

THE NONSENSE SUPPRESSOR

Newsletter of the Department of Biology
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Rochester, NY 14627-0211

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Diplomas to be Awarded to Eighty-seven Graduates

Forty-eight women and thirty-nine men are eligible to receive their degrees at the Diploma Ceremony of the Department of Biology being held on Sunday, May 15, 2005, at 2:30 p.m. in the River Road Auditorium. The eighty-seven men and women of the Class of 2005 have satisfactorily completed the requirements for one of the four Biology Department tracks—B.A. in Biology (BIO), B.S. in Biological Sciences: Cell and Developmental Biology (BCD); B.S. in Biological Sciences: Evolutionary Biology and Ecology (BEB), B.S. in Biological Sciences: Molecular Genetics (BMG).

Dr. Thomas Eickbush, Professor of Biology and Department Chair, will be the Master of Ceremonies, welcoming students and guests and also handing students their diplomas.

This year's student speakers, chosen by the faculty for excellence in academics and research and for service to the College, are Max Banko who will be introduced by Dr. Elaine Sia; and Julie Sullivan who will be introduced by Dr. John Jaenike.

Dr. John Jaenike will present the Janet Howell Clark Prize, a College award given each year to a senior woman who has shown promise in creative work in science and mastery of allied fields. Julie Sullivan (BEB), class of 2005, is the recipient. Dr. Terry Platt will present The Donald R. Charles Memorial Prize. Given annually by the Biology Department to students who show great potential and have exhibited excellence in science, the 2005 Charles Award will be received by Max Banko (BMG), Erin Bressler (BCD), Scott Caesar (BCD), Ross Goldstein (BIO), Sharon Paige (BCD), Julie Sullivan (BEB).

The ceremony will culminate in the awarding of diplomas. Announcement of honors—Phi Beta Kappa and Latin Honors—along with the reading of blurbs written by the graduates will be done by Dr. Anthony Olek (BIO), Dr. Cheeptip Benyajati (BCD), Dr. John Jaenike (BEB), Dr. David Hinkle (BMG).

A reception will be held immediately following the ceremony in the tent on the front lawn.

The Department of Biology Graduating Class of 2005

Bachelor of Arts

Adrianna Camille Aleman
Alok A. Bhatt
Abigail Irene Black
Maria S. Carman
Matthew A. Cavagnaro
Kelly Chen

Charles Derek Cohn
Vishal Demla
Stephanie D. Doan
Christina A. Dony
Lauren Elizabeth Farberman
Lyndsay Field

(continued, p. 2)

Bachelor of Arts (continued)

Mary Laura Gaeddert
 Karen Glatfelter
 Ross L. Goldstein
 Rahul Gupta
 Jennifer Marcy Handzel
 Mariko S. Harasaki
 Gregory Andrew Hart
 Sean W. Hopkins
 Max G. Kinsky
 Ajay E. Kuriyan
 Christina Lee
 Sarah Elizabeth Leistman
 Jason Matthew Ling

Peter G. Maxwell
 Stephanie Lynn McGarry
 Stephanie L. Montrallo
 Cynthia M. Mousseau
 James Anthony Mullen
 Ashley L. Poelma
 Adam Charles Polivy
 Kathryn E. Quinn
 Karthik Rajasekaran
 Dulip M. Ratnasoma
 Crystal D. Rocha
 Alyson Jane Ronald
 Caroline Elizabeth Rouse

Valerie M. Rozak
 Lilya Rozenberg
 Alayna M. Sak
 Sybil C. Schmidt
 Sean Nolan Slifer
 Justin J. Tese
 Sherry Tsang
 Kathryn Wolak
 Rebecca M. Wolfson
 Brian J. Wong
 Jan Rang Wong

Bachelor of Science**Biological Sciences: Cell and Developmental Biology**

Anna Louise Barbi
 Erin Ashley Bressler
 Scott Raymond Caesar
 Benjamin J. Frisch
 Sharon Lynn Paige
 Hisham Shafik Rifaey
 Jennifer A. Salati
 Megha Ashok Shah
 Pranav R. Shah
 Heather Weisner

Biological Sciences: Evolutionary Biology and Ecology

Christopher William Brunson
 Patrick Spencer Corey
 Nicholas Delahanty-Swauger
 Catherine M. Ertel
 Kenneth Edward Frisch
 Alex Li
 Erika Logan
 Pamela Ann Okerholm
 Rachel Corrie Sill

Angela Maragret Simunovic
 Julie Christine Sullivan
 Tatiana Santos de Souza Varges
 Amie E. Whigham

Biological Sciences: Molecular Genetics

Max Banko
 Margaret Rose Casazza
 Matthew J. Gabler
 Benjamin J. Gigliotti
 David Michael Iseminger

Lidza Kalifa
 Adam R. Leman
 Erin Marie Murphy
 Woo-sin Park
 Ravish M. Patel
 Max Popp
 Klariza Lebumfacil Robles
 Christopher Doria Skeehan
 Michelle Luan Villasmil
 Laura Everett Vincent
 Sara Marie Young

Research Emphasized as One Major Component of Biological Science Education at UR

The Biology Department of the University of Rochester, together with the research departments of the School of Medicine and Dentistry located just a five-minute walk away, offers to its majors a diversity of opportunities for engaging in hands-on modern biomedical research. Those opportunities are limited only by students' talents and by their persistence in searching for faculty doing research projects that match their interests. Every year Biology majors engage in laboratory research as volunteers, as student employees, for credit in IND 395, and in the summers as research fellows either at the UR or at other institutions as well as in paying jobs for biotechnology companies.

Independent Research

Twenty-nine members of the Biology Department graduating class of 2005 have done one or more semesters of Independent Research for credit. Those students, their faculty sponsors, sponsor's department and number of semesters of research each year are:

Fall 02/Spring 03

Karthik Rajasekaran, Mark Noble, Center for Cancer Biology (1).

Fall 03/Spring 04

Max Banko, Elaine Sia, Biology (1); Vishal Demla, Mark Noble, Department of Biomedical Genetics (2); Lyndsay Field, Donald Kane, Biology (1); Rahul Gupta, Lois J. Arend, Pathology and Lab Medicine (1); Erika Logan, John Werren, Biology (1); Pamela Okerholm, John Jaenike, Biology (2); Adam Polivy, Jay Reeder, Pathology and Lab Medicine (2); Kathryn Quinn, Willis Li, Center for Cancer Biology (2); Hisham Rifaey, JH David Wu, Chemical Engineering (2);

Crystal Rocha, John Werren, Biology (1); Megha Shah, Robert Angerer, Biology (1); Angela Simunovic, John Jaenike, Biology (1); Christopher Skeehan, Thomas Eickbush, Biology (1); Jan Wong, Stephen Dewhurst, Microbiology & Immunology (1).

Fall 04/Spring 05

Max Banko, Elaine Sia, Biology (1); Erika Logan, John Werren, Biology (1); Adam Polivy, Jay Reeder, Pathology and Lab Medicine (2); Angela Simunovic, John Jaenike, Bi-

ology (1); Abigail Black, Gary Paige, Neurobiology and Anatomy (1); Erin Bressler, Mark Davies, Surgery (2); Christopher Brunson, John Werren Biology (2); Patrick Corey, Allen Orr, Biology (1); Rahul Gupta, Robert A. Mooney, Pathology & Lab Medicine (2); Nick Delahanty, John Jaenike, Biology (1); Lidza Kalifa, Elaine Sia, Biology (2); Woo-sin Park, Douglas Portman, Ctr. for Aging and Developmental Biology (1); Rachel Sill, John Jaenike, Biology (1); Kathryn Wolak, David Lambert, Biology (1); Catherine Ertel, John Werren, Biology (1); Ashley Poelma, Mark Noble, Department of Biomedical Genetics (1); Kathryn Quinn, Willis Li, Center for Cancer Biology (1); Lilya Rozenberg, Catherine Ovitt, Center for Oral Biology (1); Christopher Skeehan, Thomas Eickbush, Biology (1); Amie Whigham, John Jaenike, Biology (1); Jan Wong, Steven Goldman, Neurology-MC Admin (1).

de Kiewiet Summer Research

The Undergraduate Program in Biology and Medicine (UPBM) has been awarding de Kiewiet Summer Research Fellowships since 1983 to UR students majoring in one of the UPBM tracks. (See article on Summer 2005 Fellows.) Although the number of applicants is small compared to most summer programs, the competition is intense. Students applying must already have a mentor and must submit a detailed research proposal. The summer fellows work fulltime in a lab for 10 weeks. Class of 2005 graduates who have been de Kiewiet fellows are: Max Banko, BMG; Steven Chan, BBC; Patrick Corey, BEB; Brandi Davis, BBC; Vanessa Franco, BNS; Andrew Hart, BNS; Jason Moore, BNS; Julie Sullivan, BEB.

Max Banko worked with Elaine Sia, Department of Biology on the project "Analysis of the inner mitochondrial membrane protein Yhm2p." Steven Chan was mentored by David Goldfarb of the Biology Department on his project, "Multiple translocation pathways through the yeast nu-

clear pore complex." Patrick Corey worked on "Ethanol induced responses of *Drosophila* species" under the direction of Jim Fry in the Biology Department. Brandi Davis was mentored by Jeff Hayes of the Department of Biochemistry and Biophysics on her project "Creation of a cDNA library of *Physarum polycephalum* and the cloning of H1." Marc Schieber of the Department of Neurobiology and Anatomy was Vanessa Franco's advisor on her project "Mistakes in communication between brain and muscles." Andrew Hart's project "Dopamine receptor activation mediates CaMKII activation in the avian basal ganglia" was directed by Kathy Nordeen of the Department of Brain and Cognitive Sciences. Jason Moore worked with Jim Ison, Department of Brain and Cognitive Sciences and Surgery (Otolaryngology) and CVS on the project "Cross-spectral channel gap detection in the aging CBA mouse and humans." Julie Sullivan's project "Male mate choice in *Drosophila innubila*" was done under the supervision of John Jaenike, Department of Biology.

Eight UPBM Graduates Earn Distinction in Research

The Undergraduate Program in Biology and Medicine (UPBM) provides majors in the B.S. or B.A. tracks the opportunity to graduate with distinction in research. Students must achieve a minimum GPA of 2.7 and must defend their written thesis at a meeting of their advisory committee. Most students seeking a degree with distinction have worked on a research project for a year or more and have achieved significant results. They then immerse themselves in the time-consuming process of writing the thesis. Those who successfully complete their research and then push on to write the required paper are rewarded with the phrase "Distinction in Research" added to their transcripts.

The eight members of the class of 2005 who have earned the honor of "Distinction in Research" are:

Varun Chowdhry, BBC, whose project "Protein-protein interactions of the thyrotropin releasing-hormone receptor," was carried out under the sponsorship of Patricia Hinkle, Pharmacology and Physiology.

Vanessa Franco, BNS, whose project "Inducible variations in functional connections between M1 and muscles," was directed by Marc Schieber, Neurobiology and Anatomy.

Erika Logan, BEB, whose project "The behavioral and genetic basis of female mate discrimination in *Nasonia longicornis*," was mentored by John Werren, Biology.

Crystal McClain, BBC, whose project "Distribution of pCREB and Bcl-2 in the primate amygdala: implications for the treatment of mood disorders," was undertaken with the guidance of Julie Fudge, Psychiatry; Neurobiology and Anatomy.

Jason Moore, BNS, whose project "Cross-Spectral Channel Gap Detection in the Aging CBA Mouse," was guided by James Ison, Brain and Cognitive Science.

Sharon Paige, BCD, whose project "PGE2 modulates IL-1 β -induced inflammation in mouse astrocytes," was

undertaken with the guidance of M. Kerry O'Banion, Neurobiology and Anatomy.

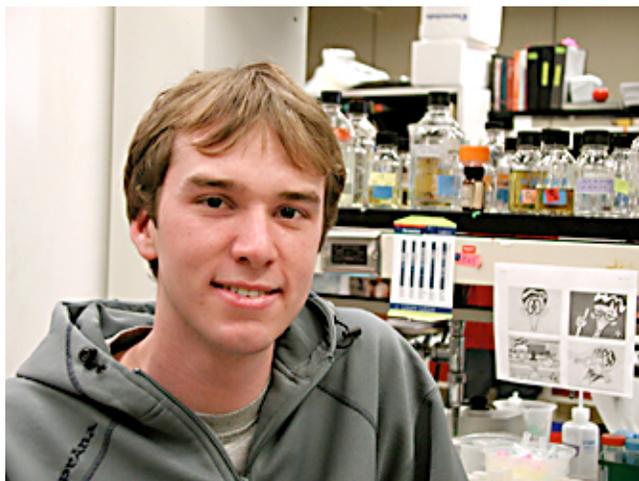
Stacey Poloskey, BNS, whose project "Cell proliferation in the striatum during postnatal

development," was directed by Suzanne Haber, Pharmacology and Physiology.

Lisa Span, BBC, whose project "Methylation of glutamine residues in the translation release factors of yeast", was completed with the sponsorship of Bogdan Plevoda, Biochemistry and Biophysics.

Life-Shaping Experiences and Future Plans Are Revealed by Seniors

Max Banko (BMG)



I knew I wanted to be a molecular genetics major before I started college as I have always been fascinated by DNA replication and repair. My desire to be a biologist was reinforced in my first few biology classes, but it wasn't until I took molecular biology that I was absolutely sure I wanted to do research and study molecular processes for the rest of my life. Dr. Elaine Sia demonstrated how exciting molecular biology could be and taught me to think about how and why particular experiments are done rather than just forcing the memorization of isolated facts.

My first opportunity to do research in molecular biology and experience what it is like to conduct a research project of my own came in the summer of 2003 when I participated in the Graduate Education in Biological Sciences (GEBS) summer scholar program. The GEBS program allowed me to do research in the lab of Dr. Sia, studying factors involved in mitochondrial genome maintenance and replication in the budding yeast, *Saccharomyces cerevisiae*. Mitochondria are the sites of cellular respiration and function to produce energy for the cell. Mitochondria are surrounded by a double membrane and contain their own genome which encodes many of the proteins required for cellular respiration. My research project was focused on trying to identify proteins that physically interact with the DNA

polymerase responsible for replicating the mitochondrial genome in *S. cerevisiae*, Mip1p. I continued my research in the lab doing independent research during the academic year and participating in the de Kiewiet research program during the next summer. During this time I studied two proteins, Yhm2p and Hpr5p, both of which interact either physically or genetically with Mip1p.

Yhm2p is a protein that is localized to the inner mitochondrial membrane and is thought to function in protein transport into or out of mitochondria, but its exact role is unknown. My project was determining how this protein is involved in mitochondrial genome maintenance. To do this, I constructed a strain of yeast in which *YHM2* was deleted and determined the effects of this mutation on a variety of mitochondrial phenotypes. Deleting *YHM2* increases the rate of repeat mediated deletion in mitochondrial DNA (mtDNA) and suppresses respiration loss in some strain backgrounds. I am currently conducting additional experiments to construct a model for the role of Yhm2p in mtDNA stability.

I also studied Hpr5p, a DNA helicase that functions in nuclear DNA repair. Naina Phadnis, the graduate student I worked with in the lab, found that Hpr5p physically interacts with a number of mitochondrial proteins. This suggests that Hpr5p plays a role in the mitochondria as well as in the nucleus. To test this hypothesis, I deleted *HPR5* and looked for effects on the mtDNA mutation rate and the ability of cells to cope with damage due to UV irradiation. The deletion of *HPR5* was found to affect a number of these mitochondrial phenotypes, providing further evidence that Hpr5p functions in the mitochondria. I have also worked on constructing a fluorescently labeled version of this protein in order to determine the localization of Hpr5p using microscopy.

The biology courses I have taken and the research I have conducted at the University of Rochester taught me an incredible amount of biology and convinced me that doing research in molecular biology is what I want to do for a career. To pursue this goal I am going to graduate school at Stanford University next year. I will be joining the Genetics Department at Stanford, where I plan to study the use of non-viral vectors for gene therapy. I would like to

thank Naina Phadnis and everyone else in the lab for the phenomenal experience I had working with them, as well as all of the excellent biology professors I have learned from over the last four years, especially Dr. Elaine Sia.

Anna Barbi (BCD)

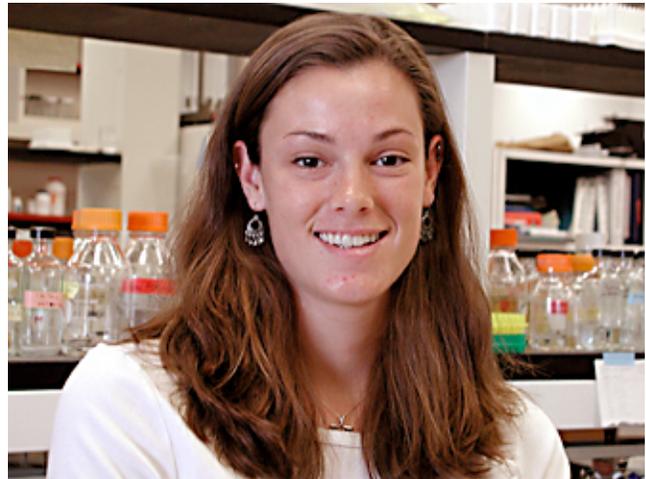
Upon entering college I was certain that I wanted to major in biology. With aspirations to become a physician, I also knew that I needed to follow the pre-med track. What I never expected though, was to find myself involved with biological research. Having not yet become aware of the variation and excitement that research can entail, I rejected the idea of working in a laboratory. The idea of research simply did not appeal to me. After sampling small aspects of research in introductory courses, however, my opinion began to change. I started to realize what a huge attribute research is to both biology and medicine. Around that time, an opportunity in research was presented to me from an unexpected source, and I decided to give research a chance.

Being involved with varsity track here at the University has offered me many things, but most people would never guess that being on the team is what pushed me into research. During the middle of my sophomore year, an upperclassman on the team mentioned that her cell biology professor, Dr. Rita Miller, was looking to hire a lab technician. I already had a job off campus as a nanny, but after discussing the potential of the position with my teammate, I eagerly contacted Dr. Miller and applied for the job. If it wasn't for the advice of my teammate, I might have missed out on what has come to be one of my most valuable experiences here at the University of Rochester.

After an interview with Dr. Miller, I was thrilled to find that I had received the position. Being a sophomore with not a lot of laboratory or biology training yet, I started where most underclassmen in laboratories find themselves—at the sink. I washed dishes and performed various other tasks around the lab, using this initial period as a time to orient myself with the inner-workings of a research laboratory and to become familiar and comfortable in what, for me, was a foreign atmosphere. By that summer, my responsibilities around the lab had increased, and I was ready to take on small research projects of my own.

The Miller lab studies the processes of spindle positioning and nuclear migration during mitosis in *Saccharomyces cerevisiae* (budding yeast). In particular, the group focuses on how the protein Kar9 interacts with cell microtubules, the actin cytoskeleton, and other protein factors to coordinate and organize the processes of cell division. After assisting Dr. Miller and the graduate students with several cloning experiments, I started my first project with the Kip2 protein. This protein is found exclusively on

cytoplasmic microtubules and is known to play a role in nuclear migration. The aim of my research was to determine if an interaction exists between Kar9p and Kip2p, and if so, where this interaction occurs on the Kar9 molecule. Using the yeast two-hybrid system, we found that an interaction does exist between the two proteins, and that this interaction occurs at a specific region within the Kar9 protein. This result was included in a poster presented by graduate student Jeff Moore and was also published within an abstract in the special November issue of *Molecular Biology of the Cell*.



With a lot of help from members of the lab, and a little bit of beginner's luck, I quickly found how rewarding research can be and how much knowledge can be obtained in the process. From my experience with research during that first summer, I decided to specialize in cell and developmental biology. Not only was I eager to apply what I had learned from my research to the classroom, but my laboratory work interested me in learning more about cell biology. During my junior year and into the next summer, I found that the advanced courses and laboratories within my major gave me an even greater understanding of what was going on within and around the topics of my research.

My research experience at the University of Rochester has and will continue to benefit me in the field of biology and medicine. Not only have I learned much about biology and valuable research techniques, but I have also learned how to become a critical and scientific problem solver. Following graduation I am looking to work in clinical trial research or as a research assistant in the medical field. During this time, I also plan to apply to medical school. Along with my family, I would like to thank Dr. Rita Miller, Dr. Harold Hoops of SUNY Geneseo, Sonia D'Silva, Jeff Moore, and Nida Meednu for all of their advice and assistance and for their commitment to education and research. I would also like to thank my advisor, Dr. Cheptip Benyajati for her continual support and helpful guidance.

Erin Bressler (BCD)



Entering UR I was sure I was destined to be a chemistry major. After all, chemistry had been my passion in high school. But upon taking Dr. Goldfarb's molecular cell biology course my sophomore year I was immediately fascinated by the incredible complexity and order of the cellular systems. During this year I decided that I would concentrate in cell and developmental biology. Development had always amazed me in the remarkable intricacy of the mechanisms and pathways that governed the journey from one single cell to a complex multicellular organism.

My first experience with research began the summer following my freshman year when I interviewed and received a position as a full-time laboratory technician working with Dr. Christopher Lawrence. The Lawrence laboratory was interested in investigating DNA-damage induced mutagenesis and the replication past damaged DNA which gives rise to these mutations. I was originally hired primarily to make solutions, wash and autoclave glassware, make selection media, and do simple tasks like spectrophotometry readings. However gradually throughout the summer I was promoted to more advanced tasks, such as PCR, digestions, Southern blotting, enzyme assays, HPLC purification, transformations. I continued my work there through my junior year, working exclusively with a graduate student on his project in the lab. However, I eventually found that I desired to expand my laboratory experience by diving into other areas of research.

The summer following my junior year, I applied for acceptance into the GEBS (Graduate Education in Biological Sciences) Summer Scholars Program here at the University of Rochester; part of the National Science Foundation REU program, and due to my interest in signal transduction was placed in the laboratory of Dr. Mark G. Davies. His research focuses primarily on the pathological effects of surgical vein grafts on the migration and proliferation of smooth muscle cells in the vascular system that ultimately lead to vein hardening and subsequent need for additional surgeries. The ultimate goal is

understanding the biology of veins transported into arterial systems so that interventions can be designed. My individual project focused on cell migration induced by the urokinase plasminogen activator and the possibility of protein kinase C (PKC) involvement in the molecular cross talk of downstream signaling. After my summer in the lab, I continued work on my project via two semesters of independent research throughout my senior year and have made progress in elucidating the role of PKC in this pathway. My research with Dr. Davies has served to further strengthen my interest in signal transduction. I find the intricate details of the pathways amazingly complex and enjoy working to discover the interactions between downstream signaling components.

Science is my passion and because of this I have worked to integrate it into many areas of my life. My junior year here, a small group of students, including me, set out to revive the once successful undergraduate biology society that had been in hibernation for the past seven years. One of SUBS' (Society of Undergraduate Biology Students) goals as a society was to aid in facilitating communication between students and faculty and to provide events whereby the biology department could interact outside of the academic setting. As event's chairperson, I was responsible for planning many of these events. The following year, I took the position as president and have worked along with the executive board primarily to get higher attendance at events. SUBS is a growing organization and I am fully confident in the abilities of next year's executive board to make it even better.

My undergraduate experiences have helped to solidify my passion for science and research and have led me to realize that my interests are not only geared towards clinical medicine. Although I am passionate about medicine, I could also envision myself being fulfilled with a career in research. In the upcoming year, I will be conducting research through a fellowship at the National Institutes of Health. During this time, I will also be finalizing my decision on whether to enter an MD or a MD/PhD program and subsequently applying for entrance into the programs. My eventual career goals are directed towards surgical medicine, possibly with a specialization in orthopedics or prenatal interventions. I have also entertained the idea of combining a career in surgical medicine and research.

Over the past four years, the University of Rochester has been integral in my growth personally, academically, and socially. Besides my mother who has sacrificed so much to make achieving my dreams within the realm of possibility, I would like to thank the members of the biology faculty. Most importantly, I would like to thank Dr. Cheeptip Benyajati for her constant support and advice over the past two years. My growth as a researcher would not have been quite as successful without the help of a few key

individuals. First of all, I would like to thank Dr. Christopher Lawrence and Dr. Peter Gibbs for leading me in my first research experiences. Finally, my gratitude goes to Dr. Mark Davies, Elisa Roztocil, and Suzanne Nicholl for all their guidance, advice, and support throughout my final year of independent research here at the University of Rochester.

Scott Caesar (BCD)

I am not like the other students you are going to read about in this issue of the *Nonsense Suppressor*. Unlike most Biology students, I never could get myself to sit in a laboratory for hours at a time. I never could squint my eyes long enough to look at cells respond to inducing factors for weeks at a time. I could not deal with the snow.

Growing up in Miami, Florida I was blessed with the most wonderful family anyone could ask for. My mother and father, both Public School Teachers, set the bar very high for any educator I ever had. I never thought anyone could match up to their work. My sister and grandmother, the most compassionate women on this earth, made it even tougher for anyone to match up to their good nature.

Freshman year showed me just how wrong I was. Enrolling in BIO 110 and BIO 111, I had the privilege of learning from Dr. Olek and Dr. Sajdak—and they had the privilege of listening to me ask questions each and every day. Taking every question in stride, answering them to the best of their ability, both Dr. Olek and Dr. Sajdak proved how supportive the Biology Department was. They listened. Immediately I knew that I wanted to be a major part of helping students learn as much as they had helped me my first year.

My sophomore year was the turning point in my college career. Playing rugby for the University of Rochester Men's Rugby "Uglies," I already had one job—to help my team win every match we played. However, both Dr. Sajdak and Dr. Olek gave me another opportunity, to become a Teacher's Assistant for their freshman courses. I took the jobs immediately, thoroughly looking to flex the teaching gene my parents had implanted in me. Running review sessions, workshops, and administering exams became the highlights of my week. Dr. Olek and Dr. Sajdak had rubbed off on me—I could not wait to help each student learn.

To fuel my love for surgical medicine, teaching and warm weather, I became the Head Research Assistant at the University of Miami's William Lehman Injury Research Center under Dr. Jeffrey Augenstein the following summer. I routinely spent countless hours filming trauma surgeries—everything from a routine gunshot bullet removal from vital organs to emergency triple bypass heart surgeries. I later talked to the doctors, filming their lectures on the procedures they had just performed. With the footage, I created interactive presentations in which medical students could learn

about the procedures and then created simulations to test their knowledge on the subjects.



Coming back to Rochester for my junior year, I had a much stronger desire to help anyone that I could. With the MCATs looming, I found myself re-learning the same material I had taught as a TA for BIO 110 and then BIO 199. However, even with the MCAT looming and working on one leg after tearing my PCL and MCL in a rugby injury, I wanted to teach. I found that the best way I learned was by helping others learn. While I taught my students, I was really teaching myself.

Influenced by my yearning to help those in need, my love for sports, and my fascination with "putting people back together" after being put together myself, I firmly decided on the path of surgical medicine. Next year I will be attending Medical School at University of Pennsylvania's School of Medicine aiming to help more people as an Orthopedic Surgeon. Due to my experience in the Biology Department at the University of Rochester, I will be ready. Working under professors who truly care for their students, I find myself equipped with all the tools needed to be a compassionate physician.

I came into the University of Rochester looking for a challenge. I wanted to work. I wanted to struggle. I wanted to learn. Thanks to the brilliant professors in the Biology Department, I succeeded in achieving all of these goals. While taking their classes was a great experience in itself, working with these professors allowed me to realize my potential. Along with every professor who entered my life, I'd like to extend special thanks to Dr. Olek, Dr. Benyajati, Dr. Sajdak, and Dr. Platt—you truly made the University of Rochester my home 1,500 miles away from home.

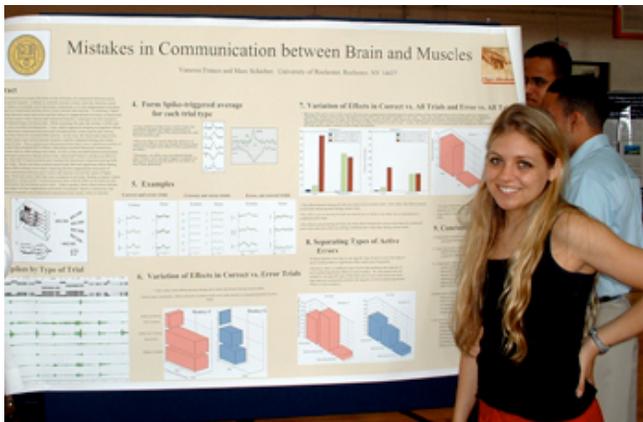
Pat Corey (BEB)

During my tenure here at the University of Rochester, I have had the pleasure to serve as an Undergraduate Leader for six separate courses, including lecture, discussion based and laboratory courses. The experience has taught me a lot about myself and biology. Also, I have completed two Inde-



pendent Research courses, the first with Dr. James Fry studying the extent of speciation of *D. melanogaster* living on ethanol. My second independent research was completed under the direction of Dr. H. Allen Orr, working with senior graduate student J.P. Masly studying the genes affecting speciation of *D. sechellia* and *D. mauritiana*. I was also awarded the de Kiewiet Research Fellowship during the summer of 2004 to study in Dr. James Fry's laboratory the ethanol induced responses of *Drosophila* species.

Vanessa Franco (BNS)



Since the summer prior to my freshman year in college, I have been involved in neuroscience research at the University of Rochester Medical Center with principal investigator Dr. Marc Schieber. My research experiences included training monkeys in behavioral tasks, assisting in monkey neurosurgeries, attending journal clubs and symposiums, programming in Spike2 and MatLab, and designing two of my own research projects. I completed one project, examining how functional connections between motor cortex and muscles are different for movements made correctly versus those made incorrectly, during the deKiewiet summer research program and presented this same project at the National Conference for Undergraduate Research this

past April. The second project showed that such variations in functional connectivity between motor cortex and muscles were actually inducible by operantly conditioning the synchronous activity of motor cortex with muscles.

My involvement in research has shown me the excitement of asking why and provided me with powerful tools for investigating my own questions and thoughts in the lab. I really enjoy pondering the reasons behind and the potential implications of various experimental results. Each day is different and poses new problems, creating an intellectually stimulating environment that I love. Collaboration, journal clubs, and meetings are all exciting opportunities to gain familiarity with what others are doing as well. I enjoy research because it enables me to approach problems with no predetermined path of right or wrong. Rather, it is an exploration that I find engaging and appealing.

My experiences working in neuroscience research have intertwined with my volunteering experiences at a rehabilitation clinic in high school to fuel my interest in neural prosthetics. Currently in development, neural prosthetics use neural activity to predict intentional movements and responsively drive a prosthetic limb. This is a wonderful marriage between my interests in the motor system and in helping those who have lost their physical independence. To further pursue this interest, I created an independent study through which I shadowed a neurosurgeon for a semester. Not only did I learn about life as a neurosurgeon, but I enjoyed the patient contact and uniqueness of each case.

While I am drawn to a career in neural prosthetic research, I strongly believe that without a genuine concern for the clinical challenges and experiences patients are facing, scientists will be limited in their ability to refine medical devices such as neural prosthetics and their understanding of research's ultimate goals. Similarly, physicians with an involvement in medical research can better understand the causes of their patients' conditions and better appreciate all that is occurring within the body, so as to provide better treatment.

By alternating and integrating both research and medical experiences over a long period, I realized that an MD/PhD program would be a perfect match for me, in hopes of pursuing a career as a physician and scientist devoted to the development and clinical implementation of neural prosthetic devices. Being dedicated to both the clinical and laboratory applications of neural prosthetics will strongly enhance my ability to understand, develop, and introduce these future devices into the lives of many people in need. Thus, the scientific exploration and clinical applications of neural prosthetics are necessary developments towards which I plan to devote my career as I begin the MD/PhD program at the University of Pittsburgh this fall.

Ross Goldstein (BIO)

My experience as a biology student here at the U of R has not only been rewarding but has absolutely helped to shape my future plans. Over the past four years, I have had the opportunity to become involved both inside and outside of the classroom. By working closely with Dr. Olek in Biology 110 I became a very active and interested student as well as workshop leader. As a workshop leader I had the chance to develop a deep interest in biology as well as a true passion for teaching. These qualities became the framework for my coming years at Rochester.



After working in Biology 110, I pursued an independent research project that looked into advancing student exam preparation and performance in large lecture based courses. Through my research I was able to present at the Council of Undergraduate Research's National Conference. Speaking at the Conference and working on the project were incredibly exciting for me because they helped me to better understand my own learning and become an accomplished student. Moreover, being involved with the project helped me to find my interest in research.

During my junior year I instructed the Molecular Cell Biology Laboratory for biology majors. Teaching that lab along with my interest in research motivated me to participate in Human Embryonic Research at The Johns Hopkins School of Medicine in Baltimore, Maryland. As an intern at Hopkins, I learned about the mechanisms defining cancer and stem cell lines. I quickly saw the possibilities that studying these types of cells could provide. Equally as important to the research practices I learned, was the knowledge and interest I developed about academic medicine. Next year I will be attending medical school with the hopes of pursuing a career in pediatric medicine with a concentration in academics. My desire to pursue academic medicine is in large part thanks to my experiences as teaching assistant as well as the curiosity I grew in the sciences as a biology student. Overall I believe that my success has been a direct result of the skills that I have developed as a biology student here at UR. I truly thank those professors who dedicated themselves to helping me to succeed.

Without their encouragement and guidance, as well as the support of my family and friends, I would not be where I am today.

Andrew Hart (BNS)

My lab career began during the spring of my sophomore year, when I was employed in the Center for Aging and Developmental Biology as a lab helper. My duties included washing dishes, autoclaving, and mixing media for yeast and bacteria cultures. The job wasn't that great. However, I got to know some of the grad students and faculty who worked on my floor and at the end of the semester they helped me find a summer job doing a genetic screen of nematode mutants in Doug Portman's lab. I enjoyed working in the Portman lab very much, but as a Neuroscience student I knew that invertebrate genetics wasn't for me.



Fortunately, before the summer had started, I had tracked down Kathy Nordeen, a faculty member in the Department of Brain and Cognitive Sciences who was studying the molecular basis of learning and memory. She helped me declare my major, and after discussing my research interests, she invited me to join her lab in my junior year.

I spent the first part of my junior year reading, attending lab meetings, and coming up with a research project. The Nordeen lab studies vocal learning in songbirds, and I decided that I wanted to study how reward signals involving dopamine might influence the activation of proteins implicated in learning and memory. Professor Nordeen and I worked out the methods of my project. I would inject drugs into the brains of songbirds that would interfere with dopamine signaling and use western blots to assay how the injections affected protein activation. The hardest part of this project was learning to do the injections which must be performed surgically on anesthetized animals. Several months of work were devoted to just practicing the surgeries.

In the mean time, I wrote up my project as an application for a de Kiewiet Fellowship in the Biological Sciences. The de Kiewiet Fellowship is offered to students who wish to receive financial

support as they spend the summer in Rochester conducting research. With my previous lab experience and with recommendations from Professor Nordeen and Dr. Portman, I put together a strong application and was awarded the fellowship.

That summer really solidified my desire for a career in scientific research. I was thrilled to come to lab every day and work on a project that I had designed myself. Because I wasn't taking any classes, I could devote all of my attention to my research. At the end of the summer I prepared a ten-minute talk on my project and designed a poster. Though I had presented my data, my work was not over. I kept working on my project and continued to develop more sensitive ways to test my hypotheses.

I have continued my research and have received both academic credit and pay for working in the Nordeen lab. My senior year, I applied to Ph.D. Neuroscience programs and my lab experience became an invaluable asset during the application and interview processes. I was accepted into some of the

Lidza Kalifa (BMG)



Trying to escape the stifling heat of south Texas, I moved to Rochester to pursue my dream of becoming a molecular geneticist. Here I met Dr. David Hinkle whose inspiring lectures on DNA repair and replication helped shape my future. I pursued the genetics track with one of the best classes I have ever taken, Dr. Elaine Sia's molecular biology course. This course taught me to think experimentally and reinforced my dream of becoming a scientist. In the following years I was a teaching assistant for both of these courses which helped to cement my love for teaching.

Soon after arriving at the University of Rochester I joined the lab of Dr. David Goldfarb. In his lab I had the opportunity to work with one of the greatest women in science, Nataliya Shulga. With the help of Dr. Goldfarb and Nataliya I learned much about the real world of science and tools that I will use throughout my life.

best Neuroscience graduate programs in the country and next year I will start my graduate education at the University of Washington. My future work at UW will bring new challenges as I leave the study of vocal learning behind and begin to learn new skills and ask new questions. I look forward to these new challenges, and I feel that my lab experience at the University of Rochester has truly prepared me for my future as a researcher.

I was fortunate to have a variety of experiences working in three different labs and to have found a research advisor willing to provide me with the resources and the freedom to develop and execute my own independent research project. My research at UR has been a critical part of my education and has provided me with a unique experience that I could not have had in a classroom or even in a lab course. I am lucky to have gone to a university where the faculty members are easy to approach and research opportunities in all of the sciences are freely available to motivated undergraduates.

In the summer of 2004, I participated in the Graduate Education in Biological Sciences (GEBS) summer scholars program. Through this program I was able to work in the lab of Dr. Elaine Sia studying mitochondrial DNA repair, replication, and stability in the budding yeast *Saccharomyces cerevisiae*. My project focused primarily on the yeast nuclear gene *MGM101*, which encodes a protein that is required for mitochondrial DNA maintenance. Although the role of *MGM101* is not yet known, disruption of this gene leads to loss of the mitochondrial genome. Preliminary studies suggest that Mgm101p interacts with proteins involved in sumoylation. The sumoylation pathway is responsible for post-translational protein modification, which is used to modify protein-protein interactions and may play a role in localization. *SMT3* encodes *S. cerevisiae*'s only known SUMO, small ubiquitin-like modifier, moiety. I examined whether the interaction of Mgm101p and Smt3p is dependent on other proteins involved in the sumoylation pathway (i.e. Nfi1p and Wss1p) and tested for a physical interaction between Mgm101p and proteins involved in the sumoylation pathway.

I continued my work in the Sia lab through two consecutive semesters of independent study. During this time I discovered the temperature sensitive mutant *wss1Δ*, which is a weak suppressor of *smt3-331*, a temperature sensitive *SMT3* mutant. The *wss1Δ* causes a loss of respiration after 18 hours at 37°C, but maintains its mitochondrial DNA. I also have found that Abf2p, a mitochondrial histone-like protein, interacts with Smt3p and other proteins involved in sumoylation. *ABF2* has become the new focus of my research and I will continue to characterize its functions.

The University of Rochester has become my home over the past four years and I have decided to stay and join the Biology Department's Ph.D program.

As of May 16th, 2005, I will be considered a full-time graduate student in the Department of Biology. I have also received the University of Rochester Provost Fellowship which will provide support during my time in the Ph.D program.

I would like to thank my parents, without whom I would never have been given this opportunity. I also want to thank Dr. David Hinkle for helping me to learn to deal with criticism; Dr. Cheeptip Benyajati for all her encouraging words; Dr. Xin Bi for my speedy

graduate school interview; Dr. David Goldfarb for teaching me that it's ok to take a break every once in a while; the biology administrative staff for their tremendous help the past four years; the Sia lab members for making the lab my favorite place to be; and last but not least I would like to thank Dr. Elaine Sia, my mentor and my friend, who welcomed me to her lab and taught me the awesome power of yeast genetics.

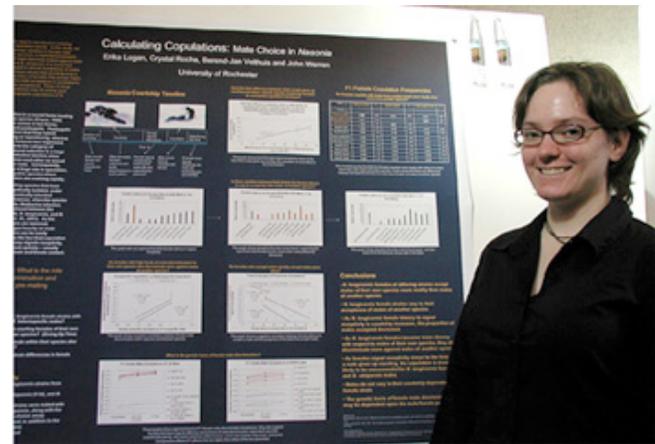
Erika Logan (BEB)

One class above all others has captured my academic interests here at UR—Animal Behavior. The first week of my sophomore Animal Behavior class, I learned that by manipulating hormones you can make male rats act like female rats during mating. I thought that was the most amazing thing ever. I started gobbling up research articles and getting teased by my friends for constantly talking about animal behavior. I could not help myself; I was fascinated. Prior to taking that class I had been pursuing a genetics major, but now I am graduating with a B.S. in Evolution and Ecology and a minor in Psychology.

My first practical animal behavior opportunity came from a summer internship I did at the Alaska SeaLife Center. As an avian intern, I worked closely with researchers studying diving sea birds like puffins, guillemots, and eiders. I learned an enormous amount about research animal husbandry, field work, data collection, and public education. Due to the fact that the ASLC has the deepest diving bird tank in the world, I also learned about scientific diving. That summer before my junior year was an incredible experience that served to deepen my academic passion.

Back at UR, I started my first independent Animal Behavior research project in the Werren Lab. Working closely with a graduate student, B-J Velthuis, I learned all about the mating behaviors of a parasitic wasp called *Nasonia*. My research focused on determining if there was variability in courtship behaviors among geographical populations of a single species of wasp. By the end of the semester I had found that there were in fact differences in the wasps' mating behaviors. The results were so exciting that I decided to stay on for the summer to see if I could find a genetic basis for the differences I was seeing.

That summer was a hectic one. I worked 20 hours per week in the lab helping with general maintenance and various other graduate students' research. Additionally, I did 20 to 30 hours each week of my own research. Follow-up experiment after follow-up experiment kept me going until I finally realized that I needed to just cut myself off from data collection and start analyzing the data I had. So, in September of my Senior year I finally started devoting my time to the computer.



I had to push myself to get a poster together for the UPBM poster session, but it was worth it. It was such an amazing feeling to finally have something to present after ten months of work. I was also really happy about having new people to discuss my research with. Additionally, it was at this poster session that I learned about, and was encouraged to apply to, the National Conference of Undergraduate Research. I am so glad for that encouragement because speaking at NCUR was a marvelous experience. I learned an astounding amount of information, I made exciting new contacts, and I had a blast in the process. I came home wishing that every week could be NCUR week.

Now that I am graduating I am glad that I pursued the path to a Degree with Distinction in Research. Working independently has taught me more than all of my other classes. I feel prepared for what lies ahead and I am incredibly thankful for that. I am not entirely sure what the future holds for me; however, my plans right now include joining the Peace Corps then returning home to attend graduate school.

Stephanie McGarry (BIO)

My research experiences at the University of Rochester, contrary to many other students, have primarily been clinical. I was chosen for the Strong Children's Research Center Fellowship in the summer of 2004, where I worked with Dr. Cheryl Kodjo in the Department of Pediatrics-Adolescent Medicine. Many of the other students in this program worked on "basic science" research, but I was very excited to have the

opportunity to learn more about the clinical aspect of research. My project examined the support systems and overall well-being of adolescent mothers with one or more children under the age of four. Through interviewing these moms and having them complete short questionnaires during their routine visit, I was able to learn about the different obstacles they go through and how they manage their busy lives.



As the summer went on, I thoroughly enjoyed my experience and was grateful to have the opportunity to have constant patient contact and understand more about medicine on an individual level. Most other biology students here do spend their time doing basic science research, and while I think that is very interesting and informative, I have found that clinical research contributes a bit more to the whole experience. My results didn't come from running a PCR or examining DNA, but rather they came from sitting in an examination room listening to a nineteen year old girl tell me about the problems she's had with her two young children's fathers, how she cannot find a job, and how she constantly has her mother telling her how to raise her children. All of this going on while she is trying to finish school and give her children all that they need. It was amazing to see these girls, all of whom were younger than I was, standing on their own and trying to do what was right and make the best of the situation, to benefit their children. As there are many stereotypes associated with teenage mothers, I was happy to see that many of those that I met really did care and really did want a bright future. It was an unforgettable experience.

The program as a whole opened my eyes to many other fields of medicine and also helped shed light on biological concepts I had been taught over the previous three years. Over the course of the summer, I encountered physicians in all specialty fields and was given the time to learn more about their research. This incredibly rewarding experience allowed me to use the information I had learned in classes such as genetics and biochemistry and apply it to actual patients. I encountered children and adolescents with

diseases such as Sickle Cell Anemia, Epilepsy, Anorexia and Osteogenesis Imperfecta, to name a few. It was wonderful to be able to sit at a table full of doctors and understand what they were talking about when they mentioned a chemical imbalance that the child had or a reaction that was occurring due to the patient's medication. Suddenly, all of the knowledge I had gained over the past years was put to use and I saw the importance of it first hand.

This research experience also shaped my plan for graduate education. Since my research was focused on adolescent parents, I saw many young girls with children of their own and, in several cases, they were being tested during their visit for sexually transmitted diseases. Seeing this gave me an interest in STD/infectious disease prevention and prevalence so I will be pursuing my Master's degree in Public Health, concentrating in Epidemiology, at Rollin's School of Public Health at Emory University.

In the past year, I also had the privilege of being a teaching assistant for the new 112/113 series for freshman biology students. Being a small class, with many bright students with a strong interest in biology, I had the opportunity to help mold their biology experience that will continue over their next three years here. In working under Bob Minckley and Terry Platt, I held weekly discussion sections that gave students an opportunity to not only learn the information taught to them, but also talk to other students about the material and gain a better understanding themselves. I found this unique idea to not only be helpful to the students, but also very rewarding to me as I learned more about each of them. As the course is structured to hit on several different topics, I found myself learning new things and was given the opportunity to learn more about the research of different professors in the department, whom I had not previously known much about. I am grateful to have had this opportunity that has given me a stronger confidence in my knowledge and abilities. I am extremely appreciative of all of my experiences in biology over the past years and I look forward to being able to use them as I continue my education and pursue my career.

Pamela Okerholm (BEB)

Many students start out washing dishes in a lab before they are given the opportunity to take on their own research project; however, I got lucky. September of my junior year I met with Dr. Jaenike to get some advice on possible field research topics and was invited to join his lab to look at male mating preference in *Drosophila innubila* infected with male-killing *Wolbachia* bacteria for the entire school year. They had already shown females to choose mates who were not infected with the bacteria, so we wanted to see if the reverse was also true.

I learned very quickly (the hard way) that our flies needed a lot of TLC and with the support of our experienced lab tech, grad student, and Dr. Jaenike I

was given the chance to try out several techniques and experimental designs. The undergrads in our lab also presented a paper each week and gave a final presentation about our research at the end of the year.

Being able to work on my own research was an invaluable experience, and I also got to feel closer to the department. Learning to try new designs and ask new questions when things don't turn out quite right, in addition to carefully planning out a breeding schedule and maintaining my own stock of flies was a challenge, but a welcome one.

Also during my second semester of junior year, I was given the wonderful opportunity to teach at the Dr. Charles T. Lunsford Elementary School in the 19th Ward. My partner and I, as members of the

Sharon Paige (BCD)

My undergraduate research experiences have played a profound role in building my passion for the scientific process and its various applications. The summer following graduation from high school I accepted a job as a research technician in the laboratory of Dr. M. Kerry O'Banion (Department of Neurobiology and Anatomy), studying the role of the cyclooxygenase (COX) pathway in neuroinflammation. Prostaglandin E₂ (PGE₂), a byproduct of COX activity, is relevant to many clinical conditions, including neurodegenerative ones such as Alzheimer's disease (AD).

During my first two years in the O'Banion lab, I worked on projects that utilized a mouse *in vivo* model. One project examined the consequences of COX-2 activity in adult mouse brain following irradiation. This study suggested that COX-2 activity is necessary for some physiological responses to brain irradiation, including edema. I received co-authorship on a paper as a result of the work I did on the radiation project.

The summer following my sophomore year I pursued an independent project in the O'Banion lab as part of the GEBS Summer Scholars Program. My specific aim was to examine PGE₂ receptor expression in mouse astrocytes undergoing an inflammatory response to interleukin (IL)-1 β , a pro-inflammatory cytokine. Over the past two years I have carried out additional experiments using this *in vitro* model. Data generated from these studies suggests that COX-2 inhibitors can modulate the expression of COX-2 itself, as well as PGE₂ synthase enzymes and PGE₂ receptors in mouse astrocytes undergoing an inflammatory response to IL-1 β . This past fall I presented this data at the annual meeting of the Society for Neuroscience and I have recently completed my senior thesis.

In addition to the work in the O'Banion lab, during the summer of 2004 I interned in the laboratory of Dr. Kai Stoeber and Dr. Gareth Williams at University College London. The lab's goal is to develop anti-cancer treatments by manipulating the DNA replication licensing system. Before DNA can be

replicated during the cell cycle, origins of replication must be "licensed" for replication. Once DNA replication has begun, several mechanisms exist to prevent re-licensing so that DNA replication occurs once, and only once, during the cell cycle. One way metazoan cells do this is by sequestration and inactivation of Cdt1, a licensing factor, by the geminin protein. My project involved utilization of bacterial cloning vectors to create several forms of geminin mutated at specific amino acids. Ultimately, these mutants may be used to develop novel anti-cancer drugs. In thinking back on the eight weeks I spent in London, I realize that I grew tremendously, both as a scientist and as a person. I fell in love with the European way of life, and I hope to return at some point during my scientific career.

campus group Grassroots and sponsored by Dr. Iuli, went once a week for an hour to teach our 4th grade class Environmental Education. At the end of the year, we invited all of our classrooms to the UR campus for a field day in hopes of encouraging them to believe that college is in their futures too. Images of our students' excitement over learning about their environment and the things they can do to affect it will stay with me for a very long time.

My experience at the UR, in addition to a very varied selection of summer jobs and internships, has deepened my desire to go on to graduate school for a degree in Animal Behavior. One of my future goals is to be involved with conservation projects at zoos where I can also teach the public.

Aside from the above, I have also developed an enthusiastic attraction to government and politics. I was encouraged to explore varied interests, and so I chose to pursue a B.A. in Political Science in addition to a B.S. in Cell and Developmental Biology. This past fall, I volunteered for the Kerry campaign to enhance my understanding of the American electoral process. Though I was disappointed with the outcome of the election, the experience solidified my desire to remain politically active.



Aside from the above, I have also developed an enthusiastic attraction to government and politics. I was encouraged to explore varied interests, and so I chose to pursue a B.A. in Political Science in addition to a B.S. in Cell and Developmental Biology. This past fall, I volunteered for the Kerry campaign to enhance my understanding of the American electoral process. Though I was disappointed with the outcome of the election, the experience solidified my desire to remain politically active.

When I began my undergraduate studies, I was certain that I wanted to go to medical school. The biology courses I have taken along with my experiences in the laboratory have solidified my love of science. I now wish to pursue a career that integrates both patient care and investigative science. I am fascinated by what is known about human disease and treatments, but even more so by current limitations and the opportunities for improving our understanding of clinical conditions and potential therapeutic interventions. Specifically, I am enthusiastic about the possibility of studying the genetic and cellular signaling pathways that lead stem cells to differentiate into specific cell types. A greater understanding of developmental processes could lead to stem cell therapies for developmental defects and

cancer, as well as acquired and degenerative diseases. I recognize that stem cell research is still in its early stages, but this motivates me even further to explore this promising field, both as a scientist and a political activist.

This summer I will move to Seattle to join the MD-PhD program at the University of Washington. I will begin my journey in the lab of Dr. Charles Murry working with embryonic stem cells and their application to repairing damaged heart tissue.

Finally, I would like to thank Dr. Kerry O'Banion for giving me the opportunity to be part of his wonderful lab for the past 4 years. Also, special thanks to Dr. Cheeptip Benyajati who has inspired my enthusiasm for developmental biology.

Ashley Poelma (BIO)



When I came to college three years ago, I was determined not to major in Biology although I knew my ultimate goal was medical school. However, this all changed freshman year within the first month of taking Professor Hattman's Gene Structure and Function class. I enjoyed the course so much that by the end of the semester I couldn't imagine majoring in anything but Biology. Fortunately, I was given the opportunity to TA this class my sophomore year, which was one of the best experiences of my undergraduate years. It also made me discover my love of teaching which I was able to continue throughout the rest of college as a TA for General Chemistry Lab and other courses. Because I have decided to graduate from college early, I will take next year off before beginning medical school. From this June until September, I will utilize my love of teaching full-time and be an English teacher for children in Seoul, South Korea.

During the summer after my sophomore year, I participated in a summer research program at the

Eppley Cancer Institute in Omaha, NE. My research focused on the cloning, retroviral transfer, and functional analysis of a Tamoxifen-Inducible Cre Recombinase. Although I really enjoyed this experience, it made me realize I don't love doing research enough to complete a combined MD/PhD program—an idea I had seriously considered on and off since high school when I participated in a summer research program at Roswell Park Cancer Institute and had enjoyed. However, the experience did make me realize I regretted not becoming involved in research at U of R. This led me to conduct independent research in Dr. Mark Noble's lab at the medical center this past semester. I am conducting research on the levels of NF κ B (a transcription factor) in different tumor cell lines. This opportunity has been fantastic. My mentor, Ed Rice, has been a great help! He has struck the perfect balance between teaching and allowing me to be independent. If I hadn't decided to graduate early, I undoubtedly would have continued independent study research.

In 1989, just after the Romanian Revolution, the newsmagazine *20/20* documented the inhumane conditions of Romanian orphanages. Although I was only five years old at the time, I was enormously moved by the images of malnourished children who received no emotional or physical attention, lying helplessly in feces-filled cribs and vowed to my parents that I would "someday help those kids."

During the summer after my freshman year, I was finally able to make that promise a reality. In Romania, most of my work dealt with making up for the insufficiencies of the nurses. Even though the hospital was grossly overstaffed, the nurses only did what duties were required to keep the children alive. On the premature floor, this meant entering the infants' rooms every four hours just to feed them. During feeding time, the nurses would prop up massive glass bottles that had nipples with a hole as huge as my pinkie finger. They would then stand and talk to the other nurses for a few minutes. When they decided the infants had had long enough to eat, they

would flip the babies onto their stomachs for 30 seconds, then flip them back onto their backs and leave the room, shutting two sets of doors behind them. The nurses would not return again until the next feeding time four hours later. On this floor my work mainly dealt with assisting in feeding the babies (I would hold the babies and make sure they were given their whole bottle), bathing them, and mainly just holding them.

In addition to the premature floor, I also did a lot of work with three abandoned children who were thrown onto multiple floors in order to fill spare beds. Of all the children in Romania, one of these handicapped children named Marius inspired me most. Even though he appeared to be five years old, he was really ten. He would sit in his bed all day and rock himself back and forth. He would also rub strips of paper that he had found in the garbage back and forth between his thumb and forefinger in order to keep himself entertained. Marius' only medical problem was that he had been emotionally ignored in the hospital and orphanages his whole life. He would take my hands and rub his head between them like an animal. Every morning, the second he would hear my

voice he would start grinning and shrieking with excitement. Even though he could walk, he only wanted me to hold him. He insisted on never being more than one inch from my body at any moment.

Although my summer experience was incredible, I left the country with an even bigger desire than before to return someday and help the abandoned children in a more profound way. I have received a Fulbright Fellowship to Romania from the US State Department for next year. I will conduct research with a public health research institute on the causes of child abandonment, volunteer with the abandoned children at a Children's Hospital, and teach a class at the University of Bucharest.

After my adventures next year, I will return to medical school at University of Rochester in August 2006. In the future, I plan on pursuing a career in pediatrics with a strong international health component.

The past three years have been filled with innumerable awesome memories! Best of luck in the future to all of my classmates! Special thanks to my parents for their undying support and dedication.

Carrie Rouse (BIO)



Ever since I was a child, I knew I wanted to be a doctor. For a person looking in from the outside, it might have even seemed a given that I would want to pursue medicine as my life's calling; both my parents are doctors and for the longest time it seemed to me that being a physician was the only legitimate option for me. I naturally gravitated towards all things medical. So I played doctor with my younger sister, did science projects on rates of blood flow through different arteries and followed very closely any specials on 20/20 that had a distinctly medical flavor. This passion for medicine persisted through grade school and high school, and upon being offered admission to the University of Rochester, I was positive that I wanted to be a doctor.

The University of Rochester turned out to be the perfect place for me. One of the things I had worried about as a pre-frosh was being able to pursue both Biology and Spanish (which I had developed a love for in high school). Rochester's unique curriculum allowed me not only to complete a double major in Biology and Spanish and a minor in Psychology, but I was also able to study abroad for an entire year in Salamanca, Spain. I knew coming into college that a strong knowledge of Spanish would allow me to be able to work effectively with an entire segment of the population that I otherwise wouldn't even be able to communicate with. Indeed, it was my year abroad in Spain that showed me just how rewarding this communication could be. The single most valuable experience I had while living in Spain was volunteering at a governmentally funded center for mentally handicapped adults. Every weekday morning, 40-50 adults board a charter bus and ride to the Insolamis building where, depending on their abilities, they make notebooks, take classes, or simply wander around looking for a hug. Not only did I form ties with these wonderful people, but it also encouraged me to think about the importance of such social programs to the medical field. A society cannot concentrate only on the hospital based health—the social aspects must also be healed as well.

These experiences in Spain solidified a decision I had been contemplating for quite a while—the decision to apply for a Fulbright Fellowship. After about a semester and a half of rumination, I decided to go full steam ahead and work towards getting the grant to work for a year in Mexico. After much toil and not much reward, finally, a week before the U of R deadline for application submission,

I finally established a reliable contact in Cuernavaca, Mexico. Seven months later I learned that I had been granted the Fellowship! I will be working at the Mexican National Institute of Health with Dr. Dilys Walker, designing and implementing educational seminars for parents of adolescents to help them talk with their children about sex and sexuality. These seminars will build on the results of a previous study done by Dr. Walker that implemented and evaluated a school based HIV prevention program funded by the World AIDS Foundation.

My brief description of my experiences may seem a bit atypical for a University of Rochester Biology major in that it does not include extensive lab experience. I must admit that the laboratory was never my favorite place to be—I actually tried my best to avoid it. However, after participating in the U of R Career Center's Externship program in which I was paired with and shadowed an alumna, my interest in lab worked was piqued. I shadowed Dr. Jamie Renbarger, a pediatric oncologist who has done

Pranav Shah (BCD)



I started taking biology classes because throughout my high school career, biology intellectually captivated me the most. During introductory biology classes, my interest in it grew. Because of this, I decided to volunteer in Dr. J. Bhattacharya's lung cell biology lab at Columbia University during the summer after my freshmen year. There, I was introduced to some of the basic ideas and techniques in biological scientific research.

During my sophomore year, I took Prof. Hinkle's class on genetics, and Prof. Goldfarb's class on molecular cell biology. The material and the concepts presented in the biology class invited me to go beyond the assigned material and read more. I was fascinated by the myriad ways a prototypical system was used to accomplish such a wide variety of functions in the cell. Molecular Cell Biology introduced me to the basic model systems the cell uses to control various processes such as systems of G protein, apoptosis and the caspase cascade, and many

extensive work in clinical pharmacology. She gave me a job in her lab last summer, one that I will continue in this summer. I will be working with amlodipine, a commonly prescribed calcium-channel blocker that appears to be metabolized by the protein cytochrome P450 3A although there is no data officially reporting this. I will be testing to see if amlodipine is actually metabolized by CYP3A.

All of my experiences, both in the classroom and outside of it, have contributed significantly to my desire and preparedness for the life of a doctor. I was accepted through the Early Decision program to the Indiana University School of Medicine and will be attending there upon returning from Mexico in the summer of 2006. Looking back on the last four years, I realize how grateful I am to the University for fostering my passion for both Spanish and Biology and to the people who helped me work towards my goals.

others. These two classes cemented my decision to declare a biology major and pursue a Bachelor's degree in Science.

The following semester, Developmental Biology truly captured my imagination by exploring topics such as how an embryo knows its top from its bottom, and its dorsal from its ventral. Examination of both cellular processes and tissue level interactions like induction to create a functional organism were simply incredible.

As I took more advanced biology courses, I was exposed to the experimental basis for the models of cellular functioning that I had learned. I was struck by the resourcefulness and the creativity in designing experiments to test various hypotheses. The four-credit developmental biology lab with Prof. Benyajati and Prof. Kane, and the concurrent developmental biology class introduced me to new ways to approach biological systems, and design and evaluate hypothesis about those systems.

During the summer of my sophomore year, I started working in Dr. Mosmann's immunology lab. The specific examination of how the immune system at the cellular and molecular level adapts and changes to fight against foreign antigens is extremely fascinating. My interest in immunology was an outgrowth of my interest in developmental biology. At a cellular level both investigate the factors causing a specific precursor cell to differentiate into its particular cell type. I continued to work in Dr. Mosmann's lab during my junior year. During the summer, I was accepted into the Graduate Education in the Biomedical Sciences (GEBS) Summer Scholars program at the University of Rochester. Through the program, I was able to work full-time for ten weeks in Dr. Mosmann's lab and become more thoroughly immersed in the experimental cellular immunology.

By carrying out experiments and carefully identifying exactly what they show, I have grasped how seemingly similar experimental techniques allow one to conclude two very different things. Additionally, by solving problems that frequently occur in the course of experimental research, I have come to respect and appreciate the rigorosity of science in a new light. During the last three years, I have learned many interesting facts, and acquired several new skills and experiences that have helped define my personal goals. I have also learned to think more critically and found a lifelong academic interest. Moreover, the critical thinking skills that I have acquired and developed will be useful in many other aspects of my life, and will be very vital in my career in medicine.

Chris Skeehan (BMG)

Upon enrolling at the University of Rochester, I had no clear academic objectives in mind. I had not visited the University as a pre-fresh, and had no real knowledge of the school prior to my attendance. While academically my future was unclear, at the beginning of my freshman year I had already gotten myself involved in numerous extra curricular activities on campus. I had tried out for and made the Varsity Track and Field Team on which I would continue for the next four years. I also joined UR Concerts and later became the president of the group during my senior year. I also helped restart the Society of Undergraduate Biology Students and acted as its business manager my junior year. But at the opening of the 2001 Fall semester I knew I needed a job. The student activities office had sponsored a departmental job fair in Wilson Commons for incoming freshman and at that job fair I met a lady named Doris Kist. She informed me of an opening in the biology department for a dishwasher/media preparer in the Eickbush lab. From that beginning my undergraduate research career began.

I spent my first year and a half at the lab washing glassware, autoclaving pipettes, and preparing fly media and buffer solutions. During the spring semester of my sophomore year I was asked by the primary investigator, Dr. Thomas Eickbush, whether I'd be interested in doing research in the lab. I was of course interested and began that summer working under Xian Zhang, a graduate student in the lab.

The Eickbush lab works with the retrotransposable elements R1 and R2, and the rDNA locus in *Drosophila simulans* and *melanogaster*, essentially bits of DNA that make RNA that then makes DNA that then insert into the genes that make ribosomes in flies. I was charged to help Xian find an active line of *D. simulans* and once found help determine its R2 activity in the rDNA locus.

I spent the fall of my junior year completing the research I had started in the summer, acquiring more data to refine the numbers I had derived for the

activity of the lines of *Drosophila simulans* I was studying. I was concurrently taking Molecular Biology with Dr. Elaine Sia. It was at this time I really began seeing the connection between the classroom and the laboratory, and found myself able to apply the knowledge I had learned in the classroom to what I was doing in the laboratory.

That spring I switched projects, having helped Xian complete the characterization of R2 activity. My new project was to observe recombination events occurring between the rDNA loci on the X chromosomes of inactive R2 *D. simulans* lines. This was of great importance as it meant that if recombination was occurring, it would confuse our activity calculations. I was concurrently taking both Evolution with Dr. Orr and Eukaryotic Genomes with Dr. Eickbush. Again, the parallels I found between the classroom and the lab continued to mount and at this point I was able to make some meaningful contributions to discussions in the lab.

My senior year I spent on a new research project aiding Xian looking for somatic cell activity of the R2 element in active lines of *D. simulans*. This is important as other people in the lab had seen high transcript levels of the R2 element in somatic tissue. It is believed that high transcripts correlate with high element activity. I am looking for evidence of the latter. At this point I feel like a complete contributing member of the lab.



Having nearly finished my academic requirements for graduation with a BS in Molecular Genetics, I feel that I have an excellent grasp of both my field and of experimental science and looking back I see that a major portion of this understanding was the time I spent in the lab. I have spent every semester of my college career in that lab as well as nearly two summers. I have acquired a better understanding of biology and a feeling of both competence and confidence in the lab environment. The members of the lab have been like a family to me, celebrating my birthday (they accidentally celebrated my twenty-first birthday on my twenty-second, but the cake was still

good), offering me more in depth explanations on classwork than I could get from TAs, and giving me meaningful advice on my future career plans. I plan

Adam Polivy (BIO)

My time at the University of Rochester has allowed me to take advantage of the numerous research opportunities. Since the spring of 2004, I have been working as a student fellow in pathology at the URM in the department of Pathology and Laboratory Medicine with Jay Reeder, Ph.D. We were interested in further characterizing the promoter region of DBC1, a tumor suppressor gene that is deleted in bladder cancer. My time has been spent performing various experiments that tinker with the promoter sequence via deletions and insertions of critical pieces of DNA. These experiments were done to measure the GFP uptake in cancer cells as well as measuring the Luciferase activity of the plasmids constructed.

Each summer I have been shadowing and working with Michael Atkins, M.D. at the Beth Israel Deaconess Medical Center in Boston, Massachusetts. My experiences in an oncology clinic have strengthened my desire to pursue a career in medicine. Upon graduating, I will be returning to Boston to continue my work full-time with Dr. Atkins.

Julie Sullivan (BEB)



I came to the University of Rochester planning to major in chemistry, and it was only on a whim that I also registered to take Principles of Biology my freshman year. While chemistry continued to hold my interest, biology fascinated me and by the end of my first semester I decided to make it my major. After a second semester, I further narrowed my focus and decided to concentrate on evolutionary biology and ecology. Because there are relatively few classes

on attending medical school and working in the more personable side of the biological sciences, specializing in either infectious disease or medical genetics.

offered here in these fields, I decided to look into independent research as a way to learn more.

My first introduction into laboratory research was during the summer after my sophomore year. I was able to stay in Rochester to work in Dr. John Jaenike's lab through the GEBS Summer Scholars program. Much of the work in his lab centers around the interactions between the endosymbiotic bacterium *Wolbachia* and the various species of *Drosophila* that harbor it. This bacterium is only transmitted from mother to offspring and is able to manipulate offspring production in various ways, making it a powerful force for affecting the evolution and ecology of the species it infects. My main project during that summer and the following fall semester involved sequencing mitochondrial and nuclear genes across different populations of *Drosophila subquinaria* in order to examine population structure of this species in relation to that of *D. recens*, a closely related species that is infected by *Wolbachia*.

I continued with my independent research in Dr. Jaenike's lab during the spring semester, this time working on a behavioral project with Pam Okerholm (also class of 2005). We conducted experiments to look for mate choice discrimination in male *D. innubila*. The strain of *Wolbachia* that infects this species kills all male offspring of an infected female. Depending on the prevalence of infected females, this can generate a population with a much higher number of females than males - potentially driving a species to extinction as the number of males approaches zero. Consequently, it would be beneficial for males of this species to develop a preference to mate only with uninfected females, as only this cross will produce male offspring. *D. innubila* proved to be a difficult species to work with in behavioral experiments, so we spent most of the semester searching for an ideal experimental design that our flies would cooperate with. Though we did eventually work out a suitable method, the end of the semester cut our experiments short before we could obtain conclusive results.

Fortunately, I was able to continue to work on that same project during the summer of 2004 as a de Kiewiet fellow. I restarted the experiment from the beginning and after two months of trials I came to the conclusion that males do not show any preference at all for uninfected females. After taking a break from research in the fall of 2004 I returned to the lab this spring to pursue one possible explanation for why my summer project turned out the way it did. One assumption of my summer project was that males are limited in the amount of sperm they can produce, so the need to distribute those sperm in a manner that produces sons is what generates the selective pressure to mate only with uninfected females. I set out to

discover if my assumption was correct, and after weeks of breeding flies and one massive trial that required the help of everyone in the lab, I concluded that males are indeed sperm-limited. This was surprising to me because there seems to be high selection pressure on males to avoid the effects of *Wolbachia*, yet they do not seem to have evolved any way to do so.

While my research has raised more questions than it has answered, it was still a very rewarding experience that taught me a lot about research and science in general, including the process of publication - my work with *D. innubila* will be included in a paper with another of Dr. Jaenike's experiments some time in the next year.

In addition to my research work, I was also a teaching assistant for Principles of Biology for two years. I enjoyed both my research and teaching experiences here at the University of Rochester, and have gained the knowledge and confidence to move on to the next level - this fall I will begin work toward a Ph.D. in Ecology at Syracuse University. I'm very grateful to all the professors here for being so generous with their time and advice, especially to Dr. Jaenike for allowing me to work in his lab for almost two years, Dr. Hinkle, and Dr. Benyajati, and also to everyone in Dr. Jaenike's lab for making my research experience so much fun.

Woo-Sin Park (BMG)

After declaring to be a genetics major, I have worked as a workshop leader for organic chemistry and biochemistry. These positions provided me with valuable experiences from being a leader to engaging with other students to solve problems. I also worked with Dr. Doug Portman to research genetic traits and neurological development of *C. elegans*. I joined the lab during the summer of 2004, when I received the GEBS summer fellowship, and continued on with independent research during the school year. I worked on CWP-4 and -5 expression and am currently studying *tbb4* regulation. I will be studying political science and history at UR in my take five year.

Rachel Sill (BEB)

Coming to the University of Rochester, I was eager to pursue my passion for animal health and conservation both inside and outside of the classroom. As a BEB major, I learned about the biological concepts behind many of the problems animals currently face in the wild and in our homes. This knowledge deepened the experiences I was able to have outside of the classroom as an undergraduate. In the summer of 2002, I was an Intern for the Endangered Animal Rescue Sanctuary (EARS). At EARS, I was responsible for the daily care of tigers and lions. As former pets or performers, these cats were incapable of return to the wild, and yet too dangerous to be kept by all but the most experienced exotic animal keepers. During my time at EARS, I saw the

heartbreaking effects of animal exploitation and abuse upon some of the rarest and most treasured species on earth. The situation for endangered animals is disheartening to most people, but as a student of biology, I was able to understand the situation and the science behind it. As I took more biology courses, my expanding knowledge base allowed me to delve deeper into the multi-faceted and complex situation of the highly threatened tiger population.

The summer of the following year, as a Herd Management Intern for the University of Maryland Wye Research and Education Center, I shifted my focus to healthcare for domesticated cattle. The Wye Center is known for its herd of Black Angus cattle, which have been influential in the development of the breed. In this position, I assisted in the breeding program, the maintenance of herd health, and participated in an experimental land use project. Here, I got to see how genetics, ecology, and animal behavior were being applied to animal health and business.

I have continued to explore other avenues of animal care. I have been an intern at several veterinary hospitals, to gain experience with small animal veterinary medicine.

Most recently, I collaborated with Simone Sidel (class of 2006) for an Independent Research project. With the help of the Seneca Park Zoo, we performed an observational study of orangutan behavior. The resulting paper, "Behavioral Differences between Wild and Captive Orangutans" explores how life in captivity alters the behavioral patterns of orangutans. Many factors, including diet, social grouping, enclosure size and structure, may be responsible for the behavioral differences we observed. After noting behavioral differences, such as increased social activity and shorter birth intervals, we explored why the transition from captivity back to the natural habitat is often unsuccessful. After detailed study of a small group of orangutans, I was able to understand why the orangutans are losing their battle against extinction.

I would like to thank John Jaenike for his support and guidance, as well as David Hamilton of the Seneca Park Zoo for giving us the opportunity to study the orangutans.

Michelle Villasmil (BMG)

I began undergraduate school with an interest in molecular genetics and I started exploring research at the end of my freshman year. For two and a half years, I worked in Christopher Lawrence's laboratory in the Biochemistry and Biophysics department studying mutation bypass pathways in *Saccharomyces cerevisiae* and *Escherichia coli*. While working in this lab, I also helped sequence the *S. cerevisiae* gene Rev5.

Last summer, I began working in Mark Frampton's laboratory within the Division of Pulmonary and Critical Care Medicine studying the effects of particle exposure on inflammatory markers

in human blood. Here, I learned new research techniques and became involved in more aspects of the research process. Because of the diverse research experiences I have had working with Dr. Lawrence and Dr. Frampton, I feel confident that my undergraduate experience has helped to prepare me for a career in biological sciences.

Laura Vincent (BMG)

During the summer of 2002, I worked under Dr. Todd Steck at the University of North Carolina at Charlotte in an effort to develop a method to detect contamination in surface water systems for the use in the EPA's total maximum daily load assessments. Our method involved using an *Escherichia coli* strain that has been genetically engineered to carry a GFP gene. The genetically modified organism was added at potential sources of contamination and its presence monitored in downstream soil and water to confirm the source and the extent of allowed contamination. My work in the project was to analyze the viability and culturability of different strains of the genetically modified organisms to ensure they would not live longer or propagate more than wild type strains of *E. coli*.

In the summers of 2003 and 2004, I worked for Dr. Robert Sobol in the Department of Pharmacology

at the Hillman Cancer Center in Pittsburgh. During the first summer, I refined protocols for site-directed mutagenesis and produced a number of DNA mutations. These sequences were then transfected into a variety of human cancer cells. Publication pending.

I returned to the Hillman Cancer Center's Department of Pharmacology the next summer to investigate the efficacy of temozolomide (TMZ) and dacarbazine (DTIC), two commonly used chemotherapeutic agents for tumor treatment. Although the drugs are widely used, they are effective treatments in only about 15% of patients. Resistance to TMZ and DTIC is thought to be due in part to the action of the base excision repair (BER) pathway. It had recently been discovered that one of the intermediates of the BER pathway is toxic to the cell, reducing the efficacy of the cancer drugs. By targeting and reducing BER activity, the effectiveness of current chemotherapeutic agents may be greatly increased. In an effort to better understand the first steps of the BER pathway, I tested strains of mouse embryo fibroblast protein extracts with different DNA repair deficiencies in biochemical activity assays to assess their ability to recognize and remove different base lesions. I also prepared extracts and did preliminary glycosylase assays on human tumor cell lines (glioma and melanoma) that will be analyzed further in the future.

Eight UPBM Majors Awarded Summer 2005 de Kiewiet Research Fellowships

Eight undergraduates majoring in four of the B.S. tracks of the Undergraduate Program in Biology and Medicine (UPBM) have been awarded de Kiewiet Research Fellowships for the summer of 2005. The de Kiewiet Fellowships were established in 1983 in memory of former UR president C.W. de Kiewiet. Every year since then they have provided the opportunity for UPBM undergraduates to spend the summer doing research full time. This year each Fellow will receive a stipend of \$3,000 for ten weeks of research in the laboratory of a University researcher as well as a housing stipend.

Following are the recipients of the 2005 de Kiewiet Summer Research Fellowships, their projects and their mentors.

Shanley Blackley, BMB major, class of 2007 is working on the project "Identification of nature target cells for Dengue viral infection" in the lab of Xia Jin, Department of Microbiology and Immunology.

Stephen Brown, BBC major, class of 2006, will research "Dual fluorescence in affinity assays for somatostatin-receptor SSTR2" under mentor Mark Dumont, Department of Biochemistry and Biophysics.

Virginia Coleman, BMG major, class of 2006, will be looking into the "Role of Ldh isozyme

switching in cancer" under the direction of Hartmut Land, Department of Biomedical Genetics.

Jonathan Dashkoff, BMG major, class of 2006, is exploring "Localization and function of the yeast mismatch repair protein, MSH6p" in the laboratory of Elaine Sia, Department of Biology.

Reema Mehta, BBC major, class of 2006, is studying "The effects of RAD genes on mitochondrial repair" with mentor Elaine Sia, Department of Biology.

Dan Reid, BBC major, class of 2006, will be doing a "Functional analysis of pseudouridine in U2 snRNA" under the direction of Yi-Tao Yu, Department of Biochemistry and Biophysics.

Jaclyn Renfrow, BNS major, class of 2006, will be working on "Identifying the destabilization element in nonsense-mediated decay" with Fred Sherman, Department of Biochemistry and Biophysics advising her.

Crosby Sommers, BNS major, class of 2007, will be "Characterizing oxidative damage in neuronal ceroid lipofuscinoses models" in the lab of mentor David Pearce, Department of Biochemistry and Biophysics.

Howard Bryant Honored through Named Room, Scholarship



The family and friends of Howard Bryant gathered on April 13, 2005, to celebrate his life and to dedicate Hutchison Hall 316 in his name. Howard started in the Biology Department as a technician in 1961 and had held the position of Facilities Manager since 1975. When Howard passed away in August, 2004, Biology Department faculty, students and staff wanted to remember Howard's many positive contributions in a permanent way and decided to name Hutchison Hall 316 in his honor. This room is a hub in the Biology department, having been used over many years for faculty meetings, journal clubs, and seminars. Under Howard's exacting direction, the room had been recently renovated with state-of-the-art projection equipment and a restful décor.

The formal opening of the Howard Bryant Room was preceded by a ceremony held in Hubble Auditorium where a few of Howard's many colleagues recounted their fond memories of him. Those speaking included: Tom Eickbush, Professor and Chair of Biology; Jim Fry, Assistant Professor of Biology; Alan Dietsche, Senior Lecturer in Biology; Hiram Lyon, Technical Associate; Shona Mookerjee, Biology graduate student; Mark Englerth, a River Campus Facilities manager; Ron Paprocki, Senior Vice President of Administration and Finance and Chief Financial Officer; and Joanna Olmsted, Professor of

Biology and Dean for Faculty Development. Anecdotes were varied and personal, with a recurring theme being Howard's exceptional gift for befriending, educating and encouraging everyone—faculty, students, staff, facilities workers, business reps—while performing his job at the highest possible level.

A reception in the Howard Bryant Room followed the formal dedication ceremony, and included the unveiling of a cabinet, handcrafted by Hiram Lyon and Bill Burke, that contains items about Howard. Howard's Distinguished Service Award flanks a picture of Howard showing his typical sunny smile. The cabinet also contains a collection of antique scientific instruments that Howard had preserved, and a testament to Howard's stewardship of these instruments and all else in the department. Through Howard's attention to detail and his desire to have Biology be 'the best department', all in the department thrived.

In concert with the dedication, the establishment of the Howard Bryant Memorial Scholarship Fund was announced. This fund was made possible through a generous initial endowment from a friend of Howard's, and is intended to help provide tuition to undergraduate students in need who wish to pursue studies in sciences and engineering. Tom Eickbush, Marty Gorovsky, and Joanna Olmsted will assist others in the University in identifying potential recipients, and the awardees of these scholarships will be called Bryant Scholars. Anyone wishing to make a donation to the fund may do so by contacting the department or through Charles Pickhardt (Office of Trusts and Estates: 585-273-5900 or pickhardt@alumni.rochester.edu). Donations are welcome at any time, but the donor will match donations made by individuals through December 31, 2005.

Those who knew Howard Bryant will always remember him for his professional dedication to excellence, but even more so for his dignity, personal warmth and generosity of spirit. He is greatly missed by his "Biology family" and many others at the University.

UR Biology Scientist Present at Ukraine Inauguration

Nataliya Shulga, Research Associate in David Goldfarb's laboratory since 1992, had the very exciting experience of attending the Ukrainian presidential inauguration and shaking hands with the new president. The following is her account of how she came to be invited.

In 1995 UR School of Medicine and Dentistry was awarded a two year grant from USAID to

improve teaching methodologies in two medical schools in Ukraine and to introduce an idea of standardized testing of students' performance. When a letter from Dr. Jozefowich (P.I. on the grant) to the Ukrainian Federal Credit Union was passed to me I immediately realized that life was giving me an opportunity to be a part of something very special. What I committed to do unfolded with time into a

beginning of the medical education reform in my home country, Ukraine.

It is still a problem for many of my friends to comprehend how few people with no apparent power and social status working as volunteers were able to organize and conduct pilot studies on standardized testing in the medical education in the whole country and establish a unique medical fellowship to train the most prominent young medical students to become a future leaders of Ukrainian medicine. When I am asked about this, my answer is simple: we just did it, that's all. I can recommend two articles about this project:

<http://www.urmc.rochester.edu/pr/publication/index.cfm>

<http://www.ukrweekly.com/Archive/2004/490432.shtml>

This year we will celebrate a 10th anniversary of the "Medical Education and Training Partnership Project with Ukraine". There will be no fanfare and champagne. There will be a special session at the Annual Higher Education Reform Conference held in Ukraine. It will be the first time when all participants—organizers and alumni alike—will have a chance to reflect on results of that initiative. For a decade organizers were keeping a low profile and were avoiding advertisements and media attention as we were not sure that it would help us to do the job. For a decade managers in Ukraine were fighting with tax police to protect UR tax-free donations of the textbooks and clinical visual materials from being confiscated or taxed as there was no law in Ukraine protecting such contributions to the educational institutions. For a decade managers in Ukraine were fighting numerous attempts to bribe or to discredit them from those who did not want to face fair competition and objective evaluation of students' performance. Even here, in Rochester, I was approached many times with an attitude of disbelief and suspicion.

Then 2004 came to bring an epochal Presidential election in Ukraine. The whole world was watching the election process in Ukraine. A truly remarkable event occurred after Victor Yushchenko's

opponent was initially declared the winner amid widespread voter fraud and abuse. Yushchenko's supporters, collectively referred to as Orange Revolution, rose up to embrace hope and freedom in the face of tyranny. The Orange Revolution has served as a powerful symbol of victory over tyranny for the rest of the world. I traveled four times to New York City to vote for President Yushchenko. Many Ukrainian professionals who work in Rochester and



Buffalo joined me for that trip. I thought I might be doing something good as a mentor if all my former students were decorated in orange and were among the observers, organizers and tent city participants during the Orange Revolution in Ukraine.

I was moved to tears when on Thursday, January 20, 2005 I received an e-mail with an official invitation to participate in the Inauguration of the President, Victor Yushchenko, in Kyiv, capital of Ukraine. As surreal as it can look, this invitation came to me in recognition of my contribution to the reforms in Ukraine and my work for the positive image of Ukraine and Ukrainians over the past decade. I could not lose such an opportunity and went there to be an eye witness of the glorious victory of the people of Ukraine—a new hero of the democratic world.

Congratulations

Grants and Awards

Vera Gorbunova has been awarded an AFAR grant in the amount of \$50,000 for her project "Changes in the levels of DNA double-strand break repair proteins during aging and cellular senescence."

Rita K. Miller received a Research Opportunity Award (ROA) of \$24,900 from the National Science Foundation for her research on "The role of Bik1p in positioning the mitotic spindle in yeast" effective June 1, 2005 through August 31, 2005.

The National Science Foundation has funded a \$214,197 two-year grant to PI **H. Allen Orr** and co-PI **Yuseob Kim** for their project, "Theory of adaptation in experimental and natural populations."

H. Allen Orr has received a four-year grant of \$620,000 direct funding from the National Institutes of Health for "The genetic basis of speciation in *Drosophila*."

Jack Werren has received an NIH four-year grant of \$1,100,000 for "Genetics of Wing and Cell-Size Evolution in *Nasonia*." Jack is also project coordinator for "*Nasonia* Genome Sequencing" for which NIH provides funds directly to the Sequencing Center.

Prabhjot Singh Dhadialla (BCD, 2003) was named a 2005 Soros Fellow. The Paul and Daisy Soros Fellowships for New Americans are awarded annually to approximately 80 extraordinarily talented students of immigrant background to pursue a graduate degree in any field. Jot graduated Phi Beta Kappa and magna

cum laude from UR in 2003 with a B.S. in Cell and Developmental Biology and a B.A. in History. Jot was also a 2002 national Goldwater Scholar and a recipient of UR's Ayman Amin-Salem Memorial Prize in 2003. He is currently a second-year student in the Cornell/Rockefeller/Sloan-Kettering Tri-Institutional Medical Scientist Training Program where he is pursuing an M.D./Ph.D. program. The three-year Soros Fellowship covers half of graduate tuition and provides an annual stipend of \$20,000. Mr. Dhadialla is the second UR student or alumnus to be offered a Soros Fellowship.

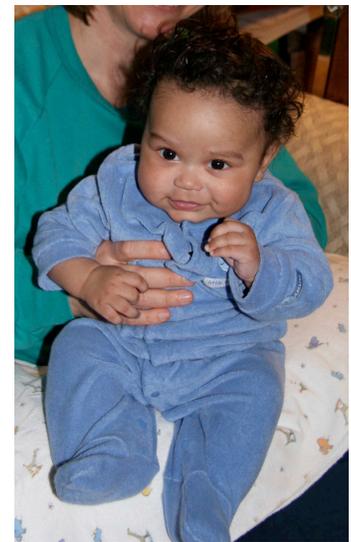
Births

Rita Miller, Assistant Professor of Biology, and Mike Hubbard are the parents of Sarah Hubbard born January 27, 2005. Sarah weighed 8 pounds 6 ounces.

(The sweater was knitted by Dr. Elaine Sia.)



Silvia Sørensen and James Fry, Assistant Professor of Biology, are the proud parents of Tobias James Sørensen-Fry, born January 27, 2005, adopted January 29, 2005. Tobias weighed 7 pounds 9 ounces and was 22 inches long at birth.



Jianquan Chen and Yinghui Yu announce the birth of Erin Chen on April 23, 2005. Erin weighed 6 pounds, 8 ounces and was 20 inches long at birth. Jianquan is a graduate student in Rulang Jiang's lab.

Rong Xie, postdoc in the Gorovsky lab announces the birth of his daughter Sophie Xie on October 20, 2004. Sophie weighed 7 pounds, 11 ounces at birth.

Grad Class of 2004 Choose Permanent Labs

Six graduate students completing their first year have been assigned to the labs in which they will do their doctoral research. **Jianquan Chen** and **Rosemary Ryan** will do their work in Rulang Jiang's lab in the Center for Oral Biology; **Samantha England** has

chosen Jim Palis' lab in Pediatrics; **Zhiyong Mao** and **Xi Shi** have joined Vera Gorbunova's lab in the Department of Biology; **Jeremy Rabinowitz** will be working with David Lambert in Biology.

Other

Jack Werren's efforts to have *Nasonia* selected for full genome sequencing by NIH have been rewarded; *N. vitripennis* will receive 6-fold coverage and the two sibling species 1-fold coverage each. This will provide a wealth of information for developing the system as a model for the genetics of complex traits.

In January **Jack** went to Ecuador to collect insects along with Don Windsor (Smithsonian Tropical Research Institute, Panama). The trip was part of the global studies of bacterial diversity in insects, focusing on *Wolbachia*, and widespread endosymbiont that alters reproduction in insects. Along the way they saw a 21+ foot Anaconda (no kidding!!), as well as more insects than you can imagine.

Anna Barbi (BCD, 2005) finished seventh in the heptathlon as part of the New York State Collegiate

Track Conference championships.

Arrivals and Departures

Kelly Dyer, graduate student and postdoctoral fellow in the Jaenike lab, has a new position as a Royal Society Fellow at the University of Edinburgh with Brian Charlesworth.

Julie Stahlhut has joined the Jaenike lab as a Postdoctoral Fellow. She earned her Ph.D. in Biological Sciences at Western Michigan University in 2002. Her scientific interests include different aspects of insect biology, especially using molecular methods to study relationships among individual behaviors, population structures, and community interactions.

Julie is married to Rick Stahlhut. Among her hobbies and other interests are officiating at quiz bowl tournaments, very occasional songwriting, progressive

politics, and issues faced by mid-life career changers and non-traditional students.

Deodoro Oliveira from Sao Paulo, Brazil, has joined the Werren lab as a Postdoctoral Researcher.

As of July 1, 2005, **Miriam Barlow** will be an Assistant Professor of Biology at the University of California at Merced. Miriam was a graduate student in the lab of Barry Hall at UR before going on to a postdoctoral fellowship at Emory University.

Nataliya Shulga, Research Associate in Dave Goldfarb's lab is leaving UR to become Vice President for Research and Development of the National University of "Kyiv-Mohyla Academy."

Off Campus

Barry Hall gave the following presentations: Phylogenetic Methods: A two-day workshop for the Emory University Dept. of Epidemiology and the Centers for Disease Control, Atlanta, GA April 2004; "Predicting the Evolution of Antibiotic Resistance," Dept. of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA April 2004; "Experimentally predicting the evolution of antibiotic resistance in Nature," Molecular and Cell Biology Dept., University of Connecticut, Storrs, CT, April, 2005; "Phylogenetic analysis of microbial population data: uses and misuses in epidemiology and forensics," Molecular and Cell Biology Dept., University of Connecticut, Storrs, CT, April, 2005; "Phylogenetic Analysis Made Easy: Using DNA Sequence Data for Strain Typing, MLST, and Beyond," the 7th International Meeting on Microbial Epidemiological Markers, Vancouver, B.C., Canada, May 2005.

John Jaenike presented seminars at Michigan State University and UC, San Diego.

Allen Orr spoke at the National Academy of Sciences Colloquium on Systematics and the Origin of Species: On Ernst Mayr's 100th Anniversary, Irvine, CA in December, 2004. His topic was "Genetic basis of reproductive isolation and of species differences." In March, 2005, for the Osborne Endowed Lectureship, University of Edinburgh, Institute of Evolutionary Biology, his topic was "Is a theory of adaptation possible?" At the Carnegie Museum of Natural History, University of Pittsburgh Honors College, and Department of Biological Sciences, in March he spoke on "The genetics of speciation in *Drosophila*." For the

2005 Edward Sturtevant Hathaway Lectureship in Natural History at Tulane University, Department of Ecology and Evolutionary Biology on March 31, he spoke on "The origin of species: what do we know now?" and on April 1, at the Tulane University, Department of Ecology and Evolutionary Biology Departmental Seminar, he presented the talk "Is a theory of adaptation possible?" On April 15, at the Genomes Evolving Symposium, University of California, San Diego, he spoke on "The theory of adaptation at the DNA sequence level." For the Third Annual Fred Sherman Lecture, Genetics Day, University of Rochester, April 22, he presented the talk "The genetics of speciation."

Elaine Sia spoke at the University of Minnesota, Department of Genetics, Cell Biology and Development on March 8. The title of her talk was "Replication and Maintenance of Mitochondrial DNA in *S. cerevisiae*."

Jim Fry's talk "*Aldehyde dehydrogenase* is essential for ethanol tolerance and shows a world-wide polymorphism which parallels the *Adh* polymorphism" was presented as a platform contribution at the 46th Annual *Drosophila* Research Conference, San Diego, CA., April 1. He also presented at the NSF Living Stock Collections study section, December 9, 2004.

Vera Gorbunova has been invited to attend the Ellison Colloquium on the biology of Aging, October 23-25, 2005, Buck Institute, Novato CA. She was a seminar speaker at the Biology Department SUNY Geneseo April 1. Her subject was "What happens to DNA repair in senescent cells?"

Jack Werren spoke at the following places: *Wolbachia* FIBR Working Group Meetings, Portal Arizona (Organizer); Nasonia Meetings, Bellingham Washington; UC Riverside Entomology Department; University of North Carolina, Biology Department; Indiana University Center for Genomics and Bioinformatics; University of Maryland, Biology Department.

Jack Werren co-organized a workshop for high school teachers at the Marine Biological Labs (Woods Hole). Seth Bordenstein (UR Biology alumnus) was co-organizer, and Michael Clark and Bob Minckley gave lectures and lab exercises. The goal is to use *Wolbachia* in a set of integrated high school labs to introduce students to biodiversity, basic molecular methods, bioinformatics, and molecular phylogeny.

Recent Publications

Eickbush

Zhang, X. and T. Eickbush. 2005. Characterization of active R2 retrotransposition in the rDNA locus of *Drosophila simulans*. Genetics. 2005 Mar 21; [Epub ahead of print]

Fry

Phadnis, N. and J.D. Fry. 2005. Widespread correlations between dominance and homozygous effects of mutations: implications for theories of dominance. Genetics, accepted pending revisions.

Mhyre, T.R., E.J. Chesler, M. Thiruchelvam, C. Lungu, D. A. Cory-Slechta, J.D. Fry, and E.K. Richfield. 2005. Heritability, correlations, and *in silico* mapping of locomotor behavior and neurochemistry in inbred strains of mice. Genes, Brain and Behavior, in press.

Gorbunova

Gorbunova, V. and A. Seluanov. 2005. Making ends meet in old age: DSB repair and aging. Mechanisms of Aging and Development, in press. (Invited review)

Gorbunova, V. and A. Seluanov, D. Mittelman and J. Wilson. 2004. Genome-wide demethylation destabilizes CTG/CAG trinucleotide repeats in mammalian cells. Human Molecular Genetics 13:2979-2989.

Gorovsky

Collins, K. and M.A. Gorovsky. 2005. *Tetrahymena thermophila*. Curr. Biol. 15:R317-8.

Dou, Y., X. Song, Y. Liu and M.A. Gorovsky. 2005. The H1 phosphorylation state regulates expression of CDC2 and other genes in response to starvation in *Tetrahymena thermophila*. Mol. Cell Biol. 10:3914-22.

Liu, Y. X. Song, M.A. Gorovsky and K.M. Karrer. 2005. Elimination of foreign DNA during somatic differentiation in *Tetrahymena thermophila* shows position effect and is dosage dependent. Eukaryot. Cell 4:421-31.

Hall

Salipante, S., M. Barlow and B.G. Hall. 2003. GeneHunter, a transposon tool for the identification and characterization of cryptic antibiotic resistance genes. Antimicrob. Agents Chemother. 47:3840-3845.

Hall, B.G. 2004. *In vitro* evolution predicts that the IMP-1 metallo- β -lactamase does not have the potential to evolve increased activity toward imipenem. Antimicrob. Agents. Chemother. 48:1032-1033.

Hall, B.G. 2004. Predicting the evolution of antibiotic resistance. Nature Reviews Microbiology 2:430-435

Hall, B.G. and M. Barlow. 2004. Evolution of the serine β -lactamases: Past, Present and Future. Drug Resistance Updates 7:111-123.

Hall, B.G. 2004. *Phylogenetic Trees Made Easy: A How-To Manual*. 2nd Edition. Sinauer, Assoc. Sunderland, MA.

Hall, B.G., S. Salipante and M. Barlow. 2004. Independent origins of the Subgroup (B1 + B2) and the Subgroup B3 metallo- β -lactamases. J. Mol. Evol. 59:132-140.

Hall, B.G. 2005. Comparison of the Accuracies of Several Phylogenetic Methods Using Protein and DNA Sequences. Mol. Biol Evol. 22:792-802.

Garau, G., A.M. Di Guilmi and B.G. Hall. 2005. Structure-based phylogeny of the metallo- β -lactamases. Antimicrob. Agents and Chemother., in press.

Hall, B.G. and M. Barlow. 2005. Revised Ambler Classification of β -lactamases. J. Anitmicrob. Chemother., in press.

Hall, B.G. and M. Barlow. 2005. Phylogenetic Analysis as a Tool for Molecular Epidemiologists. Annals of Epidemiology, in press.

Hattman

Horton, J.R., K. Liebert, S. Hattman, A. Jeltsch and X. Cheng. 2005. Transition from nonspecific to specific DNA interactions along the substrate-recognition pathway of Dam methyltransferase. Cell 121:349-361.

Hattman, S. 2005. DNA-[adenine] methylation in lower eukaryotes. Biochemistry (Moscow), in press.

Jaenike

Dyer, K.A. and J. Jaenike. 2004. Evolutionarily stable infection by a

male-killing endosymbiont in *Drosophila innubila*: molecular evidence from the host and parasite genomes. *Genetics* 168:1443-1455.

Shoemaker, D.D., K.A. Dyer, M. Ahrens, K. McAbee and J. Jaenike. 2004. Molecular evolutionary effects of *Wolbachia* infections: decreased diversity but increased substitution rate in host mtDNA. *Genetics* 168:2049-2058.

Dyer, K.A., M. Minhas and J. Jaenike. 2005. Expression and modulation of embryonic male-killing in *Drosophila innubila*: opportunities for multi-level selection. *Evolution* 59:838-848.

Dyer, K.A. and J. Jaenike. 2005. Evolutionary dynamics of a spatially structured host-parasite association: *Drosophila innubila* and male-killing *Wolbachia*. *Evolution*, in press.

Miller

Moore, J.K., S. D'Silva and R.K. Miller. 2005. The CLIP170 homologue, Bik1p promotes the phosphorylation and asymmetric localization of Kar9p. *J. Cell Biol.*, submitted and in revision.

Orr

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Orr, H.A. 2005. Theories of adaptation: what they do and don't say. *Genetica* 123:3-13.

Orr, H.A. 2005. The genetic basis of reproductive isolation: insights from *Drosophila*. *Proc. Nat. Acad. Sci. USA* 102:6522-6526.

Orr, H.A. 2005. The distribution of fitness effects among beneficial mutations in Fisher's geometric model of adaptation. *J. Theor. Biol.*, submitted.

Kim, Y and H.A. Orr. 2005. Adaptation in sexuals vs. asexuals: clonal interference and the Fisher-Muller model. *Genetics*, submitted.

Orr, H.A. 2005. Vive la différence! (review of Bryan Sykes's *Adam's Curse: a Future Without Men*, Steve Jones's *Y: The Descent of Men*, and David Bainbridge's *The X in Sex: How the X Chromosome Controls Our Lives*). *The New York Review of Books*, May 12, 2005, pp. 18-20.

Werren

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Velthuis, B.J., W. Yang, T. van Opijnen and J.H. Werren. 2004. Intra-specific variation in sexual isolation: Genetics of female mate discrimination in *Nasonia longicornis* (Darling) (Hymenoptera, Pteromalidae). *Animal Behavior* 69:1107-1120.

Werren, J.H. 2005. Heritable microorganisms and reproductive parasitism. In *Microbial Evolution: Concepts and Controversies*. J. Sapp (ed.) Oxford University Press (New York).

Werren, J.H., J. Gadau, L. Beukeboom, C. Desplan, J. Lynch, R. Rivers, S. Richards, L. van de Zande 2005. Proposal to sequence the *Nasonia* genome. <<http://www.rochester.edu/College/BIO/labs/WerrenLab/nasonia/LettersOfSupport/NasWhitePaper2004.pdf>>

Telschow, A., N. Yamamura and J.H. Werren. Bidirectional CI, Cytoplasmic Divergence and the Stable Coexistence of Two Strains in Structured Host Populations. *J. theor. Biol.*, in press.

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Baldo, L., N. Lo and J.H. Werren. The Mosaic Nature of the *Wolbachia* Surface Protein (wsp). *J. Bacteriology*, in press.