment approaches on microbial populations in the vaginal discharge of cows diagnosed with clinical metritis.

NON-PEER REVIEWED

Bean*, E., and Van Diepen, L.T.A. Quantifying Short-Term Soil Biological and Vegetation Feedback from High-Intensity, Short-Duration Grazing Versus Conventional Grazing. **2018**. *Field Days Bulletin*,

University of Wyoming Agricultural Experiment Station. 32-33. Available online:
<https://www.uwyo.edu/uwexpstn/publications/field-days-bulletin/2018-field-days-bulletin.pdf>

Ganda, E., Kovac, J., Kenney, S.M., **Van Syoc, E.P.**, Chung, T. **Patent:** Methods and compositions for real-time antimicrobial resistance profiling. Application no. 63/419,911

ORAL PRESENTATIONS

Harvard Chan Microbiome in Public Health Center Symposium **Boston, MA | 2023**

Title: Mining metagenomes reveals alterations in the gut mycobiome with metformin and type 2 diabetes mellitus.

Penn State Huck Life Sciences Symposium **University Park, PA | 2022**

Title: Metformin modulates the microbiome of broiler breeder hens in an avian model of ovarian dysfunction.

Penn State Physiology Colloquium **University Park, PA | 2022**

Title: Global metagenomics analysis reveals impact of metformin and type 2 diabetes on the gut mycobiome.

Penn State Physiology Colloquium **University Park, PA | 2021**

Title: Energy restriction and physical activity alter the metabolomic profile in the tumor microenvironment and in the plasma in the 4T1.2 mammary tumor model of triple negative breast cancer.

Penn State Microbiome Center Seminar **University Park, PA | 2020**

Quantifying the immediate response of the soil microbial community to different grazing intensities on irrigated pastures.

UW Department of Ecosystem Science & Management Seminar **Laramie, WY | 2019**

Title: The critical role of soil microbiota to sustainable agriculture: Quantifying short-term microbial and vegetation feedback to intensive grazing.

Wyoming Stockgrowers Association Range Health Soil Workshop **Buffalo, WY | 2017**

Title: 'Mob' grazing and the short-term effect on soil health.

POSTER PRESENTATIONS

Penn State Physiology Research Showcase **University Park, PA | 2023**

Title: The gut mycobiome has a consistent relationship with type 2 diabetes mellitus and metformin treatment across populations.

American Society of Microbiology **Washington D.C. | 2022**

Title: Metformin modulates the microbiome of broiler breeder hens in an avian model of ovarian dysfunction.

Experimental Biology **Philadelphia, PA | 2022**

Title: Global metagenomics analyses demonstrate metformin-induced changes in the gut mycobiome in subjects with type 2 diabetes.

- Abstract: The FASEB Journal, Volume 36

Penn State Physiology Retreat**University Park, PA | 2021**

Title: Global metagenomics demonstrate metformin-induced changes in the gut mycobiome in subjects with type 2 diabetes.

American Society of Microbiology at World Microbe Forum**Virtual | 2021**

Title: Effect of metformin treatment on the gut mycobiome of type 2 diabetes patients: A meta-analysis.

Penn State Huck Life Sciences Symposium**Virtual | 2021**

Title: Effect of metformin treatment on the gut mycobiome of type 2 diabetes patients: A meta-analysis.

Wyoming Weed & Pest Conference**Sheridan, WY | 2018**

Title: The critical role of soil microbiota to sustainable agriculture: Quantifying short-term microbial and vegetation feedback to intensive grazing.

Ecological Society of America**New Orleans, LA | 2018**

Title: Quantifying short-term soil biological and vegetation feedback from high-intensity, short-duration grazing versus conventional grazing.

TEACHING AND MENTORSHIP EXPERIENCE**Guest Instructor: Animal Microbiomes (ANSC 456)**

Department of Animal Science, Penn State

2023

Led computer lab session on introduction to RStudio, introduced basic concepts of R scripting, interpreting console output, and data types.

Guest Instructor: Introduction to 'Omics'**2022**

Faculdades Integrada Campos Salles, Brazil

Lectured on concepts, methods, and applications of metabolomics, transcriptomics, and proteomics to veterinary students.

Leader: Bioinformatics Bootcamp

Ganda Lab, Penn State

2021

Led twice-weekly coding sessions for junior lab members. Content included an introduction to bash scripting and R and analysis of each student's 16S sequencing dataset from raw fastq files to publication-ready analyses and plots. Resulted in the core set of analyses for manuscripts by each student that are in preparation.

Workshop Instructor: Automating Secondary Sequence Analysis**2021**

One Health Microbiome Center in collaboration with the Institute for Computational and Data Science's Research Innovations with Scientists and Engineers, Penn State

Instructed a 3-hour workshop on command line methods to access the Sequence Read Archive by using bash scripting and GNU parallel to automate download and basic analysis of shotgun metagenomics data.

Teaching Assistant: Microbiome Center Kickstarter Bootcamp**2020-2021**

One Health Microbiome Center, Penn State

Assisted in 5-day workshop for new graduate students that familiarized the students with concepts of command line, RStudio, Github, and basic bioinformatics data analyses.

Teaching Assistant: Animal Biology (BIOL2022)**2019**

Department of Biology, University of Wyoming

Instructed 3-hour undergraduate laboratory sections on principals of animal biology including taxonomy, phylogeny, and animal behavior. Led dissection labs for fish, rats, and frogs. Led labs with live beta fish and guided students through developing a research question and hypothesis, designing an experiment, performing data analysis, and writing a research report.

Teaching Assistant: Soil Microbiology & Ecology (SOIL4140/5150)**2017-2018**

Department of Ecosystem Science & Management, University of Wyoming

Co-instructed 3-hour undergraduate & graduate laboratory sections with a wet lab, and computational lessons. Taught foundational principles of microbiology including microscopy, culturing, gram staining, and DNA extraction. Guided computational labs where students analyzed Sanger sequencing from a cultured bacterial isolate and identified the isolate with BLAST.

Teaching Assistant: Soil Fertility (SOIL4160/5160)**2018**

Department of Ecosystem Science & Management, University of Wyoming

Created course material for graduate lecture course, graded materials, and proctored and graded exams.

Mentor: Summer Research Apprenticeship Program**2017**

NSF EPsCOR, University of Wyoming

Served as primary mentor for a high school student for a summer research experience. Mentored the student in helping with field sampling, formulating their own research question and experiment, and delivering a presentation on the project.

Teaching Assistant: Introduction to Soil Science (SOIL2010)**2017**

Department of Ecosystem Science & Management, University of Wyoming

Instructed 3-hour undergraduate laboratory sections for principles of soil morphology, nutrient cycling, fertility, and soil health metrics. Developed a lesson with augmented reality technology in collaboration with the Shell 3D Visualization Center that “brought” students to an outdoor site in Vedauwoo and narrated ecological definitions of the things around them, such as lichen.

Teaching Assistant: Forest and Range Soils (SOIL 4150/5150)**2016**

Department of Ecosystem Science & Management, University of Wyoming

Co-instructed field sessions with weekly trips to the Snowy Mountains range and Albany County, Wyoming. Students dug soil pits and described soil morphology and taxonomy across a range of ecosystem and soil types.

Undergraduate Teaching Assistant: Lambing Enterprise**2013-2016**

Department of Animal Science, California Polytechnic State University San Luis Obispo

Instructed a 100% hands-on field course for Animal Science undergraduate students that managed every aspect of the lambing season at Cal Poly’s Cheda Ranch. Accompanied students on twice-daily lambing checks where students learned to tag, weigh, and record new lambs; pull or assist during dystocia; and necropsy stillborn or dead lambs.

PROFESSIONAL SERVICE/LEADERSHIP

Manuscript Reviewer **2022-present**
Agriculture Ecosystems & the Environment (Elsevier), Scientific Reports (Nature)

Planning Committee **2023-present**
One Health Microbiome Center 2024 Symposium
Co-organize the symposium, generate agenda and section topics, invite keynote speakers.

Seminar Facilitator **2022**
One Health Microbiome Center Fall 2022 Seminar Series
Invited internal and external speakers, organized travel and meeting agendas, started a new tradition of hosting a post-talk lunch with trainees and the speaker.

Founder, Clinical Trials Coffee Hour Journal Club **2021-2023**
Penn State
Organized students in the Clinical and Translational Sciences Institute to meet monthly and discuss new research or hot-topic press releases such as new drug approvals. Hosted additional sessions with guest speakers including Dr. Jim Lewis (University of Pennsylvania) and Dr. Ian Paul (Penn State College of Medicine) to share their career insight as physician-scientists, and Dr. Laura Weyrich (Penn State Department of Anthropology) to lead a discussion on ethics in clinical science.

Co-founder and Treasurer, Soil Science Club **2016-2018**
University of Wyoming
Obtained Student Organization status from University leadership and organized monthly meetings or activities for graduate, undergraduate, and K-12 students.

EXPERIENCES

Changing Microbiomes Symposium **2022**
Penn State One Health Microbiome Center

Diversity Book Club and Discussion (6 hours of diversity credits) **2022**
College of Agriculture, Penn State

Unconscious Bias webinar **2022**
American Society for Biochemistry and Molecular Biology

Reshaping the Microbiome Through Nutrition (virtual conference) **2021**
University of California San Diego and Nature Journals

Bioinformatics Data Reproducibility Bootcamp (5-day workshop) **2020**
Bioinformatics and Genomics, Penn State

KEY SKILLS

Computational

- Shotgun metagenomics pipelines from fastq to completed analysis; FastQC, MultiQC, Kaiju, Kraken2, Metaphlan3, EukDetect, blastN, Diamond, MetaPhlan, Humann3

- Amplicon sequencing pipelines from fastq to completed analysis: 16S and ITS pre-processing in dada2 or QIIME2, R analyses including alpha and beta diversity, differential relative abundance, correlational analysis
- Metabolomics data analysis in R and MetaboAnalyst
- R package and function development
- Versioning and collaboration on Github
- UNIX, bash scripting and cluster computing including job submission on Torque or SLURM schedulers using job arrays or GNU Parallel
- Managing data with relational databases: Microsoft SQL, Access

Laboratory

- Mouse handling, oral gavage, blood collection (submental, submandibular, cardiac puncture), euthanasia, dissection
- Polymorphic mononuclear blood cells isolation from whole blood
- Flow cytometry
- Fluorometric and colorimetric extracellular enzyme assays
- Soil physicochemical analyses: Dissolved organic C & N, mineralized nitrate and ammonium, gravimetric water content

Communication/Administration

- IACUC preparation
- IRB preparation
- Electronic health record extraction in PowerChart and REDCap

PROFESSIONAL MEMBERSHIPS

American Society of Microbiology	2020-present
American Physiology Society	2022-present
Penn State One Health Microbiome Center	2019-present

REFERENCES

Seth Bordenstein, PhD

Dorothy Foehr Huck and J. Lloyd Huck Endowed Chair in Microbiome Sciences
 Professor of Biology and Entomology
 Director of the One Health Microbiome Center
 Huck Institutes of the Life Sciences
 Pennsylvania State University
 814.865.1100 | s.bordenstein@psu.edu

Erika Ganda, PhD

Assistant Professor of Food Animal Microbiomes
 Department of Animal Science
 Huck Institutes of the Life Sciences
 Pennsylvania State University
 814.865.4084 | ganda@psu.edu

Connie J. Rogers, PhD

Professor and Head
 Department of Nutritional Sciences

Curriculum Vitae

Emily P. Van Syoc

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Linda T.A. van Diepen, PhD

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