

# Ann E. Wells

PHD · STATISTICS MASTERS

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## Education

### University of Tennessee-Knoxville

PH.D. IN GENOME SCIENCE AND TECHNOLOGY

*Knoxville, TN*

*2010 - 2017*

### University of Tennessee-Knoxville

M.S. IN STATISTICS

*Knoxville, TN*

*2010-2017*

### University of Tennessee-Knoxville

B.S. IN MICROBIOLOGY

- minor: Business

*Knoxville, TN*

*2006-2009*

## 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
  - [C57BL/6J 2DG data analysis website \(click here\)](#)

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

## Dry Lab Skills

### Statistics

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

## Computer Skills

### Programming Scientific Applications

Working knowledge in C++, Matlab, and Python

**SAS:** PROC GLM, FREQ, UNIVARIATE, MEANS;

**R:** DiscrMiner, ggplot2, reshape, Hmisc, psych, grid, caret, qtl2, tidyverse, WGCNA, rmarkdown, shiny

**Linux**

**git**

### Other Applications Operating Systems

MS Office, iWork, LaTeX

MS Windows, OS Sierra

## Teaching Experience

### Instructor

Bar Harbor, ME

STATISTICAL INFERENCE FOR BIOLOGY

Mar. 10,17,24 2020

- Collaboratively taught with 4 other instructors
- Taught sections on exploratory data analysis, underlying distributions, test assumptions, etc.
- Aided students with coding

### 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

CELLULAR AND MOLECULAR BIOLOGY (BIO 160)

- 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

Knoxville, TN  
Spring 2016, Fall 2016, Spring 2017

## Graduate Teaching Assistant

BIOINFORMATICS APPLICATIONS (EPP 622)

- 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

Knoxville, TN  
Fall 2015

## Graduate Teaching Assistant

SKILLS OF BIOLOGICAL INVESTIGATION (BIO 159)

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

Knoxville, TN  
Spring 2015

## Graduate Teaching Assistant

DESIGNED UNDERGRADUATE BIOSTATISTICS COURSE FOR BIOLOGY DEPARTMENT (STILL IN DEVELOPMENT)

- 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

Knoxville, TN  
Fall 2014

## Graduate Teaching Assistant

ANIMAL BREEDING AND GENETICS (ANSC 340)

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

Knoxville, TN  
Spring 2014

# Mentoring

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## JAX Summer Student Program

MENTEE: MEREDITH MAYER

- 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

Bar Harbor, ME  
Aug. 2019

## UTK High School Intern Program

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

Knoxville, TN

## UTK student research assistant

MENTEE: KOURTNEY KOUSSER

- 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

Knoxville, TN  
Fall 2010 - Spring 2012

## International Student Exchange

MENTEE: MARIJA MATVEJEVA

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

Knoxville, TN  
Summer 2010

# Publications

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## 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, IROY 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

## Presentation

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### ORAL

#### 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

#### JAX Symposium

NATURAL VARIATION ALTERS ALZHEIMER'S-RELATED GENE EXPRESSION IN DO MICE

*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

- 2nd Place Emerging Leaders in Nutrition Poster Competition

*San Diego, CA*

*Apr. 2016*

#### Tissue Level Sex-by-gene-by-diet Interactions Show Unique Metabolite and Clustering Profiles

GENOME SCIENCE AND TECHNOLOGY RETREAT

- 1st Place Cynthia B. Peterson Poster Competition

*Knoxville, TN*

*Mar. 2016*

## Untargeted Metabolic Profiling Distinguishes gene-by-diet “Metabotypes” at the tissue level in mice

AMERICAN SOCIETY FOR MASS SPECTROMETRY

St. Louis, MO

Jun. 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

GENOME SCIENCE AND TECHNOLOGY RETREAT

Knoxville, TN

Mar. 2015

## Metabolomics Identifies Effects of Dietary Macronutrient Composition on Tissue Metabolism

THE OBESITY SOCIETY

Boston, MA

Nov. 2014

## Metabolism and Diet: Metabolic and Lipid Changes Across Multiple Diets and Genetic Backgrounds

GENOME SCIENCE AND TECHNOLOGY RETREAT

Knoxville, TN

Mar. 2014

## Mechanisms of population level variation in fatness and leanness

EXPERIMENTAL BIOLOGY

Boston, MA

Apr. 2013

## Modeling the Effect of Soluble Fibrin on the Immune-tumor Interaction

BIOLOGICAL SCIENCE AND ENGINEERING CENTER CONFERENCE

- 2nd Place BSEC Poster Competition

Oak Ridge, TN

Mar. 2011

## Modeling the Effect of Soluble Fibrin on the Immune-tumor Interaction

RESEARCH ALLIANCE IN MATH AND SCIENCE

Oak Ridge, TN

Aug. 2010

## Modeling the Effect of Melanoma Tumor Cells when in the Presence of Natural Killer Cells

BIOLOGICAL SCIENCE AND ENGINEERING CENTER CONFERENCE

- 2nd Place BSEC Poster Competition

Oak Ridge, TN

May 2010

## Modeling the Effect of Melanoma Tumor Cells when in the Presence of Natural Killer Cells

WOMEN IN SCIENCE

Oak Ridge, TN

May 2010

## Modeling Immunity Against Cancer

STUDENT UNDERGRADUATE LABORATORY INTERNSHIP

Oak Ridge, TN

Apr. 2010

## Modeling the Effect of Tumor Cells When in the Presence of Natural Killer Cells

STUDENT UNDERGRADUATE LABORATORY INTERNSHIP

Oak Ridge, TN

Dec. 2009

## A Mathematical Models of the Effect of Melanoma Tumor Cell Growth when in the Presence of Natural Killer Cells

RESEARCH ALLIANCE IN MATH AND SCIENCE

Oak Ridge, TN

Aug. 2009

## Academic Honors & Awards

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### AWARDS

- |      |  |                    |
|------|--|--------------------|
| 2019 | International Mammalian Genome Conference Travel Award   | Strasbourg, France |
| 2017 | Graduate Student Senate Excellence in Teaching Award   | Knoxville, TN      |
| 2016 | <b>2nd Place</b> , Experimental Biology American Nutrition Society Emerging Leaders Poster Competition | San Diego, CA      |
| 2016 | <b>1st Place</b> , Cynthia B. Petersen Poster Competition  | Knoxville, TN      |
| 2015 | Graduate Student Travel Award  | Knoxville, TN      |
| 2011 | <b>2nd Place</b> , BSEC Poster Competition   | Oak Ridge, TN      |
| 2010 | <b>2nd Place</b> , BSEC Poster Competition   | Oak Ridge, TN      |

### HONORS

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

*Knoxville, TN*  
*Knoxville, TN*  
*Knoxville, TN*

## Fellowships

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### NIH funded PEER Fellowship

*Knoxville, TN*  
*Aug. 2011 - Aug. 2013*

### Microbiology Department Summer Research Fellowship

\$3200 STIPEND

*Knoxville, TN*  
*May 2008 - Aug. 2008*

## Service

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### Software Carpentry

INSTRUCTOR

*Bar Harbor, ME*  
*Jan. 2020 - present*

### JAX Postdoc Association

CO-CHAIR

*Bar Harbor, ME*  
*Aug. 2019 - Aug. 2020*

## Outreach

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### The Longest Day

RAISED MONEY AND PARTICIPATED IN COUNTRY WIDE ALZHEIMER'S EVENT TO PROMOTE AWARENESS

*Bar Harbor, ME*  
*Jun. 2018, 2019*

### JAX Open Tours

TOUR GUIDE

*Bar Harbor, ME*  
*2019*

## Professional Memberships

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### International Mammalian Genome Society

MEMBER