CDB Participates in an Interdisciplinary Cluster to Study Multiscale Cell Mechanics

In 2007, President Mary Sue Coleman and Provost Theresa Sullivan announced a new initiative to hire 100 new junior faculty across the University whose research and teaching interests are interdisciplinary. Recognizing that interdisciplinary approaches have become increasingly critical to decipher complex biological systems, CDB joined with four other departments across the Medical and Engineering Schools to form a Cluster titled Multiscale Cell Mechanics. The faculty and research of this cluster are focused on a comprehensive quantitative understanding of how cells function at the molecular level and how molecular actions determine cell and tissue behavior.

UM faculty from five departments joined forces to create this cluster and submitted a proposal to the Provost’s Office to fund the recruitment of five new faculty. A goal for the cluster is that the five newly-hired faculty would extensively collaborate both within the cluster as well as within their home departments. As the newly-hired faculty should utilize innovative approaches not commonly employed in one’s respective field, significant scientific advancement will be facilitated. Kristen Verhey spearheaded the effort for CDB together with Joel Swanson (Microbiology and Immunology), Shuichi Takayama (Biomedical Engineering), Jennifer Linderman (Chemical Engineering), and Krishna Garikipati and Edgar Meyhofer (Mechanical Engineering). In June 2009, the faculty received word that their proposal was funded!

Faculty searches were thus undertaken in the CDB and Microbiology and Immunology departments whereas the engineering departments elected to postpone their searches one year. Both departmental search committees received a large number of extremely strong applications. As a result, the CDB search committee offered positions to its two top candidates, Sivaraj Sivaramakrishnan and Ajit Joglekar. Both accepted and plan to arrive at the UM to initiate their independent research programs in January 2011. Microbiology and Immunology also hired their top candidate, Irina Grigorova from the University of California at San Francisco, who arrived in September 2010.

Sivaraj (Shiv) Sivaramakrishnan has been conducting postdoctoral research at Stanford University with James
This has been another amazing year for the Department at many different levels. In faculty recruitment, our search committee identified half a dozen outstanding candidates (from more than 100 applicants) for an Assistant Professor position that was part of a Provosts’ cluster hire in Biomechanics which has brought to campus some of the most creative young quantitative microscopists on the face of the planet. Thus the tradition of extending the boundaries of historical excellence in cutting edge microscopy, initiated when Kent Christensen first established the Microscopy and Image Analysis Laboratory in the Department in the 1970s, extends into the future with these new recruits. In the final analysis, the top two candidates were so outstanding that we could not decide between the finalists, so we recruited them both! Drs. Ajit Joglekar and Shiv Sivaramakrishnan (pictured on cover) come to us after spectacular postdoctoral careers at the University of North Carolina and Stanford, respectively, and join the Department and the University of Michigan Medical School as Biological Sciences Scholars.

Two named lectures were greeted with standing room only audiences in Kahn Auditorium in 2009/2010. The Burton Baker Lecture honored Tony Hunter, PhD, from the Salk Institute, who, among many historic contributions, first discovered that the cancer-causing protein that is produced by the Rous sarcoma virus is a protein kinase. Dr. Hunter described his recent studies on the actions of many components of the human kinome. The Inaugural Sarah Winans Newman Lecture was delivered on April 27, 2010 by Pietro de Camilli, MD, from Yale University. Dr. de Camilli has pioneered our understanding of the cell biology of the synapse, and has made extensive contributions to our understanding of regulated endocytosis and the roles of phosphoinositide lipids in membrane traffic.

It was also another banner year for recognition of our faculty, postdoctoral fellows, and students at many levels and with the acquisition of numerous highly competitive grants, recognitions and awards. As a reflection of this rejuvenated activity, the Department ranking among all Cell and Developmental Biology departments nationally also rose to the highest level since I arrived in 2002, to 16th in the nation in NIH funding. While this statistic pales in comparison to some of our outstanding sister Departments in the Medical School who have been among the top 10 Departments nationally for decades, none of our peers at the UM or nationally have exhibited an equivalently dynamic rise over the same period. The Medical School as a whole also rose to an astonishing 6th highest rating in the country last year, again underscoring the incredible work and growing international stature of our biomedical scientists among our leaders (and best).

The momentum of the Department is clearly headed in the right direction, and I hope to be able to report to you in the next year or two, as several of our junior scientists mature, that we have broken the barrier I hoped and planned to achieve when I arrived, and that our Department is in the top 10 in the nation. Only with the continued efforts of this amazing group of undergraduate, graduate, medical student, postdoctoral and faculty scholars can we achieve this goal, and I could not be more certain of our eventual success. I wish you all the very best for a productive and rewarding 2011!

James Douglas Engel, Ph.D.
G. Carl Huber Professor and Chair
Among the faculty at The University of Michigan are a number of scientists that study Hedgehog signaling, a vital developmental pathway. Their interests range from understanding normal Hedgehog pathway function during embryonic development (Ben Allen, Scott Barolo, Deborah Gumucio,) to exploring how abnormal pathway activity leads to a number of different cancers, including skin cancer (Anj Dlugosz), pediatric brain tumors (Xing Fan and Yuan Zhu), adrenal cancer (Gary Hammer) and pancreatic cancer (Marina Pasca di Magliano).

To take advantage of this research strength at the UM, Ben Allen, who joined CDB in 2009, and whose lab studies Hedgehog signaling during embryogenesis, organized a monthly “Hedgehog club” meeting last fall. This club meets the second Thursday of every month in BSRB and provides graduate students, postdoctoral fellows and faculty opportunities to present their work to a broad group of scientists and to get critical feedback on their projects. To date, these meetings have been a rousing success—currently the Hedgehog club consists of 17 investigators at the UM from several different departments across campus.

A key goal of the club is to foster interactions and discussions among labs that can lead to new grant proposals seeking to better understand the functions of this vital signaling pathway and to use the knowledge gained from these studies in the rational design of novel therapies to treat a number of different Hedgehog-dependent developmental diseases and cancers. To demonstrate the success of the Hedgehog club, one needs to only take a look at the numbers: within the past year members of the Hedgehog club have co-submitted no fewer than five grants, including two proposals each comprising 5 to 7 investigators that are currently under review by the University of Michigan Institute for Clinical and Health Research (MICHR) and the Center for Organogenesis.

This group is a testament to the interactive and collaborative environment in the CDB department.

HEDGEHOG BACKGROUND

Three mammalian hedgehog genes, (Desert, Indian, and Sonic hedgehog) play key roles during embryonic development, from the early establishment of the overall body plan to later specification of individual organs. Abnormal Hedgehog signaling is also involved in a number of human developmental diseases and cancers, including common skin tumors (basal cell carcinoma) and pediatric brain tumors (medulloblastoma). Hedgehog signaling deregulation is also linked to some of the deadliest human malignancies such as pancreatic cancer.

MULTISCALE CELL MECHANICS (CONTINUED FROM COVER)

... Spudich. The goal of Shiv’s research is to elucidate links between structure and function at the single protein, single cell, and tissue levels using cutting-edge microscopical, biophysical, and computational approaches, with a cell biological focus on molecular motors (see accompanying “Featured Faculty” article). Ajit Joglekar has been conducting postdoctoral research at the University of North Carolina-Chapel Hill with co-mentors Ted Salmon and Kerry Bloom. Ajit’s research focuses on the biophysics of kinetochore force generation and molecular mechanisms of its regulation using advanced in vivo imaging techniques (see accompanying “Featured Faculty” article). Interestingly, Ajit’s arrival at the UM as an Assistant Professor represents a return to the UM, where obtained his Ph.D. in Biomedical Engineering. Hopefully Ajit will be able to help Shiv find his way around this huge campus the first few months. Please welcome these two stellar scientists to the CDB faculty.
Cell and Developmental Biology Faculty

Ben Allen
Assistant Professor

Richard Altschuler
Professor
P: Otorhinolaryngology

Kate Barald
Professor

Scott Barolo
Assistant Professor

Faye Bradbury
Research Investigator

Marina Di Magliano
Assistant Professor, P: General Surgery

Andrzej Dlugosz
Professor, P: Dermatology

James Douglas Engel
Professor and Chair

Xing Fan
Assistant Professor, P: Neurosurgery

Diane Fingar
Assistant Professor

Philip Gage
Associate Professor
P: Ophthalmology & Visual Science

Roman Giger
Associate Professor

Jun-Lin Guan
Professor
P: Molecular Medicine & Genetics

Deborah Gumucio
Professor

Zhe Han
Assistant Professor, P: Molecular Medicine & Genetics

Peter Hitchcock
Professor, P: Ophthalmology & Visual Science

Graham Rex Holland
Professor
P: Dentistry: Cariology, Restorative Sciences and Endodontics

Michael Hortsch
Associate Professor

Tomonori Hosoya
Research Investigator

Patrick Hu
Assistant Professor, P: Internal Medicine: Hematology/Oncology

Ajit Joglekar
Assistant Professor

Sun Kee Kim
Associate Professor

Cheng-Yu Lee
Assistant Professor, P: Molecular Medicine & Genetics

Kim-Chew Lim
Research Assistant Professor
Jiandie Lin
Assistant Professor

Ivan Maillard
Assistant Professor,
P: Internal Medicine:
Hematology/Oncology

Sean Morrison
Professor
P: Molecular Medicine & Genetics

Kentaro Nabeshima
Assistant Professor

Sue O'Shea
Professor

Sivaraj Sivaramakrishnan
Assistant Professor

Osamu Tanabe
Research Assistant Professor

Billy Tsai
Associate Professor

Kristen Verhey
Associate Professor

Lois Weisman
Professor

Deneen Wellick
Associate Professor,
P: Molecular Medicine & Genetics

Michael Welsh
Professor

Yukiko Yamashita
Assistant Professor

Bing Ye
Associate Professor

Yuan Zhu
Assistant Professor
P: Molecular Medicine & Genetics

Alphonse Burdi
Professor Emeritus

Walter Castelli
Professor Emeritus

A. Kent Christensen
Professor Emeritus

Stephen Ernst
Professor Emeritus

Pentti Jokelainen
Professor Emeritus

Margaret Lomax
Professor Emeritus
P: Otolaryngology
RESEARCH FOCUS

How different structural and functional compartments form in a cell is a fundamental problem in biomedical research. This problem is especially acute in the nervous system, where there are thousands of types of neurons that differ in morphology and function and thus in their subcellular compartmentalization. Understanding how distinct subcellular compartments of neurons are established will provide critical insights to the assembly, function, plasticity, and disorders of the nervous system.

We are interested in how dendrites and axons, two major compartments that ensure directional information flow in a neuron, develop differently, and how dendrites become further compartmentalized into distinct functional domains. To study these problems, a major system that we have been using is the Drosophila dendritic arborization neurons, which elaborate their dendritic arbors in the body wall in a near two-dimensional fashion and thus allow for high resolution imaging of intracellular events in live, intact larvae. Taking advantage of the superb Drosophila genetics, we have carried out genetic screens and various types of analyses to identify the molecular mechanisms underlying differential development of dendrites and axons. We also complement the Drosophila system with cultured hippocampal neurons from rat embryos, a well-established system for neuronal cell biology, to both extend the mechanistic studies and investigate the evolutionary conservation of such mechanisms. Using these approaches, we have studied how membrane systems, especially the secretory pathway (e.g. dendritic Golgi outposts), contribute to the differential development of dendrites and axons.

Genetic programs that differentiate dendrite development from axon development: From a genetic screen, we isolated many Drosophila mutants that displayed defects in either dendrites or axons. Shown here is one mutant with its dendritic arbor preferentially reduced (dar mutant) and one mutant that exhibits axon-specific defects.

We plan to both extend the studies on membrane systems and explore new aspects of neuron compartmentalization in the context of developing, functioning, and diseased neural circuits.
Lois Weisman  
**PROFESSOR**

A.B. Rutgers University  
Ph.D. University of California-Berkley  
Dr. Weisman is currently the Sarah Winans Newman  
Collegiate Professor in the Life Sciences. Previous honors and awards include an American Heart Established Investigator Award, and an NSF Early Career Development Award.

**RESEARCH FOCUS**

The PI3,5P2 signaling pathway and neurodegeneration.  
Little is known about the underlying causes of neurodegeneration and other neurological diseases. Our lab recently made the unexpected discovery that altering the PI3,5P2 lipid signaling pathway to half its normal levels causes profound neurodegeneration and lethality in mice. Based on these observations we are focused on the following questions. 1) How is the PI3,5P2 lipid signaling pathway regulated. 2) What are the downstream effectors that are regulated by this lipid. 3) Are defects in this pathway a common cause of human disease? 4) Does upregulation of this pathway show therapeutic value? If we find that it does, then we will pursue a screen that we developed for drugs that can modulate this pathway. The above studies are being pursued in yeast, cultured mammalian cells and mice.

How do organelles move to the correct place at the proper time?  
Directed organelle movement is critical during cell division and differentiation. During cell division, a new cell-center is chosen, organelle volume doubles, and each type of organelle is accurately distributed to their proper location in the new daughter cells. Likewise during cellular differentiation, organelles move to new intracellular locations. This movement is essential for cells to acquire new functions. Defects in organelle movement have wide-ranging effects. For example defects in myosin Va based motility cause neurological diseases and defects in pigmentation, whereas defects in myosin Vb are linked to an inherited form of infant mortality. Our lab studies yeast Myo2, a direct homologue of myosin Va and Vb.  

Major discoveries include our discovery of one of the first organelle-specific receptors. Analysis of the receptor showed that it is a direct target of a major cyclin-dependent kinase, Cdk1. This is a key part of the mechanism that coordinates organelle inheritance with other cell-cycle processes, such as DNA replication. In addition we found that the spatially regulated destruction of the organelle-specific complex, is required to retain the organelle at its correct destination. Moreover, we have found a well-conserved Rab GTPase binding site on the myosin V cargo-binding domain.

We are focused on the following questions: 1) What is the mechanism that underlies the spatially regulated degradation of organelle-specific complexes? 2) How do Rab GTPases regulate cargo attachment to myosin V? 3) Does cargo attachment require regulatory conformational changes in the cargo-binding domain of myosin V? The above questions are being pursued in yeast, yet our overall goal is to determine the mechanisms of cargo attachment to myosin V in higher eukaryotes.
RESEARCH FOCUS

My main interest is in understanding how the cell regulates and performs DNA segregation. At each cell division, the entire genome is duplicated and each daughter cell must inherit an exact copy of the entire genome. Errors in this process can contribute to cancer, causes birth defects and can also be a factor in aging. The kinetochore is the major player in DNA segregation. It is the motor that attaches to chromosomes and directs them to each of the daughter cells. It not only provides the physical muscle for chromosome segregation, but it also helps the cell recognize and correct problems in chromosome segregation. My current goal is to characterize the biophysics of how the kinetochore drives chromosome movement and the cell biology behind how the kinetochore senses and communicates defects in chromosome segregation.

The kinetochore is one of the most complex macromolecular machines. In vertebrates, more than 100 different peptides have been identified as kinetochore proteins. A large number of microtubule-based motors, depolymerases, and microtubule-associated proteins also contribute to kinetochore function. This complexity has been a major hurdle in obtaining a molecular understanding of kinetochore function. To cross this hurdle, I devoted my post-doctoral work to define the protein architecture of the kinetochore. I relied on live-cell fluorescence microscopy techniques using genetically encoded fluorescent proteins in budding yeast. I developed methodologies to count the number of molecules of kinetochore proteins (quantitative fluorescence microscopy), and to determine their position within the kinetochore with nanometer-scale accuracy (super-resolution microscopy). Through a phylogenetic comparison, I also established that the kinetochore architecture is highly conserved in all eukaryotes, from yeast to humans. These studies now set the stage for detailed biophysical investigation of kinetochore function.

I will use a combination of live-cell measurements (various modalities of fluorescence microscopy: Fluorescence Resonance Energy Transfer or FRET, single particle tracking, fluorescence polarization measurement etc.) and in vitro characterization of reconstituted complexes (involving FRET, fluorescence life-time measurement, etc.) to determine nanoscale distributions of kinetochore proteins. These experiments will be followed by simulations of explicit physical arrangements of kinetochore proteins. I will then use dynamic FRET measurements to infer kinetochore protein dynamics. Together, these studies will provide an in vivo quantitative description of the molecular mechanisms underlying kinetochore function in chromosome movement and segregation.

The combination of live-cell fluorescence microscopy, yeast genetics, molecular and cell biology, and in vitro biophysical measurements developed for the kinetochore studies can be an extremely powerful approach for integrating biophysical and cell biological investigations of a wide range of cellular processes. In the long-term, I am interested in expanding my research to other macromolecular machines in the cell (the microtubule organizing center and transcription machinery in particular). These biophysical investigations will provide the foundation for cellular engineering.
Sivaraj Sivaramakrishnan
ASSISTANT PROFESSOR

B.E. University of Pune, India
M.S. University of Illinois, Urbana-Champaign
Ph.D. Northwestern University
Postdoctoral training Stanford University (James Spudich)

RESEARCH FOCUS
The laboratory research spans the fields of single molecule biophysics, protein biochemistry and cell biology and integrates a variety of experimental and computational approaches.

Coordinated function of the myosin family of molecular motors
Myosins are actin-based molecular motors implicated in diverse cellular processes. They are cellular engines that convert the chemical energy derived from the hydrolysis of ATP to mechanical motion. A lot is known about the structure and function of myosin molecules and the interaction of single myosins with single actin filaments. Myosin function in vivo is an emergent property of the simultaneous interaction of multiple myosins with multiple actin filaments. These coordinated interactions are essential for cellular processes such as membrane trafficking, mRNA transport and maintenance of membrane tension. An unexplored frontier in molecular motor research is how the same motor interacts with different subcellular compartments to perform different cellular functions. The laboratory uses a model experimental system (Figure 1), developed by Dr. Sivaramakrishnan, to examine the movement of organelle-sized nanostructures linked to different numbers and types of myosin motors on an organized meshwork of actin filaments.

Figure 1 – Coordinated movement of myosin VI-coated nanospheres on the dense F-actin network in the fish epidermal keratocyte lamellipodium. The linear trajectories result from flexible elements in the myosin protein that enable multiple dimers or monomers of this motor to coordinate their interactions and move cargo over large distances (> 10 μm).

Regulation of protein-protein interaction using an ER/K α-helix
Cell biological processes in health and disease are regulated by dynamic interactions between proteins. We use a technique termed SPASM (Systematic Protein Affinity Strength Modulation) to regulate the strength of protein-protein interactions in vivo. SPASM involves two interacting proteins separated by an ER/K helix of designed mechanical stiffness. The ER/K helix acts as a semi-flexible structure that regulates the strength of interaction between the proteins it separates. The mechanical properties of the helix can be engineered systematically to alter the affinity of the protein-protein interaction. The laboratory is focused on the use of SPASM for a variety of applications including the design of FRET bio-sensors, protein concentration sensors (Figure 2) and modulating autoinhibition of enzymes such as kinases.

Figure 2 – Schematic of a SPASM based FRET sensor (a) Inactive (Open – No FRET (fluorescence resonance energy transfer)) and (b) Active (Closed – FRET) state. Illustration here shows protein calmodulin (CAM) and its binding peptide, separated by an ER/K α-helix. Interaction between CAM and peptide in its closed state results in FRET between CFP and YFP. ER/K α-helix stiffness is engineered, such that FRET efficiency changes with intracellular protein concentration.

Contractility and signaling in cardiomyocytes
Cardiomyocytes have a highly organized acto-myosin cytoskeleton that drives contractility of heart muscle. Contractility of cardiomyocytes is influenced by numerous factors including the control of sarcomeric proteins by calcium signaling. Genetic mutations in sarcomeric proteins such as β-cardiac myosin can also influence contractility in diseases such as β-cardiac myosin. Recent technological advances have enabled the contractility measurements of isolated cardiomyocytes under physiological load conditions (Figure 3).

Figure 3 – Schematic of single-cell stretch device to study force-length changes in single cardiomyocytes.

The laboratory is broadly interested in the development of FRET bio-sensors to act as spatio-temporal probes of signaling events in cardiomyocytes during normal and disease states.
Faculty Honors and Research Leadership Roles

The Department’s faculty, students and postdoctoral scholars continue to be honored for their research and scholarly achievements.

Listed below are some of the recognitions that have been accrued at the time this newsletter went to press.

Kate Barald is a member of the AAAS Electorate Nominating Committee of the Section on Biological Sciences Editorial Board, Developmental Dynamics, member of the NSF graduate fellowship review panel for the Engineering Directorate, member of the NSF Developmental Neural Systems cluster review panel (IOS) and member of an NIH NINDS K99 study section; ad hoc reviewer for the Wellcome Trust, the National University of Singapore, the Australian and New Zealand MRC, and served as chair of the CDMRP Neurofibromatosis review panel.

Scott Barolo is a member of the NICHD - Development Biology Review Group and American Heart Association Basic Science Subcommittee.

Doug Engel is an Editor of Molecular and Cellular Biology, a member of the NIH Molecular and Cellular Hematology Study Section and during the past year was a co-organizer of the 17th Hemoglobin Switching Conference (Oxford) and the 5th International GATA Conference (Sendai).

Deb Gumucio is a member of the Molecular and Cellular Biology Editorial Board, a member of the Developmental Biology Committee at NICHD, and a member of the External Advisory Committee for the University of Pennsylvania Gastroenterology Research Center.

Michael Hortsch is a managing editor of Frontiers in Bioscience and on the editorial board of Cellular & Molecular Biology Letters, the International Journal of Cell Biology and the Advanced Studies in Biology. During his Sabbatical in 2009 he was appointed Adjunct Associate Professor at the University of Michigan-Shanghai Jiao Tong University (UM-SJTU) Joint Institute, received a Teaching with Technology Institute (TTI) Award from the UM Center of Research on Learning and Teaching (CRLT), and was awarded a Medical Education Scholarship (MESP) by the UM Department of Medical Education.

Ivan Maillard received a scholar award from the Sidney Kimmel Foundation for Cancer Research.

Kentaro Nabeshima received a March of Dimes Basil O’Conner Scholar Research Award.

Sue O’Shea is the Co-Chair for the National Stem Cell Bank - Scientific oversight committee, an ad hoc reviewer for the NIH, NINDS, and a member of the Stem Cells International, Editorial Board Co-director consortium for Stem Cell Therapies.

Billy Tsai is a member of the editorial board for the Journal of Virology.

Lois Weisman is a recipient of an NIGMS NIH MERIT award. She is a member of the NIH CSR Study Panel, NCSD, serves on the editorial board of J. Cell Biology and is a co-organizer of the Cold Spring Harbor Yeast Cell Biology Meeting.

Mike Welsh is a member of the Cellular Biochemistry and Physiology Editorial Board and Oakridge Associated Universities Peer Review Panel.

Yukiko Yamashita is a member of the Current Protocols in Stem Cell Biology Editorial Board and Molecular Biology of the Cell, Board of Reviewing Editors.

Bing Ye has been named a Pew Scholar.
Thesis Defenses

Fumi Ebisu (Barald Lab): Role of the cytokine Macrophage Migration Inhibitory Factor (MIF) in inner ear neuronal and sensory cell development.

Jeannie Hernandez (Altshuler Lab): Development of an Embryonic Stem Cell-Based Therapy of Spiral Ganglion Neurons. She is now a postdoctoral fellow in California.

Jae Lee J (Morrison Lab): The Regulation of Signaling in Hematopoietic Stem Cell Maintenance. He has a manuscript in preparation which is likely to be a landmark study in the field. As part of his dual MD/PhD degree he is currently doing medical rotations.

Mengding Qian (Tsai Lab): Roles of Lipid and Protein Receptors in Regulating Polyomavirus Infection. She is now in London, UK.

Nicole Slawny (O’Shea Lab): Tri-lineage differentiation of embryonic stem cells: role of Wnt signaling. She co-authored several publications and is now a post-doc in Gary Smith’s UM lab.

Aaron M. Udager (Gumucio Lab): Cell-specific gene expression: pylorus morphogenesis and Hedgehog-regulated enhancers. Working toward a dual MD/PhD degree he is now doing medical rotations. Here at CDB he published two first author papers, but also set up a bioinformatic tool, called TopoTX, that allows to search the whole genome for specific transcription factors binding sites. The TopoTX platform is likely to lead to significant advances in many fields, including developmental biology and cancer biology, and has been a key element to new grant proposals involving more than 10 investigators at Michigan.

Lou Chang (Zhu Lab): Insights from Murine Models of Neurofibromatosis Type I: The Etiology and Appropriate Therapeutic Windows for Peripheral Nerve Sheath Tumors.

Yuan Wang (Zhu Lab): The Role of Tumor Suppressor Genes PS3 and NF1 in Neural Stem Cells and Brain Tumor Development.

Awards

John Dishinger (Verhey Lab) received a NIH Ruth L. Kirschstein National Research Service Award - Postdoctoral Fellowship

Andy Chervenak (Barald Lab) received a pre-doctoral fellowship award from the NIH-sponsored Hearing, Balance, and Chemical Senses Training Grant, an Association for Research in Otolaryngology Midwinter Meeting Travel Award, a Travelling Fellowship from the Company of Biologists LTD (the Journal Development) and a Rackham International Research Award to spend a semester working at the Australian National University in Canberra, Australia.

Travis Dickendesher (Giger Lab) received the Fine Science Tools Graduate Student Travel Award from the neuroscience program.

Lihong Shi (Engel lab) received an American Heart Association postdoctoral fellowship.

Ajay Prakash (Gumucio lab) received an NIH F30 NSRA award for his studies on pyloric development.

Alumni Updates

Christina Swanson was the first PhD student to graduate from the Barolo lab, where she was extremely successful, publishing two first author papers, one of which, in the very high impact journal Developmental Cell, has been featured as “editor’s choice” in Science is a “must read” at “Faculty of 1000 Biology”, a science reviewing community of experts that reviews the most significant new publications. Christina is currently a SPIRE postdoctoral fellow at University of North Carolina. Chapel Hill. The SPIRE fellowship allows her a great level of independence within the lab of Bob Duronio.

Kaleena Bernardi Dezsi (Tsai lab), studied the cholera toxin intracellular localization, she returned to Tsai lab as a postdoctoral fellow.
Ask the Post-docs!

As a post-doc who survived the graduate school experience, what advice would you have now for current graduate students?

Ph.D.1 Don’t worry about the little things that won’t matter at the end of graduate school. Things will work out. Projects will work. Trust that your advisor and committee members have your best interest at heart. However, if it is obvious that they do not, seek advice from other faculty members and students on how to proceed with such a difficult situation. The University wants you to succeed!

Attend many talks. Read many papers. Don’t be scared to talk to someone who may have great suggestions for your project. Be confident! Don’t be scared to give a talk or have others critique your data. Worrying about the tone of someone’s voice or poor word choice that may seem rude, but in all likelihood, was not meant to be so is wasted energy. Do not take it personally! You will need to spend your time being productive!

There are many times in graduate school where you might doubt yourself and your goals. Remind yourself often of why you came here and what you hoped to accomplish. When things are difficult, it can be easy to let your mind venture into other careers that you think will be better. The grass is not always greener on the other side. There is nothing wrong with going on to do something else, perhaps in industry or a non-research science field, but just make sure it’s for the right reasons. Every job and career has its frustrations.

As a final note, take time for yourself, your family, and your friends. You can be in graduate school and have a personal life—just don’t lose your focus!

Ph.D.2 This first piece of advice is suitable for international students: Don’t waste too much time when you arrive in this country with fun/exciting distractions that have nothing to do with research. Remember that graduate study is just the very beginning of a scientific career, and thus it is the main thing you must focus on. I wish I had realized this earlier! Don’t be too relaxed, even though you have already put a tremendous amount of work into getting into grad school in the United States.

The second piece of advice is to read more literature. In my first few years of graduate school, I mainly focused on bench work while not reading papers. Reading the literature will better help you move your thesis project forward more quickly. Catching up on the literature near the end of grad school took a tremendous amount of time and effort. Thus, I suggest to read papers from the first day of graduate school. Then the process won’t be too painful.

Ph.D.3 Work hard. For most graduate students, your only immediate concern is you, not family, etc. Work hard, but don’t stress. If you leave graduate school, it is not the end of the world; in fact, you may find a career that works much better for your interests and talents. Graduate school will end. Make sure you find a supportive mentor; if you don’t, find a new lab. If you’re not sure if you want to do a post-doc, try other options. It is possible to come back to a post-doc.

Ph.D.4 Learn from your mentor how to find the major and important questions—this is the foundation for the science. If you develop the habit of asking yourself these questions, it will benefit you your entire academic life.

FROM OUR MOST HUMOROUS PH.D.

There are only two situations when you need to be in the lab:

One—when experiments aren’t working;

and Two—when experiments are working.

Also, Ph.D. Comics aren’t funny until after you graduate… Try not to read them until then.
Gifts to Department Honor Legacy of Newman Family

Professor Emerita, Dr. Sarah Winans Newman, joined the University of Michigan faculty in 1970, following her postdoctoral training at Downstate Medical Center of the State University of New York. A few years later, as an assistant professor in the Department of Cell and Developmental Biology (then called the Department of Anatomy), Sarah had a serendipitous meeting with a young medical student, Richard “Rick” Newman. Their shared fascination for neuroanatomy, especially uncharted areas of the brain, bonded them professionally and personally. Sadly, Rick passed away just a few short years into his career and their marriage.

To honor Rick’s life and his dedication to the field, his parents, Leonard and Eileen Newman, established the Dr. Richard Mark Newman Professorship in Neuroanatomy in the Department of Cell and Developmental Biology. Through their estate gift, they will not only pay homage to their son’s memory in perpetuity, but also continue their deep commitment to the University of Michigan.

Rick’s father, Len was a Michigan man in every sense of the term. Born and raised in Grand Rapids, Len obtained both his BA and his MA from the University of Michigan. After serving in World War II, Len returned to Michigan to start his own business – the clothing store, Beverly’s, which later grew into a chain across the state of Michigan. In 1948 he married Eileen Kollenberg, a fellow Grand Rapids native. Throughout their 53 years of marriage, Len and Eileen were devoted to Michigan, actively supporting arts and education throughout the state, and specifically at the University of Michigan.

Len and Eileen had two children, Rick and his sister, Judi. Rick first pursued his education at the University of Colorado and then at Michigan State University, where he met Professor Jack Johnson, a renowned neuroanatomist who became Rick’s mentor. Guided by a new-found passion for neuroanatomy, Rick entered medical school at the University of Michigan. During his freshman year, Rick approached Sarah (then Sarah Winans) about joining her lab to conduct research. When Sarah asked what he wanted to study, she recalls that Rick did not hesitate. “He said he wanted to study the neuroanatomical connections of the nucleus accumbens. At the time this was not exactly a hot topic in neuroscience; it was not even on the map.”
"I asked him why he wanted to study a topic about which essentially nothing was known. He responded that he wanted to be the first to discover the connections of this area of the brain." Sarah was immediately intrigued since she, too, had been inspired to research an unstudied area of the brain during her post-doctoral training, an endeavor that led to new perspectives on pheromones and the brain pathways that control sexual behavior. Sarah recalls, "There was no question that Rick would join my lab."

Rick graduated from the University of Michigan Medical School in 1979, but was diagnosed with Amyotrophic Lateral Sclerosis (ALS) just as he finished his medical training. Rick opted not to enter a residency program and instead chose to pursue an active research agenda with Sarah. Rick’s early research on the neuroanatomy of the nucleus accumbens and olfactory tubercle was highly successful, and was published as two extensive papers in the Journal of Comparative Neuroanatomy. Rick passed away in 1987. Through Len and Eileen’s generosity, Rick’s passion for scientific discovery is more than just a memory.

Sarah’s dedication and passion for her work and the University also inspired her own mother, Marian Aldrich Schilling, to make an estate gift to the Department of Cell and Developmental Biology. Through this gift, Inaugurated in March, 2010 following Mrs. Schilling’s death, the Sarah W. Newman Graduate Student Fund is now being used to support programs that foster collegiality and community amongst graduate students in the Department of Cell and Developmental Biology.

Mrs. Schilling, herself a dedicated teacher, chose to honor the graduate students of Sarah’s laboratory as well as Sarah’s committed service to the Department and the University.
MAKE A DIFFERENCE

If you would like to support graduate education by making a gift to the Department of Cell and Developmental Biology visit

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or send check payable University of Michigan to the address above care of Lori Longeway.

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