MCB

Department of
Molecular and Integrative Physiology

DECEMBER 2014 NEWSLETTER

GREETINGS FROM THE HEAD

Milan K. Bagchi, PhD

I hope you will enjoy the 2014 edition of the MIP newsletter. At the end of my second year as the Head of the department, I have many reasons to feel upbeat and hopeful for the future.

Prior to my taking the headship, the department went through a lean period with a sharp reduction in faculty ranks caused by an unprecedented number of retirements: nine professors retired within a span of two years. Although this loss of experienced faculty presented immediate challenges for our teaching mission, it also opened up a unique opportunity to revitalize and reshape our research program.

During the past two decades, the discipline of physiology has undergone a huge transformation. It has entered an exciting new era that melds our knowledge of molecular and cellular processes with the principles of systems biology, allowing us to gain new mechanistic insights at the organismal level. To keep pace with this rapidly evolving field, our current challenge is to rebuild the department in its traditional core areas of strength, such as neuroscience, endocrinology, metabolism, and reproduction, as well as in emerging areas, such as genomic medicine.

Last year, our major goal was to recruit new faculty in these areas. I am happy to report that we have been hugely successful in this endeavor. We have recruited three stellar Assistant Professors: Catherine Christian and Nien-Pei Tsai in the area of molecular and cellular neuroscience, and Erik Nelson in the area of metabolic regulation and cancer. In addition, we partnered with the Institute of Genomic Biology to recruit Professor Derek Wildman, a well-established scientist who will provide leadership in the computational genomic medicine area. These new additions will strengthen the priority areas of the department's research mission and allow us to redesign our teaching curriculum to make it more attractive and effective for our undergraduate and graduate students.

The department is also gaining momentum in various other academic aspects. We have launched an effort to improve our research infrastructure by developing shared instrument facilities. We invested funds to refurbish a two-photon laser microscope and purchased a Nanodrop spectrophotometer. The department has also committed funds to support transgenic animal and histology core facilities and to a campus initiative to procure an optical imaging system for non-invasive imaging of live animals.

To improve the graduate training experience, we have decided to award several travel grants each year to our graduate students who will present their research at national meetings. A robust departmental seminar program and the endowed C. Ladd Prosser lectureship continue to bring world's leading scientists to speak to our students.

Collectively, these initiatives are important steps in the right direction, allowing our laboratories to continue to conduct cutting edge research, publish in high impact journals, and remain at the forefront of their fields. With the addition of four new talented faculty members this year, the MIP department feels energized and is moving forward with strong resolve and high aspiration. We welcome the support of our alumni, friends, and well-wishers to be part of the department's significant growth and energy. •

IN THIS ISSUE

Greetings from the Head
by Milan Bagchi 1

Molecular and Integrative Physiology reaches accross campus to collaborate
by Deb Aronson 2-3

New faculty 3-5

MIP family news 6-7

In Memorium
William W. Sleator, Jr. 8

ABOUT THE NEWSLETTER

The Molecular and Integrative Physiology Newsletter is an annual publication of the Department of Molecular and Integrative Physiology in the School of Molecular and Cellular Biology at the University of Illinois, Urbana-Champaign. The newsletter is written by MIP faculty and friends, and designed by MCB Communications.

Our alumni are important to us. We want to hear from you. Send us your latest news, and we'll include it in the next newsletter's MIP Family News. We also welcome articles and suggestions for future newsletters. Here's how to reach us:

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MOLECULAR AND INTEGRATIVE PHYSIOLOGY REACHES ACROSS CAMPUS TO COLLABORATE

by Deb Aronson

How does a living system operate by translating the genomic information into molecular and cellular functions? How do we integrate information from the single molecule to cellular to whole organism levels? What goes wrong when diseases happen? Understanding these basic questions enables MIP faculty to be at the forefront of many research advances. Many of these advances come from cross-campus collaborations.

"Physiology is an exciting frontier of biology that serves as a link between molecular function and whole animal integration," says Milan Bagchi, Professor and Head of the Department of Molecular and Integrative Physiology (MIP). "Many new tools and collaborations are helping us understand how thousands of encoded proteins work in concert to bring about the highly coordinated behavior of cells and tissues underlying physiological functions."

For example, Daniel Llano's work focuses on the brain, but he is particularly interested in how the brain responds to injury and how that is manifested in the auditory system. Llano, Assistant Professor of MIP, ferrets out how aging and Alzheimer's disease affect the auditory system, as well as how language and cognitive dysfunction arise from stroke.

"We are studying how brains process various kinds of sounds using a range of techniques including imaging, electrophysiology, and computational work," he says.

Llano successfully collaborated with Taher Saif, Professor of Mechanical Engineering, who has had a longstanding interest in the mechanical properties of neurons. Saif determined that even tiny perturbations in the mechanical tension of neurons can substantially change neuronal activity. Llano has preparations of brain slices in his lab that he puts on micro-devices, built by Saif, that exert tiny forces on the portions of brain tissue. He then uses optical imaging to measure how populations of brain cells respond to these forces.

"There are many clinical conditions where mechanical forces are extremely important, for example, brain tumors, traumatic brain injury, and hydrocephalus, all stretch brain cells and nobody has any idea how that affects brain function," says Llano.

Llano also has a collaborative project with Stephanie Ceman, Associate Professor of Cell and Developmental Biology (CDB) and Brad Sutton, Professor of Bioengineering, that led to a Beckman Institute seed grant award to develop novel optogenetic and brain imaging approaches to study hierarchical control mechanisms in the brain.

Martha Gillette, Professor of MIP and CDB, is also bringing a myriad of tools and collaborators to bear on complex questions of how the brain works. Gillette is leading an ambitious NSF-funded project that will explore the dynamic brain — "how it remembers, enables us to move or be moved, to awake and sleep each day of our lives," as she says.

"Many new tools and collaborations are helping us understand how thousands of encoded proteins work in concert to bring about the highly coordinated behavior of cells and tissues underlying physiological functions."

The brain team, which includes Jonathan Sweedler, Professor of Chemistry and an affiliate of MIP, Gabriel Popescu, Professor of Electrical and Computer Engineering; and John Rogers, Professor of Materials Science and Engineering, intends to examine how neurons in the brain are activated in response to experiences, in order to see how they cause behavioral changes and subsequent activities of the neurons, also known as brain plasticity. In order to do this, the team will develop and use newly created, complementary technologies that will non-invasively control, measure, and analyze brain network dynamics and change in real time.

Being able to analyze a system on both a molecular and cellular, as well as a system-wide level, also leads to far greater understanding and opportunities for translational work.

For example, in the case of Bagchi, a long-time collaboration with Indrani Bagchi, Billie Field Professor of Comparative Biosciences in the College of Veterinary Medicine, to study hormonal effects on endometrial biology has led to great advances in understanding of endometriosis, a major gynecological disease. Their collaboration with Benita Katzenellenbogen, Swanlund Professor of MIP, and Robert Taylor, a world-renowned clinical expert on endometriosis at Wake Forest University, North Carolina, which has been supported by an NIH-funded Specialized Center for Research in Reproduction, successfully created a mouse model for endometriosis and identified abnormally expressed angiogenic and inflammatory factors that appear critical for the development of the disease.

"If we can find a way to curb the action of these factors, that will help develop a treatment strategy," says Bagchi.

Katzenellenbogen is also a lead researcher in a campus-wide multi-investigator Research Center on Botanical Estrogens awarded by the NIH. At this Center, she collaborates with William Helferich, Professor of Nutrition and John Katzenellenbogen, Professor of Chemistry to understand how the botanical estrogens might be impacting human health.

These projects have been going on for several years, but other MIP faculty are just getting started. For example, Derek Wildman, Professor of MIP, the newest member of the department, has just begun to collaborate with numerous faculty, from anthropologists to various computer scientists and engineers.

As one of the few people who study the evolution of pregnancy and the role of the placenta, Wildman is interested on both a clinical and evolutionary level. Most of the syndromes that cause pregnancy problems, like pre-eclampsia and intrauterine growth restriction (poor growth of fetus in utero) are associated with placental dysfunction. "The placenta", Wildman says, "is the most variable mammalian organ in its shape, the way it connects with the uterus and how deep it goes into the uterine wall". By looking at those variations in humans and other species and by collaborating with Rebecca Stumpf, Associate Professor of Anthropology, who studies comparative sexuality and reproduction, Wildman hopes to both determine ways to prevent those problems and also to under-

stand placental biology and how pregnancy evolved.

In addition, Wildman, whose background is in anthropological genetics, is leading a new theme at IGB called computational genomic medicine. Wildman frequently collaborates with computer scientists and bioengineers, lending his physiological expertise to figure out ways to analyze enormous amounts of complex genomic data.

Because of his work with high-throughput computational methods and his work with IGB, Wildman is also part of the campus's CompGen initiative, which combines the university's strengths in both genomic research and computer science in order to develop new approaches and tools to make comparing genomic sequences easier and more accurate. CompGen is a cross-campus collaboration involving about 80 Illinois faculty, as well as institutions in India and China.

It is just as important to train the next generation of scientists cross disciplinarily as it is to advance a given field of research, and many MIP faculty are involved in various campus-based, cross-disciplinary efforts to do just that.

For example, Ann Nardulli, Professor of MIP, is working closely with Rashid Bashir, Professor of Bioengineering, on a training grant in cancer nanotechnology which funds graduate students interested in studying both cancer biology and nanotechnology. This Midwest Cancer Nanotechnology Training Center, of which Nardulli and Bashir are co-PIs, trains graduate students and post docs in nanotechnology to create novel sensors that might identify early cancer in body fluids, develop therapies that involve nano-sized and highly targeted drug doses, and understand the interaction of nanotechnology and mechanobiology.

Bagchi, Katzenellenbogen, Nardulli, and Lori Raetzman, Associate Professor of MIP, are also deeply involved in a cross-campus NIH-funded "Endocrine, Developmental and Reproductive Toxicology" training grant that has been continuously funded for fifteen years. These scientists are also part of a group, called Program in Endocrinology, Embryology, and Reproduction (PEER), which meets every Wednesday for presentations by research trainees. This seminar-style group strongly establishes a collaborative and cross-disciplinary environment in the campus.

"This program is important because it provides a training component and because that cross-disciplinary approach percolates down from post-docs to undergraduates quite a bit," says Bagchi.

If the future is working across disciplines, then the MIP department is well positioned to continue to be a major contributor to these groundbreaking and innovative collaborations in biological and health sciences. •

CELLS, SYNAPSES, AND CIRCUITS IN NEURO-ENDOCRINOLOGY AND EPILEPSY

Catherine Christian, PhD

In the process of applying and interviewing for faculty positions, I was hoping to find a rare combination of factors: outstanding collaborative potential, a high level of collegiality, talented and motivated students, excellence in neuroscience, and excellence in endocrinology. I was delighted to find this combination in the MIP department at Illinois, and joined as an assistant professor in August 2014.

My laboratory works at the interface between neuroendocrinology, the study of interactions between the neural and endocrine systems, and epilepsy, a class of neurological disorders characterized by repeated seizures that affect 65 million people worldwide. Many patients (both men and women) with a particular type of epilepsy, temporal lobe epilepsy, experience dysfunctional neuroendocrine regulation including altered hormone levels, irregular menstrual cycles, and infertility. This can be due to the seizures themselves, or may be side effects of taking antiepileptic drugs. This has a significant impact on quality of life and overall health for these patients, and potentially compromises the treatment of seizures, which can be influenced by hormonal feedback. The neurobiological mechanisms underlying this dysfunction remain poorly understood.

In my laboratory, we are focusing on the impact of temporal lobe epilepsy on the brain's control of the reproductive neuroendocrine system. Specifically, we are using a rodent model of temporal lobe epilepsy, the pilocarpine model, to investigate changes in the regulation of the hypothalamo-pituitary-gonadal (HPG) axis, which controls the production of gonadal steroid hormones (e.g., estrogen, progesterone, and testosterone) in both males and females. We are particularly interested in how seizure activity that primarily impacts other areas of the brain (the hippocampus, amygdala, and cortex) is transmitted to the hypothalamus. Do the seizures disrupt normal information processing between these areas? Do the seizures cause the formation of connections that normally

are not there or are sparse? Or conversely, do the seizures lead to loss of connections that normally help to properly regulate the HPG axis?

In related work that is currently supported by the Citizens United for Research in Epilepsy (CURE) foundation, we are also exploring the role of astrocytes in regulating synaptic transmission mediated by the neurotransmitter GABA. Although a role for astrocytes in modulating excitatory glutamatergic transmission is well established, less is known about the roles of astrocytes in modulating synaptic inhibition. We are exploring this question by selectively altering astrocytic function and observing the changes in GABAergic transmission and circuit function that result from modifications in astrocytic activity. We are also exploring the actions of endozepines, which are endogenous peptides that mimic the actions of benzodiazepine drugs (Christian et al., Neuron 2013), on modulation of GABAergic transmission and how this modulation affects both normal and abnormal behaviors.

To tackle these questions, we will use a multidisciplinary range of tools and techniques such as optogenetics, patch clamp electrophysiology, laser scanning photostimulation, calcium imaging, and in vivo electroencephalogram (EEG) recordings. Our hope is that this work will provide new targets in treating epilepsy and other neurological and psychiatric disorders (such as anxiety, depression, and memory disturbances) associated with neuroendocrine dysfunction and hormonal feedback effects. •

ENDOCRINE AND METABOLIC CONTROL OF BREAST CANCER PATHO-PHYSIOLOGY

Erik R. Nelson, PhD

With a woman's lifetime risk of invasive breast cancer currently estimated to be 1 in 8, breast cancer remains the most common cancer among women and is the second leading cause of cancer death. The magnitude of this problem provides a strong impetus for studies that may lead to new chemopreventative strategies and/or lifestyle changes that reduce cancer incidence and mortality. Therefore, the goal of my research is to investigate the effects of the endocrine system and metabolism on breast cancer initiation and progression.

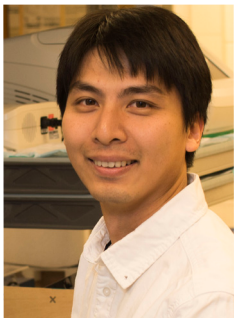
Many epidemiological studies have implicated cholesterol as a risk factor for breast cancer onset and recurrence. In recent work we used mouse models of breast cancer to directly test the effects of cholesterol on breast cancer. Indeed, elevated cholesterol decreased the time it took for mice to develop tumors, as well as increased the growth of tumors. We found that it was not cholesterol itself, but rather a cholesterol metabolite called 27-hydroxycholesterol (27HC) which mediates the effects of cholesterol. 27HC has the capacity to activate the estrogen receptor, which is known to stimulate breast cancer growth. Importantly, tumor growth rate can be reduced by inhibiting cholesterol synthesis with drugs like statins, or by novel inhibitors of the enzyme responsible for the synthesis of 27-hydroxycholesterol. We are actively exploring these as novel therapeutic options for breast cancer patients.

In our studies we made the observation that in addition to stimulating breast tumor growth, 27HC dramatically increased the metastasis (spread) of the cancer. This is a very important observation since the majority of breast cancer patients will eventually relapse with metastatic disease. Unfortunately, outside of cytotoxic chemotherapy and radiation, both of which having significant side-effects, there are not very many treatment options for patients with this stage of disease. 27HC may represent a viable therapeutic target to prevent and/or treat metastatic disease. Therefore, the first goal in my laboratory is to elucidate the mechanisms by which 27HC, other related metabolites, and endocrine factors impact metastasis. We hope that our work will result in near-term therapeutic options for breast cancer patients. This is of incredible importance given that the incidence of breast cancer is highest in post-menopausal women, a population where elevated cholesterol levels are common, and the fact that the majority (>90%) of breast cancer patients will eventually succumb to metastatic disease

I am excited to be carrying out this important research in the Department of Molecular and Integrative Physiology. The department is rich with proven expertise in endocrinology, metabolism and cancer biology. A very talented and dedicated population of undergraduate and graduate students coupled with state of the art technology will allow for us to carry out cutting edge research. I look forward to collaborating with members of the department as my team investigates the endocrine and metabolic control of breast cancer pathophysiology. •

SYNAPSE DEVELOPMENT IN HEALTH AND DISEASE

Nien-Pei Tsai, PhD



As a molecular neurobiologist, the collaborative and interdisciplinary environment of MIP will enable me to continue and expand my research program in studying synapse development.

Synapse development in early life contributes tremendously to nervous system plasticity and functionality. Abnormal synapse development has been documented in multiple neurodevelopmental disorders, including autism spectrum disorders and mental retardations. My research aims to understand the molecular and cellular mechanisms underlying normal and dysregulated synapse development using mouse models of neurodevelopmental disorders.

My recent research has focused on one of the most common neurodevelopmental disorders: fragile X syndrome (FXS). FXS is caused by mutations on a gene called Fmr1. Fmr1 encodes an RNA-binding protein, named Fragile X Mental Retardation Protein (FMRP), which regulates protein translation. FXS patients and the mouse model of FXS, the Fmr1 deletion mice, show multiple neuronal and synaptic deficits in the central nervous system. However, because numerous targets are regulated by FMRP, the neuronal deficiencies in FXS are extremely complex and likely involve multiple cellular processes besides protein translation.

My postdoctoral research identified a protein degradation pathway and a protein translation pathway involved in one of the major synaptic deficits in FXS, the deficiency of synapse elimination. The findings suggest a unique and parallel crosstalk between protein synthesis and degradation to regulate synapse number in the central nervous system. To continue this exciting discovery, my lab is pursuing two directions. First, we will study the protein ubiquitination in synapse development. Ubiquitination is the major process that selectively chooses proteins for degradation. It is important for cellular homeostasis and therefore is critical for those dynamic neuronal structures, such as synapses. The goal is to elucidate how specific protein degradation pathways are involved in synapse development and how the regulations might be altered in neurodevelopmental disorders.

Second, we will study the protein translation locally at or near the synapses. The messenger RNA (mRNA) can be localized to, or close to, synapses and translated into proteins. This type of translation provides efficient and spatial regulations for selected genes and is critical for many synaptic events that are dysregulated in neurodevelopmental disorders, such as FXS. The goal of this direction is to investigate novel regulatory mechanisms in the local protein translation and to determine how they are connected to synapse development. In the long term, by dissecting both the protein translation and protein degradation pathways in synapse development, I hope my research can facilitate understanding and development of therapeutics for neurodevelopmental disorders. •

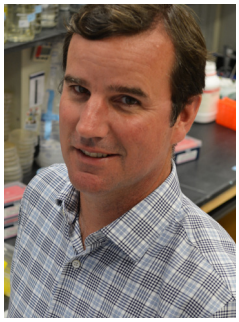
COMPARATIVE GENOMICS AND THE EVOLUTION OF PREGNANCY

Derek Wildman, PhD

I joined the faculty in the Department of Molecular and Integrative Physiology in August 2014. I chose to join the department because of its excellent faculty and students, and I am particularly attracted to the department's strengths in endocrinology and neurobiology.

My laboratory pursues many research questions, but I am most excited about our work that focuses on pregnancy in mammals. I wonder why elephant pregnancies last nearly two years while mouse pregnancies are done in fewer than three weeks. Human pregnancies fall roughly in the middle of this range, but oftentimes the process goes awry, and babies are born prematurely. Nationally, preterm birth occurs in about one of every eight pregnancies, and the hospital costs alone for these births is upwards of $26 billion per year. Amazingly, scientists have not yet discovered how to accurately predict when women will go into labor. Accurately predicting the timing of the onset of labor is therefore an important goal.

Preterm labor and birth can be caused many different factors including infection, injury, stress, and vascular disorders. Because preterm birth has multiple causes it is considered a syndrome rather than a disease. Human term and preterm labor are characterized by several common features including uterine contractions, cervical dilatation, and rupture of chorioamniotic membranes; however, current thought suggests that term labor is initiated by different factors than those in preterm labor. About 70% of preterm deliveries occur after spontaneous labor, the rest are due to "indicated" preterm deliveries in which the mother and/or fetus is at great risk. While preterm labor is relatively common in humans, its rate of occurrence in other species is poorly known with the exception of a few forms of domesticated livestock. Recently, we were the first group to characterize the rate of preterm delivery in the chimpanzee (Wildman et al. PLoS ONE 2011;6(9):e24509). As in humans, the preterm delivery rate is fairly common in this species. Preterm birth



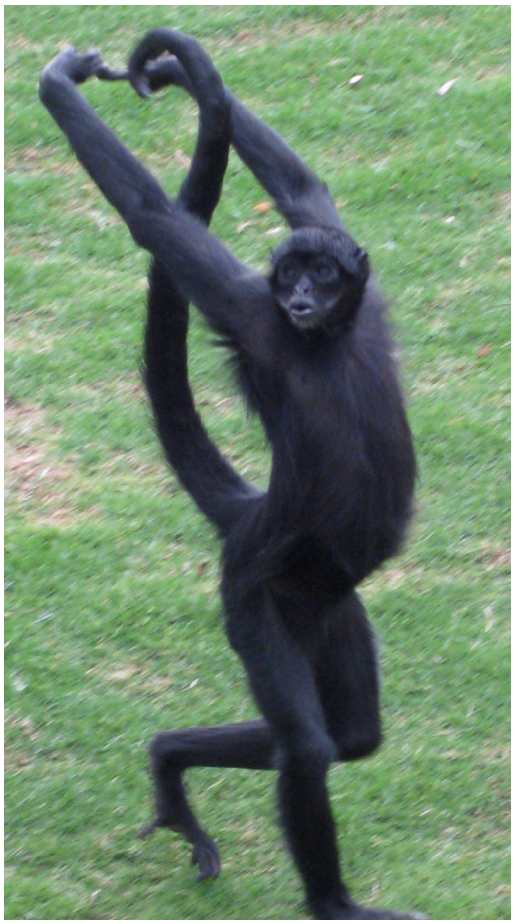
rates have not been published for any other primate species making it difficult to say whether the human and chimpanzee pattern is typical. We anticipate addressing this question in the future.

Preterm birth is also associated with disorders in placentation, and we have spent some time studying placenta biology. Our phylogenetic studies have shown that the human type of placenta, long thought to represent the most evolutionarily advanced form, is actually the ancestral type amongst placental mammals (Wildman et al. Proc Natl Acad Sci U S A. 2006 Feb 28;103(9):3203-8). After this study, we realized that we needed to look at the evolution of genes not just in recent human history, but also deep in our past, in order to unravel the molecular underpinnings that form the basis of our placenta. Toward that end, we have conducted a series of evolutionary studies that have identified patterns of adaptive evolution in placenta expressed genes (Uddin et al. Proc Natl Acad Sci U S A. 2008 Mar 4;105(9):3215-20; Hou et al. Genomics. 2009 Jan; 93(1):33-41), and we have also reconstructed the evolutionary history of the placenta transcriptome (Hou et al. Genome Biol Evol. 2012;4(5):713-25).

In addition to ancient placenta evolution, we have also studied more recent events in primate placenta evolution. By examining placental growth hormone genes in spider monkeys (shown on the right) we were able to determine that human placental growth hormone genes are of relatively recent origin (Papper et al. Proc Natl Acad Sci U S A. 2009 Oct 6;106(40):17083-8). We also discovered a family of immune modulating genes called galectins (Than et al. Proc Natl Acad Sci U S A. 2009 Jun 16;106(24):9731-6). These galectins are found only in Old World monkeys and apes (including humans), they are almost exclusively expressed at the maternal-fetal interface, and they appear to be involved in apoptosis. Whether they kill maternal immune cells at the interface is an open research question that we are actively pursuing. Galectins outside of our newly discovered gene cluster have a well-appreciated role in preventing fetal loss by inducing immune tolerance, and we are hopeful that we can learn more about the physiological role of these genes.

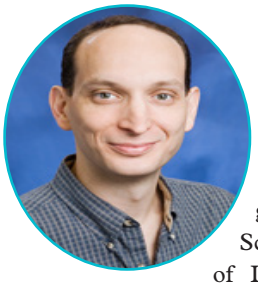
In the future, we plan to combine computational genomic and experimental approaches to learn more about mammalian pregnancy. We are leveraging the explosion of genomic data in order to make better inferences about the function of genes involved in pregnancy. We are also using ancestral gene resurrection techniques to study nuclear hormone receptor function in primates. By synthesizing ancient genes and placing them into cells we are able to gain insight into genes such as the progesterone receptor. For example, the progesterone receptor is one of the top 50 fastest evolving genes between humans and chimpanzees. We can use ancestral gene resurrection techniques to determine how the gene functions differently in the two species and how the ancestral gene differed in function from the gene as it appears today.

It is an exciting time in genomics and in science. Our lab is very happy to have the opportunity to conduct research at the University of Illinois, and we look forward to updating you on our progress in the future. We hope we can make discoveries that can improve then-lives of mothers and their children in many species. •



MIP FAMILY NEWS

FACULTY AWARDS



Professor Claudio Grosman

Dr. Grosman was appointed as Richard and Margaret Romano Professorial Scholar by the UIUC College of Liberal Arts and Sciences. This award recognizes his outstanding achievements in research and teaching and his many efforts in support of building excellence on the campus.

Assistant Professor Hee Jung Chung

Dr. Chung was recognized by the MIP Department with the James E. Heath Award for excellence in teaching. Dr. Chung's major teaching activity has been the development and delivery of MCB 461/Neur 461, Cellular and Molecular Neuroscience course, which has been extremely well received by the students.

Swanlund Professor Benita Katzenellenbogen

Dr. Katzenellenbogen gave the Plenary Lecturer at the Endocrine Society of Australia in Melbourne, August 2014, speaking on "Estrogen receptor integrative genomics and signaling networks in breast cancer and endocrine resistance."

MIP DEPARTMENT AWARDS

Outstanding Thesis Award

Leah Goldberg Nantie
Mentor: Dr. Lori Raetzman

Outstanding Teaching Assistant

Janelle Mapes
Mentor: Dr. Milan Bagchi

Howard S. Ducoff Prize for Best Senior Thesis

Eunkyung Yu
Mentor: Dr. Jongsook Kim Kemper

C. Ladd Prosser Outstanding Achievement Award for an Undergraduate

Michael Sun
Mentor: Dr. Milan Bagchi

TRAINEE HIGHLIGHTS

New Ph.D.s 2013-2014

Sandeep Pawar (Ph.D., 2014) "Molecular Mechanisms Regulating Implantation" Mentor: Milan Bagchi. Sandeep has started a postdoctoral fellowship at the University of Chicago.

Leah B. Goldberg Nantie, (Ph.D., 2014) "The Role of Notch Signaling in the Regulation of Proliferation and Cell Differentiation during Embryonic and Postnatal Pituitary Development " Mentor: Lori Raetzman. Leah has started a postdoctoral fellowship at the University of Wisconsin-Madison.

Alicia K. Dietrich, (Ph.D., 2014) "Role of Estrogen Receptor α and Oxidative Stress Response Proteins in the Central Nervous System" Mentor: Ann Nardulli. Alicia is Adjunct Faculty of Biologyat Prairie State College.

Ting Fu, (Ph.D., 2014) "Metabolic Regulation by the Nuclear Receptor FXR and Micro RNA-34a in Health and Disease" Mentor: Jongsook Kim Kemper. Ting has started a postdoctoral fellowship at the University of Illinois.

Kieran Normoyle, (Ph.D., 2014) "Cyclase Associated Protein (CAP) and the Physiological Disassembly of Actin" Mentor: Bill Brieher. Kieran is continuing for his MD.

Vesna Tosic, (Ph.D., 2014) "Enhancing Efficacy of Oncolytic Myxoma Virus and Adoptive T Cell Therapy against Tumors" Mentor: Ed Roy. Vesna is currently a TA for the school of MCB.

Harry Rosenberg, (Ph.D., 2014) "Diurnal and Stimulated Astrocyte Morphology Dynamics in the Rodent Central Nervous System" Mentor: Martha Gillette. Harry is continuing for his MD.

Notable Achievements of Former Trainees

Dr. Anna Bergamaschi, Postdoctoral Scientist in Benita Katzenellenbogen's Laboratory, is now Senior Research Scientist at Genomic Health, Inc. in Redwood City, CA.

Dr. Zeynep Madak-Erdogan, Postdoctoral Scientist in Benita Katzenellenbogen's Laboratory, is now an Assistant Professor faculty member in the Department of Food Science and Human Nutrition at UIUC.

Dr. Gordon Buchanan, MD, PhD, a former graduate student of Professor Martha Gillette, is relocating from Yale University to assume a chaired professorship at the University of Iowa School of Medicine.

Dr. Vanessa Noboa (2011), former graduate student of Professor Rhanor Gillette, has been recently appointed as Director of Academic Affairs at the University of San Francisco Medical School in Quito, Ecuador.

Recognition for Current Students and Trainees

Dr. Donghyun Kim, Postdoctoral Research Associate in Professor Jongsook Kim Kemper's laboratory, has been awarded a prestigious American Heart Association Award to study the regulation of metabolism by nuclear hormone receptors and the dysregulation that occurs in obesity-related diseases.

Dr. Sandeep Pawar, a recent graduate from Milan Bagchi laboratory, received an award from the Endocrine Society for Outstanding Publication in 2013 in Molecular Endocrinology.

SPECIAL MIP EVENTS IN 2014

The annual MIP Department Retreat was held on September 12 at the Alice Campbell Alumni Center. As every year, the event was organized by a Committee of MIP graduate students with guidance from MIP faculty and office staff. This year's retreat had it all: breakfast, talks and posters presented by graduate students and postdocs of the department, research presentations by the new faculty members, and a delicious lunch provided by university catering services. The keynote lecture "Sleep in epilepsy and SuDEP" was delivered by MIP alumnus Dr. Gordon Buchanan. Dr. Buchanan is an Assistant Professor of Neurology at the Yale School of Medicine. The first-ever MIP T-shirt design contest brought out a lot of artistic talent in the department. The winning T-shirt design was submitted by graduate student Hanna Erickson. It was selected for printing the official MIP T-shirt (shown in the left). The department thanks Dr. Sayee Anakk for a wonderful job in planning and executing this fun contest.

The MIP Department held the second C. Ladd Prosser Endowed Lecture on October 16, 2014 in Alice Campbell Alumni Center Ballroom. The lecture "Stem Cell Targets and Pathways in Prostate Cancer" was delivered by Dr. Owen Witte. Dr. Witte is an Investigator with the Howard Hughes Medical Institute and a Distinguished Professor of Microbiology, Immunology & Molecular Genetics at the University of California at Los Angeles where he holds the President's Chair in Developmental Immunology. He is also a Distinguished Professor of Molecular and Medical Pharmacology at the David Geffen School of Medicine and the Director of the Eli and Edythe Broad Center of Regenerative Medicine & Stem Cell Research at UCLA. Dr. Witte has made seminal contributions to the understanding of human leukemias, immune disorders, and epithelial cancer stem cells. His work includes the discovery of tyrosine kinase activity for the ABL gene and the demonstration of the BCR-ABL oncoproteins in human leukemias. Dr. Witte's many honors include election to the National Academy of Sciences (1997) and the Institute of Medicine (2003) as well as appointment to the President's Cancer Panel (2011).

The first-ever MIP-department-sponsored Halloween Party was held on October 31 in Burrill 501. The students and faculty showed up dressed in a variety of costumes and the labs participated in a pumpkin carving competition. The department thanks Assistant Professor Sayee Anakk and the MIP office staff, Julie Moore and Penny Morman for taking the initiative to organize this fun-filled event.

ALUMNI UPDATES

June R. Aprille, Professor and former provost of Washington and Lee University and an MIP alumna, has created the June Remboldt Endowment for Molecular and Integrative Physiology to benefit graduate fellowships in the department. Professor Aprille received her M.S. in 1969 and her Ph.D. in 1970 in physiology from the U of I. Her mentor was with Professor Dennis Buetow. She went on to become an internationally recognized researcher on energy metabolism at the cellular and molecular level, especially in newborns. She later joined the biology faculty at Tufts University in 1977 and was a lecturer in biochemistry for pediatrics at Harvard Medical School. In honor of her outstanding career, the Department of MIP gave her the Distinguished Alumni Award for Professional Achievement in 2003.

Carol and John Greenleaf (Ph.D. 1963), great friends and supporters of the MIP department, visited from California during the Homecoming weekend (October 23-25). They have an estate gift for an endowed chair in the Department of Molecular and Integrative Physiology. John's thesis was on "Voluntary Dehydration in Man"; he worked with Dr. F. Sargent. After he completed his doctorate, John went to work for NASA's Ames Research Center in California. Carol and John enjoyed a short tour of the MIP department and learned about its exciting research programs. This year John was honored by the University of Illinois College of Applied Health Sciences with its distinguished alumni award. He was awarded the MIP department's Distinguished Alumni Award in 1998.

Mary Jane Beasley, a Research Specialist in Dr. Benita Katzenellenbogen and a strong supporter of the MIP Department, visited with MIP faculty members during the Homecoming weekend. She and her husband Norm Beasley now lives in Tucson, Arizona.

Martin Frank, Ph.D., Executive Director of The American Physiological Society visited the department on September 17 and met with the new faculty and learned about their research programs. Dr. Frank did his Ph.D. with Professor William W. Sleator. He received the Distinguished Alumnus Award of the MIP department in 2001.

Tony G. Waldrop, former Professor of MIP (1986-2001) and Vice-Chancellor of Research at UIUC, has been named President of the University of Southern Alabama.

STUDENT TRAVEL FUND

Funds donated by alumni and friends of MIP are critical for maintaining the excellence of our graduate student training program. A critical aspect of graduate research training is to support the travel of our students to national meetings in their relevant research areas. This allows our students to present their work to the scientific world in the form of abstracts, posters, and oral presentations and obtain exposure to cutting-edge science. Given the shortage in federal funding these days, individual research labs are finding it increasingly difficult to bear the cost of supporting graduate student travels. For our students to get this invaluable professional experience, it has become essential that the department provide travel grants. We would like to raise $20,000 to establish 10 travel grants of $2,000 each. We hope to raise this amount from our alumni and friends. We hope that each of you will consider helping us to provide our graduate students an excellent training experience.

I would like to make the following contribution to MIP

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William W. Sleator, Jr. 96, died on December 23, 2013 at Carle Hospital after a fire at his house in Urbana. Dr. Sleator was a former Professor and Head of the Department of Molecular and Integrative Physiology. He was a distinguished Biophysicist and excellent administrator who led the department at a pivotal time.

Dr. Sleator was appointed Professor and Head of the Department of Physiology and Biophysics (now Molecular and Integrative Physiology) in 1969. He stepped down as Head in 1976, retired in 1987 from the University, and was a professor emeritus at the time of his death. Dr. Sleator received A.B. and M.S. degrees and a Ph.D. degree in 1946 in Physics, from the University of Michigan. He was a Fellow of the Johnson Foundation for Medical Physics at the University of Pennsylvania in 1939-40. During the war from 1942-45, he held the position of Physicist at the Ballistic Research Laboratory at the Aberdeen Proving Ground in Maryland. After receiving his Ph.D. degree, he was a Research Associate and Instructor in the Department of Physics at the University of Minnesota before accepting an appointment as an Assistant Professor of Biophysics in the Department of Physiology at Washington University, St. Louis in 1949, progressing to Professor. He served as acting Chairman of the Department in 1966-67.

As Head of the Department of Molecular and Integrative Physiology, with his expertise and experience in Physics and Biophysics, he moved the department in a more mathematical, quantitative direction, but was also instrumental in hiring in the newer disciplines of Molecular and Cell Biology. He also played a key role in the founding of the School of Basic Medical Sciences (now College of Medicine) at Urbana which was started in 1971. Dr. Sleator had a distinguished research career, first as a physicist and then as a muscle physiologist. For the first few years after receiving his Ph.D., he studied the scattering of protons by other protons and helium. Applying these principles to the biological realm, he began studying the scattering of light by biological tissues, first by blood in the process of oximetry, which measures oxygen levels, and then in muscle to examine changes in response to muscle contraction. The interest in muscle evolved into his major research contributions over the next couple of decades focusing on the effects of drugs on mechanical and electrical properties of muscle, particularly the heart. Dr. Sleator was a pioneer in the development of the emerging field of biophysics and was a charter member of the Biophysical Society, formed in 1957, which he served as Secretary and Council Member.

Dr. Sleator was also an accomplished musician, with a great love for and knowledge of the classics. He played viola and was an active member, over the years, of several chamber music groups that often performed locally. He was also noted for his extraordinary memory of poetry and could recite material that he learned even in his student days.

Dr. Sleator was born on April 5, 1917 in Ann Arbor, Michigan. In 1941 he married Esther Kaplan (1915-96), a medical doctor who carried out research at the Child Research Center at the University of Illinois and also worked as a physician at the Frances Nelson clinic. They had three sons, William, Daniel, and Tycho, and one daughter, Victoria.