KEITH ARORA-WILLIAMS

I'm interested in developing user-friendly tools that identify significant patterns in complex data and visualize them in ways that are both quantitative and intuitive.

CONTACT

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EDUCATION

2020 | 2016
PhD, Environmental Health and Engineering
Johns Hopkins University — Baltimore, MD
Advisor: Sarah Preheim
Title: Microbial Genes, Genomes and Taxa Associated With Key Aspects Of Pathogenesis and Biogeochemical Cycles

2018 | 2016
MS, Environmental Sciences
Johns Hopkins University — Baltimore, MD
Advisor: Sarah Preheim

2013 | 2009
BE, Biomedical Engineering
SUNY: Stony Brook University — Stony Brook, NY
GPA: 3.50 (Cum Laude), Deans List 7 semesters

2009 | 2007
CUNY: Baruch College — New York, NY
- **GPA:** 3.85
- **Transfer**: from BS in Finance

LANGUAGE SKILLS

Expertise: Python, pandas, R, bash, Matlab

Proficient: Ruby, C/C++, Markdown, Git/Github, SPSS, Perl

RESEARCH EXPERIENCE

Doctoral Research Projects — **Preheim Lab, EHE@JHU**

2020 | 2018
Biogeochemical cycling potential of the Chesapeake Bay water column microbiome

- Assisted with pumping, filtering, sampling and transportation of water samples from field site under the Bay Bridge near Annapolis, MD.
- Prepared amplicon and whole genome short read libraries from environmental samples and bacterial cell cultures.
- Developed bioinformatic pipelines for amplicon sequence-variant calling, performed genome binning, and taxonomic/functional annotation.
- Developed novel statistical methods for identifying significant spatiotemporal boundaries and synchronous abundance changes within the Chesapeake Bay microbiome.
- Provided preliminary data and written material for multiple grant applications
- See publications in prep #1, 3

2020 | 2019
The effects of intermittent aeration at different time scales on water column microbial community gene expression in Rock Creek

- Prepped, organized and managed a team of 15 student volunteers to participate in 3 weeks of daily sampling
- Trained/mentored 3 Masters & Undergraduate students in filtration, cell culture, DNA extraction, data management and analysis methods.
- Developed a flow cytometry-based bacterial cell staining and counting protocol

- Provided preliminary data a grant application

2018 | 2016

Distribution of microbial populations affiliated anaerobic biogeochemical cycling in Mystic Lake

- Developed bioinformatics pipeline for producing and curating metagenome-assembled genomes
- Implemented multivariable optimization method for reactive transport model

2020 | 2018

Pathogen sequence signatures in persistent and recurrent infections of Campylobacter spp. in Peruvian infants

Collaboration w/ Dr. Margaret Kosek at University of Virginia

- Used traditional statistical methods to quantify the effect sizes of host factors and quantify infection frequency in 300 subject cohort incidence data
- Utilized existing tools i.e. core-genome MLST, pangenomics, and small polymorphisms detection to identify enriched sequence signatures among relapsing infection strains
- Identified high incidence rate of multi-Campylobacter species coinfection
- See publication in prep #2

2015 | 2013

Assistant Research Scientist **NYU Center for Genomics & Systems Biology**

- Technical lead for PowerBridgeNY clean energy technology development team
- Developed and implemented a protocol for recursively isolating and culturing high-lipid algae cells using cell sorting to achieve adaptive laboratory evolution
- Performed all aspects of Arabidopsis cultivation, as well as imaging for projects as needed

2013 | 2012

Research Aide **Cardiac Cell Engineering Lab, Stony Brook University**

- Developed software in MatLab Real-Time Workshop to interface with patch clamp hardware in order to deliver automated optical stimulation to human embryonic kidney cells

2012

Amgen Scholar **Planetary Protection Division, NASA JPL/CalTech**

- Cultured microbial isolates and performed DNA extraction, amplification, and purification.
- Vetted, assembled, and aligned 16S rRNA sequences mapped evolutionary distances

2011

Summer Intern **U. of Sussex Centre for Advanced Microscopy**

- Dissected, prepped, fixed, and mounted various Drosophila tissue samples for imaging
- Imaged fluorescent tissue in 2D & 3D with confocal laser scanning and wide-field microscope

2011

Life Sciences Fellow **Duan Lab, University of Missouri**

- Transfected HeLa and skeletal myoblast cells with custom plasmids containing a synthetic and natural promoters with different fluorescent reporters
- Assisted with small animal feeding, whelping, handling, and DNA extraction for genotyping

2011 | 2010

Research Assistant **ISAG Lab, Stony Brook University**

Quantified cancellous and cortical bone levels from unloaded rat hind limbs with microCT as a model for the effects of microgravity on bone mass

Publications and Patents

Microbial Community Assembly in the Chesapeake Bay: Beyond Seasonal Cycles and Spatial Gradients

- Arora-Williams, K., Zhang, Y., Secor, M., Unger, M., Sakowski, E., Xia, M., Ellis, J., Preheim, S.
- Status: In prep (#1)

Sulfur-oxidizing microbes are prevalent in the water column of the Chesapeake Bay

- Arora-Williams, K., Holder, C., Sakowski, E., Ellis, J., Gnanadesikan, A., Preheim, S.
- Status: In prep (#3)

Host factors and genomic correlates of persistent Campylobacter jejuni and coli infection isolates in a pediatric cohort.

- Arora-Williams, K., Schiaffino, F., Gray, H., Parker, C., Olortegui, M., Peñataro-Yori, P., François, R., Preheim, S., Kosek, M.
- Status: In prep (#2)

Capturing in situ Virus-Host Range and Interaction Dynamics through Gene Fusion with epicPCR.

- Sakowski, E., Arora-Williams, K., Tian, F., Zayed, A., Zablocki, O., Sullivan, M., Preheim, S., (2020) *Nature Microbiology.*
- Role: analysis support
- Status: In revision

Contribution of time, taxonomy and selective antimicrobials to antibiotic and multidrug resistance in wastewater bacteria.

- Gray, H., Arora-Williams, K., Young, C., Bouwer, E., Davis, M., Preheim, S. (2020) *Environmental Science and Technology*
- Role: analysis support
- Status: Resubmitted

Dynamics of microbial populations mediating biogeochemical cycling in a freshwater lake.

- Arora-Williams, K., Olesen, S., Scandella, B., Delwiche, K., Spencer, S., Myers, E., Abraham, S., Sooklal, A., Preheim, S. *Microbiome* 6, 165 (2018). 10.1186/s40168-018-0556-7

Systems and methods for selecting cellular strains

- Birnbaum, K. and Arora-Williams, K., 2018, US20180058987A1
- Status: Pending

Posters, Talks, & Workshops

2019 **Genomic variation among isolates from persistent Campylobacter infections in a pediatric cohort**

- Arora-Williams, K., Schiaffino, F., Gray, H., François, R., Parker, C., Olortegui, M., Prehiem, S., Penataro-Yori, P., Kosek, M.
- **Lightning Talk,** *Campylobacter and Helicobacter and Related Organisms*. Belfast

2019 **Attendee,** M3 Mid-Atlantic Microbiome Meetup. Johns Hopkins University, Baltimore

2018 **Microbial and Water Quality Data Define Emergent Habitats in an Estuarine Water Column**

- Arora-Williams, K., Holder, C., Sakowski, E., Preheim, S.
- **Poster,** Environmental Health and Engineering Research Retreat. Baltimore

2018 **Attendee,** M3 Mid-Atlantic Microbiome Meetup, University of Maryland, College Park

2016 **Participant,** The First Traditional Anvi'o Colloquium Workshop. International Symposium on Microbial Ecology, Montreal

2013 **Genetic and Metabolic Profiles of Microbes Isolated from the Mars Exploration Rovers.**

- Arora-Williams, K., Schubert, W., Smith S., Childers, S., Paszczynski, A., Benardini, J.
- **Poster,** American Society for Microbiology General Meeting, Denver

Teaching and Awards

2018 **TA and Grader for Environmental Health & Engineering Systems Design**

- Presented analytic techniques frequently for public decision making. Emphasis is on mathematical programming techniques e.g. linear, integer, mixed-integer, and multi-objective programming. Spring term, graduate-level course

2018 | 2017 **TA and Grader for Data Analytics in Environmental Health and Engineering**

- Presented approaches to model formulation, application, and interpretation in fields of computational statistics, data mining and machine learning. Fall term, graduate-level course.

2016 **National Science Foundation Graduate Research Fellowship: Honorable Mention**

2015 **Recipient of M. Gordon Wolman Fellowship from Johns Hopkins University**

2015 **Volunteer Judge in New York City Science and Engineering Fair**

2013 | 2012 **Tutor for Educational Opportunity Program at Stony Brook University**

- Provided 1-on-1 supplemental lessons relating to Engineering Statics and Dynamics courses