



CELLULAR & MOLECULAR BIOLOGY NEWSLETTER

UNIVERSITY OF MICHIGAN

Fall 2020

Contents

Letter from the Director.....1,2

Student Life in Covid.....3,4

CMB Retreat.....4

DEI Task Force Updates.....5

Recent CMB Graduates.....5

Faculty Profile: Miriam Meisler, Ph.D.6

New CMB Students.....7

Student Profile: Marshall Howington.....8

U-MYSci: Encouraging Young Scientists.....9

New CMB Faculty.....10



C. Bidlack

From the Director:

Dear colleagues, friends, and CMB well-wishers,

I am honored to succeed Bob Fuller as the new Director of CMB. Bob has been a long-term champion of the many aspects that make CMB great, including breadth and excellence in science and an unwavering focus on students, and has constantly worked towards increasing program diversity. At a personal level, I am deeply thankful to Bob and CMB for welcoming me when I moved here in the summer of 2017, making the transition as easy as possible for me and my students. Bob will continue to help guide the program as an Associate Director.



I acknowledge that this has been an incredibly challenging year in many ways. The pandemic has thrown many uncertainties into our lives and forced us to abandon our normal way of life, both personal and professional. Navigating these uncertainties has definitely been difficult, but 2020 has also taught us many valuable lessons. It has taught us that methodical research on the cellular and molecular biology of genes, proteins, and pathways is profoundly

From the Director (continued):

important for public health. In this instance, by accelerating the development of vaccines to address a global pandemic. It has opened our eyes to systemic racism and biases within and outside academia, and emphasized that we all need to play active roles in ensuring a diverse, equitable, and inclusive environment wherever we are. I am proud of our students and faculty for being forthright and persistent in raising issues of inequity when they see them. For fighting for what is right. For the extraordinary interest and willingness they showed in being a part of the newly formed CMB DEI task force, and for making sure that their work extends to all aspects of the program.

For CMB, this year has also reaffirmed that our community is strong and resilient. We have done our best to adapt to the changing mandates of research ramp-down and ramp-up, the stresses of isolation, and the virtual world. Since the shutdown, 10 CMB students have successfully defended their PhD theses. CMB students have won several awards including from Rackham, the NIH and the HHMI. We have welcomed 17 new students and 10 new faculty into CMB. Our students, among other things, organized a CMB course on advances in microscopy, held monthly social events, and are devising innovative ways to make our recruitment engaging and effective. They organized an excellent annual retreat, where we heard about the great science going on in CMB from speakers including Janet Smith, who delivered the Myron Levine lecture. We also discussed inequities in population health and how to address them with Sean Valles, Associate Professor of Philosophy at Michigan State, who delivered the Jessica Schwartz lecture. I congratulate Haley Amemiya and Rosa Menjivar for winning the Student Service Award, Stephanie Bielas and Scott Leiser for winning the Faculty Service Award, and Nils Walter for winning the Faculty Mentor Award, nominated and selected by students!

Directing CMB would not be possible without the fantastic support from the CMB leadership team and staff. Sincere thanks are due to Ben Allen, who serves as the Associate Director and the Faculty Ally for Diversity, Kathy Collins, who served as the Associate Director, and to Sue Hammoud and David Antonetti for chairing the admissions committee this year. I also extend much gratitude to Pat Ocelnik, who recently retired after supporting CMB for the past few years, and to Lauren Perl, who both kept the administrative side of the program running smoothly - no simple task for a program with close to 160 faculty and 80 students.

Next year, we will celebrate the 50th anniversary of CMB. As we look to the future of CMB, my goal is to ensure that every single member of our community is welcomed and supported. We need open and transparent discussions about the issues that remain, and need to convert this dialog into actions to confront these issues. I realize that this is not an easy task, but I am fully committed to this goal. I look forward to working with all of you to get there.

Sincerely,



Manoj Puthenveedu, MBBS, Ph.D.

“I am proud of our students and faculty for being forthright and persistent in raising issues of inequity when they see them”

As Coronavirus Rages, Our Community Finds Its Footing

Chris Bidlack

We are living in the worst pandemic our nation has faced in over a century. At the beginning of March, few could have predicted how rapidly SARS CoV2, or coronavirus, would upend our lives at the University of Michigan.

Just two weeks before Gov. Gretchen Whitmer's March 23 "Stay Home, Stay Safe" Executive Order, the University took rapid action to prevent the spread of the disease. On March 12, all in-person classes moved to online instruction. Four days later, the CMB student seminar was postponed, and the University ordered researchers to "ramp down" and halt noncritical lab activities by March 20.

Outside of the PIBS program, the University and Ann Arbor ground to a halt. On March 15, the University told undergraduate students to empty the dorms and go home, leaving the campus and Ann Arbor's downtown deserted. Restaurants and small businesses closed under the executive order, and some resorted to GoFundMe donations to stay afloat.

Although research labs gradually reopened on May 21, and the executive order was lifted on June 5, life did not return to normal. Research labs opened slowly at limited capacity, and researchers had to pass a health screening before going to work. The CMB student seminar eventually returned online, but the CMB 2020 Research Symposium was cancelled.

Mask wearing and social distancing became staples of everyday life, both in the lab and on the streets of Ann Arbor. Thousands of Michiganders have lost their lives to the virus as well, including over one hundred Washtenaw county residents.



Members of the M. Ohi lab enjoying the Ann Arbor autumn outside the Life Sciences Institute. (Photo credit: L. Chang)

The CMB program kept pace with the challenging times. Faculty members redirected their research to investigate multiple questions concerning the novel coronavirus. Some researchers, such as Christiane Wobus, are investigating SARS CoV2 infection biology and potential antiviral therapeutics. The Wobus lab is using organoids of lung, kidney, and intestinal tissue to study these issues.

Researchers in the University of Michigan Center for RNA Biomedicine, co-directed by CMB faculty member Mats Ljungman, have also taken a particular interest in COVID-19, which is a positive sense, single-stranded RNA virus. Meanwhile, members of the Life Sciences Institute, such as David Ginsburg, have begun investigating multiple aspects of COVID-19. The Ginsburg lab is using genome-scale CRISPR screens to identify genes involved with coronavirus entry into the cell. In the clinic, CMB-affiliated researcher Mark Russell is studying the effects of coronavirus infection on patient populations.

When teaching resumed online, students took classes featuring "distanced learning" on Zoom. Adapting to an online teaching format had its challenges, said Anna Michimerhuizen, a fourth-year CMB student who taught genetics to undergraduates during the summer. A hurdle she encountered was how "only two or three people consistently would appear on screen" while she was teaching, and the rest of her students did not share their video. Teaching material to an "invisible audience," Anna noted, made it difficult both to teach and have her students discuss the class material. "I think the students adapted quite well to the online format," Anna said, "but I think the challenge of delivering really good teaching via Zoom is one that we'll still be thinking about for a while."

PIBS rotations also had to adapt quickly to the pandemic. A PIBS Rotation Working Group met before the pandemic even began to address students' rotation needs. The group members, including both graduate students and faculty, retooled to determine how to conduct virtual and in-person rotations. Ultimately the group settled on a flexible rotation schedule that allowed students to work in labs of their choosing for four to eight weeks per rotation. Students who did a four-week rotation in a lab that they enjoyed had the option of returning for a second four-week rotation. Faculty also met with students on Zoom to discuss rotation questions.

(Coronavirus, Continued)

Students and faculty members maintained their communities virtually as well. National conferences, for example, moved to entirely online formats, allowing researchers to connect with one another. The CMB annual retreat, featured elsewhere in this newsletter, included student and faculty Zoom talks, online games, and some socially-distanced activities such as a hike through the Arb and a coffee break at Argus Farm Stop.

As for Scott Barolo, the head of the PIBS program organized virtual “Werewolf” games open to faculty and graduate students which were a howling success. Gamers spent these Zoom sessions accusing each other of being secret werewolves in a fictional village. By rethinking how to research, study, and socialize, our community has stayed connected, productive, and positive during the pandemic. ■

“...we also knew that one of the important parts of having a retreat is being able to build community with CMB.”

Annual Retreat is a Virtual Success

Last year, faculty and students flocked to the Detroit Institute for the Arts for the annual CMB retreat. This year, to comply with Michigan’s pandemic regulations, the retreat was hosted almost exclusively over Zoom, with a few social activities taking place in Ann Arbor itself.

“We recognized that we’d have to change our plans a bit to make the retreat virtual,” the Retreat committee said in a statement to the Newsletter, “but we also knew that one of the important parts of having a retreat is being able to build community within CMB.”

The retreat began on Friday, November 20th, with CMB student and faculty service awards. Haley Amemiya and Rosa Menjivar were co-recipients of the Student Service Award, while Stephanie Bielas and Scott Leiser received the Faculty Service Award. The CMB student body also selected Nils Walter to receive the Faculty Mentor Award. Dr. Janet Smith then gave the opening Myron Levine Keynote Lecture about her research of Flavivirus Non-structural Protein 1 and its role in viral infection. The rest of the day featured student and faculty talks, where students discussed their research, and faculty members advertised their labs to recruit interested students. Around noon, some CMB members met up for various socially-distanced activities including a hike through the Nichols Arboretum and online games. The evening featured Zoom breakout rooms where students and faculty socialized while answering icebreaker questions written by retreat committee members.

Saturday’s main event, the Jessica Schwartz Keynote Lecture and Discussion, featured Professor Sean Valles from Michigan State University. Invited by the student body, Dr. Valles discussed structural challenges to addressing healthcare inequality in the United States, and proposed potential solutions. Afterwards, the retreat ended with social activities, including a socially-distanced coffee break in Ann Arbor and more online games. ■



Students take a break while hiking through Nichols Arboretum, with a clear view of North Campus in the background (From left: Marshall Howington, Angela Tuckowski, Harihar Mohan, Shahana Chumki, Allyson Munneke). (Photo credit: C. Bidlack)

Formation of the DEI Task Force

Sarah Connolly



Ann Arbor residents protested police brutality in the Diag.
Annie Klusendorf/Daily

This spring the murder of George Floyd by Minneapolis police officers shocked and enraged many across the nation. In response to Floyd's tragic death, the reinvigoration of the Black Lives Matter movement, and nationwide protests against police brutality, CMB evaluated the environment it creates for students and the systemic inequalities in science both inside and outside UM.

The program came together on June 5th for a town hall meeting where members of the community suggested concrete actions to address racial disparities in science. These proposed actions included adding a diversity, equity, and inclusion (DEI) seminar to CMB 850, considering diversity efforts in review of CMB faculty, and hosting sessions on the history of racism in scientific research. These and other suggestions were surveyed for support from the CMB community.

CMB subsequently created the DEI Task Force to generate ideas for fostering inclusivity in the program, empowering community members, and implementing curriculum changes to reach the former goals. The Task Force, including CMB students and a faculty advisor, focused on addressing the proposals discussed in the summer town hall and creating a survey to identify problems in the program environment and better understand student experiences.

The Task Force invited Dr. Jamie Amemiya and Elizabeth Mortenson to a CMB 850 seminar to discuss the underrepresentation of people of color in science. At the fall retreat, CMB hosted Dr. Sean Valles to speak about structural inequalities in U.S. healthcare and how the system must change to address them.

The work of the Task Force has just begun, and member Haley Amemiya states that going forward "a top priority for the group is to keep our eyes and ears open to our community...[we] aim to create more platforms to let voices be heard and not burden already marginalized groups to educate others on what is happening in the world." For the upcoming semester, the task force will continue defining their goals and using these goals to drive changes in CMB's curriculum. ■

Summer/Fall CMB Graduates

Sara Wong (Lois Weisman, mentor)

"Mechanisms that Regulate the Termination of Myosin V Mediated Transport"

Eric Perkey (Ivan Maillard, mentor)

"Exploring a new immunological niche: How fibroblastic reticular cells tune T cell immunity through Notch signals"

Maxwell DeNies (Allen Liu & Santiago Schnell, co-mentors)

"Investigation of how receptor localization and endocytosis regulate CXCR4 signaling and post-translational modification"

Jaclyn Fingerhut (Yukiko Yamashita, mentor)

"Swimming upstream: Overcoming the challenges of gigantic gene expression and lengthy cilia assembly in *Drosophila* spermatogenesis"

Molly Naylor (Dan Michele, mentor)

"Mechanisms of Plasma Membrane Repair in Striated Muscle"

Adam Krieger (Xiaoxia Nin Lin, mentor)

"Programming synthetic microbial communities for coexistence, coordination, and information processing"

Ameya Jalihal (Nils Walter, mentor)

"To find and to form: Strategies for intracellular molecular target search and higher-order assembly"

Jay Li (William Dauer, mentor)

"Dystonia: Pathogenesis and Targeted Therapy"

Faculty Profile: Miriam Meisler, PhD

A longtime faculty member at the University of Michigan, Dr. Meisler is the recipient of many awards for her research in epileptic encephalopathy and her mentorship of graduate students. In this interview, Dr. Meisler discusses her research, her perspective on teaching, and how her lab has adapted to the pandemic.

How did you become interested in your topic of research?

After the basic discoveries regarding DNA, RNA, and protein, it became clear that we would be able to understand the mysteries of mammalian biology, and life itself, in molecular terms. As a postdoctoral fellow in a mouse genetics lab, I realized that spontaneous mouse mutants provided a direct route for associating individual genes with complex phenotypes. It took 20 years for the technology to be developed, but eventually it did work out that way. The process continues as we try to assign function to the remaining ten or fifteen thousand incompletely characterized mammalian genes by examining the effects of single gene mutations.

What is the most interesting scientific question you addressed in your research?

We repeatedly asked the question “What’s wrong with this mouse?” In other words: what is the molecular mechanism that explains why this mouse runs in circles? or has a muscle tremor? hind limb paralysis? six toes on each paw? tremor? hind limb paralysis? six toes on each paw? cytoplasmic vacuoles? We connected the gene with the phenotype for a dozen spontaneous mutants, using genetic mapping and positional cloning. Each one revealed something new about mammalian biology.

What was your most exciting finding?

One exciting finding came when we asked the question: what phenotype would result if we altered a sodium channel in the brain so that the channel would open normally but fail to close normally? The clear but unexpected answer was severe convulsive seizures. It was a big surprise, since in 1996 the role of sodium channel mutations in epilepsy was not known. These mice led us to look for sodium channel mutations in patients and helped establish the important role of sodium channels in neurodevelopmental disorders, a very active research area today.

In 2017 you received the Rackham Distinguished Mentor Award. What has been the most rewarding aspect of your time as an educator?

The opportunity to work in small groups in which we come to know each other well is a wonderful feature of academic research. Working closely with students and postdocs over a period of years on projects of common interest provides an enriching experience of teaching and learning together. When students and postdocs continue on to successful careers and build on what they learned in the lab, I feel a great sense of satisfaction and admiration for what they go on to accomplish.



Has being a woman in science offered any unique opportunities or challenges during your career?

Back in the 1980s, I was able to provide women graduate students with a training environment in which their scientific capabilities would never be questioned. I knew that women could succeed, from my own experience. I think this conviction continues to be a positive factor in interactions with younger colleagues today.

How has your lab adapted to the pandemic? Do you have any advice to students and faculty in this unusual time?

The people in my lab have done a heroic job of keeping the experiments going and continuing to answer questions, in spite of the reduction in interactions and support that we enjoy in normal circumstances. We have “attended” several virtual national and international meetings together, which was affordable and stimulating. We have published one paper and one review article and we are working on others. Lots of Zoom meetings, of course. But I think we have reached a point where some new ways of interacting are needed, to replace the casual conversations that are our usual mechanism for intellectual stimulation and support. ■

New CMB Students



Dylan Bartikofsky
Wobus Lab



Brandon Chen
Shah & Lyssiotis Labs



Sarah Connolly
M. Ohi Lab



Maggie Durdan
Weivoda & Keller Labs



James Haggerty-Skeans
Venneti Lab



Maha Hamed
Anantharam Lab



Evie Henry
Pletcher Lab



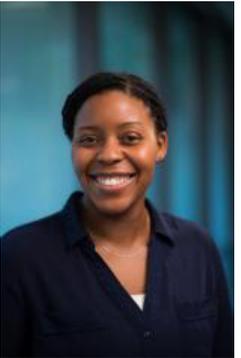
Hari Mohan
Paulson Lab



Shannon Miller
Todd Lab



Matthew Pun
Venneti Lab



Brynne Raines
Narla Lab



Tony Robinson
Giger Lab



Charles Ryan
Rajakakse Lab



Melissa Seman
Ragunathan & Kalantry Labs



Katy Speckhart
Tsai Lab



Angela Tuckowski
Leiser Lab



Gunseli Wallace
Corfas Lab

Finding the Right Fit: Marshall Howington's Journey to CMB

This semester, we had the chance to catch up with Marshall Howington, a fourth year CMB student in Scott Leiser's lab.

Describe your career(s) before coming to the University of Michigan. What were the largest challenges that you had to overcome, and your biggest accomplishments? So I had something of a wild ride before coming to U of M. When I was 18 I joined the Army after a semester at USC (South Carolina). I didn't know what I wanted to do with my life, so at the time this seemed like a good option. After three trips to Afghanistan as a Psychological Operations soldier and team leader (and countless pushups and other awesome punishments), I decided that six years in the military was enough for me. After that, I finished up a degree in financial economics at Methodist University in Fayetteville, NC. I worked for a couple of years in sales after that (10/10 would not recommend), before taking some time to figure out what I really wanted to pursue. Once I realized that my passion lay in science, I went back for another degree (chemistry at UNC-Charlotte), and now I'm gladly here at U of M. My biggest challenge was honestly just processing three deployments in three years. It was a lot to handle, but I feel good about where I'm at now. My biggest accomplishment is that I was awarded two bronze stars for my efforts during those deployments.

When did you decide you wanted to pursue a Ph.D. in biomedical sciences? What skills from your previous employments best prepared you for a research career? When I was in my previous work, I didn't really have any sense of fulfillment. I liked business a lot, but working in sales in a field that I was indifferent towards made me feel mostly like a cog in the giant machine of capitalism. So I took some time to figure out what I was really interested in. For me that was researching aging. Two skills that I learned in previous jobs are how to handle stressful situations and how to think on my feet. My military experience provided the former, while working in sales provided the latter.

What is your favorite part of graduate school at Michigan? What do you think is the most important thing you've learned in graduate school? My favorite part of graduate school (outside of research) is working with and getting to know so many different people. Also, the professional development experience offered at Michigan outside of academia are really great. The most important thing I've learned so far in graduate school is that failure often leads to progress. I've failed plenty in my life and learned a lot of valuable lessons, but only in grad school can constant failure teach you so much not only in terms of research, but also in terms of humility.

What drew you to join the Leiser lab? What has been the most exciting experiment you have done in his lab so far?

I interviewed with Scott during the application process, and I knew we had similar rigorous approaches to research, but he also promoted things that I considered to be ideal attributes in a mentor, such as teamwork, collaboration, and



generally great mentoring. Once I rotated through his lab and met all the great people that worked in it, joining his lab (if given an offer) was a no brainer. Really enjoying the aging research didn't hurt either. The most exciting experiment I've conducted so far was my first lifespan. It gave me some interesting results, but more importantly, it was the first time I remember being a knowledge creator instead of a knowledge consumer, which was a humbling and very cool feeling.

What are some of your hobbies outside of lab research? Are there any hobbies or issues you are particularly passionate about? I really enjoy working out and working around the house. I'm particularly passionate about fantasy books and world building. I think it's pretty awesome for authors to be able to create these whole worlds with rich histories and economies.

What is your best advice to other students about how to adapt their work and lives to the COVID19 pandemic? Everyone's research and life situations are completely different, so I can't presume to give universal advice by any means. My approach though has been to just take all of this one day (and one experiment) at a time. I think the pandemic has given a rare opportunity to really methodically think about and maximize each experiment. That's one of the silver linings of the pandemic: everything has slowed down, which gives people time to plan/execute. Now the flip side of that is that mistakes become more costly since we have less time in lab. All in all though, this is a time in which patience becomes a considerable virtue. Patience not only with research progress, but also with ourselves. The stress of the pandemic is serious, and this is a time that I think people should be much more forgiving and kind to themselves. ■

Encouraging Young Scientists in U-MYScI

Shannon Lacy

Shannon Lacy is third year CMB student in Matthias Truttmann's lab and the Deputy Director of scientific outreach organization, U-MYScI.

U-MYScI (University of Michigan Young Science Innovators) is a scientific outreach organization that encourages middle school students to pursue careers in STEM2 (Science, Technology, Engineering, Mathematics, and Medicine). An educational crisis in communities surrounding UM is de-prioritization of science education. Students from socio-economically underprivileged households often lack opportunities in STEM2 compared to advantaged peers. Many do not learn basic scientific terms such as "hypothesis" until they take nation-wide science aptitude tests. U-MYScI aims to assist students from diverse backgrounds and improve their participation in STEM2 fields.

Our organization runs a week-long science summer camp for local middle schoolers. Throughout the year we plan the curriculum, raise money to make the camp free for all campers, and train graduate student volunteers to be camp counselors. Attendees engage with the scientific method and investigate diverse topics that have previously included: Newton's third law of motion with a rocket launch; binary trees with a basic coding workshop; and the speed of sound using an oscilloscope. Campers also conduct experiments and visit UM museums and laboratories. On the camp's last day, students present their research projects to family and friends.

Interactions with leaders in STEM2 greatly improves students' propensities to participate in these fields. U-MYScI is one of many wonderful UM student organizations focused on this goal.

This year, the pandemic led U-MYScI to adopt a virtual format. We pre-recorded lessons about scientific phenomena that students could observe at home. In one lesson, we taught students about crystal formation and demonstrated how to make "hot ice" and rock candy crystals.



Middle School Attendees from the 2018 (top) and 2019 (bottom) summer camps run by U-MYScI. (Photo Credit: U-MyScI).

For the Spring semester, we are establishing a virtual mentoring program. We will pair mentees with mentors from diverse careers in science. Outside speakers will also inform participants about non-traditional paths to scientific careers. Students will take virtual lab tours, and discuss their identities as young scientists and future identities pursuing higher education.

Interactions with leaders in STEM2 greatly improves students' propensities to participate in these fields. U-MYScI is one of many wonderful UM student organizations focused on this goal. ■

New CMB Faculty



Gabriel Corfas, PhD
Kresge Hearing Research Institute
Department of Otolaryngology-Head and Neck Surgery
Neuroscience Graduate Program



Goutham Narla, MD, PhD
Internal Medicine, Division of Genetic Medicine
Human Genetics



Morgan DeSantis, PhD
Molecular, Cellular, and Developmental Biology



Lev Prasov, MD, PhD
Ophthalmology and Visual Sciences
Human Genetics



Yu Leo Lei, DDS, PhD
School of Dentistry
Periodontics and Oral Medicine
Rogel Cancer Center
Department of Otolaryngology-Head and Neck Surgery



Rajesh Rao, MD
Ophthalmology and Visual Sciences
Pathology



Stephanie Moon, PhD
Human Genetics
Center of RNA Biomedicine



Janet Smith, PhD
Biological Chemistry
Biophysics
Center for Structural Biology, UM Life Sciences Institute



Christiane Wobus, PhD
Microbiology and Immunology
Human Genetics



Indika Rajapakse, PhD
Computational Medicine and Bioinformatics
Biomedical Engineering
Department of Mathematics, LSA
Michigan Institute for Data Sciences

CMB Newsletter Committee: Chris Bidlack, Sarah Connolly
Supporting Faculty and Staff: Karl Desch, MD; Lauren Perl
Contact: Chris Bidlack, bidlackc@umich.edu

Have an opinion on a science or program issue? *Write an article!*
Want to put your editing skills to the test? *Become an editor!*
Can't wait to show off your awesome new data? *Submit your bioart!*
The CMB Newsletter Committee is always looking for more people to write, edit, and design.