Ann E. **Wells**

PhD · Statistics Masters

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Education

University of Tennessee-Knoxville — *Knoxville, TN*

Ph.D. in Genome Science and Technology — *2010 - 2017*

University of Tennessee-Knoxville — *Knoxville, TN*

M.S. in Statistics — *2010-2017*

University of Tennessee-Knoxville — *Knoxville, TN*

B.S. in Microbiology — *2006-2009*

minor in Business

Research Experience

Postdoctoral Associate (Mentor: Dr. Greg Carter) — *The Jackson Laboratory*

Apr. 2018-present

Project title: Tissue Level Transcriptome Profiling Reveals Independent and Interactive Effects of Glycolytic Inhibition on Immunity, Metabolism, and Protein Synthesis

- Processed metabolomics samples for shipping
- RNAseq and metabolomics analysis to obtain data for integration across 9 tissues
- Developed filtering strategy to identify pathways altered by 2DG
- Developed data resource (link) using blogdown package and rmarkdown in R to disseminate complete analysis and code for transparency and reproducibility

Project title: Inhibition of Glycolysis and Disruption of N-linked Glycosylation Modify Distinctive Pathways Across Multiple Tissue Compartments in a Lupus-prone Mouse Model

- Developed R code to analyze multiple -omics datasets
- RNAseq and metabolomics analysis to obtain data for integration across 9 tissues
- Developed filtering strategy to identify pathways altered by 2DG
- Developing data resource using blogdown package and rmarkdown in R to disseminate complete analysis and code for transparency and reproducibility

Project title: Differential Response to 2DG treatment Across Multiple Lupus-prone mouse models

- Analyzing the effects of 2DG across two lupus-prone mouse models and one healthy mouse population
- Using various statistical techniques to assess similarities and differences across their transcriptomes

Project title: Rank and prioritize altered biochemical pathways across multiple -omics using Belief models

- Utilizing the Dempster-Shafer Theory and Transferable Belief Model to rank and prioritize experimentally altered biochemical pathways through single or multiple -omics
- Determining the mass that will take into account difficulty in identifying pathway and other biological factors
- Creating a test case to prove it works in a biological setting
- Testing on biological datasets I have already processed

Project title: Combined Analysis of Pleiotropy and Epistasis (CAPE)

- Added kinship function to R package to handle overall and leave-two chromosome out kinship correction
- Performed various biological analysis to test CAPE
  - cardiac function in DO mice
  - immune function in DO mice

Project title: Natural variation alters Alzheimer's-related gene expression in DO mice

- Compared DO mice hippocampal RNA expression data and paracliques to human AMP-AD modules
  - Performed QTL and mediation analysis to identify loci influencing paracliques and potential mediator genes
  - Used Jaccard Index to identify genes shared between mouse and human

Graduate Research Assistant (Mentor: Dr. Brynn Voy)

University of Tennessee-Knoxville

Mar. 2011 - Dec. 2017

Project title: Untargeted Metabolic Profiling Distinguishes Gene-by-diet "Metabotypes" at the Tissue Level in Mice

- Collected adipose, skeletal muscle, and liver tissue from mice
- Extracted metabolites from tissue using Mass spectrometry
- Picked metabolite peaks from raw results
- Utilized linear models and multivariate statistics to analyze metabolite abundances from mouse tissue

Project title: The Effect of Low Dose Radiation on Macrophage Populations in BXD mice

- Irradiated mice
- Extracted bone marrow from mice femurs
- Performed cardiac punctures to extract blood from mice
- Dissected liver, spleen, thymus, lung, and femur from mice
- Performed macrophage migration assay

Project title: Mechanisms of Population Level Variation in Fatness and Leanness

- Extracted RNA from BXD recombinant inbred strain mice adipose tissue
- Performed qPCR on adipogenesis genes
- Analyzed qPCR results using correlation and partial correlation
- Calculated deltaCT and standard curves

Graduate Research Assistant (Mentor: Dr. John Biggerstaff)

University of Tennessee-Knoxville

Aug. 2010 - Mar. 2011

Project title: Melanoma Tumor Growth and Metastasis in Zebrafish

- Maintained hepatic and melanoma cancer immortal cell lines
- Microinjected GFP labeled melanoma/hepatic cells into zebrafish larvae
- Tracked cell growth using deconvolution and time lapse microscopy

Research Alliance in Math and Science Intern (Mentor: Kara Kruse)

Oak Ridge National Laboratory

June 2010 - Aug. 2010

Project title: Modeling the effect of soluble fibrin on the immune-tumor interaction

- Developed a series of differential equations to simulate the effect of soluble fibrin on the interaction between macrophages and melanoma cells using physiologically relevant estimates
- Separated blood to isolate macrophages
- Performed a macrophage migration assay
- Measured macrophage movement using deconvolution and time lapse microscopy

Research Alliance in Math and Science and Student Undergraduate Laboratory Internship (Mentor: Kara Kruse)

Oak Ridge National Laboratory

June 2009 - Apr. 2010

Project title: Modeling the effect of melanoma tumor cell growth in the presence of natural killer cells

- Developed a series of differential equations to simulate the effect of soluble fibrin on the interaction between natural killer cells and melanoma cells using physiologically relevant estimates
- Performed sensitivity analysis in Matlab to test robustness of model

Undergraduate Research Assistant (Mentor: Dr. Ted Henry)

University of Tennessee-Knoxville

May 2008 - June 2009

Project title: Detection of oxidative stress in zebrafish when exposed to C60 nanoparticles

- Zebrafish husbandry
- Aided zebrafish exposure to C60 nanoparticles

Project title: Effects of *Microcystis aeruginosa* on zebrafish reproduction

- Maintained *Microcystis aeruginosa* cultures
- Lyophilized *Microcystis aeruginosa*
- Dissected liver from zebrafish
- Cryosectioned and H and E stained liver tissue

Project title: Bioaccumulation of *Microcystis aeruginosa* in channel catfish

- Maintained large scale production of *Microcystis aeruginosa* cultures
- Dissected muscle from channel catfish
- Performed channel catfish husbandry

Project title: Detection of estrogenic activity in *Microcystis aeruginosa* using a yeast estrogen bioreporter

- Maintained *Microcystis aeruginosa* cultures
- Analyzed estrogenic levels from *Microcystis aeruginosa*

Publications

In Preparation/Submitted

Ann E. Wells, John J. Wilson, Sarah E. Heuer, Jian Wei, Colleen Mayberry, Derry C. Roopenian, Gregory W. Carter, Chih-Hao Chang. Inhibition of Glycolysis and Disruption of N-linked Glycosylation Modify Distinctive Pathways Across Multiple Tissue Compartments in a Lupus-prone Mouse Model

Ann E. Wells, Narayanan Raghupathy, Ray F. Robledo, Daniel M. Gatti, Steven C. Munger, Charles Phillips, Juliet Ndukum, Troy Wilcox, Joel H. Graber, Matthew J. Hibbs, Michael A. Langston, Gary A. Churchill, Gregory W. Carter, and Elissa J. Chesler. Natural Variation Alters Alzheimer's-related Gene Expression in DO Mice.

Ann E. Wells, Chih-Hao Chang, Gregory W. Carter. Using Web-based Data Resources for Transparent and Reproducible Data Analysis.

Published

Ann E. Wells, John J. Wilson, John D. Sears, Jian Wei, Sarah E. Heuer, Raghav Pandey, Mauro W. Costa, Catherine C. Kaczorowski, Derry C. Roopenian, Chih-Hao Chang, Gregory W. Carter. (2024) Transcriptome Analysis Reveals Organ-Specific Effects of 2-Deoxyglucose Treatment in Healthy Mice. PLOS ONE 19(3): e0299595. https://doi.org/10.1371/journal.pone.0299595. paper link

Ann E. Wells, William T. Barrington, Stephen Dearth, Nikhil Milind, Gregory W. Carter, David W. Threadgill, Shawn Campagna, Brynn Voy. Tissue Level Strain and Sex-by-Strain Interactions Reveal Unique Metabolite and Clustering Profiles Using Untargeted Liquid Chromatography-Mass Spectrometry Across Adipose, Skeletal Muscle, and Liver Tissue in Mice Fed a Standard Chow Diet. Metabolites. 2022 Apr 8;12(4):337. doi: 10.3390/metabo12040337. PMID: 35448524; PMCID: PMC9031494. paper link

Tyler AL, Emerson J, El Kassaby B, **Wells AE**, Philip VM, Carter GW. The Combined Analysis of Pleiotropy and Epistasis (CAPE). Methods Mol Biol. 2021;2212:55-67. doi: 10.1007/978-1-0716-0947-7_5. PMID: 33733350. paper link

Tyler AL, El Kassaby B, Kolishovski G, Emerson J, **Wells AE**, Matthew Mahoney J, Carter GW. Effects of kinship correction on inflation of genetic interaction statistics in commonly used mouse populations. G3 (Bethesda). 2021 Jul 14;11(7):jkab131. doi: 10.1093/g3journal/jkab131. PMID: 33892506; PMCID: PMC8496251. paper link

Ann E. Wells, William T. Barrington, Stephen Dearth, Amanda May, David W. Threadgill, Shawn Campagna, Brynn Voy. Tissue Level Diet and Sex-by-Diet Interactions Reveal Unique Metabolite and Clustering Profiles Using Untargeted Liquid Chromatography-Mass Spectrometry on Adipose, Skeletal Muscle, and Liver tissue in C57BL6/J Mice. J Proteome Res. 2018 Mar 2;17(3):1077-1090. doi: 10.1021/acs.jproteome.7b00750. Epub 2018 Feb 2. PMID: 29373032. paper link

William T. Barrington, Phillip Wulfridge, **Ann E. Wells**, Carolina Mantilla Rojas, Selene Y.F. Howe, Amie Perry, Kunjie Hua, Michael Pellizzon, Kasper D. Hansen, Brynn Voy, Brian J. Bennett, Daniel Pomp, Andrew P. Feinberg, David W. Threadgill. (2017) Optimizing Metabolic Health Through Precision Dietetics in Mice. Genetics. 2018 Jan;208(1):399-417. doi: 10.1534/genetics.117.300536. Epub 2017 Nov 20. PMID: 29158425; PMCID: PMC5753872. paper link

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A. E. Wells, S. A. Bewick, K. L. Kruse, R. C. Ward and J. P. Biggerstaff, "Modeling the effect of soluble fibrin on the immune-tumor interaction," Proceedings of the 2011 Biomedical Sciences and Engineering Conference: Image Informatics and Analytics in Biomedicine, Knoxville, TN, USA, 2011, pp. 1-4, doi: 10.1109/BSEC.2011.5872324. paper link

A. E. Wells, S. A. Bewick, K. L. Kruse, R. C. Ward and J. P. Biggerstaff, "Modeling the effect of tumor cell growth when in the presence of natural killer cells," 2010 Biomedical Sciences and Engineering Conference, Oak Ridge, TN, USA, 2010, pp. 1-4, doi: 10.1109/BSEC.2010.5510820. paper link

Data Resources

Complete data analysis investigating the transcriptional effects of 2-deoxyglucose on nine organs in C57BL/6J mice. data resource link

Grants and Fellowships

Pending

L'Oreal USA Women in Science fellowship: Interspecies Molecular Classification of Lupus Nephritis

The Jackson Laboratory

2024-2025

Awarded

American Association of Immunologists Intersect Fellowship for Computational Scientists and Immunologists
$53,460
The Jackson Laboratory
Jan. 2021 - Jan. 2022

NIH funded PEER Fellowship
$50,000
University of Tennessee-Knoxville
Aug. 2011 - Aug. 2013

Microbiology Department Summer Research Fellowship
$3200 STIPEND
University of Tennessee-Knoxville
May 2008 - Aug. 2008

Academic Honors & Awards

Awards

2023-2025	NIH Loan Repayment Program renewal **($29,308.68)**	*The Jackson Laboratory*
2022-2023	NIH Loan Repayment Program renewal **($43,252.36)**	*The Jackson Laboratory*
2022	RStudio Diversity Scholars Program	*Washington, D.C.*
2022	JAX Travel Award	*The Jackson Laboratory*
2021	American Association for Immunologists Trainee Abstract Award	*Virtual*
2020-2022	NIH Loan Repayment Program **($100,000)**	*The Jackson Laboratory*
2019	International Mammalian Genome Conference Travel Award	*Strasbourg, France*
2018-2024	Alfond Leaders program **($60,000)**	*The Jackson Laboratory*
2017	Graduate Student Senate Excellence in Teaching Award	*University of Tennessee-Knoxville*
2016	**2nd Place,** Experimental Biology American Nutrition Society Emerging Leaders Poster Competition	*San Diego, CA*
2016	**1st Place,** Cynthia B. Petersen Poster Competition	*University of Tennessee-Knoxville*
2015	Graduate Student Travel Award	*University of Tennessee-Knoxville*
2011	**2nd Place,** BSEC Poster Competition	*Oak Ridge National Laboratory*
2010	**2nd Place,** BSEC Poster Competition	*Oak Ridge National Laboratory*

Presentations

Oral

Organ-specific Effects of 2-Deoxyglucose Treatment in Lupus-prone Mice
The University of South Carolina (Invited Talk)
Columbia, SC
Oct. 2023

Organ-specific Effects of Short- and Long-term 2-Deoxyglucose Treatment in Lupus-prone Mice
Lupus 21st Century
Naples, FL
Sept. 2023

Unveiling Organ-Specific Effects of 2-Deoxyglucose Treatment in Mice
The Jackson Laboratory Board of Scientific Counselors Meeting
Bar Harbor, ME
Aug. 2023

2-Deoxyglucose Inhibits N-linked glycosylation and Glycolysis Modulating Biochemical Pathways in a Tissue-specific Manner in C57BL6/J Mice
UC Merced (Invited Talk)
Virtual
Dec. 2022

Natural genetic variation alters Alzheimer's-related gene expression modules in mice
Complex Trait Consortium
Virtual
Sept. 2021

Glycolysis Inhibition Modulates Unique Metabolic and Immune Pathways Across Multiple Tissue Compartments
Immunology
Virtual
May 2021
- Trainee Abstract Award

Natural Variation Alters Alzheimer's-related Gene Expression in DO Mice
International Mammalian Genome Conference
Strasbourg, France
Sept. 2019

Gene, Sex, and Diet Interact to Control the Tissue Metabolome
Experimental Biology
San Diego, CA
Apr. 2016

Mechanisms of Population Level Variation in Fatness and Leanness
Comparative and Experimental Medicine and Public Health Research Symposium
Knoxville, TN
June 2010

Modeling Melanoma Tumor Cell Growth in the Presence of Natural Killer Cells
Sigma Xi Student Competition
Knoxville, TN
Feb. 2010

Poster

Inhibition of Glycolysis and Disruption of N-linked Glycosylation Modify Distinctive Pathways Across Multiple Tissue Compartments in a Lupus-prone Mouse Model
JAX Symposium
Farmington, CT
May 2023

Inhibition of Glycolysis Modifies Distinctive Pathways Across Multiple Tissue Compartments Associated in a Time Dependent Manner
Lupus 21st Century
Tucson, AZ
Sept. 2022

Inhibition of Glycolysis Modifies Distinctive Metabolic and Immune Pathways Across Multiple Tissue Compartments Associated with B and T Follicular Helper Cells
GRC Immunometabolism in Health and Disease
Smithfield, RI
June 2022

Inhibition of Glycolysis Modifies Distinctive Metabolic and Immune Pathways Across Multiple Tissue Compartments Associated with B and T Follicular Helper Cells
Immunology
Portland, OR
May 2022

Glycolysis Inhibition Modulates Unique Metabolic and Immune Pathways Across Multiple Tissue Compartments
Immunology
Virtual
May 2021
- Trainee Abstract Award

Natural Genetic Variation Alters Alzheimer's-related Gene Expression Modules in Mice
Alzheimer's Association International Conference
Virtual
July 2020

Natural variation alters Alzheimer's-related gene expression in DO mice
JAX Symposium
Bar Harbor, ME
May 2019

Epistatic Networks Influence Phenotypes Related to Cardiac Function in Diversity Outbred Mice
Human and Mammalian Genetics and Genomics: The 59th McKusick Short Course
Bar Harbor, ME
July 2018

Tissue Level Sex-by-gene-by-diet Interactions Show Unique Metabolite and Clustering Profiles
Genome Science and Technology Retreat
Knoxville, TN
Mar. 2017

Gene, Sex, and Diet Interact to Control the Tissue Metabolome
Experimental Biology
San Diego, CA
Apr. 2016
- 2nd Place Emerging Leaders in Nutrition Poster Competition

Tissue Level Sex-by-gene-by-diet Interactions Show Unique Metabolite and Clustering Profiles
Genome Science and Technology Retreat
Knoxville, TN
Mar. 2016
- 1st Place Cynthia B. Peterson Poster Competition

Untargeted Metabolic Profiling Distinguishes gene-by-diet "Metabotypes" at the tissue level in mice
American Society for Mass Spectrometry
St. Louis, MO
June 2015

Investigating Tissue Level Gene-by-diet Interactions with Metabolomics
Experimental Biology
Boston, MA
Mar. 2015

Investigating Tissue Level Gene-by-diet Interactions with Metabolomics — *Knoxville, TN*
Genome Science and Technology Retreat — *Mar. 2015*

Metabolomics Identifies Effects of Dietary Maconutrient Composition on Tissue Metabolism — *Boston, MA*
The Obesity Society — *Nov. 2014*

Metabolism and Diet: Metabolic and Lipid Changes Across Multiple Diets and Genetic Backgrounds — *Knoxville, TN*
Genome Science and Technology Retreat — *Mar. 2014*

Mechanisms of population level variation in fatness and leanness — *Boston, MA*
Experimental Biology — *Apr. 2013*

Modeling the Effect of Soluble Fibrin on the Immune-tumor Interaction — *Oak Ridge, TN*
Biological Science and Engineering Center Conference — *Mar. 2011*
- 2nd Place BSEC Poster Competition

Modeling the Effect of Soluble Fibrin on the Immune-tumor Interaction — *Oak Ridge, TN*
Research Alliance in Math and Science — *Aug. 2010*

Modeling the Effect of Melanoma Tumor Cells when in the Presence of Natural Killer Cells — *Oak Ridge, TN*
Biological Science and Engineering Center Conference — *May 2010*
- 2nd Place BSEC Poster Competition

Modeling the Effect of Melanoma Tumor Cells when in the Presence of Natural Killer Cells — *Oak Ridge, TN*
Women in Science — *May 2010*

Modeling Immunity Against Cancer — *Oak Ridge, TN*
Student Undergraduate Laboratory Internship — *Apr. 2010*

Modeling the Effect of Tumor Cells When in the Presence of Natural Killer Cells — *Oak Ridge, TN*
Student Undergraduate Laboratory Internship — *Dec. 2009*

A Mathematical Models of the Effect of Melanoma Tumor Cell Growth when in the Presence of Natural Killer Cells — *Oak Ridge, TN*
Research Alliance in Math and Science — *Aug. 2009*

Teaching Experience

Instructor and Workshop Creator — *The Roux Institute*
Building Websites for Data Dissemination — *May 22, 2024*
- Taught Carter lab members how to build their own websites for data dissemination
- Aided students with coding
- Answered questions regarding the material
- Workshop link

Instructor — *Colby College*
Data Carpentry with Python — *Jun. 5-6, 2023*
- Taught Data organization in spreadsheets and troubleshooting dates in excel
- Aided students with coding
- Answered questions regarding the material

Assistant — *Virtual*
Software Carpentry with R — *Jan. 20, 22, 27, 29, 2021*
- Aided students with coding
- Answered questions regarding the material

Assistant — *The Jackson Laboratory*
Quantitative Trait Mapping in the DO — *Aug. 22-23, 2019*
- Aided students with coding
- Answered questions about the underlying statistics of the QTL analysis

Graduate Teaching Assistant

University of Tennessee-Knoxville

Cellular and Molecular Biology (BIO 160)

Spring/Fall 2016, Spring/Fall 2017

- Taught students how to critically analyze scientific articles during discussion
- Prepared weekly presentations and multiple quizzes
- Aided instructor during lecture
- Graded homework, quizzes, and exams

Graduate Teaching Assistant

University of Tennessee-Knoxville

Bioinformatics Applications (EPP 622)

Fall 2015

- Held weekly office hours to review material
- Guided students through computer labs
- Designed and taught Metabolomics lecture and computer lab
- Taught DNAseq computer lab
- Graded homework

Graduate Teaching Assistant

University of Tennessee-Knoxville

Skills of Biological Investigation (BIO 159)

Spring 2015

- Independently instructed students through experimentally based labs
- Taught students experimental design
- Prepared weekly presentations and multiple quizzes
- Graded quizzes and lab reports

Graduate Teaching Assistant

University of Tennessee-Knoxville

Designed undergraduate biostatistics course for Biology Department

Fall 2014

- Aided Genome Science and Technology director in designing Biostatistics course for undergraduates
- Planned bioinformatics topics to cover throughout the semester
- Designed syllabus
- Outlined labs associated with topics

Graduate Teaching Assistant

University of Tennessee-Knoxville

Animal Breeding and Genetics (ANSC 340)

Spring 2014

- Aided instructor during class
- Guest lecturer
- Proctored exams
- Graded homework and exams

Mentoring

Colby Academic Year Fellow

The Jackson Laboratory

Mentee: Laura Drepanos (Bioinformatist at the Broad Institute)

Sept. 2022 - May 2023

- Trained her in Systemic Lupus Erythematosus
- Provided guidance and instruction on:
  - performing analyses in the R
  - developing a quarto website
  - pulling data from dbGap
  - handling human clinical data
  - combining human and mouse analysis
- Provided feedback on final presentation

Colby-JAX Lunder Fellow

The Jackson Laboratory

Mentee: Laura Drepanos

Feb. - May 2022

- Trained her in quantitative genetics and Alzheimer's
- Provided guidance and instruction on performing analyses in the R package qtl2, developing rmarkdown website, motif analysis
- Provided feedback on final presentation

JAX Summer Student Program

The Jackson Laboratory

Mentee: Meredith Mayer (Graduate student as Tulane University School of Medicine)

Jun. - Aug. 2019

- Trained her in R and RStudio
- Provided guidance and instruction on performing analyses in the R packages qtl2 and WGCNA
- Provided feedback on written analyses and final presentation

UTK High School Intern Program

University of Tennessee-Knoxville

Mentee: Helen Boone (Graduate student at Tulane University)

May - Aug. 2013

- Taught her bone marrow extraction, macrophage colony formation assay
- She independently performed bone marrow extractions and subsequent macrophage colony formation assays while I dissected mice

UTK student research assistant

University of Tennessee-Knoxville

Mentee: Kourtney Kousser (Received PhD 2019, science writer)

Fall 2010 - Spring 2012

- Trained her in cell culture, deconvolution microscopy, cell migration assays, percoll density gradients
- Provided guidance and instruction on performing cell migration experiments
- Provided feedback on written analyses

International Student Exchange — *University of Tennessee-Knoxville*

Mentee: Marija Matvejeva (Veterinarian surgeon) — *Summer 2010*

- Trained her in cell culture
- Provided guidance and instruction on performing cell culture experiments
- Provided feedback on written analyses

Service

JAX Institutional Animal Care and Use Committee — *Bar Harbor, ME*

Postdoctoral member — *Sept. 2022 - Dec. 2022*

Software Carpentry — *Bar Harbor, ME*

Instructor — *Jan. 2020 - present*

JAX Postdoc Association — *Bar Harbor, ME*

Co-Chair — *Aug. 2019 - Aug. 2020*

Outreach

The Longest Day — *Bar Harbor, ME*

Raised money and participated in country wide Alzheimer's event to promote awareness — *Jun. 2018-Jun. 2023*

JAX Open Tours — *Bar Harbor, ME*

Tour guide — *2019*

Dry Lab Skills

Statistics	PLS, PLS-DA, PCA, ANOVA, Linear models, Bayesian methods, Causal models, qtl, mediation analysis, etc.
Programming	Working knowledge in C++, Matlab, and Python
Scientific Applications	**SAS**: PROC GLM, FREQ, UNIVARIATE, MEANS; **R**: DiscriMiner, ggplot2, reshape, Hmisc, psych, grid, caret, qtl2, tidyverse, WGCNA, rmarkdown, shiny, quarto, creating functions **Linux** **git**
Other Applications	MS Office, iWork, LaTeX
Operating Systems	MS Windows, OS Ventura

Wet Lab Skills

- **Mouse model**
  - Mouse dissection
  - Mouse Husbandry
  - Cardiac punctures
  - Bone marrow extraction
- **Molecular**
  - RNA extraction
  - qPCR
  - RNA immunoprecipitation
- **Cellular**
  - Blood separation
  - Tissue culture
  - Cell migration assays
  - Flow Cytometry
- **Histology**
  - H and E stain
  - Cryosectioning
  - Immunostaining
- **Metabolomics**
  - Metabolite extraction
  - Peak Analysis
- **Microbial**
  - Yeast estrogen bioreporter assay
  - Large-scale cyanobacterial culturing
- **Fish models**
  - Zebrafish spawning
  - Maintenance of larval and adult zebrafish
  - Paramecia culturing
  - Brine shrimp culturing
  - Water quality testing and monitoring
  - Microinjection of zebrafish embryos and larvae
  - Zebrafish dissection
  - Channel catfish dissection
- **Other**
  - Chicken dissection
  - Deconvolution microscopy

Courses

Causal Inference — *Chicago, IL*

Posit::conf(2023) — *Sept. 2023*

Introduction to Quarto (Diversity Scholar workshop) — *Virtual*

RStudio::conf(2022) — *Jul. 2022*

Introduction to Shiny — *Washington, DC*
RStudio::conf(2022) — *Jul. 2022*

Introduction to Immunology — *Los Angeles, CA*
AAI — *Jul. 2022*

Introduction to Tidyverse — *San Francisco, CA*
RStudio::conf(2020) — *Jan. 2020*

What they Forget to Teach You About R — *Austin, TX*
RStudio::conf(2019) — *Jan. 2019*

Plotting and Programming in Python — *Br Harbor, ME*
Software Carpentry — *Jun. 2018*

Professional Memberships

American Association of Immunologists
Member

American College of Rheumatology
Member