Juniper A. Lake

Curriculum Vitae

Education

2018–Present **Ph.D. Candidate, Bioinformatics Data Science**.
University of Delaware: Newark, DE. OGPA - 4.0/4.0

2015–2017 **M.S. Plant and Soil Sciences**.
University of Delaware: Newark, DE. OGPA - 4.0/4.0

2009–2013 **B.S. Economics**.
University of Pennsylvania (Wharton): Philadelphia, PA. OGPA - 3.7/4.0, magna cum laude

2009–2013 **B.A. International Studies**.
University of Pennsylvania: Philadelphia, PA. OGPA - 3.7/4.0, magna cum laude
Study abroad: Santiago, Chile; Spring 2011

Computational skills

General Large-scale data analysis, high performance computing (HPC), version control (Git), next generation sequencing (NGS), data visualization, statistical analysis

Programming Python (excellent), R (excellent), UNIX (excellent), Perl (familiar)

Bioinformatics programs ASReml, BLAST, Cufflinks, DESeq, EdgeR, FastQC, FImpute, GCTA, GenSel, HISAT, HTSeq, KGD, MultiQC, polyRAD, SAMtools, Trimmomatic, VCFtools

Markup HTML, Jupyter, LaTeX, Markdown, RMarkdown

Research experience

2018–Present **Graduate Research Assistant**, *University of Delaware*, Animal and Food Sciences.
- Ph.D. research on a novel and complex muscle disorder in broiler chickens called "wooden breast" that causes major economic losses and welfare concerns worldwide.
- Proposed new hypothesis linking wooden breast in chickens with type II diabetes in humans.
- Discovered first candidate genes for wooden breast in large genome-wide association study (GWAS).
- Identified blood biomarkers of wooden breast for use in diagnosis and breeding.
- Described some of the earliest changes in gene expression (RNA-seq) associated with disorder.
- Provided mentorship for undergraduate and visiting graduate students.

2015–2017 **Graduate Research Assistant**, *University of Delaware*, Plant and Soil Sciences.
- Master's research on a fatal and widespread disease of landscape roses called rose rosette disease, which is caused by a multipartite emaravirus and is vectored by an eriophyid mite.
- Managed a large, randomized field trial to screen rose genotypes for resistance to rose rosette disease.
- Studied transmission and biological control of rose rosette to mitigate spread of disease.

Fall 2018 **Independent Study**, *University of Delaware*, Advisor: Adam Marsh.
- Created a program to assist in diagnosing issues associated with low mapping rates of sequencing reads to a reference genome. The program can quickly assess the genomic and organismal diversity of a FASTQ file from a personal computer by invoking NCBI's servers over the internet.

Spring 2017 **Independent Study**, *University of Delaware*, Advisor: Randall Wisser.
- Wrote a program to simulate genetic recombination in an F2 population of maize, compare simulated allele frequencies to observed genotyping by sequencing (GBS) data, and model loci along each chromosome where allele frequencies differed significantly from expected.

Teaching experience

May 2019 **Instructor**, *Software Carpentry Workshop*.
- Taught Unix shell, version control with Git, and programming in R with co-instructor during a 2-day workshop at the Delaware Biotechnology Institute. Newark, Delaware, (May 9-10, 2019).

Nov. 2017 **R Workshop Teaching Assistant**, *Entomology 2017*.
- Provided hands-on troubleshooting of programming issues during a 4-hour 'live coding' R workshop entitled "Making the switch: A beginner's guide to R for those familiar with other packages" at the national Entomological Society of America meeting. Denver, Colorado, (November 5-8, 2017).

Spring 2017 **Graduate Teaching Assistant**, *University of Delaware*, Plant and Soil Sciences.
- Taught weekly laboratory portion of Introductory Plant Pathology.
- Prepared and maintained fungal and bacterial cultures, oversaw student experiments.
- Graded student exams and lab reports, managed an undergraduate assistant.

Spring 2013 **Undergraduate Teaching Assistant**, *University of Pennsylvania*, Biology Department.
- Conducted review sessions, graded exams, and served as main liaison for the course outside of lecture hours.
- Coordinated community service projects focused on urban agriculture and food justice in local schools.

2009–2013 **Instructor**, *Philadelphia Freedom Schools & Agatston Urban Nutrition Initiative*.
- Taught math and literacy for 2nd and 3rd grade students and provided tutoring support for K-8th students.
- Promoted self-reliance and and skill building through enrichment classes: building wooden piggy banks, growing mushrooms in coffee grounds, refurbishing a dilapidated greenhouse.

Leadership positions

2018–2019 **Communications Committee Chair, Senator**, *Graduate Student Government*, University of Delaware.
- Developed event advertisements and organizational branding.
- Maintained the Graduate Student Government website and social media pages.
- Voted on legislation and advocated on behalf of social and professional programming for graduate students.

2017–2019 **Vice President, Secretary**, *Bioinformatics Student Association*, University of Delaware.
- Organized social and professional events which included a programming workshop, a biotechnology career panel and networking dinner, and regular happy hours with invited speakers.
- Designed a new website and updated branding for the organization.
- M.C.ed a biotechnology career panel with guest speakers from industry, academia, and government for students to learn about diverse career paths post-graduation.

Peer-reviewed publications

2021 **Lake JA**, Dekkers JCM, and Abasht B. (2021) Genetic basis and identification of candidate genes for wooden breast and white striping in commercial broiler chickens. Scientific Reports 11,6785. DOI: 10.1038/s41598-021-86176-4

2021 Tomlinson IV MJ, Polson SW, Qiu J, **Lake JA**, Lee W, and Abasht B. (2021) Investigation of allele specific expression in various tissues of broiler chickens using the detection tool VADT. Scientific Reports 11,3968. DOI: 10.1038/s41598-021-83459-8

2020 Abasht B., Mignon-Grasteau S., Bottje W., and **Lake JA** (2020) "Genetics and genomics of feed utilization efficiency traits in poultry species," in *Advances in Poultry Genetics and Genomics*, eds. S. E. Aggrey, H. Zhou, M. Tixier-Boichard, and D. D. Rhoads. Burleigh Dodds Science Publishing [in press].

2020 **Lake JA**, Brannick EM, Papah MB, Lousenberg C, Velleman SG, and Abasht B. (2020) Blood gas disturbances and disproportionate body weight distribution in broilers with wooden breast. Frontiers in Physiology 11:304. DOI: 10.3389/fphys.2020.00304

2020 **Lake JA** and Abasht B. (2020) Glucolipotoxicity: A proposed etiology for wooden breast and related myopathies in commercial broiler chickens. Frontiers in Physiology 11:169. DOI: 10.3389/fphys.2020.00169

2019 **Lake JA**, Papah MB, and Abasht B. (2019) Increased expression of lipid metabolism genes in early stages of wooden breast links myopathy of broilers to metabolic syndrome in humans. Genes 10:746. DOI:10.3390/genes10100746

2018 Wax J, Zhuo Z, Bower A, [and 9 others, including **Novick DN**]. (2018) A problem-based learning exercise on food security: understanding the role of genomic variation and plant breeding. Genetics Society of America Peer-Reviewed Education Portal 004. DOI:10.1534/gsaprep.2018.004

2018 Byrne D, Klein P, Yan M, [and 7 others, including **Novick DN**]. (2018) Challenges of breeding rose rosette resistant roses. HortScience 53:5. DOI:10.21273/HORTSCI12553-17

Dissertations and theses

Ph.D. Dissertation Characterization of the systemic metabolic dysfunction underlying wooden breast and white striping in chickens. *Research Advisor: Behnam Abasht*

Master's Thesis. Evaluation of rose germplasm for resistance to rose rosette disease and studies of disease transmission and vector control. *Research Advisor: Tom Evans*

Undergraduate Honors Thesis. Smallholder agroforestry programs: An instrument for mitigating supply chain risk. *Research Advisor: R. Scott Poethig*

Posters and presentations

2020 **Lake JA**, Walugembe M, Kramer L, Dekkers JCM, and Abasht B. Genetic basis of wooden breast and white striping in commercial broilers. Poster presented at: Plant and Animal Genome Conference XXVIII; 2020 Jan 11-15; San Diego, CA.

2019 **Lake JA**, Dekkers JCM, Velleman SG, Brannick EM, and Abasht B. Preliminary results from genome wide association study of wooden breast in commercial broilers. Oral presentation given at: Poultry Science Association Annual Meeting; 2019 Jul 15-18; Montreal, QC, Canada.

2019 **Lake JA**, Velleman S, Brannick E, and Abasht B. Blood analysis and proportional muscle and organ weights in broilers with wooden breast. Poster presented at: Plant and Animal Genome Conference XXVII; 2019 Jan 12-16; San Diego, CA.

2018 **Lake JA**, Tomlinson IV MJ, and Abasht B. FastqBLAST: A tool to quickly assess the organismal and genomic diversity present in a FASTQ file. Poster presented at: 26th Conference on Intelligent Systems for Molecular Biology; 2018 Jul 6-10; Chicago, IL.

2018 Behnam A, Dekkers JCM, Velleman SG, Schmidt C, and **Lake JA**. Genome wide identification and functional validation of genes causing susceptibility to wooden breast in commercial broiler chickens. Poster presented at: 2018 NIFA Joint Animal Nutrition, Growth and Lactation and Early Concept Grants for Exploratory Research (EAGERs) Project Director Meeting; 2018 Jun 12-13; Washington, DC.

2018 **Novick DN**, Tomlinson IV MJ, Papah MB, Chazi Capelo JD, and Abasht B. A new tool to prioritize candidate genes and characterize sample behavior in differential expression analysis of transcriptomic data. Poster presented at: Plant and Animal Genome Conference XXVI; 2018 Jan 13-17; San Diego, CA.

2017 **Novick DN** and Evans T. Evaluation of rose germplasm for resistance to rose rosette disease. Poster presented at: American Phytopathological Society Potomac Division Meeting; 2017 Mar 22-24; Morgantown, WV.

Honors and awards

$28,000 Doctoral Fellowship Award from the University of Delaware, July 2020 to June 2021

$28,000 Graduate Scholars Award from the University of Delaware for academic achievements as a first-generation college student, September 2019 to June 2020

$30,000 Unique Strengths Fellowship for research in genetics and genomics from the University of Delaware College of Agriculture and Natural Resources, September 2018 to August 2019

$1,950 Summer Institutes Scholarship from University of Washington biostatistics department to attend the Summer Institute in Statistical Genetics at the University of Washington in Seattle, July 2018

$500 Professional Development Award from the University of Delaware to participate and present at the Intelligent Systems for Molecular Biology, July 2018

$3,715 Summer Doctoral Fellowship from the University of Delaware to attend the Summer Institute in Statistical Genetics at the University of Washington in Seattle, July 16th to 27th 2018

– 1st place in regional Linnaean Games (insect trivia) at Entomological Society of America's Eastern Branch Meeting

$3,000 National Science Foundation I-Corps Sites Grant for research into commercialization of a poultry feed additive, March to April 2018

$800 Neal A. Jorgenson Genome Travel Award in Bioinformatics to attend and present at the Plant and Animal Genome Conference XXVI in San Diego, California, January 2018

– 3rd place in national Linnaean Games (insect trivia) at Entomological Society of America's National Meeting in Vancouver, B.C.

– 2nd place in regional Linnaean Games (insect trivia) at Entomological Society of America's Eastern Branch Meeting

– Dean's List and The Wharton School Dean's List for 2009-2010, 2011-2012, and 2012-2013

Relevant courses

Ph.D. Artificial intelligence, Advanced artificial intelligence: Simulation and modeling bioinformatic systems, Computational biology and bioinformatics, Databases for bioinformatics, Systems biology

M.S. Applied plant virology, Biological control, Ecological modeling, Genetics and breeding, Genome science: Technologies and techniques, Insect anatomy and physiology, Insect identification and taxonomy, Introduction to plant physiology

B.S. Corporate finance, Introduction to business statistics, Leadership and communication in groups, Managerial economics, Multivariable calculus, Risk analysis and management

Workshops and short courses

Summer Institute in Statistical Genetics. Association mapping: Genome wide association studies and sequencing data, Computational pipeline for whole genome sequencing data, Advanced quantitative genetics, Statistical and quantitative genetics of disease. University of Washington, Seattle, (July 16-27, 2018).

Intelligent Systems in Molecular Biology. Machine learning methods in the analysis of genomic and clinical data, Visualization of large biological datasets. Chicago, Illinois, (July 6-10, 2018).

Software Carpentry. Programming with Python, Version control with Git, The Unix shell. University of Delaware, Newark, (August 14-15, 2017).

Genomics Data Carpentry. Project organization and management for genomics, Introduction to the command line for genomics, Data wrangling and processing for genomics, Introduction to cloud computing for genomics. University of Delaware, Newark, (March 29, 2017).

Interests

Bikes Mountain biking, road biking, bikepacking

Dance Lindy hop, balboa, blues, charleston, east coast, collegiate shag, St. Louis shag

Banjo Bluegrass and clawhammer style