Courtney R Armour PhD

Computational Biologist

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Summary

I'm a computational biologist specializing in statistical analysis of complex datasets. I am experienced with multiple programming languages as well as a variety of data exploration and visualization techniques. I'm passionate about open science and reproducible research. I'm seeking the opportunity to work on cutting edge research at the frontier of human health.

Skills and Expertise

Research	Computational	Laboratory
Machine learning – Data visualization Gut microbiome – Metagenomics Amplicon sequencing – Statistical analysis – Network analysis Reproducible research	R – R Markdown – Quarto Git/GitHub – Snakemake Conda/mamba – Bash Slurm – Perl – Python	DNA extraction – Library Preparation – Cell Culture – Cloning – Gel electrophoresis – Western blot – PCR

Education

PhD Molecular and Cellular Biology — *Oregon State University*
Deptartment of Microbiology — *2014-2020*
- Advisor: Thomas Sharpton

BS Biological Sciences — *Arizona State Univeristy*
College of Liberal Arts and Sciences — *2008-2012*
- Minor: Mathematics

Experience

Postdoctoral Research Fellow (remote) — *Univeristy of Michigan*
Schloss Lab — *2020-present*
- Optimizing machine learning models to predict colorectal cancer based on gut microbiome taxonomic abundace
- Identifying early markers of colorectal cancer development in a large clinical cohort of individuals with genetic predisposition to cancer
- Developing curriculum and teaching computational skills to coding beginners in virtual workshops

Graduate Research Assistant — *Oregon State University*
Sharpton Lab — *2014-2020*
- Metagenomic analysis of gut microbiom samples to quantify associations with health
- Assembly of metagenomic data from gut microbiome samples to build integrated gene catalogues of microbiome genomic diversity
- Collaborate with a diverse group to develop methodology for analyzing analyzing microbiome data

Research/Laboratory Assistant — *University of Arizona*
Dr. Paul Boehmer and Dr. Jui-Cheng Hsieh — *2010-2013*
- Creation of HSV-1 viral mutants to quantify impact on replication
- Mentor new members of the lab
- Maintain tissue culture and order supplies

Publications

* Indicates co-first author

1. **Courtney R. Armour**, Kelly L. Sovacool, William L. Close, Begüm D. Topçuoğlu, Jenna Wiens, Patrick D. Schloss. (2022). Streamlined implementation of a machine learning model to classify screen relevant neoplasia using reference-based OTU clustering. *bioRxiv preprint*. doi: 10.1101/2022.09.01.506299
2. **Courtney R. Armour**, Begüm D. Topçuoğlu, Andrea Garretto, Patrick D. Schloss. (2022). A goldilocks principle for the gut microbiome: taxonomic resolution matters for microbiome-based classification of colorectal cancer. mBio. doi: 10.1128/mbio.03161-21
3. Zena Lapp, Kelly L. Sovacool, Nick Lesniak, Dana King, Catherine Barnier, Matthew Flickinger, Jule Krüger, **Courtney R. Armour**, Maya M. Lapp, Jason Tallant, Rucheng Diao, Morgan Oneka, Sarah Tomkovich, Jacqueline Moltzau Anderson, Sarah K. Lucas, Patrick D. Schloss (2022). Developing and deploying an integrated workshop curriculum teaching computational skills for reproducible research Journal of Open Source Education. doi: 10.21105/jose.00144
4. Christopher A. Gaulke, Laura M. Beaver, **Courtney R. Armour**, Ian R. Humphreys, Carrie L. Barton, Robyn L. Tanguay, Emily Ho, Thomas J. Sharpton (2020). An integrated gene catalog of the zebrafish gut microbiome reveals significant homology with mammalian microbiomes *bioRxiv preprint*. doi: 10.1101/2020.06.15.153924
5. Christopher A. Gaulke*, **Courtney R. Armour***, Ian R. Humphreys, Laura M. Beaver, Carrie L. Barton, Lucia Carbone, Emily Ho, Robyn L. Tanguay, Yuan Jiang, Thomas Sharpton" (2020). Interspecies comparative metagenomics reveals correlated gut microbiome functional capacities among vertebrates *bioRxiv preprint*. doi: 10.1101/2020.06.15.153320
6. Rufa L Mendez, Cristobal Miranda, **Courtney R Armour**, Thomas J Sharpton, Jan Frederik Stevens, Jung Yeon Kwon (2020). Supplementation with sea vegetables textsuperscript*Palmaria mollistextsuperscript* and textsuperscript*Undaria pinnatifidatextsuperscript* exerts metabolic benefits in diet-induced obesity in mice Current Developments in Nutrition. doi: 10.1093/cdn/nzaa072
7. Duo Jiang, **Courtney R. Armour**, Chenxiao Hu, Meng Mei, Chuan Tian, Thomas J. Sharpton, Yuan Jiang (2019). Microbiome Multi-Omics Network Analysis: Statistical Considerations, Limitations, and Opportunities Frontiers in Genetics. doi: 10.3389/fgene.2019.00995
8. **Courtney R. Armour**, Stephen Nayfach, Katherine S. Pollard, Thomas J. Sharpton (2019). A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome mSystems. doi: 10.1128/mSystems.00332-18
9. Thomas Sharpton, Svetlana Lyalina, Julie Luong, Joey Pham, Emily M. Deal, **Courtney R. Armour**, Christopher Gaulke, Shomyseh Sanjabi, Katherine S. Pollard (2017). Development of Inflammatory Bowel Disease Is pathed to a Longitudinal Restructuring of the Gut Metagenome in Mice mSystems. doi: 10.1128/mSystems.00036-17
10. Jui-Cheng Hsieh, Ryan Kuta, **Courtney R. Armour**, Paul E. Boehmer (2014). Identification of two novel functional p53 responsive elements in the herpes simplex virus-1 genome Virology. doi: 10.1016/j.virol.2014.04.019

Presentations

Talks

Comparative metagenomic investigations link the functional capacity of the gut microbiome to vertebrate physiology — *Oregon State University*
Dissertation Defense — *MAR 2020*

The functional diversity of the gut microbiome in association with host physiology — *University of Michigan*
Microbiology and Immunology Seminar — *FEB 2020*

The power of poop: diagnostic potential of the gut microbiome in human disease — *Oregon State University*
Center for Genome Research and Biocomputing Spring Conference — *APR 2019*

A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome — *Oregon State University*
Microbiology Seminar Series — *NOV 2018*

A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome — *Oregon State University*
International Symbiosis Society. — *JUL 2018*

Interaction between herpes simplex virus-1 DNA polymerase and uracil-DNA glycosylase. ***awarded best undergraduate presentation*** — *University of Arizona*
Basic Medical Sciences Research Retreat — *JUN 2013*

Interaction between herpes simplex virus-1 DNA polymerase and uracil- DNA glycosylase
Basic Medical Sciences Intra-Departmental Seminar Series
University of Arizona
MAR 2013

Posters

Modeling the functional variation of the gut microbiome across vertebrates
ASM Microbe
San Francisco CA
JUN 2019

A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome
Lake Arrowhead Microbial Genomics Conference
Lake Arrowhead CA
SEP 2018

A Metagenomic Meta-Analysis Reveals Functional Signatures of Health and Disease in the Human Gut Microbiome. ***awarded best graduate student poster***
Fall Center for Genome Research and Biocomputing Conferences
Oregon State University
OCT 2018

Large-scale analysis of human gut metagenomes reveals functional indicators of disease in the gut microbiome
EMSL/PNNL Multi-Omics for Microbiomes Conference
Pasco WA
AUG 2017

Integrating clinical data reveals functional indicators of disease in the gut microbiome
OSU Microbiome Initiative Forum
Oregon State University
MAY 2017

Integrating clinical metagenomic data reveals microbiome signatures of dysbiosis
META Center Symposium
University of Oregon
AUG 2016

An automated workflow for the quality control and functional analysis of host-associated metagenomes
META Center Symposium
University of Oregon
AUG 2015

Fellowships

Larry W. Martin and Joyce B. O'Neill Fellowship
$25,000
Oregon State University
2018 - 2019

Nicholas R. Tartar Graduate Student Fellowship
$6,671
Oregon State University
Winter 2018

Pacific Northwest National Lab Travel Grant
Cost of conference registration
EMSL/PNNL Multi-omics for Microbiomes Conference
AUG 2017

ASM SIGHPC and Intel Data and Computational Science Fellowship
$15,000 per year - $60,000 total
Oregon State University
2016 - 2020

President's Scholarship
$9,000 per year - $36,000 total
Arizona State University
2008 - 2012

Specialized Training

Deep Learning for Life Scientists
Center for Genome Research and Biocomputing
Oregon State University
2019

Specialized workshop courses
Center for Genome Research and Biocomputing
Oregon State University
2014 - 2019

- RNAseq I and II
- Computing in Life Sciences - Perl
- Python I and II
- Command-line Data Analysis
- Introduction to Unix and Linux

Certificate in Applied Biostatistics
Department of Biostatistics
University of Washington
2014

Teaching and Mentorship

Teaching

Teaching Assistant (ST599) ***Introduction to Quantitative Genomics*** — *Oregon State University*
Department of Statistics — *Fall 2016*

Teaching Assistant (BI211) ***Principles of Biology for Life Science Majors*** — *Oregon State University*
Department of Statistics — *Fall 2016*

Mentorship

Austin Hammer (*PhD Student*) — *Oregon State University*
Department of Microbiology — *2019 - 2020*

Ian Humphreys (*Accelerated Masters Student*) — *Oregon State University*
Department of Microbiology — *2017 - 2019*

Ryan Kuta (*Undergraduate Student*) — *University of Arizona*
Department of Basic Medical Sciences — *2012 - 2013*

References

Patrick Schloss - *Postdoctoral Advisor* — *University of Michigan*
pschloss@umich.edu — *Professor*

Thomas Sharpton - *Graduate Advisor* — *Oregon State University*
thomas.sharpton@oregonstate.edu — *Associate Professor*

Katie Pollard - *Collaborator and Mentor* — *University of California San Francisco*
katherine.pollard@gladstone.ucsf.edu — *Professor*