Jill V. Hagey, MS, PhD

jvhagey@gmail.com ● (530) 205-6252 ● jvhagey.github.io

Areas of Specialization

I am passionate about creating reproducible pipelines to make biological "big data" easy to understand, visually appealing, and useful for decision making. I employ a combination of bioinformatics analysis and wet lab techniques to inform our understanding of pathogens important to public health. My unique background in bioinformatics, cell biology, microbiology, immunology and animal science is specially tailored for a career focused on improving public health.

Education

University of California Davis, Davis CA

PhD, Animal Biology with a designated emphasis in Host-Microbe Interactions	09/20
MS, Animal Biology	12/15
BS, Cell Biology	12/11

Additional Training and Certificates

Machine Learning (Regression, Classification, Clustering & Retrieval) 10/21
University of Washington, Coursera

Summer Institute Stats for Big Data: Supervised & Unsupervised Methods for Machine Learning 7/21
University of Washington, School of Public Health, Department of Biostatistics

Python 3 Programing Specialization 12/20
University of Michigan, Coursera

Python and Command Line Tools for Genomic Data Science 12/20
John Hopkins, Coursera

Strategies and Techniques for Analyzing Microbial Population Structures (STAMPS) 08/18
Marine Biological Laboratory, Woods Hole MA

Bioinformatics Skills

- Experience with HPCs (SLURM & SGE), Linux & troubleshooting bioinformatic tools on Microsoft systems.
- Proficient in R for data analysis and visualization: an example can be found here. Built R Shiny applications.
- Adept in Python for scrapping data/automated web browsing, data analysis and wrangling: examples here, here and here.
- Utilized version control with git.
- Workflow languages: Wrote tutorials for WDL and Snakemake
- Containers: Wrote tutorial for Docker and Singularity containers.
- Genomic characterization of SARS-CoV-2
- Proficient in 16S rRNA amplicon analysis with AVS identification, diversity, differential abundance and variability analysis.
- Metagenomics: examples here.
    - Custom scripts using snakemake, python, bash and R for data manipulation and analysis.
    - Tree formation and read/contig placement.
    - Functional annotation, taxonomic classification, assembly, binning and genome annotation.

Relevant Experience

APHL Bioinformatics Fellow **9/20 – present**
CDC, Clinical Detection and Surveillance Lab Team: Water Borne Disease Prevention Branch
Team Leads: Team Leads: Drs. Dawn Roellig, iyd4@cdc.gov; Shatavia Morrison, xxh5@cdc.gov

- Identified SNPs that differentiate between genomes of *Cryptosporidium* that infected humans and cattle by implementing custom workflows on a high-performance computing cluster.
- Created R shiny application to visualize and compare the similarity of 18S rRNA gene sequences of *Cryptosporidium* species.
- Evaluated performance of assembly and aligning software on sequenced *Cryptosporidium* genomes.
- Utilized machine learning algorithm to identify keep genomic differences between cattle and human associated *Cryptosporidium* genomes.

Deputy Team Lead: COVID-19 Emergency Response **3/21 – 7/21**
CDC, Laboratory and Testing Task Force: Technical Outreach and Assistance for States Team (TOAST)
Team Leads: Drs. Dawn Roellig, iyd4@cdc.gov; Ketan Patel, kqn5@cdc.gov ; Lee Katz, gzu2@cdc.gov

- Authored protocols.io for sequence submission to public repositories, pipeline implementation and troubleshooting for SARS-CoV-2 genomic characterization.
- Collaborated with state public health bioinformatians on SARS-CoV-2 sequence pipeline development and conducted comprehensive pipeline evaluations.
- Advised state public health labs on server and cloud computing purchasing and resource requirements.
- Communicated guidance for CLIA validation of bioinformatic pipelines.
- Meet weekly with NCBI staff to elevate barriers for submission of sequences to public repositories.
- Synchronized needs of bioinformatic regional resources at PHL labs with the objectives of the Office of Advanced Molecular Detection at the Center for Disease Control and Prevention.

PhD Dissertation UC Davis **9/15 – 09/20**
PI: Elizabeth Maga, PhD – eamaga@ucdavis.edu
Dissertation Topic: Surveying the composition and function of the fecal microbiota of dairy cows across California.

- Created a pipeline for 16S amplicon analysis projects:
  - Identified farm variation in microbial communities of feces and milk from dairy cattle.
  - Evaluated differences in microbial populations due to sampling method from the rumen of cattle.
- Analyzed metagenomic data to determine functional differences of the microbiome of cattle and identification of taxonomy contributing to nitrogen cycling and antibiotic resistance.
- Scripts and description of projects can be found at https://github.com/jvhagey
- Engineering *Lactococcus lactis* to secrete SodA for therapeutic use against *Salmonella* and *E. coli* in daily calves.

Masters Thesis UC Davis **8/13 – 12/15**
PI: Elizabeth Maga, PhD – eamaga@ucdavis.edu
Thesis Topic: Modulation of Gut Microbes: Interplay between Peptidoglycan Recognition Proteins and Lysozyme.

- Solid foundation in study design and statistical analysis with SAS, R, Adobe Illustrator and GraphPad Prism.
- Used an intestinal cell line, IPEC-J2, to determine expression of peptidoglycan recognition protein-3/4 in response to milk products, commensal and pathogenic bacteria.
- Analyzed gene expression of cytokines and immune receptors via qRT-PCR in a malnourished swine model.

Lab Manager **1/13 – 9/14**
PI: Munashe Chigerwe, BVSc, MPH, PhD – mchigerwe@ucdavis.edu
University of California Davis, Department of Medicine and Epidemiology

- Effectively managed administrative aspects of research projects including budget management, maintained adherence to Standard Operation Procedures and university regulations, hiring, training and data acquisition.
- Achieved completion of multiple concurrent research projects in a timely manner while adhering to a budget.
- Accurately processed and measured immunoglobulins in colostrum and serum via ELISAs and RIDs.
- Designed and optimized new immunoassay protocol for measuring immunoglobulins in feces.
- Independently held interviews and oversaw the training and mentoring of 5 research assistants.

Publications

Xiaoli, L., **Hagey, J. V.**, Lawsin, A., Winglee, K., Chen, J. C., … Katz, L. S. (2021) Benchmark datasets for bioinformatics pipeline validation: applications for SARS-CoV-2 Surveillance. *In Prep*.

Hagey, J. V., Bhatnagar, S., Heguy, J. M., Karle, B. M., Price P. L., Meyer, D., Maga, E. A. (2021). Metagenomic Analysis of the Fecal Microbiome in Dairy Cows Reveal Species Involved in the Nitrogen Cycle. *In Prep*.

Hagey, J. V.*, Laabs, M.*, DePeters, E. J. (2021). Rumen Sampling Methods Bias Bacterial Communities. *bioRxiv* 1–50. Under Review. doi:10.1101/2021.09.22.461352

Hagey, J. V., Bhatnagar, S., Heguy, J. M., Karle, B. M., Price P. L., Meyer, D., Maga, E. A. (2019). Fecal Microbial Communities in a Large Representative Cohort of California Dairy Cows. *Frontiers of Microbiology*, *10*(May),1-14.

Garas, L. C., Feltrin, C., Hamilton, M. K., **Hagey, J. V.**, Murray, J. D., Bertolini, L. R., … Maga, E. A. (2016). Milk with and without lactoferrin can influence intestinal damage in a pig model of malnutrition. *Food & Function*, *7*(2), 665–678. doi:doi.org/10.1039/c5fo01217a

Chigerwe, M., **Hagey, J. V.**, & Aly, S. S. (2015). Determination of neonatal serum immunoglobulin G concentrations associated with mortality during the first 4 months of life in dairy heifer calves. *Journal of Dairy Research*, *82*(04), 400–406. doi:10.1017/S0022029915000503

Pipkin, K. M., **Hagey, J. V.**, Rayburn, M. C., & Chigerwe, M. (2015). A Randomized Clinical Trial Evaluating Metabolism of Colostral and Plasma Derived Immunoglobulin G in Jersey Bull Calves. *Journal of Veterinary Internal Medicine*, 29, 961-966. doi:10.1111/jvim.12586

Chigerwe, M., & **Hagey, J. V.** (2014). Refractometer assessment of colostral and serum IgG and milk total solids concentrations in dairy cattle. *BMC Veterinary Research*, *10*(1), 178. doi:10.1186/s12917-014-0178-7

Murphy, J. M., **Hagey, J. V.**, & Chigerwe, M. (2014). Comparison of serum immunoglobulin G half-life in dairy calves fed colostrum, colostrum replacer or administered with intravenous bovine plasma. *Veterinary Immunology and Immunopathology*, *158*(3-4), 233–7. doi:10.1016/j.vetimm.2014.01.008

Chigerwe, M., Coons, D. M., & **Hagey, J. V.** (2012). Comparison of colostrum feeding by nipple bottle versus oroesophageal tubing in Holstein dairy bull calves. *Journal of the American Veterinary Medical Association*, *241*(1), 104–9. doi:10.2460/javma.241.1.104

Select Fellowships and Awards

- Leland Roy Saxon and Georgia Wood Saxon Fellowship — 2013-2014, 2017-2020
- Little Bang! Business Poster Competition Winner — 2020
- Business Development Fellow with the Institute for Innovation and Entrepreneurship — 2019-2020
- J. B. Russel Young Scientist Award for Best Poster Presentation — 2019
- Provost's Prize and People's Choice for Best Student Organized Session — 2016
- Graduate Program Fellowship for outstanding academic record — 2013-2018
- Keystone Symposia Underrepresented Trainee Scholarship — 2014

Grants Written/Received

- UC Davis Science Translation and Innovation Research (STAIR) Grant — 2019
- California Dairy Research Foundation Grant | **$19,000** — 2019
- Microbiome Graduate Research Grant | **$1,000** — 2019
- Center for Food Animal Health, Animal Health | **$20,000** — 2017-2018
- Henry A. Jastro Shields Research Grant | **$3,000** — 2015, 2019

Poster/Oral Presentations

SARS-CoV-2 Benchmark datasets for bioinformatics pipeline validation. **09/21**
Technical Outreach & Assistance for States Team Office Hours for State Public Health Labs

Investigating the Fecal Microbiome in Dairy Cattle Using Updated & Robust Sequence Analysis. **09/20**
University of California, Davis. Department of Animal Science Seminar.

Congress on Gastrointestinal Function
Identification of Microbes Involved in Nitrogen Fixation in Dairy Cow Manure on Farms across California **04/19**

International Society of Microbial Ecology
Prevalence of Nitrogen Fixation Genes in Dairy Cattle Feces **08/18**

Animal Biology Graduate Group Colloquium **10/16**
Survey of Microbial Fecal Populations across California Dairies

Keystone Symposia: "Gut Microbiota Modulation of Host Physiology: The Search for Mechanism" **04/15**
Lysozyme Transgenic Goat Milk Regulates Expression of Peptidoglycan Recognition Protein 3 & 4

Other Experience and Leadership Training

Innovation Access Intern **4/20-07/20**
University of California, Davis - Office of Research
UC Entrepreneurship Academy **09/19**
University of California, Davis Graduate School of Management
Leadership Challenge Workshop: Leadership Practices Inventory **02/19**
University of California, Davis Graduate School of Management

Facilitated Training/Workshops

Automating bioinformatic pipelines with Snakemake. **04/2021**
Live demo and hands-on Workshop. Genome Interest Group, Technical. CDC

Wet Lab Skills

- PCR
- qRT-PCR
- ELISA
- Library construction for NGS
- Fluorescent microscopy
- Radial immunodiffusion
- Gel electrophoresis
- Western blot
- Primer and gene design
- DNA/RNA extraction, isolation & quantification
- Cell culture – sterile technique, cell passage, storage and media preparation
- Cloning into Gram-negative (*E.coli*) and Gram-positive (*L. lactis*) bacteria