



# CompBio Fall 2020 Newsletter



## **Letter from the Director:**

The Computational Bioscience Program has great news to share! Stay up to date with everything that's happening at CPBS. Read about the recently announced new Center for Health AI at Anschutz will turbocharge informatics research, teaching and service at the University. Meet the new students, and catch up with everyone's recent accomplishments. There's always lots going on, and now that we can't see each other face to face, this newsletter is a good way to stay in the loop. Thanks very much to Program Administrator Caitlin Moloney for putting it together.



**Larry Hunter**

# New Center for Health Artificial Intelligence

● Casey Greene, PhD, has been named director of the new Center for Health Artificial Intelligence at the University of Colorado School of Medicine, where he will lead the creation of a center building communities that use sophisticated data analysis methods to advance research and improve clinical practice on the Anschutz Medical Campus.

● The Center for Health AI will build new capabilities on campus for advanced data analysis while complementing existing data and analysis centers of excellence including the Colorado Center for Personalized Medicine and the Center for Innovative Design and Analysis. Artificial intelligence approaches have already dramatically transformed our lives and our interactions with technology. Health care and biomedical research are not far behind.

● Greene is an experienced leader in the field of data analytics. After completing his PhD in computational genetics at Dartmouth College 2009, Greene was a computational biology and functional genomics postdoctoral fellow at the Lewis-Sigler Institute of Integrative Genomics at Princeton University until 2012. He joined the Dartmouth faculty that year and moved to University of Pennsylvania School of Medicine in 2015.

● The Greene Lab develops algorithms that integrate publicly available data from multiple datasets to help model and understand complex biological systems. This approach allows investigators to infer the key contextual information required to interpret the data, and facilitates the process of asking and answering basic science and translational research questions.

● <https://news.cuanschutz.edu/medicine/casey-greene-named-director-of-n-ew-center-for-health-artificial-intelligence>



**Casey Greene**

# New Students

## Connor Elkhill



- **Hometown:** Boston, MA
- **Completed Undergrad Degree at:** Northeastern University
- **Research Interest:** Most of my past experience has been in medical imaging and diagnostics, and I hope to bring some of that experience and knowledge to the Comp Bio program. I am interested in infectious disease, cancer research, and drug development/screening (among other things of course). While imaging is fascinating, I am excited to explore quicker and cheaper diagnostic assays by using imaging for validation. I am also excited to learn more about machine learning and its possible applications.
- **Past research/work experience:** My past research experience includes internships at Harvard Medical School and the Martinos Imaging Center at Mass General Hospital. At HMS I was working on novel reconstruction and "connectomics" of zebrafish brain tissue where we aimed to reconstruct major neurons that connected to the motor cortex (I worked on the Mauthner axons specifically). At the Martinos Center I was working on algorithms for MR-based attenuation correction in PET images, specifically focused on pelvic cancer data. Before coming here, I was employed at Invicro, a contract research company that works on all areas of drug development and discovery. I analyzed all kinds of data that aims to illuminate the efficacy and safety of experimental drugs.
- **Hobbies:** I am a huge sports fan, but I also love cooking, playing video games, the guitar, and rock climbing.
- **Fun Fact:** My last name was directly translated from Finnish when my great great grandfather entered the US!

# New Students

## Lucas Gillenwater



- **Hometown:** Fredericksburg, Virginia, though I've been living in Denver for 6 years.
- **Completed Undergrad Degree at:** University of Virginia
- **Research Interest:** Integrated Omics for biomarker discovery and chronic disease etiology, causal inference, pharmacokinetics and pharmacogenomics, molecular ecology and evolutionary biology, machine learning and artificial intelligence, data visualization
- **Past research/work experience:** For the past 2 years prior to Graduate School, I've worked as a Data Analyst at National Jewish Health studying the molecular biology of COPD. I've mainly worked with metabolomic data in an effort to understand associations with clinical phenotypes and integration with other omic data. Before that I've worked professionally as a science teacher and a bread baker.
- **Hobbies:** I enjoy the typical Colorado hobbies of skiing, hiking, running, and biking. I also enjoy gardening, baking, and mechanical work on my car and bikes. In the evenings I like to playing board games and reading natural history or fantasy/science fiction.
- **Fun Fact:** I've learned how to knit during this pandemic.

# New Students

## Eric Prince



- **Hometown:** Leesburg, VA
- **Completed Undergrad Degree at:** I received my B.S. in Chemistry from the University of Colorado Denver.
- **Research Interest:** My current research interests are focused on the development of computational tools which leverage machine learning, particularly in the context of limited data (i.e., rare disease), for exploration throughout a wide range of biomedical data including radiographic and omics studies.
- **Past research/work experience:** I previously worked in pediatric neuro-oncology research at CU Anschutz. In this role I engaged a variety of tasks including clinical research, cell culture, flow cytometry, sequencing, and computational analyses.
- **Hobbies:** I like to spend my free time in the mountains, typically snowboarding, cycling, or camping. I like to read books and (try) to cook new recipes. I also enjoy checking out the various excellent local craft breweries.
- **Fun Fact:** I participated in my first triathlon ever last summer and am looking forward to more races in the future.

# New Students

## Brook Santangelo



- **Hometown:** Ft. Collins, CO
- **Completed Undergrad Degree at:** University of San Diego
- **Research Interest & work experience:** My current research interest is to explore the effect of the microbiome on our health using computational methods. I hope to develop tools that can facilitate a deeper understanding of the gut and how it contributes to chronic disease while ensuring the use of diverse datasets from many different populations.
- **Past Research/Work Experience:** For my undergraduate research, I examined methane emissions from Arctic wetlands while working at the National Oceanic and Atmospheric Administration. I spent time developing small molecule drug targets at Calibr before I became a Software Systems Engineer at Illumina. There I worked with bioinformatics and cloud software teams on primary and secondary analysis pipelines, as well as the instrument software for the NovaSeq and NextSeq sequencing platforms.
- **Hobbies:** I love anything outside; skiing, biking, climbing, hiking. I grew up riding horses and with the pandemic became way more into ultrarunning.
- **Fun Fact:** I've been a Star Trek fan since I was ~5



# Student News

- **2019-2021 Invited Talks**
  - University of Colorado Denver [Data Science Symposium](#)
  - National COVID Cohort Collaborative (N3C), Knowledge Integration & Analytics Working Group
  - St. Jude Future Fellow Research Conference
  - Center for Biomedical Informatics, Wake Forest School of Medicine
  - Neuromuscular Clinic, Children's Hospital of Colorado
  - PatientsLikeMe
- **2019-2021 Conferences:**
  - World of Ontologies
  - Virtual Joint Summit of the American Medical Informatics Association
  - OHDSI Symposium (Virtual)
  - Annual International Conference on Intelligent Systems for Molecular Biology (Virtual)
  - International Conference on Computational Science (Virtual)
  - NLM Training Grant Conference (Virtual)
  - International Society of Physical and Rehabilitation Medicine World Congress and the 53rd Annual Meeting of the Association of Academic Physiatrists (Virtual)
  - Society of Toxicology 59th Annual Meeting and ToxExpo (Virtual)
  - Rocky Mountain Bioinformatics
- **2019-2021 Publications:** 10 total, including one first-author!
- University of Pittsburgh Clinical Research Informatics are integrating Tiffany's PheKnowLator KG into the Pittsburgh site of the *All of Us* Research program



**Tiffany Callahan**

# Student News

- Laura Stevens is a Fellow (FAHA) and data scientist for the American Heart Association (AHA). This, combined with her thesis work, has included developing guidelines and resources towards facilitating the use of Machine Learning in clinical research. She published a first author paper, co-authored by **David Kao**, in *Circulation: Cardiovascular Quality and Outcomes* focused on providing reporting guidelines and recommendations for reviewing and reporting Machine Learning Analyses in Clinical Research. Read More here: <https://www.ahajournals.org/doi/10.1161/CIRCOUTCOMES.120.006556>. Additionally, she is first author on a paper, co-authored by **David Kao** and **Carsten Görg**, that developed interactive and visualization tools to assist clinical researchers in the implementation of Machine Learning Analyses. Read More here: <https://www.mdpi.com/2076-3417/10/9/3309>.
- In addition to developing guidelines and resources to streamline the use of machine learning in clinical research, her thesis work focuses on automating the integration and harmonization of clinical data for predictive modeling and analytics. Working with **David Kao** and **Sonia Leach**, she has one publication currently in press for this work and another being submitted.
- Since COVID-19 she has been heavily involved in facilitating and conducting COVID-19 clinical research at the American Heart Association including:
  - Creation and development of a [COVID-19 Data challenge](#) and Supporting Website
  - Creating and Developing Resources and Frameworks for conducting research on the [Precision Medicine Platform](#) using the [AHA COVID-19 CVD Registry Data](#) powered by Get with the Guidelines®. She currently has one publication in progress for this work, and is co-author on multiple publications either in-press or being submitted on clinical research using the registry data in the Precision Medicine Platform.



**Laura Stevens**



# Student News & Alumni Spotlight

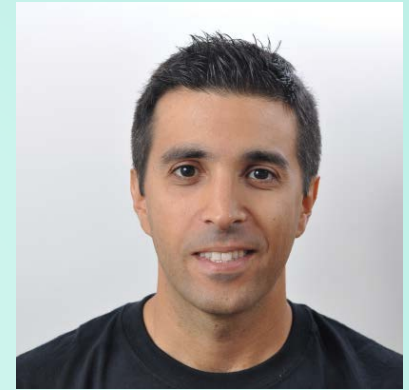


**Emily Mastej**  
(Ghosh lab)  
3<sup>rd</sup> Year Student

- Emily Mastej got a first-author paper accepted based on her rotation work! The paper came out in the *Metabolites* journal and is called "Identifying Protein-Metabolite Networks associated with COPD Phenotypes." **Lucas Gillenwater** and **Katerina Kechris** are co-authors on the paper
- Read more here: <https://www.mdpi.com/2218-1989/10/4/124>

**Ignacio Tripodi**  
(Dowell & Hunter labs)

- Defense date: May 18, 2020
- Current position:  
Bioinformatics Scientist at  
Sciome, LLC



- Ignacio is currently working on toxicology- and oncology-related research remotely, and has relocated to Barcelona! He is currently enjoying the Mediterranean weather, food & lifestyle.
- Ignacio was technically enrolled in the Computer Science PhD program at Boulder, but he was an active participant in Anschutz events. Ignacio writes: "I was glad to be part of the program, even if I was officially a CU Boulder student, and I've always felt welcome. The ability to interact with other researchers in my [clinical] areas of interest, and just walk to toxicology researchers' offices to ask random questions about molecular mechanisms, was an example of the invaluable part of being at a medical campus."

# Alumni Spotlight



- Update from Callie: “The past year I was an Associate Research Scientist at RadiaSoft, a small research and development company where I was the 'machine learning expert' amongst a bunch of theoretical physicist PhDs. I worked on a lot of different problems ranging from optimal dosage treatment predictions for prostate cancer patients to building automated simulation tools for particle accelerators. I wanted to make a switch into industry so I just started a new job at Pearson as a Data Scientist in the AI Productions and Solutions group. My team's focus is on their Aida calculus tutor app. I'm specifically working on optical character recognition (OCR), which interprets the calculus problem from the students taking a picture of their handwritten homework. In personal fun news, my boyfriend and I adopted a quarantine puppy Theo (right) who loves his big sister, Macy (left). ”

## Callie Federer (Zylberberg lab)

- Defense date: August 9, 2019
- Current position: Data Scientist at Pearson Education Management



# Alumni Spotlight



## Rani Powers (Costello lab)

- Defense date: August 14, 2019
- Current position: Senior Staff Scientist at Wyss Institute for Biologically Inspired Engineering at Harvard University
- After earning her PhD in December 2019, Rani joined the Wyss Institute at Harvard University, where she established and leads the Wyss Computational Platform, a new effort supporting breakthrough discoveries across multiple research programs funded by government, non-profit, and venture capital partners. Passionate about translating innovative ideas into impactful products, Rani works across at the intersection of scientific research, business development, and technology translation at the Wyss Institute building an ecosystem of computational tools that empower researchers of all backgrounds to perform biological data analysis.
- To support the Institute's rapid shift towards therapeutic efforts combating the COVID-19 pandemic this year, Rani's team created a secure, interactive platform for coordinating rapid compound testing in different labs across the nation. The tool integrates compound information from various vendors and public chemical databases and tracks each compound's progress through a barrage of biological assays ([article](#); [video](#)). Rani's other recent work includes developing an interactive tool for glycobiology research (published in *Cell Host & Microbe*; [press release](#)) and building the Wyss Institute's first, interactive annual Impact Report and online Technology Translation portal for real-time progress reporting to funding agencies.

# Faculty News

## Chris Miller



- The U.S. Department of Energy (DOE) announced \$5 million in funding for six new research projects in computational biology, \$1,049,639 of which goes to **Chris Miller**, associate professor in CU Denver's Department of Integrative Biology, and his collaborators—Farnoush Banaei-Kashani from CU Denver, Kelly Wrighton from CSU, and Chris Henry from DOE.
- Miller's project, titled Finding the Missing Pieces: Filling Gaps that Impede the Translation of Omics Data into Models, seeks to develop novel computational biology approaches and software to better understand microbial genomes relevant to the environment. According to Miller, there are parallels to studying the human microbiome in many challenges we see today—climate change, bioenergy-relevant systems, and more.
- Read more here: <https://news.ucdenver.edu/department-of-energy-awards-1m-to-cu-denver-led-team-for-computational-biology/>

# Faculty News

## Katerina Kechris



- Katerina was awarded the **2020 Chancellor's Teaching Recognition Award!** Awardees are nominated by students and selected by a committee of students, faculty and administrators.
- Additionally, Katerina Kechris and colleagues were awarded an **R01 grant totaling more than \$3M** entitled "Multi-Omic Networks Associated with COPD Progression in TOPMed Cohorts." Using a team science approach with an interdisciplinary team (Drs. Russell Bowler - pulmonologist, Farnoush Banaei-Kashani - computer scientist, and Leslie Lange - genetic epidemiologist), the focus of the project is to develop network based approaches to study Chronic Obstructive Pulmonary Disease (COPD) by leveraging new NHLBI Trans-Omics for Precision Medicine (TOPMed) resources. The group will also perform population specific analyses, which will enable the determination of molecular signatures and pathways specific to African Americans.