

Cell & Molecular Biology Newsletter



Issue 16 | Spring | 2021

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!



Thank you to our newsletter contributors!

Kate Sherrill, Heather Deel, Kailee Reed, Valerie Lindstrom, Joseph Stewert, Kayl Ecton
Faculty Editor: Carol Wilusz

Cell & Molecular Biology Leadership Update



Cell and Molecular Biology Students are excited to announce new and continuing leadership roles. Jessica Metcalf of the Animal Sciences Department is the new CMB Associate Director! With this new role, Jessica will be helping to develop microbiome-focused initiatives for our program, as our microbiome community grows every year. Additionally, Carol Wilusz will be the Program Director for three more years! She has been incredibly productive and has done wonderful things for students, and we are looking forward to seeing what she gets up to over the next few years.



New CMB Newsletter Editor

After several semesters of putting together fun and interesting content about our active program, Heather Deel will be stepping down as editor of the CMB Newsletter. We are pleased to announce that Valerie Lindstrom will be taking over, and we are looking forward to what she will bring to the newsletter. Everyone please welcome her into her new role! Also, thank you to Heather Deel for all you have done over the years - CMB appreciates you!



Resiliency Training through the NIH

By: Kate Sherrill

CMB was invited by NIH to join the 'BECOMING A RESILIENT SCIENTIST' training program this spring (<https://www.training.nih.gov/>). Through this program, Kate Sherrill (CMB) and Maria Yusuf (MIP) will work closely with NIH staff to bring the training program to the CSU community. CMB students were given priority registration for the small group discussion component of the training. NIH will host a series of six webinars on topics designed to help students develop the resiliency needed to navigate challenging situations in school, work, and life. The webinars will highlight emotional intelligence competencies needed for academic success and for thriving in research and careers. Students who complete at least five of the webinars and small group discussion will be provided with a certificate. The workshops and group discussions in the series are: Resilience and Wellness, Exploring our Self-Talk: Cognitive Distortions and Imposter Fears, Emotions and Emotional Intelligence in the Workplace, Self-Advocacy and Assertiveness for Scientists, Developing Feedback Resilience, and Managing Up to Maximize Mentoring Relationships.

A New Course Offered through qCMB

By: David King

The computer is an essential piece of lab equipment. Not only does it enable advanced analyses, but it opens us up to the knowledge gained through our field at large. It also connects us to massive amounts of data... yet, a wealth of data is not an "embarrassment of riches," until we apply the proper methods to determine the underlying biology at play.

The new class, Introduction to Quantitative Cell and Molecular Biology (qCMB) will cover how modern researchers use computational methods to understand the biology of the cell in the data-heavy era, involving: high-resolution imagery, transcriptomic, proteomic metabolomic experiments, and network biology. The class will also cover foundations for best practice in coding and statistics. Experts from multiple departments at CSU will lecture on analysis, resources, reproducible research practices, and the software that drives the bioinformatic techniques in quantitative biology. Also, students will have a devoted session each week to apply these techniques with guided exercises that match each lecture.

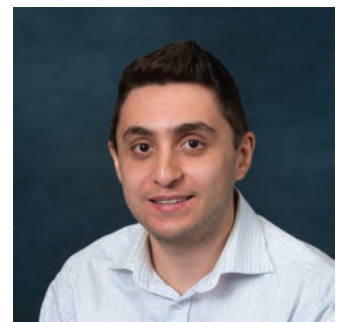
The modules taught in qCMB will provide a working knowledge of many critical topics in every-day research, and leave the student better equipped to succeed in future research projects.

Student Spotlight Q&A

Platon Selemenakis and his work with COVID-19

1. What kind of COVID-19 work do you do? What does it involve?

I am involved in the saliva screening for SARS-CoV-2. We are processing the saliva samples from students and staff members and running a digital droplet PCR (ddPCR), a method much more sensitive than real time PCR.



Student Spotlight Q&A continued

Platon Selemenakis' and his work with COVID-19

2. How has your work with homologous DNA repair proteins been instrumental in contributing to COVID-19 testing?

I thought I would be a great fit in the team because I had a lot of experience with different molecular biology techniques, such as real time PCR.

3. Have you had to transition away from your normal PhD studies during the pandemic due to your COVID-19 work? If so, how has that been? If not, how did you adapt to balancing both areas of work?

I have managed to balance my research and COVID-19 testing. I was working for my PhD project during the day and doing testing in the evenings every other day. It might seem like long days, but the whole team at the testing center is amazing and the work goes very smoothly.

4. Have you learned anything unique from your experience with COVID-19 testing that you wouldn't have otherwise learned?

Definitely! I am very grateful that I joined the team. Apart from learning a new technique, ddPCR, this was a valuable experience to see how a diagnostic lab operates and the value of teamwork to help the community.

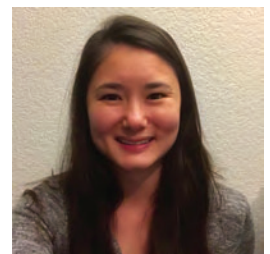
5. Do you foresee any substantial changes in your future research due to COVID-19? This could be in many areas, i.e., testing, virology, vaccinations, etc.

This work and the current pandemic definitely made me think about changing fields. Apart from the work I did at the testing center, I have experience with the CRISPR/Cas9 system. Several publications have proposed using the technology for novel treatment strategies and vaccine development. Therefore, currently I am seeking opportunities in industry that utilizes the technology for treatment and vaccine development.

Sequencing, Finishing and Analysis in the Future Meeting

Thoughts from CMB Students Julianna Sun and Reed Woyda

Julianna Sun - The pandemic has certainly taken a lot of opportunities away from all of us over the past year. However, this past November, I had the opportunity to attend the SFAF virtual meeting which I would not have been able to normally do. I was able to learn about the latest genomic technologies from the experts from the comfort of my own home. The conference also dedicated a whole day to the role of sequencing in COVID research and gave insight into how other universities are using sequencing technologies to keep their students safe. Overall, the SFAF conference was a great opportunity for me to learn more about the importance of the role of sequencing in all science fields.



Sequencing, Finishing and Analysis in the Future Meeting cont.

Thoughts from CMB Students Julianna Sun and Reed Woyda

Reed Woyda - Over my two years in the Cell and Molecular Biology program I have attended five research conferences. With the pandemic giving us a new way of life, I was concerned research conferences would be either cancelled outright or struggle to provide what attendees want most; chances to network, learn new ways of tackling scientific problems, and hearing inspirational keynote talks. Attending the SFAF 2020 meeting made me realize science prevails and that a virtual conference can be done! With three days of scientific talks, tech panel discussions, and poster sessions I was filled with knowledge surrounding Next-Generation Sequencing technologies, CoV-2 epidemiology, and improved methods of assembling whole genomes. One of my favorite talks was from the co-founder and CEO of PhaseGenomics, Ivan Liachko, who gave a curiosity inspiring overview of their progress in using Proximity Ligation Technology to reconstruct whole genomes (bacterial, archaeal, eukaryotic, and viral) from metagenomic samples. I was fortunate to hear a great presentation from the director of CMB, Carol Wilusz, who gave an in-depth talk surrounding the deployment of COVID-19 wastewater monitoring taking place at CSU. Overall, SFAF 2020 reassured me that although we are in strange times, the ability to share the science we all work hard to produce and put our hearts into has not been, and will not be, inhibited. Come join SFAF 2021 in the fall!



Speaking of Conferences...

CMB students can apply for travel fellowships to cover registration for virtual conferences. Use the link below to apply - the deadline for this semester is March 1st!

Link to apply: https://docs.google.com/forms/d/e/1FAIpQLSfyShLFH65rSWILso-wAf3YKjjO7gwVeubPREpHrKWwiDm7fFw/viewform?usp=sf_link

Outstanding CMB Student Awards

CMB students who apply for NIH/NSF external fellowships are eligible for the Outstanding CMB Student Award! These \$250 scholarships go to CMB PhD students who show initiative and commitment by submitting an application for an externally funded fellowship such as the NSF – GFRP (National Science Foundation Graduate Research Fellowships Program) or NIH – F31 (National Institutes of Health). Application deadlines are December 1, 2020 and May 1, 2021, with up to five scholarships available for each deadline. Awards for the December deadline will be disbursed at the start of Spring semester and May deadline in early Fall.

Link for more information: <https://cmb.colostate.edu/fellowships-and-scholarships/>

Link to apply: <https://docs.google.com/document/d/1gYE5SoizKVtHG3PEahbX-2cjqTEaoSMZQSi99hYrOT8Q/edit?usp=sharing>

New CMB Students this Semester

We are excited to welcome two new students to the CMB program this semester!

Timofiy Lutsiv



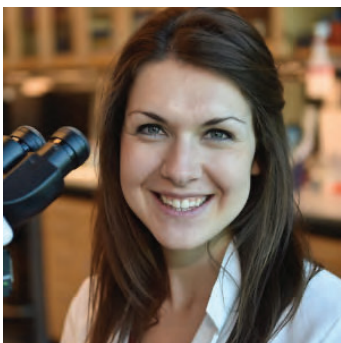
Pryvit! I am from the cultural capital of Ukraine—the City of Lviv—where I earned a B.S. in Biology and an M.S. in Human & Animal Physiology. I fell in love with cancer biology, and thanks to the Fulbright Scholarship, I pursued an M.S. in CMB studying how inherent aerobic capacity determines susceptibility to breast carcinogenesis. Now, I am starting a new chapter as a Ph.D. student in the CMB-Cancer Biology program. In the Cancer Prevention Laboratory at CSU, my research will focus on the molecular mechanisms underlying how superfood pulses reduce development of obesity and cancer via the effects of their consumption on the gut microbiota. In my free time, I will hopefully try and engage in all available cultural exchange activities at CSU and Fort Collins, start learning Spanish and French, and travel around the U.S. I am very excited to reconnect with the CMB community and looking forward to our work together!

Tyler Todd



My name is Tyler Todd and I am a new M.S. student in the CMB program. I am originally from Texas, but I have lived in Fort Collins since 2012 (minus two years in Laramie, WY). Most recently, I graduated from CSU in 2020 with a B.S. in Biological Sciences. I will be completing my degree in Dr. Marc Nishimura's lab (Biology Department), where I worked as an undergraduate researcher and as a technician after graduation. My research is directed toward improving our understanding of how pathogen virulence proteins immunocompromise some plant hosts, while others are able to recognize and respond to this activity. In addressing these questions, I will be working with an F2 mapping population in *Arabidopsis* and screening a receptor-like kinase sub-family of *Nicotiana benthamiana* using viral induced gene silencing. I'll also be continuing a handful of gene editing projects in *Arabidopsis* with the same aim.

New CMB Affiliate Faculty



CMB Welcomes new Affiliate Faculty Nicole Kelp (MIP, CVMBS) (left) and Erika Szymanski (English/CLA) (right). Drs Kelp and Szymanski are both experts in Science Communication and are excited to mentor CMB students interested in incorporating this important skill into their training. See below for an article by Dr Kelp!



Science Communication: What is it and why should we care?

By Nicole Kelp, new CMB affiliate faculty member with a research focus in science communication education (contact: nicole.kelp@colostate.edu)

What is Science Communication?

When you hear the phrase “science communication,” what comes to mind?

For many scientists, they may consider science communication to be the process of talking about their research to a lay or public audience. That is definitely a component of science communication. But I invite you to broaden your perspective. My lab uses the working definition that science communication occurs whenever science is being discussed between any individuals/groups in diverse formats. With this broad perspective, we can highlight important issues:

- It is just as vital for scientists to listen to non-scientists as it is for non-scientists to listen to scientists. We as scientists can't just speak our message and expect people to understand and accept it. We must listen to the needs, ideas, concerns, and expertise of individuals with diverse perspectives.
- We must empower non-scientists to discuss science with each other productively. We know that this is happening – we see individuals sharing information about COVID-19, vaccines, climate change, and other topics with each other on social media and other venues. How can we promote science literacy and other skills so that this sharing of information can be productive rather than detrimental?
- “Scientist” is not a monolithic group. There are diverse disciplines, each with our own jargon, methods, statistics, and more. Empowering productive science communication between scientists can promote interdisciplinary creativity and problem-solving.

What are ways to be involved in Science Communication?

There are three types of involvement in science communication:

One level is something that EVERY scientist should be involved in. This is the aspect of engaging in conversations with diverse audiences about your research. If you perform research on a disease like cancer, listen to key stakeholders like clinicians and cancer patients. Share your research with diverse public audiences. Discuss ideas with researchers in different disciplines. Additionally, it is critical that those of us who train and educate STEM students provide training in science communication for these future scientists. Programs like CSU Writes (led by Dr. Kristina Quynn) are instrumental in supporting graduate students, postdocs, and faculty develop a key science communication skill: academic science writing for journal articles and grants. However, certain individuals may recognize that they have particular skill in connecting and communicating with diverse audiences. These individuals may want to pursue a career as a PRACTITIONER of science communication. These could be jobs in science writing, science journalism, creating multimodal science communication such as YouTube channels or TV shows, science education (both formal classroom education or informal education in venues like science museums), sales/marketing for pharmaceutical companies, science policy, public health, and more. These science-adjacent careers are excellent options for people with training in science who realize that they don't want to pursue a traditional research career in either academia or industry.

Other individuals may realize that they are interested in investigating the nuances of science communication, helping support improved outcomes in science communication practice and science communication training. These individuals may want to pursue a career as a RESEARCHER of science communication. This is what I do in my lab; we have projects focused on measuring and modeling science communication skills of both STEM students and non-scientists in order to develop better ways to educate and train diverse individuals in science communication. CMB affiliate faculty member Erika Szymanski also performs science communication research focusing on the rhetoric, metaphors, and language we use to describe the microbiome.

Science Communication continued

What are ways to be involved in Science Communication? (continued)

A key feature of science communication research is interdisciplinarity. No one individual or discipline can answer all the questions we still have in the field. Traditionally much “science communication” research has been done by communication scholars, who utilize robust methods to characterize communication methods and measure the audience’s responses to these communications. I am excited to be a traditionally trained scientist who is collaborating with scholars in communication, psychology, science education, social work, and more to characterize, measure, and improve science communication outcomes. I am hoping to help bridge the gap between communication scholars and scientists in the important field of science communication.

What methods are used in Science Communication research?

I like to situate science communication in a theoretical framework that will be familiar to life scientists: networks. Cell and molecular biologists are very familiar with networks, be they gene expression networks, metabolic networks, or cell signaling pathways. Scientists quantify the nodes and pathways within the network in diverse ways. You may measure the expression of a protein to quantify a node or analyze protein-protein interactions to quantify a pathway. You may use qualitative data, such as histological images, to assess the outcome of different pathways being activated or repressed.

If we imagine interdisciplinary science communication as a network, we can see that different people/disciplines are nodes and the communication between them are pathways. Science communication researchers develop methods to quantify the nodes and pathways of such networks. For the nodes, we must understand the values and needs of each discipline. We must consider how gender, race, or other factors may affect how individuals within each node receive and synthesize scientific information. For the pathways, we must understand how each node gives and receives information. Finally, we must study the system as a whole. How does the network change if one node or pathway is changed for better or for worse? That leads us to education. How can we positively change the nodes and the pathways to promote better communication that facilitates creativity and constructive problem-solving? How do we scaffold this training for STEM students throughout undergraduate, graduate, and professional programs? How do we empower and educate non-scientists in how to think and talk about science?

Science communication researchers use methods like content or thematic analysis, which enables us to analyze qualitative data and then perform statistical analysis or develop models based on that data. We use survey instruments that are developed robustly to have validity and reliability in order to assess the beliefs, knowledge, and behaviors of different groups. Just as a life science researcher uses a plethora of qualitative and quantita-

What next steps can a CMB graduate student take to pursue Science Communication?

As a new CMB affiliate faculty member, I am passionate about supporting CMB graduate students in diverse ways. I welcome the opportunity to meet with you if you are interested in discussing what your involvement with science communication should look like. Many of you may want to pursue a career in traditional scientific research and only need the skills to talk about your research with diverse audiences. In that case, taking a STEM Communication course like GRAD 550 or a science writing course and participating in CSU Writes may be good options. Others of you may want to pursue a career as a PRACTITIONER of science communication. There are internships in science writing/journalism, science policy, and more that may be useful as you explore your options. Finally, maybe some of you are interested in being a RESEARCHER of science communication. We can talk more about the diverse interdisciplinary research in science communication and/or education that is occurring across CSU and beyond in order to see if doing research and publishing in this exciting field could be a component of your career trajectory!

Congratulations to Fall 2020 Graduates



Amy Hodges - CAMB-MS - *Investigating the role of kinetochore dynein-dynactin in spindle assembly checkpoint function* - Advisors Dr. Jennifer DeLuca & Dr. Steven Markus



James Curlin - CAMB-PhD - *Modeling the Evolution of SIV Progenitor Viruses Towards HIV-1 and HIV-2 in a Humanized Mouse Surrogate Model* - Advisor Dr. Ramesh Akkina



Jared Luxton - CAMB-PhD - *Interrogating and Predicting Ionizing Radiation Effects on Telomeres and Chromosome, and Implications for Long-Term Risks for Human Health* - Advisor Dr. Susan Bailey
Currently a Data Scientist at the USDA in Fort Collins!

Suad Elmegerhi - CAMB-CBZ-PhD - *Effect of Hydroxyl Group Position in Flavonoids on Inducing ssDNA Damage Mediated by Cupric Ions* - Advisor Dr. Takamitsu Kato
Currently a post-doc in the Perera Lab at CSU!



Graduate Student Awards



Graduate Student Showcase 2020:

Platon Selemenakis: Top Scholar for University-Wide Graduate Programs Scholarship Award
Inactivation of both RAD51AP1 and RAD54 leads to synthetic lethality

Julianna Sun: 2nd Place for Great Minds in Research Scholarship Award
Chronic Wasting Disease: A contagious prion epidemic of uncertain risk

Kailee Reed: Honorable Mention for Great Minds in Research Scholarship Award
*Identifying mechanisms of primary microRNA recognition and processing in *C. elegans**

Lisa Schlein: Honorable Mention for Great Minds in Research Scholarship Award
Feverfew: Cheerful foliage and source of an anti-cancer compound

CVMBBS Research Conference 2021:

Camron Pearce: 2nd place for his poster presentation
*Characterizing nanoparticle localization in *M. tuberculosis* infected lungs*

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 or visit <https://med-school.cuanschutz.edu/rbi/events/evenings-with-rna/colorado-rna-club>

Rigor & Reproducibility Training: Asynchronous Workshops & Virtual Discussion Groups, where CMB faculty will discuss how they address several core components of high-quality research in their own laboratories. Email carol.wilusz@colostate.edu if you are interested.

Learn how to craft better writing in a Mentor/Mentee Collaborative Writing Workshop - March 15th & April 6th, contact csuwrites@colostate.edu before it fills up! (link to flyer: <https://csuwrites.colostate.edu/wp-content/uploads/sites/10/2021/01/Mentor-through-Writing-Flier-SPRING-2021.pdf>)

The Health Research Alliance (HRA) and the Public Library of Science (PLOS) have partnered to launch the Reimagine Biomedical Research for a Healthier Future Essay Challenge
The winning essay will be published in either PLOS Biology or PLOS Medicine, and will also receive a US \$5,000 prize. Read more about the challenge, eligibility, review criteria, and more on the PLOS Blog.

The Stem Cell Research and Technology Resource Center is offering a week-long human iPSC culture workshop March 24th - 31st Registration deadline for optional hands-on training is March 8th. Workshop and registration details: <http://bit.ly/iPSC-training>

New CMB Mentor Award: CMB Mugs for Mentors

We hope that every CMB student has someone supporting their success, a person who sees their talents, nurtures and guides them as they learn, helps them discover their strengths and overcome the rigors and challenges of research. Your mentors give freely of their time and expect little in return, except to see you achieve your goals.

We are inviting CMB students to nominate a person who has gone above and beyond in supporting their growth as a scientist and/or leader to receive a CMB mug and note of appreciation. Nominations are due March 15, 2021 and awards will be delivered during the week of April. Winners will be highlighted on the CMB Website. Please use this form: <https://docs.google.com/forms/d/e/1FAIpQLScmBxad-0osfrx-9xJhL0db7aeokOmdkx Bj4rbPK8WYF85x-jA/viewform>.



You may nominate your advisor, a member of your advisory committee, a post-doc or senior graduate student, alumnus, even someone outside of CSU. Anyone who has made a difference to you professionally during your time as a CMB graduate student!

CMB Publication Highlight

Current and Former CMB Students

Alshiraihi IM, Jarrell DK, **Arhouma Z**, **Hassell KN**, Montgomery J, Padilla A, Ibrahim HM, Crans DC, Kato TA, Brown MA. In Silico/In Vitro Hit-to-Lead Methodology Yields SMYD3 Inhibitor That Eliminates Unrestrained Proliferation of Breast Carcinoma Cells. *Int J Mol Sci*. 2020 Dec 15;21(24):9549. doi: 10.3390/ijms21249549.

Luxton JJ, **McKenna MJ**, Taylor LE, George KA, Zwart SR, Crucian BE, Drel VR, Garrett-Bakelman FE, Mackay MJ, Butler D, Foox J, Grigorev K, Bezdan D, Meydan C, Smith SM, Sharma K, Mason CE, Bailey SM. Temporal Telomere and DNA Damage Responses in the Space Radiation Environment. *Cell Rep*. 2020 Dec 8;33(10):108435. doi: 10.1016/j.celrep.2020.108435. Epub 2020 Nov 25. PMID: 33242411.

Luxton JJ, **McKenna MJ**, Lewis A, Taylor LE, George KA, Dixit SM, Moniz M, Benegas W, Mackay MJ, Mozsary C, Butler D, Bezdan D, Meydan C, Crucian BE, Zwart SR, Smith SM, Mason CE, Bailey SM. Telomere Length Dynamics and DNA Damage Responses Associated with Long-Duration Space-flight. *Cell Rep*. 2020 Dec 8;33(10):108457. doi: 10.1016/j.celrep.2020.108457. Epub 2020 Nov 25. PMID: 33242406.

Luxton JJ, Bailey SM. Twins, Telomeres, and Aging-in Space! *Plast Reconstr Surg*. 2021 Jan 1;147(1S-2):7S-14S. doi: 10.1097/PRS.00000000000007616. PMID: 33347069.

Davis, H. E., Geornaras, I., **Lindstrom, V.**, Chaparro, J. M., Nair, M. N., Delmore, R. J., Engle, T. E., Belk, K. E., & Prenni, J. E. (2020). Effects of differing withdrawal times from ractopamine hydrochloride on residue concentrations of beef muscle, adipose tissue, rendered tallow, and large intestine. *PloS One*, 15(12), e0242673.

Cleymaet, A.M., **Berezin, C.-T.**, Vigh, J. (2021). Endogenous Opioid Signaling in the Mouse Retina Modulates Pupillary Light Reflex. *Int. J. Mol. Sci.*, 22(2), 554; <https://doi.org/10.3390/ijms22020554>

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.

Kingcade, A., **Ahuja, N.**, Jefferson, A., Schaffer, P.A., Ryschon, H., Cadmus, P., Garrity, D. and Ramsdell, H., 2021. Morbidity and mortality in *Danio rerio* and *Pimephales promelas* exposed to antilipidemic drug mixtures (fibrates and statins) during embryogenesis: Comprehensive assessment via ante and post mortem endpoints. *Chemosphere*, 263, p.127911.

Ramos L, Lunney JK, Gonzalez-Juarrero M. Neonatal and infant immunity for tuberculosis vaccine development: importance of age-matched animal models. *Dis Model Mech*. 2020 Sep 15;13(9):dmm045740. doi: 10.1242/dmm.045740. PMID: 32988990; PMCID: PMC7520460.

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 unravels cytokinin as a major component in the root defense responses against *Ralstonia solanacearum*. *J Exp Bot*. 2021 Jan 21;eraa610. doi: 10.1093/jxb/eraa610.

Heasley LR, **Sampaio NMV**, Argueso JL. Genome-Wide Analysis of Mitotic Recombination in Budding Yeast. *Methods Mol Biol*. 2021;2153:201-219. doi: 10.1007/978-1-0716-0644-5_15. PMID: 32840782.