

# Biological Sciences

111 Research Drive • Bethlehem, PA 18015 • 610-758-3680

LEHIGH UNIVERSITY

## From the Department Chair

The value of an undergraduate education is a popular topic. Invariably, or so it seems to me, the cost of education is equated to the value. If we assume that parents and children make reasonable decisions regarding affordability, the debate

then centers on "what could students possibly learn that makes it worth the cost?". There is no doubt in my mind that if value was based on simply the number of course credits taken to graduate, there would be little reason to invest in Lehigh.

I sent my child to Lehigh because I wanted something intangible, something related to my daughter learning to use information in a creative way. While asking students to gain information is relatively easy, using it creatively is less easy... *much* less easy.

Here, in the department of biological sciences, we teach the creative use of learned information. We do this with small class sizes at the advanced level and have students take laboratory classes that focus on creative inquiry. Many students take what they have learned and enter faculty research laboratories where they perform research projects; this gives their burgeoning creativity full expression.

Irrespective of whether or not they stay in the biological sciences, we feel our students should be able to apply their Lehigh experience to any career that requires creative solutions. I would like to believe that Michael Epstein's success as an international patent attorney (see article on page 4) working with the pharmaceutical industry relates to the learning experience he had in this department.

Come and visit Iacocca Hall! Come and experience the creative way the department of biological sciences educates our students! Call 610-758-3680 and I'll be happy to give you a tour.

Murray Itzkowitz, Ph.D.  
Professor and Chair



Murray Itzkowitz, Ph.D.  
Professor and Chair

## HHMI funds bioscience education program

--Kurt Pfitzer  
Office of Communications

The department of biological sciences has received a major competitive grant from the Howard Hughes Medical Institute (HHMI) to boost interdisciplinary research and educational opportunities for students. Lehigh's program will promote an interdisciplinary perspective on issues in the life sciences around the theme of "biosystems dynamics." Centerpieces of the program include a novel introductory survey course, "Bioscience in the 21st Century," and the Biosystems Dynamics Summer Institute (BDSI), a 10-week research-intensive experience in an interdisciplinary team environment.

The survey course exposes students to the breadth of disciplines and perspectives that address issues such as major diseases, new technology development, bioremediation, and bioethics. The BDSI supports interdisciplinary research teams comprised of undergraduates, graduate students, and faculty members from different disciplines. The teams investigate a focused life science problem in areas including genomics, bioinformatics, diagnostic technologies, drug development, novel biomaterials, and reproductive biology. To date, 24 teams have been supported.

### Working in teams on increasingly complex problems

The current HHMI program was launched in 2006 when Lehigh received a \$1.8 million grant to develop a bioscience program with the goal of preparing students to work in a team environment to address increasingly complex problems in the biosciences. Neal Simon and Vassie Ware, professors of biological sciences, headed the 2006 grant and will continue as directors of the new award, which runs through 2014.

"The cohort of students attracted to BDSI has been exceptionally well-qualified and diverse across gender, ethnicity, and academic interest," says Simon. Some students who participate in the summer BDSI have come from Lincoln and Cheyney Universities, two historically black universities in Pennsylvania. Lehigh's partnership with the two schools has been supported by both Lehigh and the state of Pennsylvania.

The HHMI program has helped advance Lehigh's efforts to establish a more integrated, interdisciplinary approach to science. Some research teams launched as part of the summer BDSI have continued to work together during the school year. Faculty members have sought out new collaborations with colleagues in other departments, and the boundaries between teaching and research have diminished.

"An exciting aspect of the HHMI program is that it is a mechanism for building an enduring cultural change in how science is practiced at the institution," Ware says. "That in turn impacts how our students learn to think about science."



Neal Simon, Ph.D., Director  
Vassie Ware, Ph.D., Co-Director



## A warm welcome!

The department of biological sciences welcomes its newest faculty member, Assistant Professor Amy Hitchcock Camp. Dr. Camp received her undergraduate degree in Molecular Biology from Princeton University in 1997 and her doctorate from Harvard University in 2003. Immediately following her graduation from Harvard, Dr. Camp was a visiting assistant professor for a year at Mount Holyoke College in Massachusetts. For the next five years, Dr. Camp was a postdoctoral research scientist at Harvard University, in the lab of Richard Losick.

Dr. Camp's research focus is on bacterial cell-cell communication and gene regulation. She already has three undergraduate students performing research in her lab! Dr. Camp is also investigating ways to integrate her research with the mycobacterial phage research being done in the SEA class (see page 6). "SEA students should be excited about how they are learning to be scientists. The students get the opportunity to merge classroom education with real research. They are also learning universal skills that allow the student not only to move from lab to lab, but encourage deductive reasoning and logic."

If you would like to learn more about Dr. Camp's research, please visit her website (<http://www.lehigh.edu/~inbios/faculty/Camp.html>).

## NASA's ET hype does disservice to science

--Tricia Long, Office of Communications



Newest faculty member,  
Amy Hitchcock Camp, Ph.D.

NASA researchers recently unveiled a major discovery—the first identified microorganism on Earth able to thrive using toxic arsenic rather than phosphorus, which forms the DNA-backbone of all other living things. But now scientists are voicing concerns about the study's conclusions, with some saying the results are not what the researchers claim. Validity of the science aside, Lehigh microbiologist Amy Hitchcock Camp says that the clumsy delivery of the news had already overshadowed the potentially groundbreaking science. NASA touted the microorganism's impact on the search for extraterrestrial life, generating buzz about alien life forms. Yet the microbe in question hailed from California.

This is a common error, says Camp, when there's breaking science news. A major scientific finding becomes at best misunderstood, and at worst, an example of how science has trouble communicating even its best discoveries. "The announcement made the science look like a disappointment. This does a great disservice to the actual findings—and leaves the public with misconceptions," says Camp.

If, in fact, the newly discovered bacterium can live on arsenic—and is not simply sneaking phosphorous as some have claimed—our notion of what life can be would change, Camp says. "Until now, science has taken a rather narrow view of life—that oxygen, carbon, sulfur, phosphorous, hydrogen, and nitrogen are the six essential atoms for life," she says. "This study could alter longstanding assumptions. It's not a truly different life form. But it could inform our search for alternative forms of life."

As for the short-lived buzz that an alien life form had been discovered, Camp doesn't share the public disappointment. "If we found this microbe in a galaxy far, far away, we couldn't study it," says Camp. "Perhaps for the public it would be more exciting to find life on another planet. But for me, it is more exciting because we can actually study it here."

Camp's attraction to the story comes from her work on understanding how microbes adapt to different environments. Because the vast majority of cellular life and diversity is microbial, scientists who are interested in finding other forms of life wisely look at microbes. The recent findings "could open up a whole new study of the arsenic-containing biological molecules, their relative stabilities, and their biochemistry," Camp says.

Arsenic was—and still is, by many—considered too unstable an element to function in biological molecules. "Even if this microbe isn't utilizing arsenic in place of phosphorus in its biomolecules, it is still remarkable that it can thrive in the presence of ordinarily lethal concentrations of arsenic," Camp says. "I think we can reliably take away from it that if there is any possible solution to avoiding death, nature will find it."

## 2010 Fast Facts

- Nine graduate students received their M.S. in Molecular Biology through the university's distance education program
- 96 undergraduate students received their degree in one of the biological sciences

### Bachelor of Arts

Behavioral Neuroscience - 15  
Biology - 17  
Molecular Biology - 2

### Bachelor of Science

Behavioral Neuroscience - 21  
Biochemistry - 18  
Biology - 19  
Molecular Biology - 4

## 2010 Doctoral Degrees

### Doctor of Philosophy *Integrative Biology*

**Jennifer Snekser**  
*Influences on Biparental Care and the Division of Parental Roles*

**Bradley Walters**  
*The role of Bone Morphogenetic Protein 2 and Estrogen in injury-induced plasticity of the songbird brain.*

**Holly Richendrfer**  
*The role of the MPNmag in adult neurogenesis in the hamster*

### *Molecular Biology*

**Susan Baker**  
*Gap Junction Internalization in Primary Vascular Endothelial Cells: A Regulatory Mechanism to Modulate Direct Cell-to-Cell Communication and Physical Cellular Uncoupling*

**Anna Gumpert**  
*Characterization of Proteins and Cellular Pathways Involved in Regulation of Gap Junction Mediated Cell-Cell Communication and Physical Coupling*

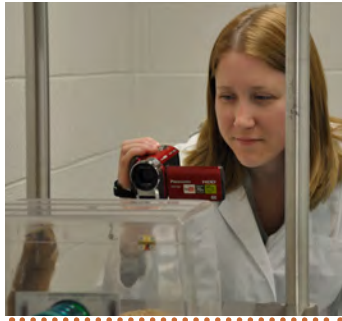
**Marie Maradeo**  
*The role of DNA replication factor C complexes in sister chromatid cohesin establishment*

# Graduate Student Spotlight

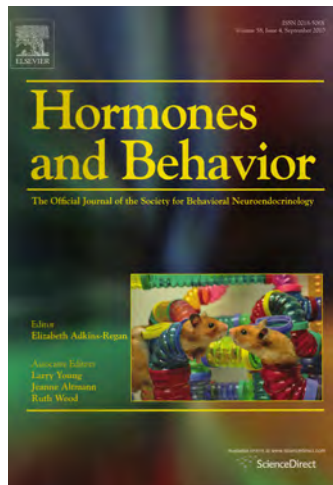
**Candice Klingerman is a Ph.D. candidate in the Integrative Biology & Neuroscience program.**

Estrogens, one of the active components of most birth control pills, are naturally occurring hormones important for reproductive function and general health. Candice Klingerman and her mentor, Professor Jill Schneider, suspect that during evolution, a major function of estrogens has been to orchestrate the appetites for food and sex in a way that allows animals to optimize their reproductive success in environments where energy availability fluctuates. When animals must work for their food, low levels of estradiol increase the appetite for food, and thereby ensure vigilant foraging and eating. High levels of estradiol (such as those that occur at the time of ovulation) decrease the urge to forage and eat while simultaneously increasing the urge for sexual adventure.

Klingerman's work with Syrian hamsters shows that after a period of food insecurity (limited food availability), hamsters spend most of the available time foraging and hoarding while ignoring the male hamsters that try to court them. Food-limited females are fixated on food until their estradiol levels rise, at which time they become more interested in male hamsters. At the time of ovulation and highest estradiol secretion, female hamsters become fixated on males and show little interest in food. These wild fluctuations in behavioral priorities are only apparent in hamsters that are energetically challenged. In contrast, females with all the food they want and little opportunity for exercise, do not fluctuate in their



(above) Candice Klingerman  
(below) Klingerman/Schneider publication featured on cover of *Hormones and Behavior*.



appetites for food and sex. They prefer sexual stimuli on all days of their estrous cycle. Similarly, women who are not on diets have little fluctuation in appetite over the menstrual cycle, whereas women on calorie-restricting diets find it very difficult to stay on their diets during the second half of their menstrual cycles, when estrogen levels are low. Other studies show that women are most likely to take sexual risks around the time of ovulation. The Schneider Lab suggests that this menstrual fluctuation in sexual appetite would be greater in women who are dieting or binge eating.

The interaction between energy availability and estradiol allows Klingerman to explore the underlying physiological mechanisms. For example, correlated with effects of food restriction on the preference for sexual vs. food stimuli, Klingerman finds changes in a brain peptide RFamide-RP-3 (in collaboration with members of the Kriegsfeld laboratory at University of California, Berkeley). In contrast, these mild metabolic challenges did not increase the activation of neurons in the mesolimbic dopamine system, a brain area involved in reward. Research in progress examines other hormones that have formerly been seen as "satiety" or "feeding" hormones.

Candice's research is relevant for understanding obesity, diabetes, fertility, and sexual libido. Candice has published four peer-reviewed manuscripts from her master's and doctoral research and has received The Gorden C. Thorne Fellowship from the Department of Biological Sciences and a research grant from Sigma Xi.

## 2010 Publications

**Venditti, J.J., Swann, J.M., & Bean, B.S.**, 2010. Hamster sperm associated alpha-L-fucosidase functions during fertilization. *Biology of Reproduction* 82:572-579.

**Behe, M.J.** 2010. Experimental Evolution, Loss-of-Function Mutations, and 'The First Rule of Adaptive Evolution.' *Quarterly Review of Biology* 85, 419-445.

**Carney, B.K.** and **Cassimeris, L.** 2010. Stathmin/oncoprotein 18, a microtubule regulatory protein, is required for survival of both normal and cancer cell lines lacking the tumor suppressor, p53. *Cancer Biol. and Therapy*. 9: 699-709.

**Deufel, A.** and **D. Cundall.** 2010. Functional morphology of the palato-maxillary apparatus in "palatine dragging" snakes (Serpentes: Elapidae: Acanthophis, Oxyuranus). *Journal of Morphology* 271:73-85.

**Baker, S., Buckheit III, R.W., and Falk, M.M.** 2010. Green-to-red photoconvertible fluorescent proteins: tracking cell and protein dynamics on standard wide-field mercury arc-based microscopes. *BMC Cell Biology* 11:15-24

**Leese, J., Snekser, J., & Itzkowitz, M.** Interactions of natural and sexual selection: damselfish prioritize brood defense with male-male competition or courtship. *Behaviour*. 147:37 – 52.

Blaukovitch, C.I., **Pugh, R., Gilotti, A.C., Kanyi, D., and Lowe-Krentz, L.J.** 2010. Heparin treatment of vascular smooth muscle cells results in the synthesis of the dual-specificity phosphatase, MKP-1. *J. Cellular Biochemistry* 110: 382-391.

Shah, S. N. & **Nyby, J.G.** Ghrelin's quick inhibition of androgen-dependent behaviors of male house mice (*Mus musculus*). *Hormones and Behavior*, 2010 57,291-296.

Bailey, D.J. & **Saldanha, C.J.** (2010). Ecological validity and the study of procedural and episodic memory in songbirds. *Cognitive Sciences*. 5(1): 1-20.

**Skibbens, R.V.,** Marzillier, J., and Eastman, L. (2010). Cohesins coordinate gene transcriptions of related function within *Saccharomyces cerevisiae*. *Cell Cycle* 9: 1601-1606.

**Kearse, M.G., Chen, A.S., and Ware, V.C.** 2010. Expression of ribosomal protein L22e family members in *Drosophila melanogaster*: rpL22-like is differentially expressed and alternatively spliced. *Nucleic Acids Res.*, 2010, 1-16. doi: 10.1093/nar/gkq1218.

Bold = Faculty  
Bold+Italics=Graduate Student  
Underline=Former/Current Student

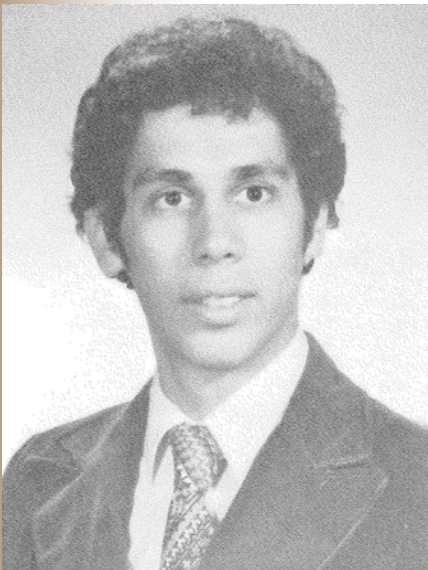
# The Law of Nature

**What do DNA and corporate law have in common? What do South Bethlehem and New York City have in common? Michael Epstein!**

**It is often believed that a degree in one of the biological sciences will take a student in the direction of medicine or research. Not true! Michael Epstein is a wonderful example of how studying biology can create the building blocks for a successful career outside the halls of a hospital or research lab.**

**A recent appointee to the Dean's Advisory Board for the College of Arts & Sciences, Michael Epstein graciously agreed to take some time out of his busy schedule to talk about how a degree in Biology helped shape his career in law.**

**Were you a member of the first class of women being admitted to Lehigh?**



Michael Epstein, 1975  
Photo courtesy of *The Epitome*

Yes, I was!

**What was that like for you?**

The number of female students is one of the biggest changes that I see on campus. When I go back to Lehigh to visit there are many more women. I am sure it was difficult for the first several classes of women. It was a different era. At that time the Steel factories were also up and running.

**Why did you decide to attend Lehigh?**

The main reason I went to Lehigh was that it had a solid liberal arts reputation. It was located on the east coast, and I liked the size of the school. I wasn't looking to go to a large mega-university.

**What do you remember about the Biology Department when you were a student?**

Barry Bean had just arrived at Lehigh. I never took any classes with him, but he was the popular new professor on the block. The chair of the department was Professor Malsburger. There was also Dr. Pritchard (Botany) and Dr. Herman (Ecology). It was a much different university back then - there were no women professors in the Biology, Chemistry, Physics, or Math Departments. I did have a female professor who taught Classics. There were certainly no women in the administrative levels. It was much more male oriented - that was true at the student level, but also at the faculty level. We had a Dean's Advisory Board meeting in December and when I looked out at the students walking around campus I remembered how back in 1975 the presence of women was rare - people used to ask for a woman's autograph! That's an exaggeration, but you get my point.

**When you were a student at Lehigh, did you know that you wanted to go into law?**

I was very interested in biology, and I also was interested in current events and politics. When I was at Lehigh, in both in my junior and senior years, I was very active in the student/faculty government that existed at that time. It was a body called The Forum. It was comprised of 60 students, 60 faculty members, and five senior administrators including the president and provost. In my senior year I held one of the officer positions.



Members of The Forum in 1975. Michael Epstein is in the second row, first on the left. Photo courtesy of *The Epitome*.

When I came to Lehigh I majored in the Biological Sciences because I was interested in medical school. But I also had a strong interest in law. Because there were no specific courses required for applying to law school but there were tons of required courses for medical school, I decided to keep my options open and major in Biology.

**Knowing what your education was like in the 1970's, and having just attended your first Dean's Advisory Board for the College of Arts & Sciences, how is education at Lehigh different today?**

Put aside that the school is now co-ed and that the snow is white and is not polluted with the fragments from the Steel factory, I think when I was at Lehigh the only computer was a big machine in the basement of Packard Lab. We didn't have computers. There was no Internet. There was no e-mail. We typed our papers on typewriters. I was lucky because I had an electric typewriter, not a manual. The ability to get information today is just incredible. I see with my own children even in elementary school that this advancement of technology since I was at Lehigh has to have caused a fundamental change in how people learn, how people are taught, and what goes on the classroom.

I think there is a lot more focus at Lehigh now on interdisciplinary matters. We need to focus on problems as they exist and often those



problems don't match up with how our academic departments are structured. I think that there is a good sensitivity to this at Lehigh in thinking through how to evolve an interdisciplinary educational process. The best example of this is the new STEPS building that just opened.

There is more sensitivity in the academic setting to global issues. Back in the mid-70s it really was a US-focused learning experience. Lehigh is now more concerned with the international picture—whether it is promoting Lehigh internationally or incorporating an international focus in many of the disciplines. Just as business has evolved to be global in scope, I think so too have academic institutions, including Lehigh.

***When you were a student were there international students on campus?***

There were some international students - it wasn't overwhelming - and as far as I can remember very few students took time to study overseas. It is important that today's students study abroad. I see the benefits from the legal perspective. I am very familiar with my firm's overseas offices, and I represent a fair number of companies that are based overseas. I think it is critical to have a sense of what other peoples' cultures are and how other people think. It is fundamental for me when I go to negotiate with the Chinese or the Japanese or the Israelis or Italians. They all have different negotiating styles. If you don't understand their culture, and you don't know what to expect and how properly to react, it hurts the deal.

***Hands-on lab experience is a strong component of our curriculum today, both through our instructional lab classes, as well as individual research with faculty mentors. Did you participate in undergraduate research while you were a student at Lehigh?***

In my senior year I did research with Professor Steven Krawiec. He was just starting out then. He was a great teacher. I took Microbiology with him. It was a great class. Fortunately I did well. Dr. Krawiec gave me an A, which further motivated my study of biology! He used to select four students each year to work in his laboratory doing research. Everybody wanted to work with him. He was very well liked. I remember, too, his wife, Margaret Krawiec. She also worked in the department. That was when all of the Biology Department was located in Williams Hall.

***Why do you think undergraduate research is important to a student's career?***

Research is very important because, from my perspective, it teaches you judgment and how to analyze what you should do next to get to your goal. Any activity that teaches a person judgment and good analytics is very hard to find, but very worthwhile. What impressed me a year ago when I visited the department was seeing the level of research that undergraduate students are doing. Very impressive!

We assume that people we interview for the law firm will have a basic level of knowledge. Some of the factors we look for are, "Does this person have drive? Is this person motivated to do well? Does this person exhibit good judgment? Is this person a self-starter?" Someone who could come in my office and describe an independent research project they successfully

**Michael A. Epstein**

**Undergraduate Degree:  
Lehigh University  
Bachelor of Arts  
Biology  
1975**

**Graduate Degree:  
New York University  
School of Law (NYU)  
1979**

**Employment History:  
Weil, Gotshal & Manges  
31 years  
Partner in 1987**

**Personal Information:  
Married to wife, Lisa  
Children:  
Jesse (14 yrs)  
Emily (12 yrs)  
Eric (8 yrs)**

conducted is someone who has demonstrated they can self-start and get things done.

***Can you describe the work you do?***

Weil is a large international law firm. We have 1,200 lawyers around the world, with 21 offices in the United States, Europe and Asia. We represent most of the largest companies in the world. I specialize in handling transactions that involve technology, or "intellectual property," which include patents, copyrights, and trademarks. One of the ways that I meld my biology background with my legal background is that I represent a number of pharmaceutical companies. Pharmaceutical companies buy a lot of technology that they think would be useful to make new pharmaceutical products. They sell off product lines to each other. They do research and development agreements with universities and other corporations. Given my background and major in biology, I have a better understanding of the science involved in a transaction, what actually is going on in the deal, and what my client wants to attain than a lawyer that does not have a scientific background. When a scientist starts talking about his or her research, the chemical compositions of products, and DNA and RNA, I can follow the conversation. The same is true representing computer companies. Even though my focus was biology, I had to take a number of math and other types of natural science courses. I think it provided me with an excellent background across the board in all areas of technology.

***What advice would you give to today's Lehigh students?***

Today's Lehigh students should use their undergraduate years to explore different areas. Students may think they know what they want but one really doesn't know all the options. Students should use a portion of their four years as an undergraduate to explore different courses. Don't be afraid to try courses! It is similar to advice I share with young lawyers who are starting at the firm. You may never have heard of a particular specialty of law before, but explore it, see if you like it! If you don't like it, that's OK. I think to some extent it is the same as an undergraduate.

I remember when I was a student at Lehigh I really didn't know what I would find in a Philosophy course, because it really seemed to be far afield from organic chemistry and biology. But I took that Philosophy course and it turned out to be a lot of fun and worthwhile in exposing me to new areas. I think that getting that type of diversity is important.

***Is there any specific advice you can give our faculty to help them prepare students for life after Lehigh?***

First, incorporate a broad international perspective into curricula. Second, it is important for students to learn to work across disciplines in a collaborative manner. Third, we should teach students how to benefit from and appreciate the incredible rate of change in technology (computer technology, telecommunications, biotechnology, pharmaceutical technology). If you go back twenty years ago no one would have been able to predict the technology we have today. Students need to be equipped with the ability to cope with and understand rapidly evolving technology in a rapidly changing world.



Michael Epstein, Class of 1975

# Fishing for Phage in the S.E.A.

Vassie Ware, Ph.D., SEA Instructor

Lehigh University is one of 70 institutions selected over the last four years by the Howard Hughes Medical Institute (HHMI) Science Education Alliance (SEA) to participate in the National Genomics Research Initiative to characterize novel mycobacteriophage genomes. This phage project is an outgrowth of the research interests of Professor Graham Hatfull (University of Pittsburgh) who studies the molecular genetics of mycobacteria and the viruses that infect them.

The program provides a research experience to undergraduate novices at early stages in their academic careers, giving them a real taste of experimental science. At many of the SEA institutions, freshmen are the primary constituency. At Lehigh, sophomores who have completed the first core course and laboratory in cell and molecular biology in the biological sciences curriculum are the focal group.

Students selected for the program participate in a two semester research-focused phage genomics course in which novel bacteriophages (viruses that infect bacteria) are isolated from local soil samples, their physical features determined by electron microscopy, and genome profiles determined by DNA analysis, genome sequencing, and gene annotation methods. Students learn a variety of techniques that span several disciplines, including microbiology, molecular biology, genomics, and bioinformatics.

All institutional SEA members and HHMI SEA staff are connected by the Internet, allowing data to be shared and discussed. At the annual HHMI-sponsored symposium at the Janelia Farm Research Campus in June where SEA faculty and students assemble to report research results on mycobacteriophage genome organization, each institution's results are communicated by a student representative.

In Lehigh's inaugural year (2009) in the Alliance, five mycobacteriophage genomes were sequenced and annotated and results reported at the annual conference by Lehigh's student representative, Ainsley Timmel. Twelve other Lehigh SEA students along with SEA faculty and the SEA teaching assistant also attended the conference and consolidated relationships with the nationwide community that were originally initiated through internet communications.

The SEA opportunity has spawned a host of research opportunities for SEA students in independent research laboratories at Lehigh and in summer research experiences elsewhere. Our new crop of SEA students in our second year in the Alliance has eagerly joined the nationwide community of scholars, pursuing unknowns in the world of mycobacteriophage genomes!

## One student's perspective

Ainsley Timmel, Class of 2012

What happens when you give 20 college sophomores free-rein to name a novel mycobacteriophage? You end up with published names like *Dandelion*, *cuatip13*, *Truffula*, *Yahalom*, *Fisherman's Glory*, *Concept II*, *Tyke*, *Mason*, *Noodle*, *Scorpio 7*, *Sh3riff*, *Pendulum*, *Freckles*, *Mockingbird*, and *Eichner*. While the names we chose might be a little silly, the Lehigh SEA course taught us how to think like researchers.

I was a member of Lehigh's pilot SEA program. Like most of my peers, I had no idea what to expect going in to the experience, but by the end of the year I was amazed at how much I had learned and accomplished. The year started with collecting soil samples and extracting mycobacteriophage from these samples. Throughout the first semester, we purified and characterized our phages. One of the most memorable moments for me was the first time my phage "Concept II" was visualized on the electron microscope at Iacocca Hall. In the second semester, we became experts at comparative genomics. We utilized software such as BLAST and Apollo,

For me, the SEA program was more than a lab. I was really able to develop my critical thinking skills and begin to think like a researcher. We developed our writing and presentations skills through reading scientific journals, making posters for symposiums, presenting powerpoints, designing our own independent project, and writing our own journal article. I think that the SEA experience allowed our entire class to understand and appreciate the procedures we were doing and learning because we were committed, invested, and engaged.

I was selected to represent Lehigh University at the HHMI Symposium in Janelia Farms, VA in June. The symposium included students and faculty from 24 other universities participating in the HHMI funded program. It brought the entire experience full circle to be able to discuss the years work with other students from all over the country and hear the keynote speaker, lead scientist Graham Hatfull, speak. We were also given the unique and exciting opportunity to tour the world-class HHMI research facilities.

This entire experience was possible because of our amazingly committed professors Dr. Kenna, Dr. Marzillier, and Dr. Ware, as well as our awesome teaching assistant, Mike Kears, and senior lab technician, Lee Graham. Through all of our successes, failures, and questions (and trust me, there were A LOT of questions!), they were there for support. Above all they fueled our excitement for the program with their passion for biology and research. I cannot speak highly enough of the mentorship and wisdom that they provided this year. I attribute to their dedication the success and continued interest in research of my peers.

## Her passion for research continues

In the summer of 2009, Gina Notaro's father was diagnosed with an inoperable brain tumor. He had encouraged her interest in science, and the two would watch NOVA programs on science together. Notaro's training in basic neuroscience made her more aware of the symptoms triggered by his brain tumor — like the tingling in his fingers, or the trouble with speech — and just how serious they were. "The experience made me realize how much more there is to be discovered that could potentially help in the fight against cancer and other diseases," she says.

During winter break, shortly after her father passed away, Notaro began filling out applications to the Amgen Scholars Program, and it kept her mind firmly focused on the future, she says. Notaro was accepted into the 2010 Amgen Scholars Program at the University of California, Los Angeles in Professor Ben Novitch's lab. Notaro investigated how molecular signals control proper spinal cord development. Dr. Novitch's group was Notaro's top pick because she wanted to learn more about how cells become neurons.

At Lehigh, Notaro had started learning lab techniques in a two-semester course funded by the Howard Hughes Medical Institute's Science Education Alliance, an initiative aimed to engage undergraduates in scientific discovery on a national scale. Notaro says the course helped her get introduced to research — namely, the lesson that experiments don't always work out the way scientists expect. As a researcher, Notaro "matured in a way that was quite noticeable, not just to her but to the entire class," notes lead instructor Vassie Ware, an associate professor of molecular biology at Lehigh.

Notaro is planning to attend graduate school and obtain a Ph.D. in cognitive neuroscience. She is interested in teaching science at the college level. "I've had a lot of influential teachers from high school and college who have had a strong positive impact on my life, and I feel I can make a similar impact on others," she says.

Used with permission. Amgen Foundation, Excerpts taken from "Focused on the future: 2010 Amgen Scholar Gina Notaro leaves home for west coast research", Amgen Scholars News, December 2010



Members of the 2009-2010 SEA Class



Amgen Scholar, Gina Notaro

## Alumni Updates

**Velma Gebhard Conway** (B.A., Biology/Psychology, 1975) is a registered licensed occupational therapist. After attending and graduating from Lehigh in the first class of women, Velma went on to the University of Pennsylvania School of Allied Medical Professions to get a certificate in occupational therapy. "My education at Lehigh was instrumental in providing me with the scientific background that is so crucial to understanding new research. I have worked with adults in a physical rehabilitation setting but most recently (the last 17 years) I have worked with children in the schools. I often envision retiring and coming back to Lehigh to study at the School of Education. It is a good dream."

**Brett Kreitman**, DMD (B.A., Biology, 1978) is practicing dentistry in Tenafly, NJ. "I have been teaching at two dental schools for the past 27 years, all of the above accomplishments could not have been possible without the careful and sometimes frustrating guidance of Dr Cundall. Lehigh is not possible without the mentors and instructors who set the bar higher than what you think is possible."

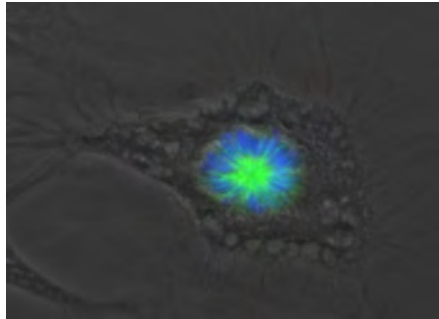
**Peter Prevelige** (B.S., Biology, 1978) is a professor in the department of microbiology at the University of Alabama at Birmingham. His research interests include structural biology/virology, virus assembly, bio-nanomaterials, and bacteriophage morphogenesis. Prof. Barry Bean was Peter's undergrad research advisor while he was a student at Lehigh.

**Art Griffin** (M.S., Biology, 1982) worked in quality control of the manufacturing of medical devices and progressed into quality control within the automotive community, where he has been at the plant or corporate level for over 21 years. "Not very biologicic, but with the Statistics I had to understand as a Field Biologist, it served me well in QC. I hope to get back to Lehigh at some point, if only to see the old annex [Williams Hall]."

**Daniel Shelly**, Ph.D., MBA (B.S., Biology, 1991) is the director of marketing and business development for Meridian Life Science, Inc. in Newtown, Ohio. He is responsible for contract biopharmaceutical manufacturing business development activities along with responsibilities for marketing of the life sciences business. He is also responsible for clinical development and outlicensing of a recombinant human Parvovirus B19 Vaccine being developed at Meridian Life Science in collaboration with the National Institutes of Health. Dr. Shelly was recognized in 2008 as one of Ohio's "30 at 30"; a list of Ohio's top 30 bioscience professionals in their 30s sponsored by BIO Ohio.

**Alexandra (Kaufer) Chiaruttini** (B.A., Behavioral Neuroscience, 1992) received her M.S. in Environmental Science and Management (1995) from Duquesne University and her J.D. from The Dickinson School of Law in 1997. She is currently living in York, Pennsylvania. "I am very lucky to be able to use my science education in my legal practice every day. It is exciting and challenging. After working at a large law firm for many years, two years ago I started a new environmental practice in the small town where I live with my husband, Jim. It is wonderful to be in charge of the practice, the type of work I am doing, and to be able to be involved in my local community. One of the best risks I've ever taken!"

**JoAn Monaco**, MD (M.S., Mol. Bio., 1994) specializes in plastic, reconstructive, and cosmetic surgery in New York City. "Please give my regards to Dr. Simon, who is still my all time hero of a mentor."



A mitotic HeLa cell in Metaphase in polar view; microtubules, green, condensed chromosomes, blue; combined fluorescence and Phase contrast illumination. *BioS 368, Fall 2010, M. Falk instructor*

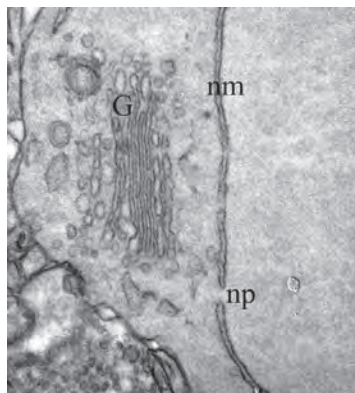
**Sarah Karam Lewis** (B.S., Mol. Biology, B.A., German, 1999) studied molecular biology at MIT and then completed her M.H.S. in physician assistant studies. She worked 6 years in rural family medicine in central PA, emergency medicine in State College and continues to work part-time clinically in emergency medicine at Hershey Medical Center. She also works full time as an assistant professor with Lock Haven University physician assistant program in Harrisburg PA. "My husband Greg Lewis is also a Lehigh grad—'99 mechanical engineer, with his Ph.D. in ME from PSU. He works in orthopedic research for PSU at the Hershey Medical

Center. The joy and humor of our lives are our 2 boys—Henry who's 3, and Jonah who's almost 1."

**Diane Dutt** (M.S., Mol. Bio., 1994; Ph.D., Mol. Bio., 2002) is currently a federal employee working for the Defense Threat Reduction Agency (DTRA) at Fort Belvoir, Virginia. "My current position is that of Senior Project Manager for the Transitional Medical Technologies Initiative (TMTI). The focus of my work is to identify, select, manage funding and oversee the progress of research projects that support the TMTI mission. Our mission is to develop and coordinate a rapid response to emerging and conventional bacterial and viral pathogens. The work is interesting as I have the opportunity to interact with those at the forefront of biotechnology development and look for upcoming researchers in the academic arena worldwide."

**Katie Stiles** (B.S., Molecular Biology, 2004) earned her Ph.D. in Cell and Molecular Biology at the University of Pennsylvania in 2010. Her graduate work was on herpes simplex virus entry and immune modulation. She is currently a postdoctoral fellow at Albert Einstein College of Medicine in New York working on viral membrane fusion.

**Rita Sergonis** (B.S., Biology, 2006) graduated from medical school in 2010 and is now at studying pediatrics at Washington University in St. Louis and training at St. Louis Children's Hospital. "I am very excited to embark on this new chapter of my life. Of course I will always carry with me lessons learned from Lehigh, of the importance of basic science, research, education, and public service."



Golgi apparatus (G) in the cytoplasm, just outside the bi-layered nuclear membrane (nm) and adjacent to a nuclear pore (np) of a hippocampal cell in the brain of an adult male zebra finch. *S. Blauman, Saldanha Lab.*

**Kristen Cornell** (B.S., Biology, 2008) is living in Atlanta working as a pediatric genetic counselor at Emory University. "It feels like just yesterday I was working on blots in the Lowe-Krentz lab and throwing out contaminated cells over and over again! Thanks, Dr. Lowe-Krentz, for helping me get to this point!"

**Jennifer Venditti** (Ph.D., Mol. Bio., 2008), was recently hired as an assistant professor at Bloomsburg University.

**Nathalie Martin** (B.A., Behavioral Neuroscience, 2010) is working at the University of Washington Medical Center doing research on Alzheimer's Disease. "I really want to say thank you to Dr. Swann for getting me through Experimental Neuroscience. I don't think I could have graduated without her help, and I truly appreciate everything!"

# Department successes in 2010

**Professor Jill Schneider** is an associate faculty of F1000 (the faculty of 1000). Faculty of 1000 Biology and Medicine are authoritative online services in which leading researchers and clinicians share their expert opinions by highlighting and evaluating the most important articles in biology and medicine. The reviews that Dr. Schneider and her two associates have contributed are apparently among the top 10% of most valued reviews in the F1000.

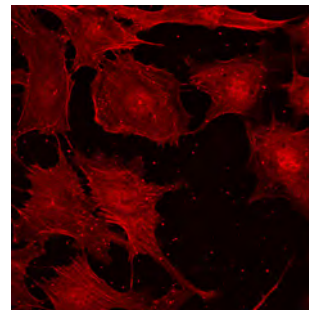
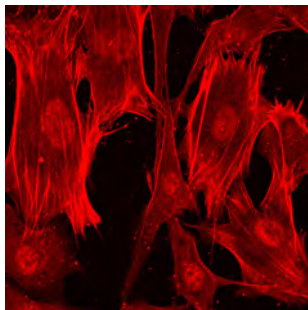
Graduate student **Candice Klingerman**, and **Professor Jill Schneider's** publication was featured as the cover photo of the journal "Hormones and Behavior."

**Raina Jain**, a Bethlehem Freedom High School student performing research in **Professor Matthias Falk's** laboratory, won this year's BioGENEius Challenge (one of the major high school student science competitions). She was invited to the first Science Fair held at the White House in October 2010 to present her research to President Barack Obama.

**Kevin (Su) Park** (undergraduate researcher in the Swann Lab) received an award for his poster presented at the Society for Behavioral Neuroendocrinology held in July in Toronto, Canada.

The **Swann Lab** hosted a faculty member from Cheyney University, Janine Maddox, Ph.D., who received a supplemental award of \$10,000 for her work. The NSF grant is "Steroidal Regulation of Synaptic Input in the MPN mag."

The Department of Biological Sciences sent 15 students to the second National Genomics Research Initiative Symposium (June 2010) at the Howard Hughes Medical Institute. **Ms. Ainsley Timmel** (Class of 2012) gave an oral presentation representing the work of 19 students in the Science Education Alliance (SEA) Class, led by Professor Vassie Ware, Lab Manager Margaret Kenna, Ph.D., Professor of Practice Jutta Marzillier, and teaching assistant Michael Kearse.



TNF $\alpha$ -induced stress fiber formation in endothelial cells is reduced in the presence of heparin. Endothelial cells were grown on coverslips coated with collagen I and subjected to TNF $\alpha$  (1 hour) or both heparin (20 mins prior to TNF $\alpha$ ) and TNF $\alpha$ . The fixed cells were incubated with antibody against actin followed by a TRITC-conjugated secondary antibody. The coverslips were imaged using a confocal microscope. *J. Slee, Lowe-Krentz Lab*

## And now we'd like to hear from you!

**Please take a moment to update us on your activities.**

### Want to visit?

Would you like to see for yourself how the department has grown? We would love to welcome you back for a visit! Simply call Vicki Waldron (610-758-3680) to make arrangements and we'll make sure someone is available to give you a personal tour!

Name: \_\_\_\_\_ Year(s) of Lehigh degree(s) \_\_\_\_\_

e-mail address: \_\_\_\_\_

News about you and your professional work: \_\_\_\_\_

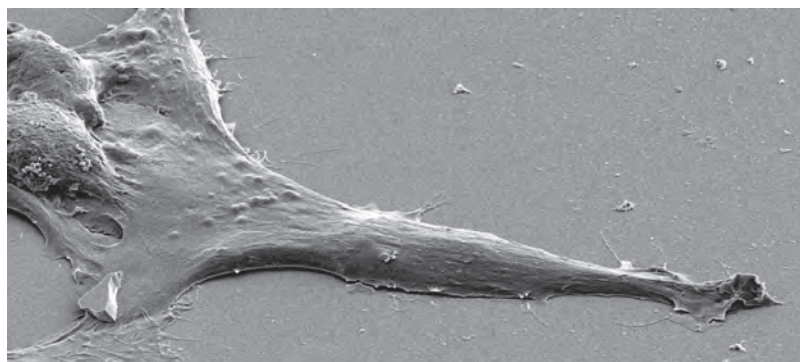
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Please send to: e-mail: [inbios@lehigh.edu](mailto:inbios@lehigh.edu)

-or- fax: 610-758-4004

-or- Department of Biological Sciences  
Alumni News  
111 Research Dr., B217  
Bethlehem, PA 18015



Scanning electron micrograph of colon cancer cells. *L. Cassimeris*