The Promoter

Department of Biological Sciences

Carnegie Mellon

Winter 2007 | No. 9

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Welcome to the 2007 edition of the Promoter, the annual alumni newsletter of the Department of Biological Sciences. More exciting changes have happened in the department since our last issue, and I am pleased to share them with you.

The Molecular Biosensor and Imaging Center (MBIC) at Carnegie Mellon was recently named a National Technology Center for Networks and Pathways. MBIC Director and Biological Sciences Professor Alan Waggoner is leading a team of scientists who are researching biosensor and imaging technologies for investigating networks and pathways in living cells. See page 4 for more about this exciting project.

We are proud to announce that the Howard Hughes Medical Institute (HHMI) awarded Carnegie Mellon $1.5 million to bolster our already impressive undergraduate research and outreach programs in the biological sciences. This latest award represents the fifth consecutive HHMI award in support of bioscience education.

We are happy to introduce two new scientists to our faculty. Developmental biologist Veronica Hinman, Ph.D., began her appointment in September. See page 3 for more about Hinman and developmental biology at Carnegie Mellon. In addition, we are welcoming Mark Macbeth, Ph.D., a biochemist, to the faculty April 1. In the past year, the number of undergraduates claiming a biological sciences major has increased by a large percentage, so plans for the Department include renovations of several faculty laboratories and an expanded undergraduate laboratory.

The annual departmental retreat in September provided an opportunity for faculty and graduate students to welcome 24 new graduate students. These students bring a variety of research interests to the program, from biotechnology to developmental biology, and neuroscience to computational biology.

"Life is tough and then you graduate," according to Jorge Cham, the author of the popular graduate school comic strip "Ph.D. Piled Higher and Deeper" who visited the department last spring and signed copies of his latest book. Cham's humorous slant on the life of a graduate student calls to mind the question "What happens after graduation?", which is answered by alumna Supriya Kumar, who explores the transition from graduate student to postdoc on page 7. We also had an opportunity to catch up with Krista Pfaendler, a Biological Sciences undergraduate alumna who is spending a semester in Africa conducting research on cervical cancer.

The Biological Sciences Student Advisory Council (BioSAC) again constructed an undergraduate major booth at the Spring 2006 University Carnival. Please come and see what they come up with in 2007; scheduled for April 20-21, the Spring 2007 Carnival theme is "Small Things Made Big." Make sure you check out our website www.cmu.edu/bio for news, upcoming events and seminars. We enjoy connecting with alumni, so please forward updated contact information and let us know what you are doing!

Elizabeth W. Jones, Ph.D.
Professor & Head,
Schwertz University Professor of
Life Sciences,
HHMI Professor

Welcome New Students

The Department is pleased to welcome six new M.S. in Computational Biology students and 18 Ph.D. in Biological Sciences students. In addition, a record-breaking 93 sophomores declared a primary major in biology, computational biology or the unified major of biology and psychology. Graduating in 2007 will be 70 seniors, most of whom will pursue graduate education.

New 2007 M.S. and Ph.D. students

Public Health in Zambia

by Rebecca Bollinger

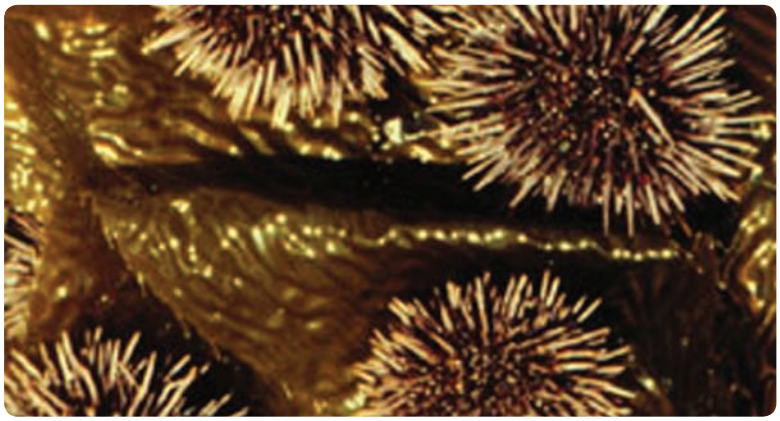
Over the past 30 years, the Department of Biological Sciences has seen its graduates receive numerous awards, scholarships, grants and fellowships, but 2006 marked the first time a graduate was awarded a Fogarty/Ellison International Clinical Research and Training Fellowship. The fellowship program, which began in 2003, offers U.S. graduate students in the health professions the opportunity to participate in mentored clinical research in a number of developing nations, including Botswana, Haiti, Mali, Peru, South Africa, Uganda and Zambia. One of the 23 students selected as a 2006-2007 Fogarty Fellow was Krista Pfaendler, who earned her B.S. in Biological Sciences from Carnegie Mellon in 2002 and is currently pursuing her M.D. at the University of Pittsburgh School of Medicine.

During her time at Carnegie Mellon, Pfaendler participated in undergraduate research by completing an honors thesis in the lab of Associate Professor Javier López. Pfaendler spent the summer following graduation with the Child Family Health International program in Quito, Ecuador and returned to Carnegie Mellon in the fall as a Fifth Year Scholar, completing the project "Healthy Campus Initiative." In the fall of 2003, she began her graduate studies in medicine at the University of Pittsburgh.

Pfaendler's experiences in Ecuador fueled her interests in international health and led her to establish the Kenyan Pediatric HIV Project (KPHP), a student group at the University of Pittsburgh that provides funding for supportive care to HIV-positive children in Kenya. The project culminated in her first trip to Africa where she helped start up the pediatric HIV/AIDS clinic that KPHP supports and organized a 4th year rotation experience for other medical students. Following her return from Kenya, Pfaendler began her third year rotations and found herself being drawn to the field of obstetrics and gynecology. It was also during her third year that she discovered the Fogarty Fellowship, an opportunity that merged her established interest in international health and her emerging interest in obstetrics and gynecology. In April 2006, she was named a 2006-2007 Fogarty Fellow for the Centre for Infectious Disease Research in Zambia to work on clinical research in cervical cancer screening, prevention and treatment.

Since her arrival in Zambia, Pfaendler's daily life as a clinical research fellow has remained just as hectic as it was during her medical studies—with a few added challenges. Initially she began working in the local clinic observing and then conducting cervical cancer screenings; she has also had the opportunity to conduct procedures such as outpatient surgeries. Currently Pfaendler works on program expansion, quality control for clinical data collection concerning cervical cancer, continuing education for nurse midwives and fine-tuning her project proposal. While Pfaendler is not at the bench conducting experiments, all of her work is tied to her research project proposal. She oversees the project through the Centre for Infectious Disease Research in Zambia (CIDRZ) and is mentored by Dr. Sten Vermund from Vanderbilt, Dr. Groesbeck Parham from University of Alabama at Birmingham, and Dr. Mulindi Mwanahamuntu from University Teaching Hospital of Zambia. When her fellowship ends next year and she returns to Pittsburgh, Pfaendler will begin her fourth year of medical school. She hopes that her experiences in Zambia will help her pursuit of a career in obstetrics/gynecology as well as serve as continued inspiration for her focus on international health.

Seeing Ourselves in Sea Urchins by Erin Martin



Sea urchins and humans are more alike than you think. Even though sea urchins, members of the echinoderm phylum, lack vertebrae, visible eyes or legs and are covered in thick spines, it was discovered that 70 percent of sea urchin genes have an equivalent human gene. This finding was made possible by the recent sequencing of the sea urchin genome, a collaborative process assisted by Professor Charles Ettensohn, Ph.D., from the Department of Biological Sciences. The Sea Urchin Genome Sequencing Consortium found that sea urchins are even more similar to humans than the research stalwart, *Drosophila melanogaster* (the common fruit fly). Sea urchins, or *Strongylocentrotus purpuratus*, also form the basis for the study of developmental biology at Carnegie Mellon, representing the research of Ettensohn and fellow faculty member Veronica Hinman.

Developmental biology, or the study of how organisms form and develop *in vivo*, is an established research field that is flourishing. Examining how organisms self-organize, and investigating the pathways and processes that an organism uses to achieve normal growth leads researchers to understand how these normal pathways can be affected by drugs, environmental toxins or other stressors. Also, by watching normal development progress in sea urchins, researchers can learn why development sometimes malfunctions, causing conditions such as Downs Syndrome and other disorders.

Because sea urchin embryos are transparent, developmental processes can be observed in great detail by biologists; often scientists capture amazing images. In addition, the relatively simple cellular structure of the embryo allows researchers to watch exact developmental processes occur in real time.

Ettensohn studies sea urchins to shed light on how genes control embryonic development. One facet of his research is exploring how sea urchin embryos become sea urchin embryos in the first place. "How cells first begin to express different sets of genes determines the organism's development," he explained. "My lab is working to identify key interactions in the early embryo, to define when they occur and their developmental consequences." Ettensohn's lab also investigates developmental plasticity, the act of "re-programming" cells, causing developmental malfunctions. Morphogenesis, the study of the migration of cells in embryonic development, and biomineralization, clarifying the genes that are involved in the development of skeletal tissue, round out Ettensohn's research interests.

His recent work assisting in the sequencing of the sea urchin genome will make these spiky sea creatures even more useful by elucidating the sea urchin's "development, immunity, nerve cell communication and evolutionary relationships with humans and other vertebrates." The more that we understand about sea urchin development, the more we understand about human development, Ettensohn pointed out in a recent article describing his role in the sequencing. "Having the complete sequence of the sea urchin genome will make a powerful model system stronger still," said Ettensohn.

Also interested in echinoderms is the Department's newest faculty member, Veronica Hinman, who uses sea urchin embryos to learn more about the evolution and organization of gene regulatory networks (GRN). "GRNs are groups of molecules that control which genes get 'turned on' and which get 'turned off,'" explained Hinman. In turn, these activated molecules control development of the embryo. "Housed in the embryo is all of the information on how to make an animal. My own field of interest is how animals have evolved to become different. Changes in the DNA will result in changes to the blueprint for the development of the animal so that it will take on a different form."

Despite not having a voice, sea urchins can tell us a great deal about how human embryos develop and what happens when that development is faulty. There may be nothing we see as human in a spiky echinoderm, but Carnegie Mellon faculty can look past the spines and see ourselves in sea urchins.

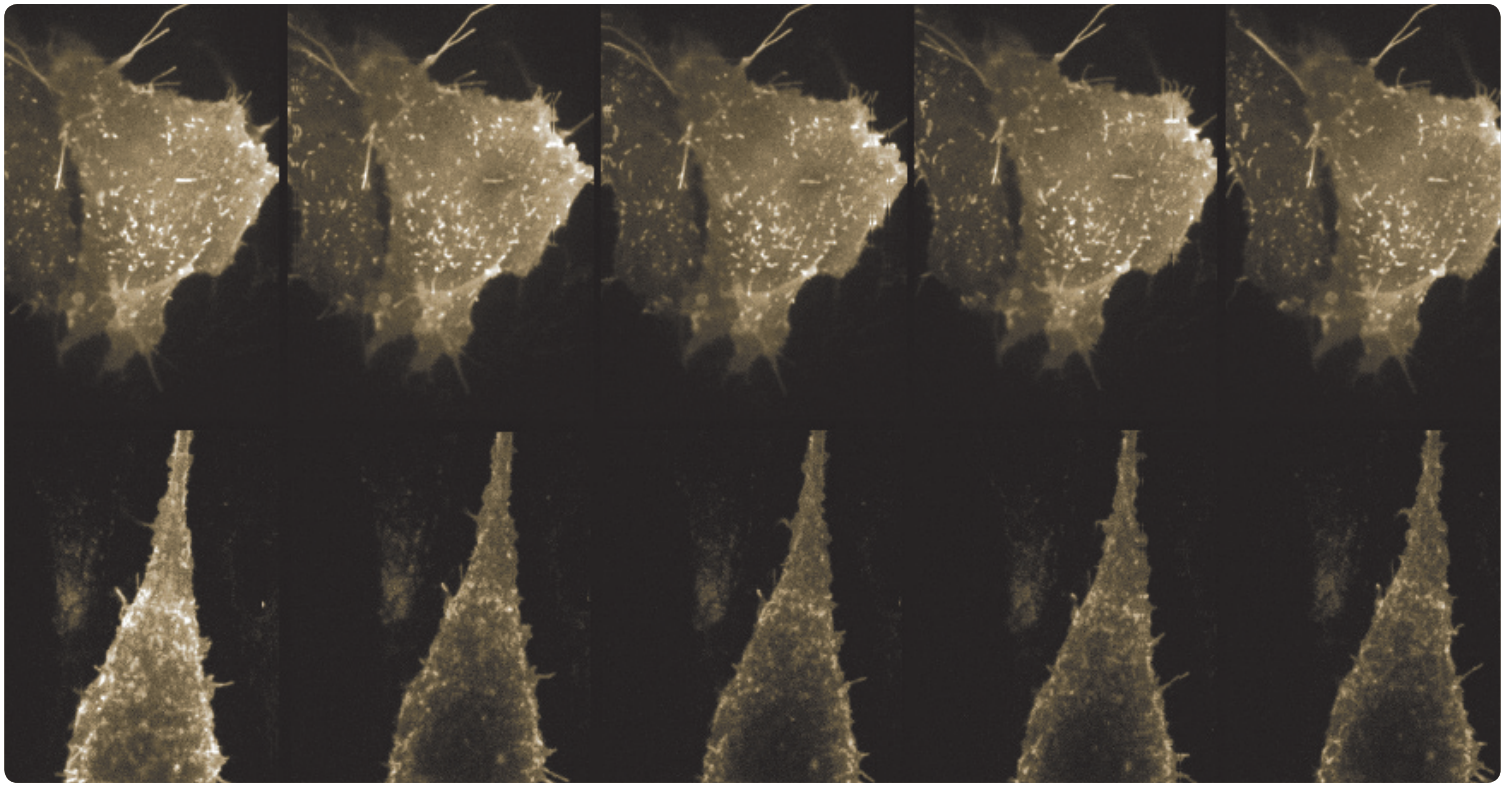
Sea Urchin Embryo

Other Biological Sciences faculty interested in developmental biology:

Javier López, Ph.D.
The López Lab is interested in the regulation of alternative pre-mRNA splicing and its contribution to cell function and development.

Brooke McCartney, Ph.D.
Research in the McCartney laboratory aims to elucidate the relationship between Wnt/Wingless signal transduction and cytoskeletal organization in *Drosophila* development using a family of tumor suppressors as a model.

Jonathan Minden, Ph.D.
The Minden laboratory uses proteomics and time-lapse microscopy to study how cells change shape during *Drosophila* embryo development.



Building Better Biosensors by Erin Martin

As everybody knows, when detectives begin to investigate a crime, clues are what give investigators information about how the crime was committed. Strands of hair, threads of fabric and fingerprints are considered by investigators as the ultimate clues—along with the now-widespread use of DNA evidence. Fingerprints may, in fact, solve a crime (and fingerprints solve 10 times more crimes than DNA evidence alone). If the fingerprints do not solve the crime, the detectives look for clues that describe the perpetrator's daily routine. A clue may be something as innocuous as a scrap of paper with a scrawled telephone number—but this clue may unlock the secrets of a crime.

Biosensors can be described as clues that help solve crimes—the crimes being human disease. These biosensors, the future of medical diagnosis and treatment, are one of biology's hottest topics. Simply put, a biosensor is a molecular marker that causes a biological response, which, in turn, translates into a measurable electrical, optical or chemical signal. This signal, which is read as a slight change in color, can act as a way to diagnose disease. Biosensors are used in a limited way in today's healthcare arena. Diabetes, a potentially fatal disease that can have long-term health complications if not carefully observed and treated, is monitored using a form of biosensor called a glucose monitor. The diabetic patient places a drop of blood on a blood-glucose strip, which is a chemically-treated piece of paper that contains a biosensor. The biosensor present in the strip changes color, or fluoresces, according to the amount of glucose present in the diabetic's blood.

Biosensors, however, will have a much larger role in the future. Currently, certain types of cancers are diagnosed by tumor biopsies, lumps of cellular material that are removed from a tumor and analyzed under a microscope to ascertain the presence of cancerous cells. The problem with this method is that the cancerous cells have to be present in large numbers to be visible. Using a biosensor method, however, can mean that only one cancerous cell has to be present to be spotted. The response to this one abnormal cell is the future of healthcare: earlier detection of illness and more targeted treatment.

Working toward this future of healthcare is Carnegie Mellon's newly funded National Technology Center for Networks and Pathways. A $13.3 million grant awarded by the National Institutes of Health will allow program co-directors Alan Waggoner, Ph.D., Professor of Biological Sciences and Director of the Molecular Biosensor Imaging Center (MBIC), and Simon Watkins, Ph.D., Professor and Director of the Center for Biologic Imaging at the University of Pittsburgh to research and develop one of biology's newest frontiers: biosensors. Marcel Bruchez, Ph.D., who previously worked as founding scientist for California-based Quantum Dot Corporation, will help lead the Center. A quantum dot is a biological detection tool—a single tiny nanostructure—that provides a better method of detecting photons in biological samples with high background fluorescence. In Bruchez's new role as program manager for the Center at Carnegie Mellon, he has moved his focus from detection to measurement.

Before developing the future's biosensors, the Center for Networks and Pathways first has to clear up some mysteries surrounding the inner working of cells by using existing biosensors. Cells communicate along pathways, and understanding these channels is where the efficacy of future biosensors lies. The Center, by working to develop better biosensors, will also clarify these networks and pathways. "An even better understanding of networks and pathways will allow us to build a more robust understanding of what molecules to measure, allowing more specific biosensor design," explains Bruchez. Understanding

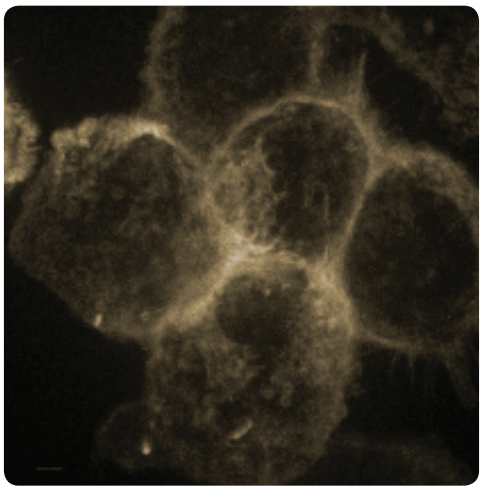
the whole system of interconnected networks and pathways among cells is known as a systems approach. The Center plans on using this systems approach to understanding the networks and pathways of cells by "building a kit of molecular biosensors," according to Bruchez.

Historically, a single biosensor scanned one system and measured one biological change. The Center hopes to develop a kit of broad-use biosensors that calculates a wide range of biological changes. It is hoped that this kit will be to medicine what GFP, or the Green Fluorescent Protein, has become to biological research. GFP is a protein from the jellyfish *Aequora victoria* that scientists have inserted in organisms such as the fruit fly and yeast. Mainly used to reveal gene expression, GFP is in widespread use among scientists due to the protein's adaptability in a variety of organisms. This multiuse platform is what Bruchez and the Center are trying to achieve in developing their biosensors. "The future of healthcare is broad-use rather than single-use tools," explained Bruchez.

One limitation that the Center is hoping to overcome is the clarity of the biosensor response. Today's biosensors are characterized by slight changes in color ratio. Measuring change is a matter of seeing more or less of the color assigned. The Center plans to develop a biosensor that is either "all on" or "all off," creating a biosensor that is more accurate and easier to read. Another limitation of today's biosensors is that the response is viewed after the cells are removed from their environment. The biosensors that Bruchez and the Center are working on will be captured in real time thanks to fluorescent probes. The probes will integrate with the biosensors along with other cells and reagents and will be imaged while these processes are still occurring.

The Center for Networks and Pathways aims to apply its new biosensors to other research at Carnegie Mellon. Brooke McCartney, Ph.D., an Assistant Professor of Biological Sciences, is already employing some of the new technologies developed by the Center. McCartney is using the recently developed probes to discern the cellular pathways in *Drosophila melanogaster*. Her research involving a cancer tumor suppressor protein and its role in animal development is key to testing out the Center's newest technologies. And it may be key to helping fight colon cancer.

Perhaps biosensors will be the evaluators for a number of bodily ills. Similar to the thrust of criminal investigation towards more specialized forensic investigation, modern healthcare propels towards a more personalized treatment model, thanks to improvements in biosensor technology occurring at the Center for Networks and Pathways.



Marcel Bruchez, Ph.D.
Carnegie Mellon University

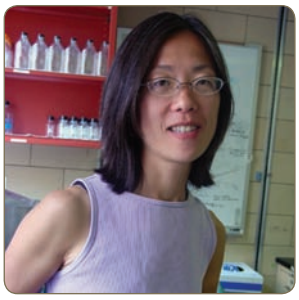
Alan S. Waggoner, Ph.D.
Carnegie Mellon University

Simon C. Watkins, Ph.D.
University of Pittsburgh

Faculty News by Parul Nisha

Nathan Urban, Ph.D.

The recent award from the National Institute of Mental Health (NIMH)/National Science Foundation (NSF) to Assistant Professor Nathan Urban will provide him and his laboratory the opportunity to investigate the basic mechanisms that allow neurons in the brain to synchronize their activity. Neurons can convey messages more emphatically when they fire together, which was a counter-intuitive observation made by Urban and his team. Their results revealed that the introduction of random inputs or noise could bring about neuronal synchronization. Experiments suggested that the timing of these inputs was crucial, and given the same inputs, neurons could increase or decrease their rate of firing depending on the rate of the inputs. With this novel finding in place, Urban now wants to investigate both what cellular and molecular changes accompany the neurons that lead them to synchronize and the role of random inputs in bringing about this synchrony. Answers from these questions will lead to a direct application in research into schizophrenia. Currently, brains of schizophrenic patients are found to be deficient in certain neuronal synchronizations, referred to as gamma oscillations (especially in the frequency range of 40Hz), whose presence is pertinent for tasks such as memory and perception. Understanding the origins and properties of these oscillations may have direct relevance in explaining why patients have aberrant or missing oscillations. This new mechanism of neuronal synchrony by random inputs opens up a completely new way of thinking about how neuronal oscillations arise and whether this knowledge could be used in advancing the treatment of schizophrenic patients. Urban is collaborating on this project with Bard Ermentrout, in the University of Pittsburgh's Department of Mathematics.



Tina Lee, Ph.D.

Assistant Professor Tina Lee was recently awarded an American Cancer Society grant to investigate the regulation of the early protein secretory pathway originating from endoplasmic reticulum (ER) in mammalian cells. The ER is a subcellular compartment responsible for membrane biogenesis. Coat proteins mediate vesicle formation from ER exit sites; this is considered the earliest committed step in the membrane transport pathway. Lee and her colleagues have set out to look for novel factors that could play a role in mediating the transport pathway inside cells, especially in response to physiological cues. By using an *in vitro* reconstitution approach with purified proteins and semi-permeable membranes, Lee identified a previously unknown factor that is required for vesicle assembly at mammalian ER exit sites. This factor, Nm23H2, belongs to a family of protein kinases best known for their nucleotide metabolism functions, although members of this family have been implicated in other processes like endocytosis of the plasma membrane, the cell surface that first encounters physiological cues. This grant will allow Lee and her colleagues to address if there is a regulatory role of Nm23H2 in the early secretory pathway and whether this protein could be the functional link between the physiological stimuli and the initial steps in the transport pathway. Another interesting aspect of studying this family of proteins is that some of its members appear to be involved in tumor progression. It is still not clear, however, how and why these proteins are implicated in certain kinds of cancer. Elucidating the functional roles of Nm23H2 and other members of the kinase family might shed some light on their involvement in tumorigenesis as well.

David Hackney

The latest National Science Foundation grant awarded to Professor David Hackney will enable him and his colleagues to investigate and gather better insight into how the energy generated by kinesin motor proteins from ATP hydrolysis is coupled to the movement of cellular processes inside a cell. Motor proteins facilitate movement and are involved with a range of important cellular processes, such as movement of cargo along microtubules and down the axons in nerve cells. The forward reaction of the energy-generating step of ATP hydrolysis is well understood, but knowledge about the energetics of the entire process still has significant gaps. Much work needs to be done to better understand the reverse reaction that will lead to the equilibrium constants and free energy change of the reaction. To study the energetics, Hackney's lab will use the powerful technique of ^{18}O oxygen exchange reactions. This technique provides important information about the reversibility of the reactions that is difficult to obtain by other means. Gathering this knowledge is pertinent to the fundamental understanding of how biological motors work and can be applied further to how they may be modified. Better understanding of the reaction energetics will also lead to understanding how energy coupling between different biological processes occur. This study will also be extended to other members of the kinesin family that might have slower processivity and can be studied more easily. Different members might also have different ways to couple ATP hydrolysis to the cellular process, which, according to Hackney, may be another interesting aspect to study.

Evolving Into a Postdoc by Supriya Kumar

I always knew I wanted to study evolution, so when it was time to apply for a postdoctoral position, I focused on choosing the best lab for me. I read papers, wrote application letters, informed my referees of my choices, mailed my letters and waited. And waited.

It was interesting to me that while the principal investigators (PIs) of some of the labs that I wrote to replied immediately (well, in a month or so), others had to be coaxed for a response. I'm not sure if the promptness of the reply says something about the responsiveness of the scientist in question or not, but I think I took this factor into consideration at some subconscious level when making my decision. I did, after all, end up in the lab of the PI who responded first! And I think I made a pretty good choice. My new advisor is friendly and very smart, the Department of Ecology and Evolution here at the University of Chicago is one of the best places to research evolution and Chicago rocks!

I've been working at the University of Chicago for close to a year now, having graduated from Carnegie Mellon in May 2005. As a graduate student, I used to study the regulation of alternative RNA splicing in *Drosophila melanogaster* at the Department of Biological Sciences; I've since moved to studying the role that microRNAs play in the evolution and speciation of different *Drosophila* species.

I'm excited to be studying different species — if you've seen different *Drosophilas* you'll know that there is a gradual change in appearance from the *melanogaster* species to *simulans* to *pseudoobscura*—I can't tell the first two apart (they're only separated by 3 million years of evolution), but just looking at *pseudoobscura* (which split from *melanogaster* about 25 million years ago), you can tell that this larger, darker fly is a totally different animal from the much smaller *melanogaster*. It's exhilarating to be studying a very "hot" topic in molecular biology today—microRNAs—in connection with evolution, something I always wanted to study.

Because I study RNA, much as I did during my Ph.D. research, the technical aspects of the work are easy. The questions I am addressing, though, are completely different from anything I had worked on before. I notice that a lot of my colleagues also make a fairly drastic switch when they move from their graduate labs to postdoctoral appointments: they either move to studying a different organism from the one they studied for their Ph.D. research, or move to asking completely different questions, albeit in the same organism. The shift can be tough, however, moving to a new city, a new university or institute and a new lab with new people to get to know can all make it more interesting than difficult. There is, after all, no one correct way to make the move from graduate school to postdoctoral research. There are probably as many different ways to discover your career path as there are people who go on to become postdocs. I find that for me it is a time to review the learning experience, explore new avenues in science, enjoy a new city, show off the skills I picked up as a graduate student…and, with a little bit of luck, be successful.

Alumni News

We received an amazing number of responses from last year's Promoter distribution. Please continue to keep in touch. Here's what some of your fellow Department alumni are doing!

Amina Abdullah (M.S. '06) recently joined the Lawrence Berkeley National Laboratory as a Software Developer.

Elena Balestreire (B.S. '01), an M.D./Ph.D. student in the University of Pittsburgh's Medical Scientist Training program, was awarded an individual NIH National Research Service Award to support her work in cell biology and molecular physiology.

After completing his third year at Weill Medical College of Cornell University, **Gabriel Brooks (B.S. '01)** was awarded a medical student research grant from the American Heart Association and a Howard Hughes Medical Fellows Program grant.

Amy (Kennedy) Burkert (Ph.D. '90) is in her 10th year as Associate Department Head for Undergraduate Affairs in the Department of Biological Sciences at Carnegie Mellon. She is also the Director of the Health Professions Program for the University and in that role, has recently been named President-elect of NEAAHP, a health professions advisor organization.

James Burnette (Ph.D. '00) is a member of the Teaching Faculty in the Department of Biological Sciences at Carnegie Mellon and was recently appointed to the Coordinator of Undergraduate Research Placement position.

Alice Chong (B.S. '99) is attending graduate school at the University of Pennsylvania, working on a Ph.D. in Chemistry, specializing in Inorganic Chemistry.

Rachel Dub (B.S. '03) spent two years working as a research technologist at Children's Hospital of Pittsburgh. She is now attending Lake Erie College of Osteopathic Medicine in Bradenton, FL.

David Hill (B.S. '05) who is currently an M.D./Ph.D. student at the University of Pennsylvania, participated in the NIH's Postbaccalaureate Intramural Research Training Program in 2006.

Deval Joshi (B.S. '00) is completing his residency at the School of Opthamology at the University of Southern Florida at Tampa.

Gloria Ju (B.S. '94) is working with the Hennepin County WIC program in Minnesota.

Morton Kligerman (B.S. '80) finished an M.D. at Pennsylvania State University in 1984 and a M.P.H. at San Diego State University in 2003. He works as a medical consultant for the California Department of Heath Services.

Prateek Kumar (M.S. '05) is working as a bioinformatics applications engineer at the J. Craig Venter Institute in Rockville, MD.

After completing a five month project in France and India, **Akshay Lalla (M.S. '05)** has settled in Houston, TX, working for Celerant Consulting.

George Matcuk, Jr., M.D. (B.S. '98) recently completed his second year of radiology residency at LAC+USC Medical Center in Los Angeles. He met his wife while at Stanford University and was married in June of 2004.

After receiving his MBA in 1976, **Marc Newman (B.S. '71)** built upon his education in biology and business and eventually progressed his career to information technology in healthcare.

Alumni News
continued

Brian Sage (Ph.D. '04) is a Postdoctoral Research Associate in the laboratory of Mark Tatar at Brown University, where he studies the molecular mechanisms of aging using *Drosophila*. He and his wife welcomed a baby girl into his family in July 2006.

Ashraf Saleemuddin (B.S. '03) is attending school at Tufts University School of Medicine.

Dietrich Stephan (B.S. '91) leads the Neurobehavioral Research Unit at the Translational Genomics Research Institute in Arizona.

Arvonn Tully (B.S. '00) works at Compix, Inc., in Cranberry, PA and was married in April of 2006.

Ashley Wermine (B.S. '02) is specializing in endocrinology in the Department of Medicine at the University of Maryland.

Mary Ellen Wiltrout (B.S. '04) is attending MIT, working towards her Ph.D. in Biological Sciences. Her work, involing DNA repair and mutagenesis in the translesion polymerase Rev1, is occuring in Graham Walker's laboratory.

Alan Zahler (B.S. '84) is a Professor of Molecular, Cell and Developmental Biology at the University of California, Santa Cruz.

Making a Connection

There are many ways you can connect with the Department of Biological Sciences. We are very grateful for all of your support!

1. Help support undergraduate research efforts

Did you know that 80 percent of undergraduates perform research before they graduate, which is invaluable experience for those entering graduate school or the job market? Your contribution will enhance the Department's research offerings, so students will be poised for greater success.

2. Speak at our Departmental seminar series

We are always looking for speakers to engage the department in a variety of topics in the biological sciences. Holding a seminar for our students is a great way to reintroduce yourself to the Department.

3. Act as a contact for students interested in networking

Our students are looking for opportunities to meet Carnegie Mellon alumni who are working "in the field." Volunteering to act as a contact for our students can give them a taste of how things are done in the real world.

4. Help support a Graduate Student Travel Award

Although we have many talented students who would like to present their exciting research at important national and international conferences, often they do not have enough funds to attend. Your contribution can help a student achieve this goal.

5. Volunteer at the BioSAC Booth during Spring Carnival

The benefits are twofold: you will get the opportunity to network with current undergraduate and graduate students and chances to connect with alumni of all ages and backgrounds.

For more information about connecting with the Department, please contact Jennifer Sciullo, Assistant to the Department Head, at 412-268-1810 or jsemper@andrew.cmu.edu or visit www.cmu.edu/bio/connect.

Student News

Actors in *The Costume Party Caper*, the 2006 Murder Mystery Dinner

Senior **Satyan Pai** was awarded the 2006 Barry M. Goldwater Scholarship.

Junior **Lauren Thorpe** performed research in the summer of 2006 at the Pasteur Institute in Lille, France, as a Howard Hughes Medical Institute (HHMI) International Scholar.

Relay for Life

This year the Biological Sciences Student Advisory Council (BioSAC) participated in the American Cancer Society's Relay for Life, the annual all-night event held in September. Participants took turns running or walking laps at Carnegie Mellon's Gesling Stadium to support cancer research. The BioSAC put in tremendous effort in raising funds by holding several bake sales, soliciting donations from local business, collecting donations and even selling hot beverages during the overnight event. Their efforts helped them raise nearly $2800 and earned them the award for the top fundraising team on campus. The BioSAC was awarded prizes for the best banner, the most emails sent and the team member with the most number of laps completed. A special thank you goes out to all of our alumni who supported the BioSAC through their donations!

The Promoter
Winter 2007

Editor
Erin Martin

Contributors
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