The skin on the palms of our hands and soles of our feet differs from most of the body. This skin (or epidermis) is hairless and has a wrinkled surface that helps us grasp objects. It is also thick and tough to protect from the high mechanical stresses that impact these tissues daily. One protein that contributes to this mechanical toughness is keratin 9, an intermediate filament protein that forms a strong network to strengthen the skin. In this section of human plantar (or sole) skin, red marks cells expressing keratin 9 whereas green marks cells expressing a related protein, keratin 16 (cell nuclei are in blue). The heart-shaped region represents a protrusion of the dermis (the tissue underneath the skin) up into the epidermis. Because keratin 9 is expressed exclusively in the palms and soles, mutations in this protein result in a disease known as epidermolytic palmoplantar keratoderma, a condition with thickening and scaling of these regions.
On August 1, 2017, I took the helm of one of the oldest departments at U-M. A couple of months ago, my appointment as G. Carl Huber Professor and Chair of CDB was renewed for another period of five years.

As I reflect over the past five years, there is much to celebrate. Our faculty grew, adding six new members. We partnered with the University’s Biosciences Initiative and the Life Science Institute to recruit faculty with expertise in cryo-electron microscopy and in single cell spatial analysis and established what became an early career faculty mentoring program. Our faculty, leaders in cutting-edge and innovative research, have increased external funding by 32% in five years! Additionally, the department supports our faculty by covering graduate student tuition, and hired a highly skilled bioinformatician, Craig Johnson, an action that has significantly magnified our ability make the best of high-throughput data sets.

CDB continually strives to optimize resources and support for our graduate students and postdocs to cultivate talent and empower the next generation of scientists. Recent examples of this commitment include the hiring of Dr. Jacqueline Popma as a full-time graduate student & postdoc coordinator, creating the Michigan Postdoctoral Pioneer Program with support from the Endowment for Basic Sciences, and establishing a new Quantitative Cell Biology graduate course under the adept leadership of Dr. Ajit Joglekar and Dr. Kristen Verhey.

The CDB culture has evolved in ways I would never have predicted amid the recent turbulence and tragedies in our world. During this time, we adopted the University of Michigan’s effort to improve Diversity, Equity, and Inclusion (DEI) by facilitating onsite training, establishing a DEI website, and sponsoring students and mentors to attend relevant conferences. During the pandemic, CDB persevered with a surge of publications reporting on significant advances in cell and developmental biology. We created hybrid scientific and social events while maintaining the opportunity to attend seminars and colloquia virtually. We also launched a departmental Intranet to help faculty and trainees efficiently find resources, share best practices, and access equipment.

CDB remains vigilant in our commitment to pursue the resources necessary to take bold new approaches and build upon our tradition of making important discoveries.

To align with a constantly changing research landscape, CDB acquired more space in the BSRB building, negotiated lab space in North Campus Research Complex, and maintained a ranking as one of the top 10 for NIH award funding.

Our department is on a trajectory to become a national model for basic science departments. Our leadership team is refining our journey to harness opportunities, build upon innovative ideas, and organize resources to seize the benefits of being a department centrally located within U-M’s vast research enterprise.

The science taking place by our faculty, students, and postdocs is important and inspiring. Together, we will continue to push forward and broaden our niche in an ever-evolving basic science industry. CDB is an environment where we thrive on educating the next generation of cell and developmental biology scientists within a culture of creativity and innovation that leads us to discoveries and even better research questions to explore.

My sincerest appreciation to every member of our CDB community for making the past five years so exciting and rewarding through some challenging times. I am enthusiastic to see how we can contribute to cell and developmental biology over the next five years.

It is a pleasure to be your chair,

Pierre Coulombe G. Carl Huber Professor Chair, Department of Cell & Developmental Biology
Craig Johnson
Bioinformatician

Bioinformatician Craig Johnson has benefited research teams across the globe since joining the CDB team in 2019. Craig provides expert analysis and interpretation of biological data using computational and analytical tools. He works on multiple projects, meeting with PIs, trainees, and research staff to discuss, interpret, and analyze data. He also designs and builds customizable interactive web applications allowing researchers to access and investigate their project data 24/7. For example, Craig created an RShiny server tool for Roman Giger's lab. With this tool, Roman can explore the data at single-cell resolution over specific time points for his research on traumatic PNS injury in mice.

Craig graduated from Grand Valley State University, earning a bachelor's in statistics and a master's in biostatistics. Craig then worked at U-M's Affymetrix core, which merged into the DNA sequencing core, before arriving at CDB. In addition to the bioinformatics services that he provides, Craig participates in the CDB course Quantitative Cell Biology, led by Ajit Joglekar, to help Ph.D. students learn computational data analysis, programming, and statistical inference.

"Developing a 'big data' course module with Craig has been exciting. It's a mirror of working with him on a research project. I get to paint a picture of the scientific direction for the module, and then he brings the expertise on the technical side, pointing out data and software that we can incorporate into the module. Then we get into the fun back-and-forth of developing course content that highlights the biological questions while giving the students hands-on experience working with 'big data' datasets at the forefront of cell and developmental biology." ~ Mara Duncan

What is your research focus?
My research seeks to decipher the host-pathogen interactions required for the entry of oncogenic (cancer-causing) viruses. We are particularly interested in how DNA tumor viruses reach the nucleus to establish initial infection. Another area of interest is the entry mechanisms of oncolytic viruses that, paradoxically, have the potential to treat cancer. By studying the basic biology of virus entry, we hope to gain a better understanding of the relationship between virus infection and cancer.

What excites you about building your own lab?
Building a lab provides the intellectual freedom to finally study all of the research questions that have fascinated me over the years. I’m excited to see what we will discover and how my research program will evolve over time. Mostly though, I am excited to interact with the next generation of scientists through the mentoring and training opportunities that having a lab provides.

What influenced your decision to become a faculty member in CDB following your postdoctoral research working in Billy Tsai’s lab?
My decision to remain in CDB as a faculty member is a testament to the amazing training atmosphere in CDB. As a researcher from a group historically underrepresented in science, it was essential that I launch my career in a department that will support me both as a scientist and as a person. Great science can be done almost anywhere, but the inclusive environment of CDB is unmatched. Speaking of great science, there is no lack in CDB! The diversity of research areas provides opportunities for collaboration and innovation and I wouldn’t want to be anywhere else.

"At each stage of my journey, I was fortunate to have worked with brilliant and thoughtful scientists, who trained me and supported my goal of becoming an independent researcher." ~Chelsey Spriggs
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<th>Name</th>
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**Faculty Awards**

- **Yu-Jie (Jay) Chen**
  Promoted to Research Investigator

- **Rami Khoriaty**
  Promoted to Associate Professor

- **Jillian Pearring**
  2022 Lichter Discovery Research Award, Skillman Early Career Professor in Pediatric Ophthalmology

- **Yang Yue**
  Verhey Lab
  CDB Excellence in Research Award, Promoted to Assistant Research Scientist

- **Ajit Joglekar**
  Promoted to Professor

- **Puck Ohi**
  Promoted to Professor, 2022 Lichter Discovery Research Award

- **Babhrubahan Roy**
  Joglekar Lab
  Promoted to Assistant Research Scientist

- **Subhash Arya**
  Parent Lab
  Bradley M. Patten Award for Excellence in Postdoctoral Research, American Heart Association Postdoctoral Fellowship

- **Erez Cohen**
  Coulombe Lab
  National Psoriasis Foundation Sue Shoenberg Endowment for Early Career Research Award

- **Dubek Kazyken**
  Fingar Lab
  CDB Excellence in Research Award

- **Melanie Ohi**
  Beckman Foundation Award, Induction as Fellow of the American Association for the Advancement of Science

- **Jillian Pearring**
  2022 Lichter Discovery Research Award, Skillman Early Career Professor in Pediatric Ophthalmology

- **Bing Ye**
  Induction as Fellow of the American Association for the Advancement of Science

**Postdoctoral Awards**

- **Kyoung Jo**
  Heemskerk Lab
  Bradley M. Patten Award for Excellence in Postdoctoral Research

- **Pilar Rivero-Rios**
  Weisman Lab
  Michigan Alzheimer's Disease Research Center Mentoring Fellowship

- **Annette Klomparens**
  Making a Difference Award

- **Beau Su**
  Coulombe Lab
  CDB Staff Excellence Award
What are you proud of in terms of your research or career?
My research is driven by pure curiosity—I want to understand how cellular machines work, and better yet, I want to build new protein machines! My lab is not tied to one technique or approach; we strive to ask the right questions and find creative ways to answer them. I am happy that our unconventional approach has been successful so far in answering critical questions about how cells accurately divide their genomes during cell division. Regarding career accomplishments, I find it very satisfying to see former graduate and undergraduate students flourish and find their paths in diverse fields.

Ajit Joglekar
Professor, CDB
Professor, Biophysics
Professor, Biomedical Engineering

What excites you about your research?
An area of biology that I find most exciting is de novo protein design—computationally designing new protein sequences that fold into a specified 3-dimensional structure. De novo protein design finally allows us to not just "read the book of biology" but add to it! I started learning the basics of protein design about three years ago. In the coming years, I want to make it into a productive part of my research.

What attracted you to CDB and U-M?
I joined CDB in the Fall of 2017. U-M is home to a few leaders in the cytoskeleton and mitosis fields, including Kristen Verhey, Dave Sept, Ann Miller, Qiong Yang, Ajit Joglekar, and (at the time) Yukiko Yamashita. Pierre Coulombe, a leader in the field of intermediate filaments and skin, arrived at the same time as I did. U-M has also recruited Mike Cianfrocco and Morgan DeSantis, experts on dyenin-mediated intracellular transport. These are all faculty that I highly value. My lab meets weekly as a “supergroup” with some of these groups and these interactions are invaluable and help to drive research forward.

What are you proud of in terms of your research or career?
I am most proud of my trainees and their accomplishments (professional and personal). In research, I am proud of work that has helped to advance my field. My group has helped to define an important pathway that drives assembly of the mitotic spindle. This work reconciles the existence of two spindle assembly pathways in the plant and animal kingdoms and may explain why a major class of chemotherapeutic drugs is ineffective in treating cancer in humans. Looking forward, I am excited about our work focused on more basic aspects of microtubules (the building block of the mitotic spindle), and how microtubules are modified to carry out diverse cellular processes.

Puck Ohi
Associate Chair for Education & Training, CDB
Professor, CDB

What are you proud of in terms of your research or career?
Our lab recently demonstrated that SEC23A functionally overlaps with its paralogous protein SEC23B, suggesting a novel therapeutic strategy for SEC23B-deficient congenital dyserythropoietic anemia type II, which we are currently pursuing. We are equally excited about our unbiased genome-scale CRISPR knock-out and activation screens that have uncovered novel genes that appear to regulate globin gene switching without affecting erythroid differentiation; these findings may result in new therapies for Sickle Cell Disease and other beta-hemoglobinopathies.

What attracted you to CDB and U-M?
I have been a faculty at U-M since 2012, but I joined CDB in 2019. CDB is a vibrant department that fosters cutting-edge research and interdisciplinary collaborations. I am very proud of our collaboration with CDB faculty, particularly with Dr. Engel and his lab.

Where were you prior to CDB?
I have been (and continue to be) a faculty in the Department of Internal Medicine at U-M.

What are you proud of in terms of your research or career?
I am most proud of my trainees and their accomplishments (professional and personal). In research, I am proud of work that has helped to advance my field. My group has helped to define an important pathway that drives assembly of the mitotic spindle. This work reconciles the existence of two spindle assembly pathways in the plant and animal kingdoms and may explain why a major class of chemotherapeutic drugs is ineffective in treating cancer in humans. Looking forward, I am excited about our work focused on more basic aspects of microtubules (the building block of the mitotic spindle), and how microtubules are modified to carry out diverse cellular processes.

Rami Khoriaty
Associate Professor, Internal Medicine (Hematology/Oncology)
Associate Professor, CDB

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What do you like most/least about your job?

The thing I like most is the thrill of discovery. There is nothing quite like that breakthrough moment when you know you have discovered something entirely new. The thing I like least is the hypercompetitive environment. While healthy competition can drive us to achieve more, extreme competition prevents openness and reagent sharing, leads to the publication of questionable results, and pushes women and underrepresented minority scientists out of academia.

What do you wish you had known when you were a postdoc?

I wish I had embraced my goal of becoming a research-focused professor. The message we often receive as Ph.D. students and postdocs is that finding a tenure-track faculty position is impossible. But someone will get the job, so it might as well be you! Thinking deeply about my career goals earlier, I might have applied to different grants, spent more time networking, and started my job application package sooner.

What do you do on a typical day?

On lecture days, I prep for teaching. I'm teaching molecular biology and learning the details of the processes I am teaching is almost as fun as teaching them. I also work in my lab with students training them in laboratory techniques or discussing results and trouble-shooting. When I can, I work at the bench.

What do you like most/least about your job?

There is no better motivation for me than students who want to learn.

What do you wish you had known when you were a postdoc?

It's easy to get brought down by setbacks and career uncertainty. Focus your emotional and physical energy on efforts that will move you toward the goal of a career that will make you happy. Don't dwell on things you can't change. Recognize that a happy career can come in many different forms and that luck will play a big role in where you land. Try to find ways to be happy along the way. It will make everything better. To add, your answers to questions in job interviews don't necessarily have to be polished. They want to know that you are thoughtful, how you grapple with issues, and that you will contribute. Communicate with them respectfully as peers, not as superiors.

What do you do on a typical day?

I typically get up before dawn to cycle in the Oakland hills before heading to work in the lab. There, I divide my time between experiments, data analysis, reading papers, laying the groundwork for starting my lab next year, and discussions with colleagues. I head back home in the late evening to have dinner with my partner and to walk our dog.

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What do you do on a typical day?

My job is roughly an equal blend of research and teaching, and I try to devote entire days to one or the other as that has been the most efficient approach. On research days, my time is split between writing (grants, manuscripts, etc.), reviewing and analyzing data, and interacting with students in the lab. On teaching days, most of my time is spent planning ways to explain complex cellular, molecular, and genetic concepts in a way that first-year college students can digest followed by designing materials to challenge and assess their learning.

What do you like most/least about your job?

My favorite part is watching students learn and grow. I teach almost 100 freshman every semester, and many start as a bundle of nerves and doubt. Watching students emerge from this shell and begin to master the subject and college life is very inspiring. In the laboratory, students typically begin not even knowing how to operate a pipette. Over time they execute complex experiments, interpret data, and develop an understanding of bigger picture ideas. It is truly a wild and exciting experience watching students develop into independent researchers from the ground up. My least favorite part is all of the documentation I am required to do. It’s ironic, but I could be much more productive if I didn’t have to spend so much effort explaining how productive I have been.
When supporting our department through donations, you are helping to harness the power of these creative young scientists, allowing them to take risks, develop preliminary data, and explore more deeply into their research. Programs, like the ones listed below, not only furnish a better educational experience for our students but provide the world at large with a deeper understanding of science.

- Bradley M. Patton Memorial Fund (795380) for Ph.D. student education
- G. Carl Huber Postdoctoral Fellows Fund (320450) for Postdoctoral student education
- Watching Molecules at Work: Building Technologies for the Future (324124) for innovative scientific contributions

For further information or to donate, please visit: www.umichcdb.com. Thank you for your continued support!

Effervescent, image from U-M BioArtography (bioartography.com) by Cynthia DeLong, Ph.D., Research Lab Specialist Senior (O’Shea Laboratory), Department of Cell & Developmental Biology.

Bipolar disorder is a severe mood disorder that affects more than 5.7 million adult Americans. Though symptoms of this disease do not develop until the mid 20’s, research indicates that the disease begins in childhood, or earlier. New technology that allows researchers to “reprogram” skin cells of a patient, first into embryonic stem cells and then into different types of brain cells, like the neurons shown here, gives us a novel opportunity to study the cell biology behind the development of bipolar disorder, with the goal of improving treatments. The green “bubbles” seen here are neuron cell bodies; the red and purple “strings” are the cell projections, or neurites, which form a network to relay chemical signals between neurons.