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: Business

Research Experience

Postdoctoral Associate (Mentor: Dr. Greg Carter) — *Bar Harbor, ME*

Project title: Integration of Multi-omics Data Determines Contribution of Biological Pathways in Systemic Lupus — *Apr. 2018-present*

- Developing R code to integrate and analyze multiple -omics datasets
- RNAseq and metabolomics analysis to obtain data for integration

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
  - QTL analysis
  - Jaccard Index

Graduate Research Assistant (Mentor: Dr. Brynn Voy) — *Knoxville, TN*

Project title: Untargeted Metabolic Profiling Distinguishes Gene-by-diet "Metabotypes" at the Tissue Level in Mice — *Mar. 2011 - Dec. 2017*

- 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: John Biggerstaff) — *Knoxville, TN*

Project title: Melanoma Tumor Growth and Metastasis in Zebrafish — *Aug. 2010 - Mar. 2011*

- 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, TN*

Project title: Modeling the effect of soluble fibrin on the immune-tumor interaction — *June 2010 - Aug. 2010*

- 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, TN*

Project title: Modeling the effect of melanoma tumor cell growth in the presence of natural killer cells *June 2009 - Apr. 2010*

- 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) *Knoxville, TN*

Project title: Detection of oxidative stress in zebrafish when exposed to C60 nanoparticles *May 2008 - June 2009*

- Maintained zebrafish
- 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*

Wet Lab Skills

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

Dry Lab Skills

Statistics Multivariate Statistics: PLS, PLS-DA, PCA, ANOVA, Linear models, Bayesian methods

Computer Skills

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
Linux
git
Other Applications MS Office, iWork, LaTeX
Operating Systems MS Windows, OS Sierra

Teaching Experience

Assistant *Bar Harbor, ME*

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 *Knoxville, TN*

Cellular and Molecular Biology (BIO 160) *Spring 2016, Fall 2016, Spring 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

Knoxville, TN

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

Knoxville, TN

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

Knoxville, TN

Designed undergraduate biostatistics course for Biology Department (still in development)

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

Knoxville, TN

Animal Breeding and Genetics (ANSC 340)

Spring 2014

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

Mentoring

JAX Summer Student Program

Bar Harbor, ME

Mentee: Meredith Mayer

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

Knoxville, TN

Mentee: Helen Boone

- 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

Knoxville, TN

Mentee: Kourtney Kousser (Recevied PhD 2019

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

Knoxville, TN

Mentee: Marija Matvejeva

Summer 2010

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

Publications

Accepted

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, 17 (3), pp. 1077-1090

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, 208 (1), pp. 399-417

Wells, A.E., Bewick, S.A., Kruse, K.L., Ward, R.C., Biggerstaff, J.P. (2011). Modeling the Effect of Soluble Fibrin on the Immune-tumor Interaction. Proceedings of IEEE/EMBS.

Wells, A.E., Bewick, S.A., Kruse, K.L., Ward, R.C., Biggerstaff, J.P. (2010). Modeling the Effect of Tumor Cells When in the Presence of Natural Killer Cells. Proceedings of IEEE/EMBS.

In Preparation

Ann E. Wells, William T. Barrington, Stephen Dearth, Amanda May, Nikhil Milind, 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 on Adipose, Skeletal Muscle, and Liver tissue in Mice fed a Standard Chow Diet. J. Proteome Research, 2020

Ann E. Wells, Narayanan Raghupathy, Ray F. Robledo, Daniel M. Gatti, Steven C. Munger, Charles Phillips, Juliet Ndukum, 1roy 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. Genetics, 2020

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, Gregory W. Carter, Chih-Hao Chang. 2-Deoxyglucose Modulates Glucose and Immune Metabolism Across Tissues in C57BL/6J Mice.

Presentation

Oral

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

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

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

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

Poster

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

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

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

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

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

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

Investigating Tissue Level Gene-by-diet Interactions with Metabolomics — *Boston, MA*
Experimental Biology — *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*

Academic Honors & Awards

Awards

2020-2022	NIH Loan Repayment Program ($100,000)	*Bar Harbor, ME*
2019	International Mammalian Genome Conference Travel Award	*Strasbourg, France*
2017	Graduate Student Senate Excellence in Teaching Award	*Knoxville, TN*
2016	**2nd Place,** Experimental Biology American Nutrition Society Emerging Leaders Poster Competition	*San Diego, CA*
2016	**1st Place,** Cynthia B. Petersen Poster Competition	*Knoxville, TN*
2015	Graduate Student Travel Award	*Knoxville, TN*
2011	**2nd Place,** BSEC Poster Competition	*Oak Ridge, TN*
2010	**2nd Place,** BSEC Poster Competition	*Oak Ridge, TN*

Honors

2008 **Phi Sigma Theta National Honor Society** *Knoxville, TN*
2008 **Omicron Delta Kappa National Leadership Honor Society** *Knoxville, TN*
2008 **Golden Key National Honor Society** *Knoxville, TN*

Fellowships

NIH funded PEER Fellowship *Knoxville, TN*
Aug. 2011 - Aug. 2013

Microbiology Department Summer Research Fellowship *Knoxville, TN*
$3200 stipend *May 2008 - Aug. 2008*

Service

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, 2019*

JAX Open Tours *Bar Harbor, ME*
Tour guide *2019*

Professional Memberships

International Mammalian Genome Society
Member

Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment
Member