



Sean Maden

*Bioinformatician; Quantitative Oncologist;
Computational Biology Ph.D. Student*

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Education

Oregon Health & Science University, August 2018 - May 2021 (expected)
Department of Biomedical Engineering,
Portland, OR

Doctorate of Philosophy (Ph.D.), Computational Biology, advised by Prof. Abhi Nellore, in affiliation with PDXGX (Nellore & Thompson Labs); Dissertation on pan-tissue and disease epigenetics; Emphasis on design of server, auto-compilation, and analysis software for tens of thousands of methylation array samples; Investigating inter-experiment biases, novel normalization techniques, and holistic assay quality assessment across samples; Workflows for multi-assay integration; Application of machine learning for cancer biomarker discovery.

Reed College, September 2007 - May 2011
Portland, OR

Bachelor of Arts (B.A.), Biology, emphases: population genetics, evolutionary ecology
Rigorous liberal arts curriculum in the humanities and sciences; Population biology and statistical genetics research; Thesis characterizing genetic diversity declines from inbreeding in captive laboratory cichlid fishes (*A. burtoni*) with microsatellite molecular markers; Advisor Prof. Suzy Renn.

Selected Research Work and Experience

Research Data Analyst Assistant October 2015 – June 2018
Fred Hutch, Seattle, WA

Principal Investigators: Prof. William Grady, Dr. Ming Yu
Study of gastroesophageal cancer epigenetics; Application of preprocessing and analysis pipelines for methylation arrays and next-generation technologies; Research collaborations across labs, departments, and campuses; Coauthor and editor of original research manuscripts; Significant intellectual contributions to grant applications; Presented lectures, posters at conferences and lab meetings; Learned and applied R, Python, and related programming languages and software for data science and biostatistical analysis; Implemented organized lab repositories for big data.

Bioinformatics Research Intern April - September 2015
Fred Hutch, Seattle, WA
Principal Investigator: Prof. William Grady; Postdoc project lead: Dr. Ming Yu
Carried out original analyses of cancer epigenetic data; Self-taught analytical programming;
Presentation of findings and research discussion at lab meetings.

Laboratory Assistant January – October 2013
Principle Investigator/Advisor: Prof. Gail Jarvik
University of Washington Medical Genetics
Analyzed clinical population and epidemiologic data; Quantified gene-environment interactions with modeling and regression techniques; Programmed preprocessing workflows for next-generation genomics; Coauthored and edited published manuscript of findings (see Publications).

Undergraduate Thesis Researcher September 2010 - May 2011
Advisor: Prof. Suzy Renn
Reed College, Biology Department
Quantified effects of laboratory breeding on genetic diversity in cichlid fishes (*A. burtoni*) using microsatellites; Authored thesis studying genetic diversity of lab cichlid fishes with microsatellites, and defended thesis before professorial board; Attained department grant funding (see Research Awards).

Scientific Memberships, Fellowships, and Funding

Grad Student Travel Stipend May 2019
MOMACS Modeling the World's Systems 2019
Washington, DC
Conference travel stipend award, hosted by University of Pittsburgh Dept. of Computer Science.

Affiliate Member, Fred Hutch, Seattle, WA June 2018 - present
Collaborators: Grady Lab; Luebeck Lab
Affiliate Member of Fred Hutch, with ongoing affiliation and collaboration with epigenetics labs in Clinical Research and Computational Biology divisions.

AAAS Member June 2018 - present
Affiliation: OHSU Graduate School
American Association for the Advancement of Science (AAAS), student member nominated by OHSU leadership.

2016 SAS-BWF Fellow, Fred Hutch, Seattle, WA May 2016 - 2017
Advisors: Prof. Bill Grady, Dr. Ming Yu
Fellowship hosted and funded by SAS Institute and Burroughs Wellcome Fund. Contributed to ongoing research of epigenetics of colorectal cancer and biomarker discovery for clinical screening. Worked closely with JMP developers and recommended new software features based on real research needs.

AACR Associate Member, Fred Hutch, Seattle, WA Jan 2016 - 2017
Recognized and supported by Association for Cancer Research (AACR) as promising early-career cancer investigator. AACR is one of the largest cancer research organizations in the US, and it hosts numerous annual meetings and workshops to help cancer researchers network and learn from colleagues.

Undergraduate Research Grant, Reed College, Portland, OR Winter 2010
Advisor: Prof. Suzy Renn
Granted funding to extend research for undergraduate senior thesis studying genetic diversity of *A. burtoni* fishes (see Publications), awarded by Reed College Biology Department based on submission of original research overview.

Fischer Memorial Fellow, Reed College, Portland, OR

Summer 2010

Advisor: Prof. Robert Kaplan

Designed and conducted habitat field survey experiment of native at-risk frog *Rana aurora*, constructed breeding habitat and compiled a literature review of amphibian ecology. Authored and coauthored extensive reports presented as contributions to canon of Fisher Fellows past and present.

Peer-reviewed Publications, Preprints, and Works in Progress

1. Julianne K. David, **Sean K. Maden**, Benjamin R. Weeder, Reid F. Thompson, Abhi Nellore. *"Cancer-specific" exon-exon junctions appear in embryological and other normal cells.* 2019 (under review)
2. Ting Wang, **Sean K. Maden**, Georg Luebeck, Chris Li, Polly Newcomb, Cornelia Ulrich, Kelly Carter, Michael Luo, Ming Yu, William M. Grady. *Dysfunctional epigenetic aging of the normal colon in association with colorectal adenoma and cancer risk.* 2019 (under review)
3. Jenny Smith*, **Sean K. Maden***, David Lee*, Ronald Buie, Vikas Peddu, Ryan Shean, Ben Busby. *Consensus Machine Learning for Gene Target Selection in Pediatric AML Risk.* 2019 BioRxiv, 632166. *contributed equally (preprint)
4. Yuna Guo, Kelly Carter, Ming Yu, **Sean K. Maden**, Darwin Edmonds, Polly Newcomb P, Christopher Li, Neli Ulrich, William M. Grady. *Senescence associated secreted factors are candidate drivers of the age related risk of colorectal cancer.* 2018 (under review).
5. Georg E. Luebeck, William D. Hazelton, Kit Curtius, **Sean K. Maden**, Ming Yu, Kelly T. Carter, Wynn Burke, Paul D. Lampe, Christopher I. Li, Cornelia M. Ulrich, Polly A. Newcomb, Maria Westerhoff¹¹, Andrew M. Kaz, Yanxin Luo, John M. Inadomi, William M. Grady. *Implications of epigenetic drift in colorectal neoplasia.* 2018 Cancer Research (accepted for publication).
6. Ming Yu*, **Sean K. Maden***, Matthew Stachler*, Andrew M. Kaz, Tai J. Heinzerling, Rachele M O'Leary, Xinsen Xu, Adam Bass, Amitabh Chak, Joseph E. Willis, Sanford D. Markowitz, William M. Grady. *Subtypes of Barrett's Esophagus and Esophageal Adenocarcinoma Based on Genome-wide Methylation Analysis.* 2017, Gut. *contributed equally.
7. Ludovic Barault, Alessio Amatu, Giulia Siravegna, Agostino Ponzetti, Sebastian Moran, Andrea Cassingena, Benedetta Mussolin, Chiara Falcomatà, Alexandra Binder, Carmen Cristiano, Daniele Oddo, Carlotta Cancelliere, Sara Bustreo, Katia Bencardino, **Sean Maden**, Alice Vanzati, Patrizia Zavattari, Mauro Truini, William M. Grady, Patrizia Racca, Karin B. Michels, Salvatore Siena, Manel Esteller, Alberto Bardelli, Andrea Sartore-Bianchi, Federica Di Nicolantonio. *Discovery of methylated circulating DNA biomarkers for comprehensive non-invasive monitoring of treatment response in metastatic colorectal cancer.* 2017 Gut; PMID: PMC5897187.
8. Georg E. Luebeck, Kit Curtius, William D Hazelton, **Sean Maden**, Ming Yu, Prashanthi N Thota, Deepa T Patil, Amitabh Chak, Joseph E Willis, William M Grady. *Identification of a key role of widespread epigenetic drift in Barrett's esophagus and esophageal adenocarcinoma.* 2017 Clinical Epigenetics; PMID: PMC5644061.
9. (**Acknowledgement**) Kit Curtius, Chao-Jen Wong, William D. Hazelton, Andrew M. Kaz, Amitabh Chak, Joseph E. Willis, William M. Grady, Georg E. Luebeck. *A Molecular Clock Infers Heterogeneous Tissue Age Among Patients with Barrett's Esophagus.* May 11, 2016 PLoS Comput Bio.; PMID: 27168458

10. Daniel Seung Kim, **Sean K. Maden**, Amber A Burt, Jane E Ranchalis, Clement E Furlong and Gail P Jarvik. *Dietary fatty acid intake is associated with paraoxonase 1 activity in a cohort-based analysis of 1,548 subjects*. 2013 Lipids in Health and Disease; PMCID: PMC3878825.
11. **Sean Maden**, Advisor: Suzy P Renn. *Observed Declines in Genetic Diversity Across Successive Generations of a Captive Astatotilapia burtoni Lineage, Using Microsatellite Molecular Markers*. Senior Thesis, 2011 Reed College.

Scientific Lay Press Works

1. (**Acknowledgement**) Anne-Sophie Kuhlman. "Esophageal adenocarcinoma: when DNA methylation informs the treatment". Fred Hutch Science Spotlight July 16, 2018.

Selected Bioinformatics Skills and Interests

Scientific software development	MySQL, MongoDB, database applications;
Bash and shell scripting;	Statistical modeling and regression;
Python and R statistical software libraries;	Machine learning;
Tibbles, tidyverse, dply, Rstudio;	ROC/AUC and predictive analyses;
R modules, ggplot2, Gviz;	Biomarker discovery;
R-shiny apps, reactive programming;	Next-generation sequencing;
GitHub, version control;	Methylation array data mining;
Nix and Windows operating systems;	Epigenetic regulation of expression;
Embarrassingly parallel processing;	Enhancers, insulators, super-enhancers;
TCGA, GEO, public genomics repos;	Metadata mining and cleaning

Selected Science Presentations

1. (poster/abstract) Sean K. Maden, Kasper D. Hansen, Abhinav Nellore. *Comprehensive Reanalysis of DNA Methylation Array Data*. 2019 MOMACS Modeling the World's Systems Conference.
2. (poster) Mitra Barahimi, **Sean Maden**, Kelly Carter, Ming Yu, Kathy Vickers, Chris Li, William Grady. *Sa1617-Discovery and Validation of Potential Field Cancerization Molecular Markers that Associate with Metachronous Polyp Formation*. *Gastroenterology* 154 (6), S-331
3. (poster) Erik J. Snider, E. Georg Luebeck, Ming Yu, Kelly T. Carter, **Sean K. Maden**, Amitabh Chak, Joseph E. Willis, John M. Inadomi, Michael D. Saunders, Adam W. Templeton, William M. Grady. *Medication effects on methylation-related biological aging in Barrett's esophagus*. 2018. *Gastroenterology* 156 (6), S-509
4. (lecture) Sean Maden. "Recount Methylation: A generalizable platform for re-analysis of array-based epigenetic data". Biophysics Journal Club meeting, October 2018.
5. (poster) Mitra Barahimi, **Sean Maden**, Ming Yu, Kelly Carter, William Grady. *Discovery and Validation of Potential Field Cancerization Molecular Markers That Associate With Metachronous Polyp Formation*. Presented at 2018 Digestive Disease Week.
6. (lecture) **Sean Maden**. *Identification of Novel Molecular Characteristics of Methylation Subtypes in Esophageal Adenocarcinoma by Integrated Analysis*. Cancer Epigenetics Affinity Group meeting. Fred Hutch campus. Nov. 7, 2017.

7. (poster) **Sean Maden*** and Georg Luebeck*, Kit Curtius, William Hazelton, Ming Yu, Prashanti Thota, Deepa Patil, Amitabh Chak, Joseph Willis, William Grady *co-first authors. *Scope and Significance of Epigenetic Drift in Barrett's Esophagus*. Cancer Systems Biology Consortium (CSBC) Principal Investigator Meeting, Broad Institute MIT, Cambridge, MA. Oct 3, 2017.
8. (lecture) **Sean Maden**. *Spatial and temporal epigenetic pattern gradients differentiate normal and progressed tissues in esophagus*. Cancer Intervention and Surveillance Modeling Network (CISNET) 2017 meeting, Esophageal Cancer projects, June 6, 2017.
9. (poster) **Sean Maden***, Ming Yu*, Matthew Stachler*, Andrew M. Kaz, Tai J. Heinzerling, Rachele M O'Leary, Xinsen Xu, Adam Bass, Amitabh Chak, Joseph E. Willis, Sanford D. Markowitz, William M. Grady (*co-first authors). *Genome-wide methylation analysis reveals methylator subtypes of Barrett's esophagus and esophageal adenocarcinoma*. 2016 AACR Annual Meeting, Abstract: #3192, Session: DNA Methylation 1.

Graduate Level Science Courses Completed

Oregon Health and Science University, Ph.D. Computational Biology, Biomedical Engineering
Summer 2018 – Spring 2021 (expected)

BMI 550/650: Bioinformatics and
Computational Biology I: Algorithms
CS 545: Machine Learning

CONJ 650: Practice and Ethics of Science
BME 601: Prequalifying PhD Research

University of Washington, M.Sc. Genetic Epidemiology, Public Health Genetics
Fall 2012 - Fall 2013 (no degree obtained)

PHG 536: Bioinformatics and
Sequence Analysis
BIOSTAT 517/518: Applied
Biostatistics I and II
EPI 512/513: Epidemiological
Methods I and II
PHG 512: Law and Ethics in Public
Health Genetics

PHG 513: Pharmacogenetics and
Toxicogenomics
BIOST 580: Biostatistics Seminar
EPI 583: Epidemiology Seminar
GENOME 525: Topics in Human Genetics
PHG 511: Genetic Epidemiology
PHG 521: Culture and Societal Genomics
PHG 523: Genetics and the Law

Undergraduate Level Science Courses Completed

Shoreline Community College, Biotechnology Lab Specialist Certificate
Fall 2014 - Winter 2015 (no degree obtained)

BIOL 270: Molecular Biology
BIOL 285: Basics of Bioinformatics
BIOL 286: Molecular Diagnostics

BIOL 265/266: Solution and Media
Prep I and II
BIOL 275: Recombinant DNA

Reed College, B.A. Biology, Fall 2007 - Spring 2011

MATH 111: Calculus
MATH 112: Intro to Analysis
PHYS 100: General Physics I
HIST 315: Medieval/Renaissance
Science and Religion
BIOL 332: Vascular Plant Diversity
BIOL 101/102: Introductory Biology

CHEM 101/102: Introductory
Chemistry
BIOL 361: Genetics
BIOL 431: Seminar: Ecology and
Evolution of Plant-Human
Interactions
BIOL 358: Microbiology

BIOL 366: Population Ecology and Evolution
CHEM 201/202: Organic Chemistry I and II
PHIL 201: Logic
BIOL 351: Developmental Biology

(lecture only)
BIOL 431: Seminar: Chromosome Structure
PHIL 316: Philosophy of Science
BIOL 431: Seminar: Gene Duplication/Overexpression

Find Me Online

<u>Website (<i>Topics</i>)</u>	<u>URL</u>
GitHub (<i>programming and bioinformatics</i>).....	https://github.com/metamaden
Personal Site and Blog (<i>programming and data science</i>).....	https://metamaden.github.io/
ResearchGate (<i>bioinformatics</i>).....	https://www.researchgate.net/profile/Sean_Maden3
LinkedIn (<i>career profile</i>).....	linkedin.com/in/sean-maden-41623640
Twitter (<i>bioinformatics, science news, programming</i>).....	https://twitter.com/MadenSean