

Biological Sciences

LEHIGH UNIVERSITY

From the Department Chair

Greetings and best wishes to all alumni and friends. Spring semester 2008 finds the department to be an exciting and evolving place. As in the past two years I've written these cover letters to you, 2007 was another year of major accomplishments in our overall mission involving research, teaching, and service. Everything we do in the department impacts all of these areas, and I sometimes use the phrase **Discovery, Learning, and Engagement** as an expression of what we are all about as a department and as individuals interested in our natural world.

This volume of the newsletter will give you an overview of some events during 2007. They include many accomplishments by faculty and students, including new books and journal articles, new grants, and global outreach. In addition, we played a major role in campus events, including the celebration of the presidential inauguration. As with every year, there were some career transitions; 2007 brought the retirement of long time professor Steven Krawiec, the promotion to associate professor for Colin Saldanha, and the arrival of a new evolutionary biologist, assistant professor Sean Mullen.

The future will of course continue to bring more changes, and you can help. For the first time in my three years of writing these letters to you, I am asking you to become an active participant in helping enhance our future. A hallmark feature of our department is the commitment we have to making cutting-edge research opportunities available to our current students. As the number of our majors has risen in recent years, it has become more and more difficult to provide enough funds for undergraduate research. Now, the University has established a fund drive to raise one million dollars to endow biological sciences undergraduate research. For the one and only time during my chairmanship, I am asking you to consider making a major financial contribution to the department. By doing so, you will help ensure the opportunity for a high quality research experience for generations of Lehigh students to come. Please see the box on the right for details on how to contribute.

I have greatly enjoyed communicating with you in this and the previous two annual newsletters. As we move on from here, I wish you all the best in 2008 and beyond.



Jeff Sands
Professor and Chair



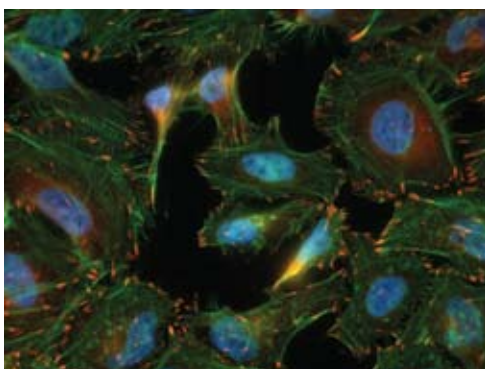
front: Jeff Sands, Chair; Linda Lowe-Krentz, Associate Chair
rear: Vassie Ware, Infrastructure Committee Chair; Murray Itzkowitz, Graduate Committee Chair

An important challenge for Lehigh is to transition Biological Sciences' award-winning programs from grant funding to endowment. Raising \$1 million in endowment for undergraduate research in Biological Sciences is the first step in securing outstanding educational opportunities for our students.

We encourage you to be a part of this historic effort and give what you can.

Make a gift today.

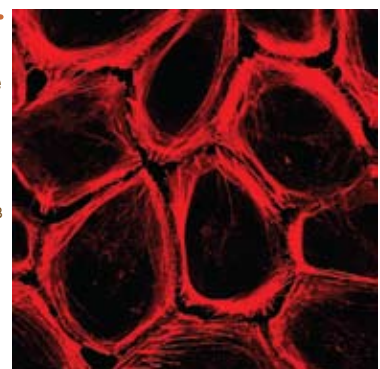
Go to giving.lehigh.edu and click on "Other" and be sure to specify "Biological Sciences Undergraduate Research."



(l) Attachment sites of cells to the extracellular matrix visualized in HeLa cells by simultaneously immunostaining the cell adhesion protein vinculin (red), actin filaments (green), and the cell nucleus (blue).

BioS 368; M. FALK INSTRUCTOR

(r) Inhibition of JNK activity blocks fluid shear stress-induced actin alignment in the direction of flow, where actin filaments become cortical (red), and endothelial cell shape remains polygonal. H. BROTZMAN, LOWE-KRENTZ LAB



Department Faculty....

Volume 4, 2008

- Jeffrey Sands, Chair • Barry Bean • Michael Behe • R. Michael Burger • Maria Bykhovskaia • Lynne Cassimeris • David Cundall • Matthias Falk • M. Kathryn Iovine • Murray Itzkowitz • Michael Kuchka • Linda Lowe-Krentz, Associate Chair • Stefan Maas • Jutta Marzillier • Sean Mullen • John Nyby • Colin Saldanha • Jill Schneider • Neal Simon • Robert Skibbens • Jennifer Swann • Vassie Ware •

New faculty member joins department

The Department of Biological Sciences welcomed Sean P. Mullen, Ph.D. as its newest assistant professor in August. Mullen is a broadly trained evolutionary biologist interested in understanding how adaptive phenotypic variation arises and is maintained in natural populations. Dr. Mullen completed his undergraduate biology degree at Dickinson College in Carlisle, Pennsylvania, and received a Master's degree in biology from Villanova University. In 2006, he earned a Ph.D. in Ecology and Evolutionary Biology from Cornell University for his research on mimicry and speciation in North American admiral butterflies. Most recently, he was an NIH NRSA postdoctoral research fellow at the University of Maryland, College Park, where he studied the evolution of sexual communication among a rapidly diverging lineage of Hawaiian crickets.

Dr. Mullen's current research program is aimed at identifying

the genetic basis of mimicry in admiral butterflies using a combination of functional genetics and evolutionary genomics. He has published research articles in a variety of journals, including *Evolution*, the *Journal of Evolutionary Biology*, *Molecular Phylogenetics and Evolution*, *BMC Genomics*, and the *Proceedings of the Royal Society of London Biological Series B*. You can learn more about Dr. Mullen's research at <http://www.lehigh.edu/~inbios/faculty/mullen.html>.

Mullen will be teaching undergraduate and graduate level courses in the areas of evolution and species/speciation.



Krawiec earns status of Professor Emeritus

After an impressive 74 semesters of serving Lehigh University, Prof. Steven Krawiec retired this past summer. Many students will remember Professor Krawiec from teaching either the Cell & Molecular Biology, Genetics, Bacteriology or Immunology courses while at Lehigh.

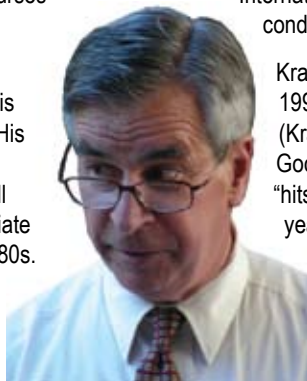
It was truly in Krawiec's genes to become an educator and scholar, since his father was before him. Krawiec received his B.A. from Brown University and Ph.D. from Yale University. His post-doctoral work was done at the University of Wisconsin. Krawiec came to Lehigh in 1970, and enjoyed the rank of Full Professor for 25 years. He served a two year term as Associate Dean (Sciences) for the College of Arts & Sciences in the 1980s.

While at Lehigh, Prof. Krawiec received the Alfred Noble Robinson Award (1975) for "outstanding performance in the service of the university and unusual promise of

professional achievement," and the Stabler Award (1985), given to the person who "demonstrates mastery of his or her field and superior ability in communicating it to others." He also was named a Fogarty Senior International Fellow (1978-1979) through which he was able to conduct research at the University of Madrid.

Krawiec's research focus was on microorganisms. His 1990 article, "Organization of the Bacterial Chromosome," (Krawiec, S. and Riley, M.) is actively cited. In fact, if you Google™ (Scholar) this article, you will find almost 170 "hits." Dr. Krawiec mentored seven Ph.D. students over the years, as well as countless undergraduate students.

The halls of Lehigh University were buttressed by Steven Krawiec's presence. His impact will be felt for years to come. Indeed, Krawiec earned his new title of Professor Emeritus.



University awards honor students, professor

Graduate student **Matthew Close** was awarded the University's annual Teaching Assistant Award in the Spring of 2007. Close was nominated by the students in the department's Genetics Lab and Core III: Integrative and Comparative Lab classes, with the final selection being made by the university deans and provost. Matt is doing research in Prof. Cundall's lab. One of the students who nominated Matt wrote, "The confidence he puts in his students is a catalyst that inspires students to work harder; I would work harder not for my professor...not for my TA...but for me -- for my personal benefit. This is the kind of attitude that will help me all throughout my undergraduate and graduate studies."

Professor and Chair, **Jeff Sands**, was named the recipient of the 2007 Deming Lewis Faculty Award of the Lehigh University Alumni Association at the annual University Faculty Dinner in April. This award from the Class of 1997 recognizes the faculty member who "has most significantly influenced its members' educational experience." Professor Sands was remembered by the Class of 1997 for the role he played in their education. At that time, Sands taught the department's core requirements, Cell & Molecular Biology, and the upper-level Virology class.

Graduate student **Ryan Wynne** was chosen to be a recipient of the 2007 Student Life Leadership Award. This award is given annually to honor students who have significantly enhanced the quality of student life through their involvement and leadership while at Lehigh. Ryan served as the president of the Biology Organization of Graduate Students (BOGS). Wynne was nominated for this award by his research supervisor, Associate Professor Colin Saldanha. Saldanha noted, "My main reason for nominating Ryan for this award is that the genesis of his interest in science seems to be that his degree from Lehigh is a springboard, not a termination. His curiosity, planning, standards, and performance are obtained from this premise. He therefore reflects progress and not stagnation. I can't think of a better description of a beginning scientist."



Saldanha promoted to Associate Professor with tenure

At the Board of Trustees meeting in May, 2007, Colin Saldanha, Ph.D. was promoted to Associate Professor with tenure. Dr. Saldanha's research focuses on how hormones reorganize the brain. Using songbirds that dramatically alter the architecture of their brains throughout life, he tries to understand how estrogens are provided to specific targets, find their receptors, and with other signaling molecules, affect learning and memory. His scholarship is supported by the National Institutes of Health, the Alzheimer's Association, and the Pennsylvania Dept. of Health.

Colin earned his doctorate at Columbia University and trained at the Brain Research Institute, UCLA



School of Medicine prior to joining the Department of Biology at Lehigh in 2001. He instructs undergraduates, graduate students, and postdoctoral trainees in the scientific method through supervised individual projects in the laboratory.

Saldanha teaches Integrative and Comparative Biology, Comparative Physiology, Developmental Neurobiology, Hormonal Correlates of Neuroplasticity, Adult Neurogenesis, and Sexual Determinism and Differentiation. Colin has received several awards including the Lindback Foundation Junior Faculty Award (2002), Libsch Early Career Research Award (2005) and the Stabler Award for Excellence in Teaching (2006).

Skibbens awarded grant for breast cancer research

Breast and ovarian cancers dramatically impact the lives of affected women, but the underlying causes remain obscured. Thanks to Susan G. Komen for the Cure, one Lehigh professor's research may help change that. Robert Skibbens, Associate Professor of Biological Sciences, was recently named a recipient of a two-year research grant from Susan G. Komen for the Cure, one of the nation's largest private funding sources focused on breast health and breast cancer. The organization funds research projects that have great potential to change the way breast cancer is diagnosed, treated, understood and survived.



Prior to cell division, each chromosome is replicated to produce two identical sister chromatids. When the cell divides, each daughter cell receives one of the two sister chromatids to produce an exact genetic copy of the parent cell. Errors in chromosome segregation produce cells with an abnormal number of chromosomes—either too few or too many. Known as aneuploids, these abnormalities can result in cancerous cells. Skibbens' work focuses primarily on the process by which chromosomes become improperly segregated during cell division. "Those mis-segregated chromosomes are hallmarks of tumorigenic cells," says Skibbens, whose work on the grant began in September.

Skibbens' lab studies the process by which sister chromatids are first paired together early in the cell cycle. His current research involves a newly discovered protein, Ctf7p, which is required to establish sister chromatid cohesion during DNA replication. This protein is needed to "glue" the two sister chromatids together. By using genetic and biochemical methods to identify other proteins that interact with Ctf7p, his lab gains insight into how new mutations result in improper pairing and random segregation to produce aneuploid cells. "With this grant we are able to take a fairly new direction for the lab, but it's predicated on work we've done in the past," says Skibbens, whose students at both the graduate and undergraduate level will have the opportunity to contribute to the ongoing research.

His lab uses budding yeast as a model organism. Since the entire sequence is known and mutations are readily generated, yeast allows the Skibbens' lab to understand how cohesion proteins interact in a cell system that can be quickly applied to studies in human cells. "The proteins that drive the functions in yeast also drive them in human cells," Skibbens says, noting that the opportunity to first gain answers from the yeast before moving to human cells was likely one of the areas of interest to the Komen Foundation.

-- Tricia Long, Office of Communications

Graduate Student Spotlight

Abigail Pattishall is completing her doctoral research in the Integrative Biology program, working in the laboratory of Dr. David Cundall. She is interested in the ecological and behavioral factors that allow animal populations to survive and/or thrive in urban environments. The deleterious effects of urbanization on wildlife are very well documented, but some populations manage to persist, or even find increased success, in developed areas. Animals that live in environments dominated by humans must deal with increased human contact, roads, habitat fragmentation and modification, pollution, unnatural distribution of food resources, etc. In general, successful urban animals exhibit wide ecological amplitudes, tolerance to disturbance, and flexibility in their behavior and habitat use. Explicit studies of urbanization and its effects on wildlife are rare, but of increasing importance given the rapid spread of anthropogenic disturbance.



Much of her research has been conducted on the northern watersnake (*Nerodia sipedon*), a medium-sized, non-venomous, semi-aquatic snake common throughout much of the eastern United States. She has been radio-tracking watersnakes in an effort to understand how snakes living in urban and natural areas differ in their spatial biology and habitat use. Because snakes are such cryptic animals little is known about their behavior compared to what is known about more charismatic, endothermic animals. Observing snakes in the field has allowed her to generate several new questions about the ultimate and/or proximate causes of, and the mechanisms responsible for, several behavioral phenomena. She plans to continue to investigate social behavior, learning and memory, and the mechanisms snakes might use to navigate through their environment.

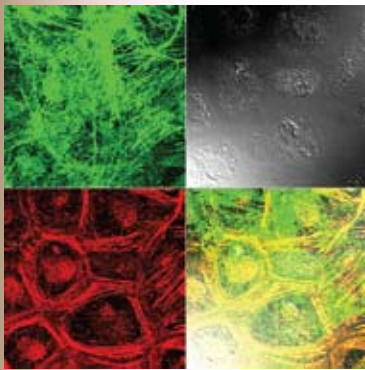
Students present research at Inauguration Symposium

Three Department of Biological Sciences students presented their research at the President's Inauguration Symposium on April 12, 2007. Alice P. Gast was inaugurated as the 13th President of Lehigh University in an official ceremony on April 13, 2007. During the symposium, an exhibition of undergraduate and graduate student research and scholarship was held in Zoellner's Butz Lobby, bringing attention to the range and remarkable caliber of creative student projects at Lehigh.

Biological Sciences undergraduate student Raffaella De Martino ('07) and graduate students Ryan Wynne and Meron Mengistu were chosen by the faculty of the College of Arts & Sciences to be among other select University students exhibiting their research.



(l-r) Raffaella De Martino, Ryan Wynne, Meron Mengistu



JNK activity (green) peaks at 5 and 30 minutes of exposure to a 15 dyn/cm² fluid shear stress, and co-localizes with the actin cytoskeleton (red), playing a role in mechanotransduction events that lead to the remodeling of these filaments. M. MENGISTU, LOWE-KRENTZ LAB

- **Raffaella De Martino**, earned a B.S. in Biology in May 2007. She performed three years of scientific research studying the effects of human anti-sperm monoclonal antibodies under the direction of Prof. Barry Bean. Her research interests include immun contraception and reproductive endocrinology. In spring 2007 she presented her undergraduate research at the American Society of Andrology National Meeting in Tampa, Florida. She is currently attending the Robert Wood Johnson Medical School.
- **Meron Mengistu** is a Ph.D. candidate in Molecular Biology, working under the guidance of Dr. Linda Lowe-Krentz. Her research interests are in the field of cell mechanics, a relatively unknown aspect of Biology today, which she is addressing through collaborations with Dr. H. Daniel Ou-Yang (Physics), and Dr. Samir Ghadiali (Mechanical Engineering). Meron is currently studying on a Nemes Fellowship. Meron will complete her Ph.D. in 2008.
- **Ryan Wynne** is a Ph.D. graduate student majoring in biochemistry in the Department of Biological Sciences. Ryan was a recipient of the Nemes Fellowship for the 2006-2007 academic year. Ryan's research in the lab of Dr. Colin Saldanha focused on the roles the endocrine system plays in brain injury and repair. He will officially be awarded his Ph.D. degree at the May 2008 commencement.

Undergraduate and graduate students were invited to participate in a competitive poster presentation where faculty of the College of Arts and Sciences were able to view the students' work, question the researchers, and then vote on their favorite presentations.

Undergraduate enjoys rare opportunity



(l-r) Lehigh Professor Jill Schneider, Jessica Simberlund, and UC Berkeley Professor Lance Kriegsfeld

A Lehigh biology major, **Jessica Simberlund**, spent her Fall Pacing Break with neuroscientists at the University of California at Berkeley looking at the activation of special neurons in the brain that control reproduction. These are neurons that contain GnIH, gonadotropin inhibiting hormone, a newly discovered molecule implicated in control of reproduction. Jessica's trip was part of her honors thesis on GnIH, supported by the Pool Scholar Program and Lehigh professor Jill Schneider and her grant from the National Science Foundation. Jessica is trying to find out how food availability turns the reproductive system off and on, and she thinks the brain molecule GnIH might be involved.

In most animals, the reproductive system is turned on and off to make sure offspring are born only at times when the environment is right for their survival. In some species, the long days and warm temperatures of spring kick-start reproduction. In our species, reproduction is turned off by lack of food, or situations in which energy demand outstrips energy intake (for example, in ballet dancers and marathon runners). The Schneider lab at Lehigh is trying to find out exactly how the reproductive system gets turned off and on by nutritional cues.

It has long been known that GnRH (gonadotropin releasing hormone) is the "on switch." Lance Kriegsfeld at the University of California at Berkeley suspects that GnIH turns off reproduction in species that stop reproducing in the short days of winter. Now Jessica Simberlund from Lehigh and Trey Williams from Berkeley, guided by Kriegsfeld and Schneider, are using immunocytochemical techniques to view individual neurons that contain GnIH and determine whether or not they are activated by changes in food availability. This information will help understand how fertility is affected by nutrition, exercise, diabetes, and eating disorders.

Our recent graduates

*= January 2007 degree recipient
**=September 2006 degree recipient

Congratulations to those who received their degrees in 2007. Please keep in touch!

Doctor of Philosophy *Integrative Biology*

Carol Ann Chapple Buckley *
Hormonal, Metabolic, and Behavioral Perspectives on Food Hoarding and Hunger Motivation in Syrian Hamsters: A Limited Role for Leptin

Jennifer Lynn Gagliardi-Seeley
*The Influence of Prior Experience, Resource Holding Power, and Resource Value During Breeding Site Acquisition and Parental Care in the Convict Chichlid (*Archocentrus nigrofasciatus*)*

Molecular Biology

Shan Hu
The Effect of Estrogenic Compounds on the Brain Serotonergic System – A Cellular and Molecular Study

James Charles Warren*
The Interrelationship of Adenovirus Infection and Host Cell Microtubule Dynamics

Master's Degree *M.S. Molecular Biology*

Becky Belotti **
Melissa Danielle Bosak
Stephen Dwight Eastman
Catherine Aversa Fleener *
Caryn Lynn Hampton*
Kevin Daniel Isett

Master's Degree (continued)

Rikhi Kaushal**
Amy Jean Landis**
Mary Jane Gladnick Reeve
Judith Anne Rolling*
Robert Hume Sinnamon III
Denis Streltsov*

Bachelor of Arts *Behavioral Neuroscience*

David Michael Abel
Dede Merya Ayite
Michael Neal Daniels
Lisa Marie Iannelli
Elaine Lin
Heather Lynne McFall
Megan Elizabeth Morse
Steven Francis Rosinski
Candace Sabrina Schoengold
Sahil Rafia Shaikh
Mark Andrew Shumski

Biology

Jeffrey Theodore McFetridge**
Andrew D. Zeiger

Bachelor of Science *Behavioral Neuroscience*

Amanda J. Barisich
Ashley Anne Cobb
Carissa Marie Daino*
Allison Catherine Heinly

Behavior Neuroscience (continued)

Marissa Lauren Papaccioli
Bhumi G. Patel
Vaishali Patel
Andrew Magee Stewart
Annette Lynne Wilmott

Biochemistry

Anna Kristina Childson
Joshua Eric Gorsky
Celia Marie Hoelke
Lauren Claire Kaczka
Christopher Michael McGinn
Laura Ann Petrini*
Douglas Shamy Pfeil
Evan Daniel Rossignol
Sarah Elizabeth Seiler
Anthony Ta**

Biology

Steven Wills Albert
Alana Danielle Baer
Sandra M. Buitrago**
Alessia Livia Carluccio
Priyanka Chandra
Li-Ing Chew
Raffaella De Martino
Jessica Lynn DeSalvo
Michael Lewis DeVito
Ismar Dizdarevic
Sophia Barbara Fischer

Biology (continued)

Danielle Rachael Freedman
Alexandra Marie Ganim
Christine Barbara Gerardi*
Jordan Isaac Goldberg
Stefanie Joanne Haynes
Brooke Nichole High
Kimberly Mae Jordan
Gina Loren Lewandowski
Katherine Suzanne MacMillan
Mark Andrew McGill
Michael Reeve Moscovitz
Brett Joseph Moses
Larry Xuan Nguyen
Caitlin A. Oksienik*
Elizabeth Marie Rabold
Ashley Marie Ramsey
Takahiro Sato
Adam Martin Speen
Kristen Marie Tamburro
Nicole Tecora Teasley
Danny You**
Morgan Elizabeth Zang

Molecular Biology

Jonathan Eric Cooper*
Ashley Elizabeth DeBarba
Laurent Vivien Delavaux
Matthew T. Fowler
Travis John Eisemann
William Woodrow Wisdom**

Alumni Research Focus

Leonard Bielory, MD (BS, Fundamental Science (Classics minor), '76; MS, Molecular Biology, '76) was one of the first students to receive a Master of Science degree in Molecular Biology from Lehigh.

Leonard Bielory earned his medical degree from UMDNJ - New Jersey Medical School in 1980. He went on to the University of Maryland Hospital where he continued his training in Internal Medicine. He followed with a subspecialty in Allergy and Immunology and Diagnostic Laboratory Immunology at the National Institutes of Health (NIH) where he was a medical staff fellow in the National Heart, Lung and Blood Institute (NHLBI) and the National Institute of Allergy and Infectious Diseases (NIAID). His research focus has been on the classic immune complex disorder – serum sickness. Bielory was recruited back to UMDNJ to direct the Division of Allergy and Immunology where he is presently Professor of Medicine, Pediatrics and Ophthalmology, Director of Clinical Research and Development for the Department of Medicine, Director of the UMDNJ Asthma and Allergy Research Center.

Dr. Bielory has several hundred publications in peer-reviewed journals. He is presently an Associate Editor of the *Annals of Allergy, Asthma and Immunology* and serves on several other editorial boards. He also serves in various capacities in a variety of national organizations, including committee chairs for various committees in the American Academy of Allergy, Asthma and Immunology and the American College of Allergy, Asthma and Immunology. Bielory was past chairman of the National Institutes of Health NIH – National Heart, Lung and Blood Institute Raynaud's Treatment Trial. He has been appointed by the Governor of New Jersey to sit on the Clean Air Council advisory to the New Jersey Department of Environmental Protection. Dr. Bielory presently sits on two U.S. Pharmacopoeia Council of Experts Committees (Immunology as well as Respiratory and Allergy). He was an original member of the recently convened USP Medicare Model Committee mandated by the United States Congress.

Bielory has successfully completed over 50 clinical research studies in asthma and allergic disorders. Active research focuses on new immune treatments for asthma and a rare disorder known as hereditary angioedema. He is an international expert in inflammatory disorders of the anterior portion of the eye – especially various forms of ocular allergy.



Dr. Bielory graduated from Lehigh University with honors as a member of Tau Beta Pi Engineering Honor Society and the Phi Beta Kappa Honor Society. "I always say that if Lehigh had a medical school I would still be there now!!! In fact, I would probably come back!"

A World Away

Normally Lehigh students use their summers off to find a job or internship, often in their field of study. This past summer four Biological Sciences undergraduate students strayed from the norm and spent a part of their break in Dar Es Salaam, Tanzania – a world away from home.

Working with the United Planet's Volunteer Quest program, the students spent two weeks focusing on AIDS and HIV awareness programs and another two weeks volunteering in Tanzanian clinics. Throughout the Spring '07 semester, Nikita Alexiades, Andrew Brown, Jennifer Olenik and Natasha Rastogi worked with Prof. Linda Lowe-Krentz in a special topics course discussing issues of travel safety, foreign culture, health care in Tanzania and defining their personal goals for this experience. The following are excerpts from papers each student submitted following their return to Lehigh in the Fall.

NA=Nikita Alexiades
AB= Andrew Brown
JO=Jennifer Olenik (includes excerpts from e-mails)
NR=Natasha Rastogi

First Impressions

JO There was little sign of wealth that I expected to see; it was much poorer than I expected. We drove through a ton of water (a result of the rainy season) and got to our house – two bedrooms (one for the girls and one for the boys) and a room with one table and a refrigerator. There was electricity, but no water. Our bathroom was outside and it was a typical squat toilet.

AB The five or six mile trip from the airport to our rooms took upwards of an hour and a half. Throughout the ride, we got our first taste of the people of Tanzania. We witnessed many people walking on the sidewalks with produce, walking to and from the market, and African women, carrying a variety of items on their heads as they walked. The one thing that struck me about seeing them walk on the side of the street was that nobody was walking quickly, everyone was seemingly strolling along. This was a cultural theme that we would notice for the rest of our time in Tanzania—the lifestyle. Very few things happen quickly in Tanzania, and while sometimes that is relaxing, other times it is frustrating.

NA All of the sights left heavy marks on me...the one that I sometimes feel has been burned into my visual cortex and I find popping up in places where I know it should not be is the eyes. Eyes everywhere piercing me, seeing through me and dissecting my insides, they were coming from every direction. As I tried in earnest to take in all of the new sights, I was constantly aware that everywhere I turned in that slow moving traffic sets of eyes were locked onto the backseat of our car. As I sat there, I realized the thing that I had neglected to prepare myself for, the one thought that I had refused to entertain during my preparations, how different my appearance would be and how much this actually mattered. I was white and they were black, we were few and they were many, it was a sensation that I had never realized existed, but one that I am so grateful to have experienced. The eyes were everywhere and I was wholly aware for once that the world was not as homogenous as it seemed at home, it was my turn to feel out of place and to be stared at, my turn to be different and to know in every instant how irrationally awkward and unnerving it feels to be aware of your different skin color. We were a novelty, four white youths uncomfortably crammed into the back of an old white Toyota and every individual in every car around us was acutely aware of our presence and amused by it.



(l to r) Natasha Rastogi, Nikita Alexiades, Andrew Brown and Jennifer Olenik gather for a group remembrance of their time in Tanzania.

Muhimbili National Hospital

NR We began to shadow the doctors at the Muhimbili National Hospital. During our first day, we shadowed the head of the pediatrics department around the ward. Although the conditions of

the ICU were nicer than I expected, the ICU was the hospital's newest edition, and it was still incomparable to any ward in the US. Mothers were lying in the beds with their children; whenever a child started to cry, the mother would feed him/her. At one point, there were no clean syringes available to do a spinal tap on a young girl as a diagnostic test for cerebral meningitis.

AB We worked with the medical students, going around with them to see their patients, as well as going to class with them. We visited the neonatal ward about a week into our working time at Muhimbili. The scene we witnessed told us a lot about the state of medicine in east Africa. In the bottom half of old incubators were two or three babies hooked up to their IV's as they slept, while their mothers sat on a bench in the middle of the room. Conditions ranged from congenital heart defects, to anemia, spina bifida, septicemia, HIV, and severe malnutrition and dehydration. It was one of the more shocking things I saw the entire trip.

NA Ward rounds truly were interesting and I'm grateful for the exposure to uncommon maladies that they provided me. The suffering of the world was no longer faceless, it was staring up at me naked and vulnerable from the concrete floor of



Muhimbili National Hospital, Dar Es Salaam, Tanzania

one of the outdoor wards. However I was constantly asking myself why I was simply strolling through the wards gawking at patients as if I were a child at the zoo.

JO We met the pediatric patients – it was heartbreaking. The only time I saw African kids cry is when they were patients in the hospital and in extreme pain. The moms sit with their babies in bed – there are no separate cribs for the children. The moms pretty much feed their children whenever they cry. Some of the children were suffering from severe malaria, tuberculosis, congenital heart defects, meningitis, and possibly HIV. The hospital was very different than what we are used to.

NR We also shadowed in the internal medicine ward of the hospital. The majority of patients were admitted for HIV, malaria, and TB. The condition of the ward was very poor. There were only approximately twenty beds in each ward, although the demand for admission was much higher. The air was not sanitary; flies were crawling around the unconscious patients and into their mouths. Most patients in the ward are simply waiting to die. We watched blood drawn from an HIV-positive patient and blood droplets were falling all over the floor. I simply could not believe that this was the condition of the national hospital of Tanzania.

NA While at the hospital I built up an external barrier, regardless of the roller coaster that my mind was strapped onto I could not allow anyone to become aware of its inner workings. I needed to maintain my composure at all costs because I felt that if I were to slip in any way I would be committing an injustice to all those around me.

JO We had class at 8, rounds at 9 in the “malnutrition ward.” Just shows you how different it is – the fact that such a ward exists. There actually was a ward called the “diarrhea ward,” too. I saw little babies with PAIDS (pediatric AIDS) that were so malnourished their wrinkly skin made them appear like tiny 80 year olds. I saw a baby with spina bifida and the med student told me it probably won’t be treated because surgery often leads to infection and death.

NR We also had a chance to tour the neonatal wards in the hospital. Some “beds” had multiple babies. There were no heart monitoring systems. Village mothers would come into the wards every three hours to feed their babies.

NA I so wished I could help them, so wished I could empty my pockets, empty my accounts, call all those that I knew and ask them for donations every instant that I spent shuffling through those wards. I felt guilty in those instants for all that I had, all that I had wasted and all that I knew I would inevitably waste in my years to come.

Ezra Ministries

AB After spending a few weeks working at Muhimbili National Hospital, we spent a week working with Ezra Ministries and our friend, Tshiye. Ezra Ministries is a small school for children of all ages, and is essentially a vocational school. Tshiye has gotten to know many of the people in the surrounding neighborhoods, and essentially looks after people who need assistance, including those people with HIV or AIDS.



Andrew Brown assists with a patient's treatment.



Jennifer Olenik shares a “high five” with a student at Ezra Ministries

JO We walked probably two miles to bring food that the four of us paid for – rice, flour, and sugar – to people who are HIV positive. We got to sit and talk with each person for a while. We were interested in religion’s role in the spread of HIV, as well as women’s role in society. One man said, “This is Africa. A woman’s place is there,” (pointing to the kitchen).

NR Over the month, we completed thirteen home-based visits. We met with a thirty-six year old woman, who was living with her mom and sister. Both she and her seven-year-old son were HIV- positive. It was unknown whether the other two children had HIV. The woman did not have a husband and used to have a job, until she became too sick. Before contracting HIV, she was unsure of what the virus was or how she could protect herself from it. For a while, she sought help from a witch doctor as she thought that she had been cursed. However, she was finally open to talking about her illness in order to get real help and medication.

continued.....



NA We visited the home of an old man, sitting on his porch eliciting in my mind images of some strange eroding African gargoyle. His image to me is highly instructive as to the pervasiveness of the disease, its cold infectious fingers stretched to grasp old and young alike. Later that day we would meet another man around the same age engaged in the same struggle, the disease within him battling against the forces of old age to see who would have the sick honor of finally wrenching the life away from his fragile frame. These men were likely among the lucky ones, only after having lived their lives did the disease pounce upon them. As our days progressed we would see a number of other cases in which the disease was not so kind as to wait.

JO We saw a 13 year old HIV+ boy and spoke with him. He got it from his mom, but his mom and dad were both HIV+ and already passed away. He lived with his sister.

AB This boy sadly presented with several characteristics that I had come to expect from some of the other people I had met. He was constantly sweating, and exhausted during our talk because of whatever current illness he had due to the AIDS, and he complained of having sores on his feet and being unable to walk and play with the other children. It was a difficult afternoon. Hearing him talk about his life after his parents had both died, and the care that he hasn't been able to get was a struggle.

NA I must say that this encounter continues to haunt me. The image of the young boy's ghostly figure, his orange shirt hanging over his limbs as he humbly sat across from us in his dimly lit living room will remain with me as long as I live. On top of being infected with HIV, he was also tormented by chronic tuberculosis. The echoes of his dense cough breaking into our conversation at many points still reverberate in my ears.

I felt so helpless sitting across the room from his diminutive figure. The image haunts me yet continually reminds me of all that needs to be done. He gave me so much and I feel as though I gave so little. He'll never know what he has given me or the importance that he holds for me and, alas, I will likely never know his fate.

NR In addition to shadowing doctors in the national hospital and completing home-based visits, we also did an HIV/AIDS presentation at a local secondary school. We presented to A-level students, aged thirteen to twenty-three, who knew English well. Our presentation began by focusing on HIV in the US. We emphasized that having HIV or AIDS does not mean that they have a death sentence. We also spoke to the females, advising them to look forward to bigger and better things in life. The students were then given a chance to ask questions, some of which concerned how to convince someone to get tested, how to help in the most rural areas, how HIV originated, how effective condoms are, and how to address poverty as a cause of AIDS.

AB There were a few questions about the causes and origins of the disease, but there was also some expressed skepticism about the modes of prevention we spoke about. They were particularly skeptical about the effectiveness of condoms, because of some bad experiences that some individuals have had.

NA My mind was racing through possible things that I might say to these students. Andrew had the main body of our speech planned out while the rest of our time would be filled with our own extemporaneous banter on the topic. I just wanted them to know that they would never be alone. We may have simply been four glib college students from America, but I wanted us to be a symbol for our audience, a sign of the investment that the whole world has in their struggle.



Nikita Alexiades, Andrew Brown, Jennifer Olenik and Natasha Rastogi surrounded by the students at Ezra Ministries.

Reflections

JO Shortly after arriving back into the comforts of my home, I received a Rotary Journal for the Central Chester County whose cover featured a story of the 10th anniversary of Community Volunteers in Medicine. CVIM's facility is not more than ten minutes from my house and I had never heard of them before reading this article. For a decade, they have been supplying the 45,000 uninsured working poor with medical, dental and wellness services that they deserve. I realized I did not have to travel

Travel support for the four students was provided by the W.M. Keck Foundation Grant for Applied Life Science Program.

continued.....

to a different continent to help people get the medical care to which all people should be entitled. I contacted CVIM and have secured a full time volunteer position for next summer. In this way, I am bringing my experiences abroad back to the U.S. to attempt to help the community in which I am fortunate to live. If the citizens of every other industrialized country and a third world country like Tanzania can receive free health care, there is no reason why the people of the United States cannot do the same.

NR Interestingly enough, there were many ways in which I felt that the quality of life in Tanzania was better than that of the quality of life in the U.S. People in Tanzania live for today. They are content with what they have and are always open to visitors and conversation. For a country with so much poverty, it is truly miraculous how happy the average person is. The trip far exceeded any of my expectations or goals.

AB The majority of the things I witnessed on the trip were wonderful and memorable in their own right. However, from my perspective, it was hard to ignore the glaring problems that the country currently faces, and those are the things I remember most about our trip. Since I've been home, I regularly get the question, "Do you think you'll ever go back to Tanzania?" I respond that I will go back when I have the ability to actually help people, hopefully as a physician.

NA My trip to Tanzania was all that I expected it to be, I surely didn't save the world, but at least I saw it and really was a part of it. For that month I wasn't another ignorant privileged Lehigh student, I was a Tanzanian actively engaged in the struggles of life alongside my people. I know that though we face struggles the best of my contributions have yet to come and there is definitely cause for hope. I will make my impact.



Natasha Rastogi (top) and Nikita Alexiades spend some time with the children of Tanzania.

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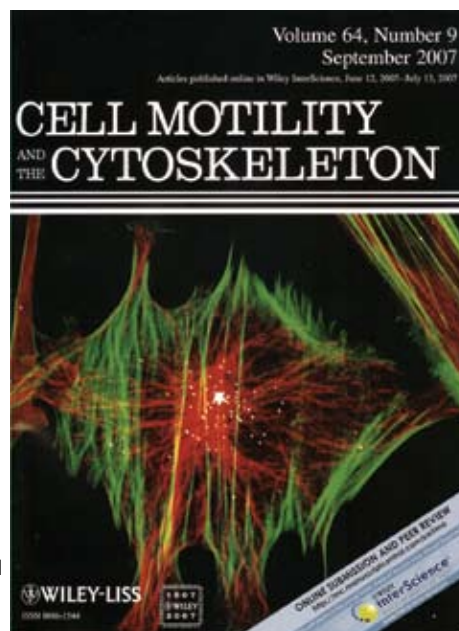
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Bold = Faculty
Bold+Italics=Graduate
Underline=Former Undergraduate

Adenovirus particles (white dots) infecting a human cell in culture. Adenovirus entry into a cell causes reorganization of actin filaments (shown in green). After cell entry, adenovirus travel on host cell microtubules (shown in red) to reach the nucleus, beginning the viral replication process.
J. WARREN, CASSIMERIS LAB

Alumni Updates

Velma (Gebhard) Conway (BA Biology/Psychology, 1975) was in the first class of women ever admitted to Lehigh. Velma received her Certificate of Occupational Therapy in 1976 from the Univ. of Pennsylvania School of Allied Health Professions and has been a registered and licensed occupational therapist for thirty years. Velma owns her own business as a contract school therapist and works with special needs students in local elementary school districts. "I am very proud of my education and very happy to be a therapist."

Janet Holva-DeSipio (BA Biology, 1977) received her MSPAS from Beaver College and is currently a part-time practicing physician assistant, specializing in dermatology. Her full-time job is Director of Physician Assistant Studies at the University of the Sciences in Philadelphia. "Another Lehigh biology alumni, **Kevin Wolbach** (MS Biology, 1991), instructs my freshman bio classes."

Cynthia Macri (BS Biology, 1979) is a Captain in the U.S. Navy and Vice President for Recruitment & Diversity at the Uniformed Services University of the Health Sciences. Dr. Macri coordinates youth outreach programs for disadvantaged youth as well as a program that will allow the large, diverse, enlisted pool to be competitive for 4 year colleges and medical school. "This is not as easy as it sounds, but right now I am the college/career counselor for about 50 enlisted sailors and marines stationed anywhere from Fallujah, Iraq to Afghanistan, to Okinawa to California and Texas - plus locally." *Cynthia worked in Dr. Bean's lab while at Lehigh.*

Charles Crowley (BA Biology, 1986) is the owner of an ophthalmology practice in Clifton, NJ and Pompton Lakes, NJ. Charles completed medical school in 1994 from New York Medical College, and a residency in ophthalmology at NYMC, rotating through West Chester Medical Center, Lincoln Hospital and Our Lady of Mercy, both in the Bronx, as well as New York Eye and Ear Infirmary in Manhattan. "I have been in practice since 1996. I am a general ophthalmologist performing lasik surgery, cataract surgery, glaucoma and retinal laser."

Robert Kruklitis (BS Biochemistry, 1990) is the Director of Interventional Pulmonology with Pulmonary Associates, P.C. at Lehigh Valley Hospital in Allentown, PA.

Jarrod Kaufman (BA Biology, 1992) is a general and vascular surgeon at Community and Kimbal Medical Centers in Toms River and Lakewood, NJ. "I also serve on the Governor's Commission on Cancer for Melanoma and I am the American College of Surgeons Cancer Liaison physician at both hospitals."

Chris Cavagnaro (BA Behavioral Neuroscience, 1995) graduated from New York Medical College in 2000 and then trained in a Pediatrics residency at the Children's Hospital of New York (Columbia Presbyterian). "I've been in Los Angeles for the last 3 years completing a fellowship in Pediatric Emergency Medicine at Children's Hospital Los Angeles, but will be returning to New York this July to start as an attending in the Pediatric Emergency Department at the Children's Hospital at Montefiore." *Chris did research in Dr. Nyby's lab while at Lehigh.*

Jennifer Isler (BA Molecular Biology, 1996) received a Ph.D. in Cell and Molecular Biology from the University of Pennsylvania in 2001. She was awarded an NIH fellowship which funded her three year postdoctoral research at UPenn. "In 2005, I accepted a position at Wyeth Research in Collegeville, PA, where I lead the Pharmacogenomics Group in the Biomarker Laboratory in Clinical Translational Medicine. I'm no longer at the bench, but I supervise all of the research related to DNA and RNA-based biomarkers." *Jennifer did research in Dr. Sands's lab while at Lehigh.*

Kristin Ruley (BS Molecular Biology, 1996) received her Ph.D. in Molecular and Cell Biology in 2002 from the University of Maryland School of Medicine's Center for Vaccine Development. "I completed my post-doc at Thomas Jefferson University in Philadelphia in the Division of Bioterrorism and Biodefense. I am now working as a medical writer for Centocor, Inc. (Johnson and Johnson) in Malvern, PA."

Deborah Burke (BA Biology, 1997) is a veterinarian for the Humane Society in Newark, NJ.

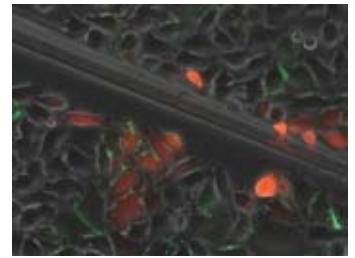
Benedetta (Horvath) Leuner (BA Behavioral Neuroscience, 1997) received her Ph.D. from Rutgers University in Biopsychology and Behavioral Neuroscience. Benedetta is currently a postdoctoral fellow at Princeton University in the Department of Psychology. *Benedetta did research in Dr. Nyby's lab while at Lehigh.*

David Pakula (BS Molecular Biology, 1997) has spent the last ten years working for Merck & Co., Inc. "Currently, I am involved in market research with a focus on the health care delivery systems."

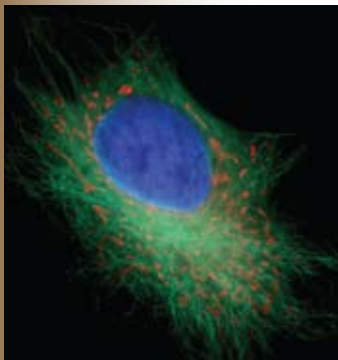
Kristen Riehman Sullivan (BA Molecular Biology, 1997) is currently employed as Manager for Communications Planning with the American Cancer Society in Atlanta, Georgia.

Karen Kish (BS Molecular Biology, 1999) graduated from MCP-Hahnemann (now Drexel University) Medical School in 2003. She is in her fifth year of general surgery residency at Abington Memorial Hospital in Abington, PA. "I had to smile when reading the article about Margaret Kraweic. I did my work study with her. I spent many afternoons cleaning fruit fly vials in Williams Hall." *Karen did research with Dr. Sands while at Lehigh.*

Abigail Lynn (BS Molecular Biology, 1999) graduated from Penn State College of Medicine in 2003 and is currently at Emory University in Atlanta in a residency program for orthopedic surgery. Upon completion of her residency, Abby "will be doing a fellowship at Children's Hospital in San Diego (UCSD). And then.....I will FINALLY get a job!"



Direct cell-to-cell communication demonstrated in stable transfected HeLa cells expressing the gap junction protein Cx43-GFP (green) by scrape-loading with the gap junction permeable dye Sulforhodamine (red). BioS 368; M. FALK INSTRUCTOR



Mitochondria (red), microtubules (green), and the cell nucleus (blue) visualized in a HeLa cell by simultaneously staining with MitoTracker, alpha-tubulin antibodies, and DAPI, respectively. BioS 368; M. FALK INSTRUCTOR

Richie Rana (BA Biology, 1999) graduated from Drexel University College of Medicine in Philadelphia in 2003. She is completing her Internal Medicine residency at the University of California, Davis Medical Center in Sacramento. "I am currently applying for fellowship training in Pulmonary & Critical Care Medicine throughout California." *Richie did research with Dr. Lowe-Krentz while at Lehigh.*

Ellen Krimitsos (BS Behavioral Neuroscience, 2000) earned her medical degree from the University of New England College of Medicine in 2006. "I am currently working as a resident physician in Neurology at Stony Brook University Hospital in New York."

Shimontini Rakhit (BS Behavioral Neuroscience, 2000) received a Doctor of Pharmacy from the University of the Sciences in Philadelphia, followed by a 1 year post-doctoral pharmaceutical industry fellowship at Sanofi-Aventis and Rutgers University. "I am currently a national education manager on the Metabolism team at Sanofi-Aventis."

Stacey (Stein) Becker (BA Behavioral Neuroscience, 2000) completed her Master's degree at Arcadia University in 2003 in Physician Assistant Studies. "I am currently working as a Physician Assistant with a neurosurgical specialty in the Chicago suburbs."

Jeremy Gill (BA Behavioral Neuroscience, 2001) is in the third year of his Neurology residency at the University of Massachusetts. "Special thanks to Drs. Nyby (my advisor) and Swann who helped me get here! I am also a new daddy to Bryce Gill, which had nothing to do with Lehigh's professors or their hormone research." *Jeremy did research in Dr. Nyby's lab while at Lehigh.*

Hayley Teich (BA Biology, 2001) graduated from Tufts University School of Medicine in May 2007 and has begun her residency in pediatrics at Mount Sinai Hospital. "Very exciting!"

Sarah Abdulla (BS Biochemistry, 2002; MS Pharmaceutical Chemistry, 2005) worked in vaccine research at the Wistar Institute in Philadelphia since graduating from Lehigh. In August, Sarah began her studies at the University of Pennsylvania Medical School. *Sarah did research in Dr. Lowe-Krentz's lab while at Lehigh.*

Elizabeth Carroll (BA Biology/Religion, 2003) graduated from the University of New England College of Osteopathic Medicine with a Doctor of Osteopathic Medicine. She is now a resident in Neurology at the University of South Florida in Tampa, Florida.

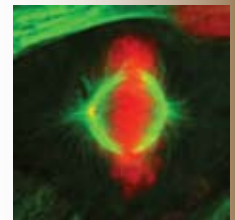
Yasmin Deliz (BS Biology, 2003) is a fourth year medical student at UMDNJ School of Osteopathic Medicine in Stratford, NJ. "All of this would not have been possible without the excellent education I received through the bio department. Thank you so much for your help."

Chris Jewell (BS Molecular Biology/Chemical Engineering, 2003) is a Ph.D. student in Chemical and Biological Engineering at the University of Wisconsin—Madison. "I work on new synthetic materials for drug delivery (drugs, proteins, DNA). It's been a great experience as I've had a chance to make new materials, characterize them, look at the biological interactions, and even go into some animal studies. Tell Dr. Kuchka, Dr. Lowe-Krentz, and Dr. Ware, 'Hello!'" *Chris did research in Dr. Kuchka's lab while at Lehigh.*

Adam Amoss (BA Behavioral Neuroscience, 2005) is employed in the Drug Discovery division at Glaxo Smith Kline. Adam is also working towards his Masters degree in Bio-Medical Sciences at Philadelphia College of Osteopathic Medicine. "Thanks for taking the time to teach a once reluctant student with, at the time, misplaced priorities! Lehigh has been good to me."

Vamsi Kancherla (BS Biochemistry, 2006) is a medical student at the University of Pennsylvania. "I'll be doing clinical research at Sloan-Kettering and I am almost certain I got into the program because of my experiences at Lehigh. While there was a long application to the program, the PI for my project wanted someone who had cultured, split, and treated cells." *Vamsi did research in Dr. Lowe-Krentz's lab.*

Priya Iyer (BA Pre-Med, 2007) is a student at Drexel University Medical School. "I just wanted to let you know that learning everything in biochemistry class in the detail we did has been helping a LOT in my med school biochemistry course!"



HeLa cell in mitosis. Microtubules are shown in green, DNA in red and centrosomes in orange. SOPHOMORE AREEB ZAMIR, CASSIMERIS LAB

Iovine protégé wins highest award

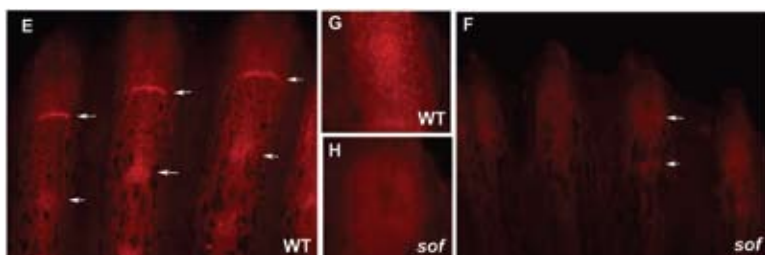
In our last newsletter we shared a story about Isha Jain, a Freedom High School student, and her research in the lab of Assistant Professor M. Kathryn Iovine. Jain's and Iovine's genetic research on how organs and limbs grow to their proper size has spanned three years, and even includes a 2007 publication* of her work. Ms. Jain ended 2007 by being awarded the grand prize at the Siemens Competition in Math, Science and Technology in New York. Isha employed her knowledge of biology and mathematics to prove her hypothesis that cell division is pulsatile within the individual bone growth phase of zebrafish.



She rose above six other finalists to win a \$100,000 scholarship, the top individual award offered in the contest. The national finals were judged by a panel of mathematical and scientific experts from across the country. Isha is the first female to ever win this honor. In addition, Isha was recently named one of 40 finalists to be considered for the Intel™ Junior Nobel Prize.

Isha has completed her requirements at Freedom High School and will spend the Spring beginning a research project at the Max Planck Institute in Germany. She will begin her studies at the college of her choice in the fall (already accepted at Yale, but hasn't decided yet). She plans to major in biology and math.

*Jain, I., Stroka, C., Yan, J., Huang, W.M., and Iovine, M.K. Bone growth in zebrafish fins occurs via multiple pulses of cell proliferation. *Dev. Dyn.* 236: 2668-2674. 2007.



Cx43 protein expression is reduced in *sof*^{b123} mutants. (E) Cx43 expression in wild-type fins. Distal tip staining in wild-type (G) and *sof*^{b123} fins (H). Cx43 expression is substantially reduced in *sof*^{b123} mutant fins (F). Arrows point to Cx43 staining at the joints. A. HOPTAK; IOVINE LAB

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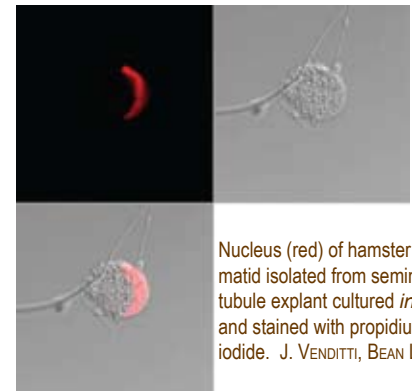
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Polar body (red) of hamster oocyte stained with propidium iodide. J. VENDITTI, BEAN LAB



Nucleus (red) of hamster spermatid isolated from seminiferous tubule explant cultured *in vitro* and stained with propidium iodide. J. VENDITTI, BEAN LAB