Greetings to CMB alumni from the beautiful summer UW campus. Fall is around the corner and graduate students will take over the campus once again. It has been a busy 2013-2014 academic year for the campus, biological sciences, and CMB. On the campus front, highlights include the arrival of Rebecca Blank as the new Chancellor, the impending arrival of Sarah Mangelsdorf as the new Provost, and the final four appearance of the men’s basketball team—Go Badgers! New buildings and departmental reshuffling have dominated the news in the biological sciences. Later today, the Biochemical Sciences Complex, i.e., the Biochemistry Addition, Old Biochemistry, and the new Biochemical Sciences Building, will be dedicated to Hector DeLuca. Amazingly, Hector has published more than 1,100 papers, many of which are on vitamins A and D. Labs are also in the process of moving into the second WIMR building (officially called WIMR II, Wisconsin Institutes for Medical Research II) at the west end of campus. The building will house the Department of Oncology and the newly minted Departments of Neuroscience and Cell and Regenerative Biology, as well as the Cardiovascular Research Center and the McPherson Eye Research Institute. This means that McArdle Labs and the Medical Sciences Center will empty out; however, given the history at UW, they are unlikely to remain empty for too long.

CMB has not been immune to change, and 2013-2014 was particularly eventful. After seven years of tremendous service, Bill Bement decided to step down from being the CMB chair. However, Bill has not slowed down. He continues to teach and mentor graduate students, he remains the Chair of the Laboratory of Cell and Molecular Biology in Bock Labs, and his lab continues to make great strides in understanding how cells build cytoskeletal arrays. Another major change was that Michelle Holland, the Student Services Coordinator and the face of CMB for 10 years, was lured away by the Graduate School. Michelle is now taking on new challenges as the Senior Student Services Coordinator for the Graduate School. It is wonderful to have Jessica Karis on board as the new CMB Student Services Coordinator. Many of you know Jessica through her work with the Neuroscience Training Program as an Outreach Specialist over the past five years and prior to that with CMB as a Student Program Assistant for four years. Jessica’s experience will help continue the strong tradition of the CMB Program. Finally, there are 16 new, enthusiastic, and bright CMB graduate students,
Welcome From the Chair...

and we look forward to hearing about their research and discoveries over the next five years.

One of my major goals as the new CMB Chair is to make sure that CMB students receive the training and mentoring needed to achieve their career goals. As alumni, you could help with this effort by mentoring CMB students. While CMB is really good at preparing students for careers in academic science, we are not as good at preparing students for other careers. If you have used your CMB degree for a non-academic science career, you are in the best position to help guide current students along that career path. To get involved, please respond to the e-mails you receive from CMB, or you can directly contact Jessica Karis at cmb@bocklabs.wisc.edu.

Please enjoy this year’s version of the “CMB Transcript.” Highlights of this newsletter include CMB faculty and student awards and honors, student publications, feature stories on the Biology Outreach Club and the student Professional Development Committee, and an article spotlighting a collaboration between three CMB trainer labs. I hope that you enjoy reading about the tremendous accomplishments of CMB faculty and students.

David A. Wassarman
CMB Program Chair

Above: Jessica Karis and David Wassarman
Bringing Back the Biology Outreach Club
By: Maria Garcia Mendoza, CMB Graduate Student

So many of us are nervous about presenting and explaining our research to our peers, but what happens when our audience is much younger, or less familiar with the biological sciences? We certainly do not worry about nailing all the audience’s questions, but mostly: did our audience understand what we said, any of it? Did they have fun? Were they in awe?

The graduate students at the Biology Outreach Club (BOC) use these questions to drive our efforts in sharing our knowledge and findings beyond the scientific community. We volunteer some of our time and spend it with children and adults that have as much curiosity as we do.

This year, third-year student, Harisha Rajanala, took it upon herself to gather a brand new Biology Outreach Club Leadership Team. This team is comprised of four wonderful ladies pictured to the right.

Although we haven’t had much time together, we have been able to form a bridge between large outreach organizations on campus, such as the Science Alliance, and CMB graduate students. Once an organization plans an outreach event, they contact us with their needs and we try to find as many volunteers as we can. Volunteering involves running exploration (mini-experiment) stations, giving scientific research talks to the public, or simple things such as setting up tables (the reward comes with the free lunch on those occasions).

I would like to highlight two events where the BOC participation was highly appreciated. The first one was the 12th Annual UW-Madison Science Expeditions on April 5th and 6th. Both days, students helped set up stations, guide people on tours, and performed small science experiments with kids and adults. Most graduate students expressed how fun it all was plus the satisfaction that we can pass on knowledge, excitement, and passion for the sciences.

Finally, we participated in the 2014 Madison Middle School Science Symposium on March 7th. We were part of the Research Exploratorium where we told and showed middle school students what we studied in the lab and answered all their questions about how we got interested in science.

I personally enjoyed how inquisitive the students were. They asked the key questions that I’m trying to answer in the laboratory, and just as I tell my colleagues: there are some things that we just don’t know yet, but we are getting close (if not, I don’t get to graduate).

I hope that with this small article you enjoyed hearing about the work that the BOC is doing, and that you also get inspired to get out in the community and share your gifts!

~Maria Gracia Garcia Mendoza
Biology Outreach Club Leadership Team
In an era of widespread genetic sequencing, the ability to edit and alter an organism's DNA is a powerful way to explore the information within and how it guides biological function.

A paper from the University of Wisconsin-Madison in the August issue of the journal GENETICS takes genome editing to a new level in fruit flies, demonstrating a remarkable level of fine control and, importantly, the transmission of those engineered genetic changes across generations.

Both features are key for driving the utility and spread of an approach that promises to give researchers new insights into the basic workings of biological systems, including embryonic development, nervous system function, and the understanding of human disease.

“Genome engineering allows you to change gene function in a very targeted way, so you can probe function at a level of detail” that wasn’t previously possible, says Melissa Harrison, an assistant professor of biomolecular chemistry in the UW-Madison School of Medicine and Public Health and one of the three senior authors of the new study.

Disrupting individual genes has long been used as a way to study their roles in biological function and disease. The new approach, based on molecules that drive a type of bacterial immune response, provides a technical advance that allows scientists to readily engineer genetic sequences in very detailed ways, including adding or removing short bits of DNA in chosen locations, introducing specific mutations, adding trackable tags, or changing the sequences that regulate when or where a gene is active.

The approach used in the new study, called the CRISPR RNA/Cas9 system, has developed unusually fast. First reported just one year ago by scientists at the Howard Hughes Medical Institute and University of California, Berkeley, it has already been applied to most traditional biological model systems, including yeast, zebrafish, mice, the nematode C. elegans, and human cells. The Wisconsin paper was the first to describe it in fruit flies and to show that the resulting genetic changes could be passed from one generation to the next.

“There was a need in the community to have a technique that you could use to generate targeted mutations,” says Jill Wildonger, a UW-Madison assistant professor of biochemistry and another senior author of the paper. “The need was there and this was the technical advance that everyone had been waiting for.”

“The reason this has progressed so quickly is that many researchers — us included — were working on other, more complicated, approaches to do exactly the same thing when this came out,” adds genetics assistant professor Kate O’Connor-Giles, the third senior author. “This is invaluable for anyone wanting to study gene function in any organism and it is also likely to be transferable to the clinical realm and gene therapy.”
The CRISPR RNA/Cas9 system directs a DNA-clipping enzyme called Cas9 to snip the DNA at a targeted sequence. This cut then stimulates the cell’s existing DNA repair machinery to fill in the break while integrating the desired genetic tweaks. The process can be tailored to edit down to the level of a single base pair — the rough equivalent of changing a single letter in a document with a word processor.

The broad applicability of the system is aided by a relatively simple design that can be customized through creation of a short RNA sequence to target a specific sequence in the genome to generate the desired changes. Previous genome editing methods have relied on making custom proteins, which is costly and slow.

“This is so readily transferable that it’s highly likely to enable gene knockout and other genome modifications in any organism,” including those that have not previously been used for laboratory work, says O’Connor-Giles. “It’s going to turn non-model organisms into genetic model organisms.”

That ease may also pay off in the clinic. “It can be very difficult and time-consuming to generate models to study all the gene variants associated with human diseases,” says Wildonger. “With this genome editing approach, if we work in collaboration with a clinician to find [clinically relevant] mutations, we can rapidly translate these into a fruit fly model to see what’s happening at the cellular and molecular level.”

The work, led by genetics graduate student Scott Gratz, was the joint effort of three UW-Madison labs — particularly notable, Harrison says, that each is in a different department and headed by a female assistant professor. “This has been an amazing collaboration,” she says. “It wouldn’t have worked if any one of us had tried it on our own.”

They have already seen tremendous interest in the work: the study, which was posted online in May, quickly became one of the most-viewed papers of the month and the researchers have fielded requests for materials and information from dozens of countries around the world.

For more information see the groups’ CRISPR website: flyCRISPR.molbio.wisc.edu.
Take a Look at What is Going on at CMB!

Above: CMB Students at the Annual CMB Retreat. Photo courtesy of Jessica Ciomperlik.

Above: CMB Student, Xiao Rao, in Kate O’Connor-Giles’s Lab. Photo Courtesy of CMB Office.

Above: CMB Student, Bob Bradley, enjoying the Annual Student Retreat. Photo courtesy of Jessica Ciomperlik.

Above: CMB Student, Kevin Cope, in Jean-Michel Ane’s Lab. Photo courtesy of CMB Office.

Above: CMB Students, Amber Lasek, Shelby Malone, Asuka Eguchi, Kelly Pittman, Jessica Ciomperlik celebrating at the retreat with the “Golden Pipette”. Photo courtesy of Jessica Ciomperlik.

Above: CMB Student, Joseph Bruckner, in Kate O’Connor-Gile’s Lab. Photo courtesy of CMB Office.
WE NEED YOUR HELP!

We are currently in the process of updating our Alumni Database. We would greatly appreciate it if you would fill out the survey that can be found at this link:

https://uwmadison.qualtrics.com/SE/?SID=SV_0OD646KNDkDLPYF

We would like to know any updates in your personal and professional life for use in the next issue of The CMB Transcript. Be sure to keep us informed of address changes so that we can continue to send you a copy of the newsletter each season.

Would you like to speak about your career to current graduate students in the CMB Program and the biological sciences at UW? We are especially in need of alumni who work in areas other than tenure track faculty at large research institutions. Let us know if you’d like to be contacted about speaking to graduate students about your career. You can contact CMB at cmb@bocklabs.wisc.edu.

Support CMB

As one of the largest biological science graduate programs at UW-Madison, CMB has been committed to excellence in graduate education since the 1960’s. If you would like to make a gift to this long-standing effort, visit the CMB website (www.cmb.wisc.edu). Your generous support is greatly appreciated!

CMB Donors 2013-2014

Dr. Barry Buchbinder
Mary & Clyde Canman
Somana Dharam
Dr. Sarah Kagan
Richard Rau
Dr. Scott Shore

Congratulations!

Congratulations to the following CMB student who received the 2014 National Science Foundation Graduate Research Fellowship

Tricia Windgassen
Class of 2013
James L. Keck Lab

NSF

We are currently in the process of updating our Alumni Database. We would greatly appreciate it if you would fill out the survey that can be found at this link:
CMB Graduate Student Publications


CMB Graduate Student Publications...


CMB Graduate Student Awards & Honors

Craig Barcus, Class of 2010, Lab of Linda Schuler
SVM-Phi Zeta Award for Research Excellence by a Graduate Student at the Vet School

Suyong Choi, Class of 2009, Lab of Richard Anderson
Predoctoral Fellowship for American Heart Association

Kevin Cope, Class of 2013, Lab of Jean-Michel Ane
NSF Graduate Research Fellowship Honorable Mention

Asuka Eguchi, Class of 2010, Lab of Aseem Ansari
Jump Start Award

Xin Gao, Class of 2011, Lab of Emery Bresnick
American Society of Hematology Abstract Achievement Award

Chris Hooper, Class of 2010, Lab of Shigeki Miyamoto
F31 NIH Predoc Award

Ryan Kessens, Class of 2013, Lab of Mehdi Kabbage
NSF Graduate Research Fellowship Honorable Mention

Sanghee Lee, Class of 2008, Lab of Wade Bushman
Vilas Conference Presentation Funds

Sarah Neuman, Class of 2011, Lab of Arash Bashirullah
3rd Place Poster Award at the Genetics Society of America 55th Annual Drosophila Research Conference

Jarred Rensvold, Class of 2009, Lab of David Pagliarini
Wisconsin Distinguished Graduate Fellowship

Xiaolin Zhang, Class of 2008, Lab of Jennifer Reed
Vilas Travel Award
One bright, sunny Thursday afternoon in June I found myself – not having lunch by Lake Mendota – but crammed companionably in the penthouse of Bock Laboratories with forty-five other graduate students and post-docs. Over the next hour or so professionals from the UW Law School, the Wisconsin Alumni Research Foundation (WARF) and a Madison law company gave presentations and talked with us about the inner workings of pursuing a career in Intellectual Property Management and Patent Law as a CMB graduate.

This panel discussion was organized by the CMB Professional Development Committee (PDC). The PDC is composed of graduate students, like me, and our primary goal is to bring together CMB students and professionals from different fields so we may learn about and better understand the various career choices available to us once we complete our graduate education.

The first Career Development event was held in May 2013, when eight members of the Madison biotech industry – including CMB alumni Dr. Laura Juckem (2008) and Dr. Lisa Johns (2010) – shared their experiences and suggestions with several graduate students and post-docs. Since then PDC career panels have focused on diverse professions including teaching at small liberal-arts colleges, serving as a Clinical Director and continuing in academic research as a post-doc.

CMB students have been taking full advantage of the opportunity provided through these panels. Cary Valley, a current CMB student in Dr. Marv Wickens’ lab, believes that “the events hosted by the CMB Professional Development Committee have helped [him] to gain a better understanding of the different career options available after graduation”. He also emphasized that these panel discussions have been a great way to meet and network with professionals from various career fields in and around Madison.

The role of the Professional Development Committee

The concept that it is advantageous for PhD students to learn about various career options available to them once they complete their graduate education was recently highlighted in an article tantalizingly titled “Rescuing US biomedical research from its systemic flaws”, published in March of this year in the journal PNAS.

Written by a quartet of highly respected scientists - Drs. Bruce Alberts, Mark Kirschner, Shirley Tilghman and Harold Varmus, who is currently the Director of the National Cancer Institute – the gist of this article is that “A graduate education in the sciences produces individuals with broadly applicable skills in critical thinking and problem-solving, whose expertise could be invaluable in fields such as science policy and administration, the commerce of science, science writing, the law, and science education at all levels”. But in spite of our graduate training preparing us for a host of different careers, the authors lamented that “for the most part, neither the faculty nor the students
are well enough informed about such careers”.

The CMB Professional Development Committee aims to bridge this information gap. Interacting with professionals from different fields allows us to make more informed judgments about what careers we would like to pursue once our graduate student days are over. Dr. David Wassarman, chair of CMB, believes that the career panels organized by the PDC are allowing CMB students to be well-rounded. “Students entering graduate school are being given a more complete vision of professional life after graduate school”, said Dr. Wassarman. “They can then tailor their PhD experiences within CMB to match their personal goals”.

That’s not to say that our dedication to the intellectual and technical education that personifies a CMB graduate degree is any less. Dr. Wassarman is quick to emphasize that “Research is still very much the number one priority; the question is what students can do to supplement their education as a CMB graduate student”.

Thank you, Alumni!

Almost 200 years ago the Danish philosopher Soren Kierkegaard said “Life can only be understood backwards; but it must be lived forward”. Moving forward as current CMB graduate students we cannot hope to experience first-hand all the potential future careers we may be interested in. But we are fortunate to have alumni in different professions who can look back on their lives and share their experiences and expertise with us.

As a current CMB student I have benefited greatly from my interactions with CMB alumni. I have found the personal perspectives and practical advice from alumni invaluable in helping me learn about possible future careers and what steps I could take today that may help me to successfully pursue these professions tomorrow. It has also been interesting to hear from alumni how their work relates to all that they learned while they were a CMB-er.

“I have found that CMB students love to help other CMB students”, said Dr. Wassarman, and I have found that sentiment to be universally true during my time as a CMB student and a member of the PDC. In addition to the alumni I have already mentioned, Dr. Laura Opperman (2008) and Dr. Victoria Sutton (2004) were part of the career panel on IP Law and technology transfer, while Dr. Amy Briggs (2010), Dr. Dyan Morgan (2011) and Dr. Don Gillian-Daniel (1997) participated in a panel discussing teaching in liberal arts colleges. Dr. Michael Chika (2007) was a part of the panel discussion on Clinical Directorships.

To all CMB alumni, so generous with your time and experiences, I say thank you.
Inside the Lab: Student Perspective
By: Emily Kelly

At CMB we are proud to have a constant stream of impressive research being produced by our faculty and students. This year we had three CMB faculty members collaborate on an impressive study centered on the new approach called the CRISPR RNA/Cas9 system. We also have three current students conducting their own research in the labs of Kate O’Connor-Giles and Jill Wildonger. They gave me an inside look at what the overall lab research experience is about, what they are focusing on, and why their lab is special.

Joseph Bruckner attended Colorado College during his undergrad and is now a cellular and molecular neuroscientist in the lab of Kate O’Connor-Giles. Bruckner’s research focuses on the molecular mechanisms that regulate the function of the active zone, a structure specialized for the synaptic release of neurotransmitter. Bruckner chose the O’Connor-Giles lab because they work on research projects that are the ideal balance of cutting edge and achievable results. His research focuses on the molecular mechanisms that regulate the function of the active zone, a structure specialized for the synaptic release of neurotransmitter.

Monica Rao completed her undergraduate degree in China and majored in Biochemistry. She has always been intrigued by the potential and complexity of the human brain. Those interests lead her to study mechanisms of neurotransmitter release regulation and molecular changes underlying synaptic plasticity.

The O’Connor-Giles lab studies the molecular regulation of synaptic development, structure, and function. Synapses are the fundamental units of the nervous system – enabling the neural circuits that underlie both simple and complex behaviors. By identifying and characterizing the components of these molecular machines, they hope to understand how their development and function enables healthy neural circuits.

Although the lab is serious about science it has a happy, relaxed atmosphere. It currently has two postdocs, four graduate students and anywhere from 10-12 undergraduate students. Needless to say they are serious about training young scientists. Due to the size of the lab, collaboration is second nature. Everyone still gets to take the lead on projects, but everyone gets to help out at some point on every project. It’s this collaborative and co-dependent environment that creates a constant flow of communication. It also helps that everyone has a great sense humor, which keeps the atmosphere fast-paced and exciting.

Sihui Yang works in the lab of Jill Wildonger. She has a Bachelor’s degree in biology and physics from Marquette University. There are three words that made her decision to study in Wildonger’s lab; cytoskeleton, neuron and fly. Yang’s research focuses on microtubule polarity in neuron and how neuron establishes certain microtubule orientation in the dendrites and axon.

The Wildonger lab is interested in understanding the polarized trafficking inside of neurons.
Inside the Lab: Student Perspective...

More specifically, they want to understand how molecules or organelles are trafficked to specific destinations inside of the neuron cells, such as functionally and morphologically distinct compartments (i.e. axon and dendrite). Some projects in the lab focus on characterizing the molecular motors dynein and kinesin that carry molecular cargos to their subcellular destination. Other projects in the lab investigate the microtubule cytoskeleton that provides tracks or roadmaps for the molecular motors to walk upon them.

Wildonger’s lab maybe young, but it is enthusiastic and growing. The lab is currently made up of one postdoc, a technician, three graduate students, and a small army of undergraduates. The lab has a laid back, relaxed culture. Everyone enjoys having fun and is always willing to help out. There’s also a snack drawer dedicated to Oreos.

Our CMB students thoroughly enjoy their research and the labs they work in. We are proud to have faculty that can provide these engaging environments that encourage collaboration and great scientific research.

Fun Campus News: Wild Fox

Meet the wild fox who has found a new home at the University of Wisconsin - Madison. This cute creature is part of a family of foxes that have been living in the Observatory Hill area since March of 2014. He can frequently be found roaming the grounds around the Soils Building on Campus during the early morning hours.

Photos courtesy of Jeff Miller/ UW-Madison, University Commons
Faculty Awards and Honors

Emery Bresnick, Professor, Cell and Regenerative Biology
2013 Kellett Mid-Career Faculty Scholar Award, University of Wisconsin Graduate School
Editorial Board, Blood

Rick Gourse, Professor, Bacteriology
Elected to the American Academy of Arts and Sciences

Melissa Harrison, Assistant Professor, Biomolecular Chemistry
Basil O’Connor Starter Scholar Research Award from the March of Dimes.
New Investigator Award from the Wisconsin Partnership Project

Chris Hittinger, Assistant Professor, Genetics
NSF Career Award

James L. Keck, Associate Professor, Biomolecular Chemistry
2013 UW Health Community Service Award

Shigeki Miyamoto, Professor, Oncology
Kellet Faculty Award

Jennifer Reed, Associate Professor, Chemical and Biological Engineering
Presidential Early Career Award for Scientists and Engineers (PECASE ) Award

The CMB Transcript is published by the Cellular & Molecular Biology (CMB) Graduate Program at the University of Wisconsin Madison.

CMB Program Staff
Emily Kelly, The CMB Transcript Content & Design
Jessica Karis, CMB Program Coordinator
David Wassarman, CMB Program Chair