Cell & Molecular Biology

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The CMB Newsletter is written and published by graduate students of the CMB program. Our mission is to create a more closely-knit CMB community by providing students, faculty, friends, family, and alumni with current information about the Cell and Molecular Biology Program at Colorado State University. This newsletter looks to emphasize accomplishments and activities of the CMB community as well as highlight future events. Please email Valerie Lindstrom (Valerie.Lindstrom@.colostate.edu) with news or if you want to become involved in future editions!



Welcome Fall 2021 Cohort!

Rachel Brady



My name is Rachel Brady, and I am an incoming PhD student in the CMB - Cancer Biology program. I am currently finishing a medical oncology residency at UC Davis Veterinary Hospital, where I also completed my DVM degree several years ago. I am originally from New York, and am excited to experience some real seasons again in Colorado - who needs constant sunshine right? I am looking forward to rotating through several labs in my search for my PhD project.

Thomas Lee



Hi, my name is Thomas Lee, and I am a new Ph.D. student in the CMB program. I came from Taiwan, where I finished my vet school, a rotating internship, and a medical oncology residency. I came to CSU in 2018, and I recently completed my radiation oncology residency at CSU Flint Animal Cancer Center. My advisor Dr. Keara Boss and I share common research interests such as radiobiology and cancer biology, and that's why I am staying here for my Ph.D. I am also interested in statistics. My future goal is to become a faculty clinician and a translational scientist. I have a Golden retriever named Spinach, and he stays with my parents, and I miss him a lot. When I have free time (rarely), I like to cook, watch movies, listen to music, and play video games.

Welcome Fall 2021 Cohort (continued)

Shady Kuster



research!

Hello! My name is Shady Kuster, and I am a new PhD student in Dan Sloan's lab. I moved to Fort Collins from the Lone Star State, Texas, where I attended Tarleton State University. During my undergrad, I studied the population genetics and mitonuclear interactions of pocket gophers. I will be continuing along similar lines in my work with Dan Sloan. My main research interests are genomic interactions and mutability and more broadly, genetics. I have also developed an interest in scicomm and hope to learn more about that in my time here. I love hiking, knitting (like an old lady), walking my dog, and reading. I am looking forward to meeting everyone and hearing about everyone's

Darcy Hunstiger



Darcy has been living in the Loveland area for eight years. She is originally from Anchorage, Alaska and grew up between there and rural Iowa. Darcy returned to community college and later, university, at the age of 25 in search of a more meaningful and impactful profession after exploring careers in audio engineering, floral design, and retail management. During her time earning her undergraduate degree in Biological Sciences at Colorado State University she discovered a fascination with algae which she first nurtured studying algal photosynthesis in the laboratory of Dr. Graham Peers. She

continues her passion for the study of photosynthetic microbes in her graduate career as a CMB PhD student in the laboratory of Dr. Christie Peebles. Darcy completed her undergraduate honors thesis with Dr. Peebles and will be continuing her research on the genetic and metabolic engineering of cyanobacteria to renewably bio-manufacture alternatives to petroleum-derived products. Beyond her research, Darcy enjoys training as a martial artist, brewing kombucha, working on illustration projects, and spending time with her partner and dog.

Jessica Gabrysiak



Hi! My name is Jess Gabrysiak, and I just moved to Fort Collins from Grand Rapids, MI where I went to Grand Valley State University and just graduated with my B.S. in Biomedical Sciences. My most recent research at GVSU in the lab of Dr. Aaron Baxter revolved around the discovery of new genes involved in the pathogenesis of Salmonella, however I fell in love with cancer biology and immunology while I was completing my senior thesis on the tumor microenvironmental immunosuppressive mechanisms on CD8+ T lympho-

cytes that contribute to tumor immune evasion. Aside from school and research, I love the outdoors, yoga, and spending time with my friends, family, and my wiener dog Olive. I am so excited to start exploring all that Colorado has to offer, as well as becoming part of this excellent research community!

Welcome Fall 2021 Cohort (continued)

Diana Lowe



I grew up in beautiful Caracas, Venezuela where I earned a bachelors in Nutrition Science followed by a MS degree in Immunology. After moving to the United States in 2009, I joined Montana State University in Bozeman, Montana as a Research Associate working specifically in the Prion and Virology fields and also, was where I fell in love with the Rocky Mountains. I returned to Venezuela for a while to obtain my PhD due to my great interest in studying the mechanisms of microRNAs in endemic infectious diseases in the country. Unfortunately, due to increasing violence, I had to leave Venezuela indefinitely. After my return, I made Colorado my new home. In the last year, I have been working for the biomedical start-up GT Molecular in Fort Collins. I am beyond excited to have this new

opportunity to fulfill my goal of pursuing a PhD in the CMB program at CSU. I love having fun with friends, exploring little shops and cafes, dancing, reading philosophy and fantasy, photographing beautiful landscapes and gardening.

Callie Slaughter



I grew up in a small north Texas town called Wichita Falls and moved to Austin, TX for high school. I felt the call of the mountains and I moved north, eventually graduating with my associate's degree in Biology at Front Range here in Fort Collins in 2018. Fort Collins has its hooks in me, and I completed my undergraduate degree in Microbiology from CSU in the fall of 2020. I've worked in virology, mycobacterial, microbial resistance gene identification and organic chemistry laboratories and am now in quality control for a genetic screening company. I am very interested in next-generation sequencing and have constructed over a thousand libraries of synthetic DNA. When I'm not doing PCR I love to

crochet clothes, home goods, wall pieces, you name it! I also have a passion for stock trading and love to talk about the biotech industry.

Rojina Shrestha



Namaste! I am an international student from Nepal. I was born and raised in Kathmandu. I completed my schooling from 4th grade to 12th grade in a boarding school in my home country. I completed my Bachelor's degree in Biochemistry from Ramapo College of New Jersey. During my undergraduate degree, I took part in summer research programs at University of Rochester and Purdue University. I love trying new cuisines, scrolling through Reddit, and being outdoors. I am looking

forward to exploring more of Colorado and meeting new people!

We are so excited to welcome our 2021 CMB cohort! If you see them around campus, during our CMB fall picnic, or otherwise, be sure to say hello. We look forward to seeing what these young scientists will accomplish here at CSU!

New Faculty Spotlight

CMB welcomes Dr. Grant Schauer, an Assistant Professor in the Department of Biochemistry and Molecular Biology. The Schauer Lab studies several auxiliary pathways that couple to the DNA replication machinery to ensure high-fidelity replication in the face of replication stress and DNA damage. These pathways include the S-phase damage response pathway, translesion synthesis, and mechanisms to negotiate highly mutagenic head-on collisions of the replication fork with transcription machinery and other R-loops. The Schauer lab also studies how the replication machinery uses specific histone chaperones to coordinate the symmetric inheritance of epigenetic



marks during replication. Dr. Schauer's group uses single-molecule fluorescence and various biochemical techniques to understand these dynamic molecular mechanisms.

Internship Spotlight

Kailee Reed, Data Science R&D Internship - Zoetis Inc.



This summer I had the opportunity to complete a Data Science R&D internship with Zoetis Inc., the largest global animal health company that develops certain medicines, vaccines and diagnostic products for livestock and companion animals. An interesting fact about this company is that it started as an animal agriculture division within Pfizer in 1988 and then became Zoetis in 2013. I worked with the Zoetis Incubator of Northern Colorado (ZINC) which was started as a division of R&D to collaborate with universities for novel research ideas. Being apart of the Data Science & Analytics group at ZINC, we focused on analyzing different types of biological datasets but also focused on automating pipelines to help the bench scientists move quickly through projects. My project this summer was to develop a transcriptomic data pipeline to automate RNA-se-

quencing experiments. My pipeline is automated so that when the bench scientiststs perform an RNA-seq experiment they are able to "play around" and explore their own data in an RMarkdown HTML. This helps both the analysts and bench scientists alike and helps to make the entire R&D process more efficient. It was exicitng to be able to contribute to the team/company since they will use this pipeline moving forward, but the best part was being able to use my own creativity while building the pipeline.

I highly recommend other students to look into internships in an industry setting if they are thinking about taking the "industry route" as there are many differences. The largest difference for me was the adjustment from working independently in academics to working in a group setting with highly intelligent individuals. There were five different teams working on the same goal or project, so things moved much faster than what I was used to (coming from being in academics my entire career). While it was a very fast-paced work place, there was a thriving environment of support, collaboration and learning amongst all teams and team members, so the daunting transition did not last long! Overall, I highly recommend an industry internship and I am more than willing to provide more information of applying, pros/cons of the experience or anything else about the company in general - please contact me if you would like more information: kailee.reed@colostate.edu.

Internship Spotlight (continued)

Kristin Scott, Computational Biology and Data Analysis - Watchmaker Genomics

For 12 weeks, I interned at Watchmaker Genomics, a biotechnology company that manufactures enzymes for DNA sequencing library preparation. Watchmaker Genomics is located in Boulder, CO and is an up-and-coming biotech. startup funded with customer dollars. We are a small team of highly motivated and talented research scientists and associates, bioinformaticians, and sales and marketing experts. The company has entered a phase of rapid growth and is hiring people at all skill levels and backgrounds with culture and attitude as central values considered during the hiring process.



Over the summer, my role as a Computational Biology and Data Analysis intern focused mainly on developing an algorithm to detect and characterize DNA sequencing artifacts in next generation sequencing data. A key step in preparing DNA for sequencing is fragmentation and size selection of DNA, however, DNA which has been enzymatically fragmented is susceptible to "hairpin" artifacts as a result of single stranded DNA ends annealing intramolecularly followed by repair using a proprietary cocktail of enzymes (Fig1A). These artifacts can have significant impacts on variant calling; preventing these artifacts is imperative for sequencing applications in a clinical setting. Using my artifact detection software, I demonstrated that enzymatic fragmentation artifacts (FAMR; fragmentation artifacts per million sequenced reads) have been reduced to a significant degree in DNA libraries prepared using Watchmaker Genomics kits (WMG) compared to kits manufactured by Kapa Biosystems (Kapa) or New England Biolabs (NEB) (Fig1B). These data indicate that Watchmaker makes a better product that is more suited for clinical research applications.

My experience as an intern at Watchmaker was phenomenal. I was very fortunate that my project produced meaningful results for the company and that my algorithm is being integrated into the main analysis pipeline. The best part about working in an industry setting is working with a team of highly intelligent people who are all invested in the project. We are able to make strides in Research & Development instead of small steps which is what I've experienced in academia. When I first started my internship, I admittedly felt discouraged by the type of research typical in industry. We are not asking basic scientific questions, rather, we are pursuing ways to improve product design. I had to shift my mindset, and it was quite jarring. But after some time, I settled into my role and began to appreciate the value and joy of research in an industry setting. I would highly recommend others to pursue an internship at a biotechnology company, as the team dynamic and research environment is very different from what you would normally experience in academia. Please feel free to reach out to me directly if you are interested in Watchmaker Genomics or have questions about internships in general.



Kailee and Kristin will be giving a seminar about their internship experiences for those who are interested - September 15th at 4:30pm - Pathology 103

'Careers Beyond Academia' - Plant Biology 2021 Workshop By: Katy McIntyre

As an active member of the American Society of Plant Biologists (ASPB), I was given the opportunity to organize and co-host the virtual workshop titled "Careers Beyond Academia" that took place at the society's annual Plant Biology conference. The goal of this workshop was to give early career researchers knowledge into the types of careers possible with undergraduate and graduate degrees in plant science, and how to obtain a job and succeed in these careers. This year we had 7 panelists

Workshop Organizer(s)



Katy McIntyre

USDA NIFA Predoctoral Fellow Colorado State University



Katherine Murphy, PhD

Postdoctoral Associate Donald Danforth Plant Science Center

with diverse careers within governmental agencies, healthcare, small start-up companies, larger agricultural companies, as well as freelance scientific writing. Although it was at times difficult to organize a workshop due to technical challenges and strictly virtual communication between the many panelists and conference organizers, I enjoyed working with other early career scientists around the country finding panelists that were relatable, diverse, and honest about their career journeys. As a host, I did not participate in the small group discussions between the panelists and attendees, but I was able to expand my network of professional scientists from very different career paths that I believe will be important for my post-graduate job search.



CMB Students at the School is Cool Backpack Stuffing



On August 3rd, several CMB students volunteered for the annual School is Cool backpack stuffing program. This community outreach program is managed and organized by volunteers in the Colorado State University community and CMB students aided in organizing school supplies to be used in backpacks. School is Cool provides these resources as an effort to provide relief to families in the Fort Collins community who are facing financial insecurities or unexpected challenges. Backpacks and school supplies are unique to each grade and are provided to students from K-12th grade. CMB

students were eager and happy to assist in this great cause and we encourage students to participate next year!

Congratulations to Spring and Summer 2021 Graduates



Platon Selemenakis - Functional Redundancy between RAD51 Accessory Proteins RAD51API and RAD54 in Homologous Recombination DNA Repair - Dr. Claudia Wiese

"I am starting my Postdoc at MD Anderson Cancer Center in Houston Texas this August. Advice that I would give is start looking for a job and the best place is conferences. Hopefully conferences will be in person again. The postdoc I got is with a PI that I met in a conference 2 years ago. Make connections! If you are applying for a job in industry start early, it takes time and also it is very competitive."

Dayton Pierce - *The Phosphatase PTP-3 Regulates AMPA Receptor Transport in C. elegans*- Dr. Fred Hoerndli

"My future plans are that I'm currently looking for teaching professorships in Sacramento, CA. My advice for the graduating class: The final year is one of the most difficult steps in acquiring your PhD. Start writing your dissertation early and just remember that each day that passes is a day closer to being finished."



Kathryn Cronise - BRAF Mutant Canine Bladder Cancer as a Translational Model for Interrogating Mechanisms of Resistance to MAPK Pathway- Targeted Agents - Dr. Dawn Duval and Dr. Dan Gustafson "Currently I'm doing a postdoc in Dr. Dan Regan's lab in the MIP department at CSU. And my advice is to write early and often!!!"

Nikki Huynh - MS - Identification of Direct Targets of Serine/Arginine Rich 45 protein isoforms by TRIBE (Targets of RNA Binding Proteins Identified By Editing) in Arabidopsis thaliana - Dr. Anireddy Reddy

Graduate Student Awards

T32 1st Year Fellows:

Lexi Keene – Stenglein Lab, MIP Carlos Juarez-Guzman – C. Argueso Lab - AgBio Victoria Nieciecki – J Metcalf Lab - AniSci Pablo Maldonado – Henao Tamayo Lab - MIP Naly Torres – E. Nishimura Lab - BMB

T32 2nd Year Fellows:

Casey-Tyler Berezin – Vigh Lab - BMS Ikaia Leleiwi – Wrighton Lab – SCS Reed Woyda – Abdo Lab - MIP Sere Williams – Santangelo Lab - BMB



CBCO-qCMB Fellows:

Joey Stewart – L. Argueso Lab - ERHS Camron Pearce – Gonzalez-Juarrero Lab - MIP

CMB Travel Awards: Katy McIntyre

Naly Torres

The McPherson Graduate Scholarship:

Pablo Maldonado



Graduate Student Awards (continued) NSF Graduate Research Fellowship Program

Kayl Ecton Darcy Hunstiger

College of Veterinary Medicine and Biomedical Sciences Diversity Scholarship

Noelia Altina

Gaby Ramirez

CSU Demo Days (Spring 2021) - Innovation in Agriculture

Kyle Pfeiffer

Where are they now? Fall 2020 Cohort

Tyler Todd: Marc Nishimura's Lab.

Daniel Kunk: Vamsi Nalam's Lab.

His work consists of a few different genetics-based approaches to answering the same or related questions that the lab has regarding the plant innate immune system. Primarily, he is working on two reverse genetics projects and one forward genetics project, which all relate back to the same question in Arabidopsis.

Lexi Keene: Mark Stenglein's lab.

She is studying virus evolution and host-virus interactions in Drosophila melanogaster. Using a range of sample types for these studies including wild caught flies from Fort Collins and eventually across the U.S. as well as old museum entomological collections; she is determining when and where various D. melanogaster viruses began infecting these organisms. Thereby determining the fitness costs associated with these viruses and how that is driving host resistance. The hope is that the more we know about the virome of D. melanogaster the more we will be able to understand the interactions between host and virus in clinically relevant organisms such as mosquitoes.

Kaz Knight: Hoerndli Lab. He is investigating regulation of synaptic GLR-1 transport, insertion, and removal in C. elegans. **Pablo Maldonado:** Hanao lab. He is working on identifying mechanisms of macrophage differentiation and function in response to tuberculosis (TB) infection. He is currently isolating macrophages and differentiating into heterogeneous culture prior to in vitro infection with Mycobacterium tuberculosis Mtb. The lab hopes to understand if key heterogenous macrophage populations are required to best clear TB infection as this area is largely unexplored.

Angel McKay Whiteman: June Medford's lab. They are working on engineering Arabidopsis thaliana for ectopic expression of transcription factors involved in the regulation of the lipid suberin, the goal is to increase understanding about suberin and how these transcription factors are involved in its regulation. This summer I received the Energy Institute 2021 Summer Internship to work on engineering plants for carbon-negative water purification, another project in the Medford lab. The goal of this project is to create plants that excrete freshwater when grown in saltwater.

Victoria Niekiecki: Jessica Metcalf lab. She is working on optimizing a method to isolate bacterial DNA from solid tumor tissues so they can better characterize the tumor microbiome. She is also working on a longitudinal study that aims to describe postmortem microbial succession in indoor environments. We will use this new data to build a postmortem interval estimation model that can be applied to indoor environments.

Kyle Pfeiffer: Nalam Lab. His project involves using the CRISPR Cas9 protein in tobacco plants to confer resistance to multiple strains of beet curly top virus.

Gabriela Ramirez: Dr. Rushika Perera's Lab - My research focuses on using systems biology-based platforms to chemically identify the metabolites that attribute to the unique biosignature of infection for Zika virus versus dengue virus in AedesAegypti, the mosquito that transmits these viruses. These mosquito-borne diseases affect Latin American and other low-income countries and I am hoping that by becoming an independent and well-rounded researcher investigating host-virus interactions, I can help alleviate these types of diseases.

Naly Torres: Erin Nishimura lab. She is studying the role of mRNA localization in cell fate and development using the C. elegans model organism. Her project is undefined but she spent the summer learning the primary genetics and microscopy techniques to collect preliminary data.

Upcoming Events and Opportunities

Evenings with RNA: Each month remotely over Zoom - Kailee Reed is CSU rep from CMB so if interested contact her for further information - kailee.reed@colostate.edu. Also, the website link for RNA club: https://medschool.cuanschutz.edu/rbi/events/evenings-with-rna/colorado-rna-club CMB Fall Picnic: August 19th, 2021 at 11:45 - 1:00 PM - Biology West Plaza qCMB Meeting: September 1st at 8:30 - 10:00 AM - Pathology 103 Kate Sherrill's Farewell Party: August 27th at 4:30 - 6:00 PM - Nick's Italian (College Ave.) CMB Preliminary Exam Overview Meeting: August 31st at 4:00 - 5:00 PM - Pathology Room 107

Fall 2021 CMB Sport Social

The CMB Student Association recently hosted the Fall 2021 Sport Social on August 14th at Chipper's Lane – Horsetooth location. It was an awesome turnout - thank you to everyone who participated!

THE RED TEAM WON:

Shady Kuster, Sam Brill, Carols Juarez, Lexi Keene & Julie Sun



CMB Publication Highlights Current and Former CMB Students

Stewart JA, Hillegass MB,Oberlitner JH,Younkin EM,Wasserman BF, Casper AM, Non-canonical outcomes of break-induced replication produce complex, extremely long-tract gene conversion events in yeast, G3 Genes|Genomes|Genetics, 2021;, jkab245, https://doi.org/10.1093/g3journal/jk-ab245

Robb Huhn, G., III, **Torres-Mangual, N**., Clore, J., Cilenti, L., Frisan, T. and Teter, K. (2021), Endocytosis of the CdtA subunit from the Haemophilus ducreyi cytolethl distending toxin. Cellular Microbiology. Accepted Author Manuscript e13380. https://doi.org/10.1111/cmi.13380

Pires E, Sharma N, **Selemenakis P**, Wu B, Huang Y, Alimbetov DS, Zhao W, Wiese C. RAD51AP1 mediates RAD51 activity through nucleosome interaction. J Biol Chem. 2021 Jul;297(1):100844. doi: 10.1016/j.jbc.2021.100844. Epub 2021 May 28. PMID: 34058198; PMCID: PMC8233230.

CMB Publication Highlights (continued) Current and Former CMB Students

Bian J, Kim S, **Kane SJ**, Crowell J, **Sun JL**, Christiansen J, Saijo E, Moreno JA, DiLisio J, Burnett E, Pritzkow S, Gorski D, Soto C, Kreeger TJ, Balachandran A, Mitchell G, Miller MW, Nonno R, Vikøren T, Våge J, Madslien K, Tran L, Vuong TT, Benestad SL, Telling GC. Adaptive selection of a prion strain conformer corresponding to established North American CWD during propagation of novel emergent Norwegian strains in mice expressing elk or deer prion protein. PLoS Pathog. 2021 Jul 26;17(7):e1009748. doi: 10.1371/journal.ppat.1009748.

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Deel H, Emmons AL, Kiely J, Damann FE, Carter DO, Lynne A, Knight R, Xu ZZ, Bucheli S, Metcalf JL. A Pilot Study of Microbial Succession in Human Rib Skeletal Remains during Terrestrial Decomposition. mSphere. 2021 Jul 14:e0045521. doi: 10.1128/mSphere.00455-21. Epub ahead of print. PMID: 34259562.

Heasley LR, **Sampaio NMV**, Argueso JL. Systemic and rapid restructuring of the genome: a new perspective on punctuated equilibrium. Curr Genet. 2021 Feb;67(1):57-63. doi: 10.1007/s00294-020-01119-2. Epub 2020 Nov 7. PMID: 33159552; PMCID: PMC7887028

Alonso-Díaz A, Satbhai SB, de Pedro-Jové R, **Berry HM**, Göschl C, Argueso CT, Novak O, Busch W, Valls M, Coll NS. A genome-wide association study reveals cytokinin as a major component in the root defense responses against Ralstonia solanacearum. J Exp Bot. 2021 Mar 29;72(7):2727-2740. doi: 10.1093/jxb/eraa610. PMID: 33475698; PMCID: PMC8006551.

Alshiraihi IM, Klein GL, Brown MA. Targeting NSP16 Methyltransferase for the Broad-Spectrum Clinical Management of Coronaviruses: Managing the Next Pandemic. Diseases. 2021 Feb 1;9(1):12. doi: 10.3390/diseases9010012. PMID: 33535388; PMCID: PMC7930934.

McIntyre, K.E., Bush, D. and Argueso, C.T. (2021) Cytokinin Regulation of Source-Sink Relationships in Plant-Pathogen Interactions. Frontiers in Plant Science. 12:677585 doi: 10.3389/fpls.2021.677585

Cronise KE, Das S, Hernandez BG, Regan DP, Dailey DD, McGeachan RI, Lana SE, Page RL, Gustafson DL, Duval DL. Characterizing the molecular and immune landscape of canine bladder cancer. Vet Comp Oncol. 2021 May 22. doi: 10.1111/vco.12740. Epub ahead of print. PMID: 34021685.

CMB Newsletter Team





Special thank you to our CMB Newsletter Team for their effort into making this newsletter!