



BCMB Newsletter

March, 2010

Volume 1 Issue 2



Life from the Inside Out

Keeping you up to date about:

Biochemistry and Cellular and Molecular Biology at UTK

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The BCMB Buzzzzzzz

A little over a year ago the faculty of BCMB gathered together in a retreat setting to think about priorities and goals. The task at hand was to develop a strategic plan for the department to guide future decisions and make the best use of our resources. What emerged from that idyllic weekend getaway were five departmental goals, with the top priority being "improving the quality of our undergraduate education efforts."

We put our students first! We have experienced growth in the number of students who major in BCMB in recent years, and currently the department has approximately 350 out of 550 total students majoring in Biology. Our majors are well prepared and highly motivated, with an average GPA of 3.4 among the graduating class in May of



Dr. Cynthia Peterson, BCMB Department Head

2009. These majors also represent a large portion of all BS degrees granted by UTK. The large majority of the students earning B.S. degrees from the College of Arts and Sciences come from our department. In the spring of 2009, there were 75 students who earned a B. S. in BCMB. We are quite proud of our talented majors, and our goal has been to

provide opportunities for them to excel at UTK.

We now have several new initiatives that can broaden the experiences of students while they are here at UTK by offering hands-on activities and professional development. There are

record numbers of students each semester pursuing independent research projects with faculty in BCMB. Each spring these

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BCMB Faculty Receive ARRA Awards

The American Recovery and Reinvestment Act (ARRA) funding was developed to help stimulate the economy. President Obama signed the bill for \$21.5 Billion dollars on February 17, 2009 for research and development. The recovery.gov website reports that Tennessee ranks 20th in creating or saving jobs. The total jobs created or saved is 9,566. The State of Tennessee has received over \$5.5 Billion dollars and received 2005 contracts, grants and loans. Instead of

yearly reporting these grants require quarterly reports. On the 10th of each month you can access the reports through the recovery website (recovery.gov). The reports are written so that anyone can understand what the PI is researching, it also indicates if someone is hired and how far they are on the project. The BCMB department is proud to announce that we have received six grants. Here are our recipi-

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An interview with Assistant Professor Elena Shpak



*Elena Shpak,
BCMB Asst. Professor*

I grew up in Moscow. Most summers I spent with my grandparents, who lived in a village just outside of Moscow. Growing up was very different than it is here. My grandparents had a very primitive house, with the restrooms outside and no running water.

My parents, by Russian standards, were middle class, and pretty well off. I never even imagined that I wouldn't go to university. I think I decided to be a scientist and study biology when I was fifteen years old. In Russia you have to decide on your profession very, very early. So by the time you're done with high school you have to have a very good idea of what you're going to do because you don't apply to the university, you apply to a specific department. Later on you couldn't switch departments if you wanted to.

My parents hated that I wanted to be a biologist. They thought that this was one of the worst professions ever, mostly because it wasn't very well paid in Russia. They tried to dissuade me for two years, almost every week talking to me, saying that I'm making a huge mistake. But you know, it's nature, you rebel against your parents. I went to Moscow State University, the most prestigious university in Russia. At the end of the first year in the Biology department I had to decide on my concentration. We had 28 concentrations in biology and I chose plant physiology. In my year, there were only four students who elected to study in that area. I was in university five years and the last two years practically all the classes and lectures were designed for only our group of four students. So the last two years were very, very special for me.

At that time Moscow State University issued only Master's degrees not Bachelor's. Everybody had to do research and write a thesis to graduate. I did my research at the Institute of Bio-organic Chemistry where I tried to isolate a receptor for the plant hormone jasmonic acid. That is when my love for plant signal transduction pathways was born.

A year after graduation from Moscow State I went to Ohio University on a teaching assistantship. It was a huge adjustment because of the cultural differences and not knowing anything about the American system of doing things. But I got lots of assistance from Student Affairs and soon found other students who could help me adjust.

I remember when I first came I had to teach the first week I was here. I was teaching organic chemistry lab and we would give lectures to the students. So there were probably ten sections, and there were ten TAs, and before the lab started all the students would go into an auditorium and one teaching assistant would lecture to them for twenty minutes. Somehow, they decided that I was going to be the first one to give such a lecture, my first week.

Q. So you had no examples to follow?

I had no clue! I was also worried about my English. So I practiced this lecture for five days, ten times a day. I wrote it all down, I memorized it. So, I did all that, and then I taught the class, and it went okay.

Q. How did you choose your advisor? When you go there, did you already have somebody in mind?

I didn't have anybody in mind and Ohio University doesn't have rotations. So somebody came to me and said, "Will you work with me?" And I said yes as long as it is plant biology related. I liked my advisor, Marcia Kieliszewski, she was a new PI and I was her first Ph.D. student. She didn't have any post-docs, so she had a lot of time to help me out and she cared greatly about my work. She spent a lot of time helping me to write papers, which was very challenging for me. Marcia is a plant biochemist in the Chemistry and Biochemistry department, and during my Ph.D I was studying how proteins from plant cell walls are glycosylated. We figured out that particular amino acid sequences are decorated with specific types of sugar molecules. So now one is able to look at a plant protein sequence and tell whether it will be glycosylated in this particular manner or not without the need to isolate the protein and study its structure.

Q. How long did it take to get your Ph.D?

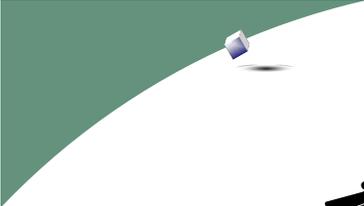
Just four years. I had two first author papers in PNAS and JBC and later on was co-author on 3 more.

At that time I had a boyfriend in Oregon and I wanted to move to the West coast. I still was in love with plant development and I wished to go back in that area. I interviewed with Keiko Torii in University of Washington in Seattle, and I liked

Quote,

"I decided to be a scientist and study biology when I was fifteen years old."

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1995

In response to our first newsletter we received responses asking why they were included in a mailing when they did not graduate from this department. The following describes the formation of the department and hopefully provides better insight into why you are receiving this even though you did not graduate from a department with the name Biochemistry and Cellular and Molecular Biology (BCMB).

BCMB officially came into existence on July 1, 1995. It was created as a result of the dissolution of the former zoology and biochemistry departments. Zoology included faculty members with expertise in ecology, environmental biology, evolution, cell and developmental biology, neurobiology and genetics. Biochemistry faculty focused on protein structure and enzymology, membrane structure and function, and cell biology and the control of gene expression. With the dissolution of these departments the zoology faculty in the areas of cell and developmental biology, genetics, and neurobiology joined with the faculty in the former biochemistry department and BCMB was born. At the same time the department of Ecology and Evolutionary Biology (EEB) was created and populated by the former zoology faculty with expertise in those areas.

Nothing stands still. In 1999 Wade Gilley was hired as the president of the

University. Shortly thereafter he initiated a competition to establish research centers of excellence across the university system. Several faculty members in BCMB together with a few from Chemistry took the initiative to propose a Center of Excellence in Structural Biology. Their proposal was one of eight from across the university system that was awarded funding in the spring of 2001. This had an exceptional impact on the department in that it aided in recruiting new faculty, it provided funding for graduate research assistants and post-doctoral fellows, and funding for new additional instrumentation. Although the original plan was for these eight centers to meet benchmarks for grant and/or contract funding with matching funds from the state, within about 3 years the state funding dried up and the centers that resulted from this initiative are only loosely held together today. However, the effect has been a lasting one on the faculty and the departments involved.

In the spring of 2003 the Botany department at UT was dissolved. The faculty could select the department with which they would associate. The split was almost equal between BCMB and EEB. By joining with the existing BCMB faculty members who use plants as model organisms this has created a very strong focus of expertise within BCMB. Since that time additional hires have been made in the department that have added to strength in the plant science including Dr. Gladys Alexandre and Dr. Elena Shpak and Dr. Brad Binder. These faculty members constitute a core strength in the area of plant molecular and cell biology and have been successful in obtaining research funding and in training numerous undergraduate and graduate students in their laboratories.

And new university initiatives continue to emerge. Approximately four years ago the UT president and upper administration working with the governor of Tennessee, formulated a plan and allocated resources to hire Governor's Chair positions. These outstanding scientists would have international reputations in areas of value to both the university and to our nearby neighbor, Oak Ridge National Laboratory. The first of these hires, Dr. Jeremy Smith, was hired in the fall of 2006 and is a member of the BCMB faculty. He is involved "in high-performance computer simulation of biological macromolecules, neutron scattering in biology, the physics of proteins, bioenergetics and the analysis of structural change in proteins". But Dr. Smith was not the first person hired in BCMB with an emphasis in these areas. In 2002 Dr. Hong Guo was hired as the department's first faculty member with training and experience in the area of computational biology and the modeling of protein structure and function. The department realized the importance of this area and considered it our obligation to offer training in this area to our students. Subsequent to Dr. Smith joining the department, Dr. Jerome Baudry and most recently Tongye Shen were both hired. This group is rapidly establishing itself as one of the strongest of its kind at a major research institution such as UT.

At present the department is working its way through the budgetary struggles that afflict most publicly funded institutions and the nation as a whole. But as you can see from this brief history, we have adapted to many changes over the past 15 years and we will continue to pursue excellence in all aspects of our teaching, research and service mission.

THEN AND NOW

Focus on an alumnus: Ricky Cox

PEER

Program for Excellence & Equity in Research

This new program funded by the National Institutes of Health aims to increase participation of underrepresented minorities earning PhDs in biological sciences at UTK.

See: <http://web.utk.edu/~peer>

In each issue of the newsletter we will focus on an alumnus from the department. This includes any of you who were former biochemistry majors as well as, zoology or botany majors whose interests are aligned with our departments mission. In addition, graduates of the former graduate programs in Cell and Molecular Biology and in Physiology should recognize BCMB as their UT home. While some of you have gone on to scientific or medical pursuits, others have taken other paths. We would love to hear how your experiences at UT influenced your choices. If you or someone you know wants to be considered for an article in our newsletter, please contact us at BCMBNews@utk.edu

Q. You came here as a graduate student in 1993. Where did you go to school before coming here?

A. I got my undergraduate degree at UT Martin and majored in chemistry. Then I went to Murray State University to get my Master's degree in chemistry. After completing my Masters' degree I stayed on because my wife was finishing up her degree. During that time I was given opportunity to teach an entry level chemistry course. That really turned me on to wanting to be in academics because I loved teaching those classes. Because they were my classes I got to teach the way I wanted to and emphasize the topics I thought were most relevant. This influenced my decision to pursue a doctoral degree and enter the higher education teaching profession.

Q. When you decided to pursue a doctorate how did you decide on UT.

A. One important factor was not wanting to get too far from home. We have very strong family connections and I wanted to be able to get home to my parents in a reasonable amount of time. I wanted to do biochemistry and so I looked at the Universities of Kentucky, Cincinnati, Vanderbilt and UT. I looked at Chemistry departments that had a biochemistry component and also at Biochemistry departments. I tried to figure out where I would fit in best. I knew that the department at UT was only going to admit a few students that year. I talked to some of the students and was really impacted by what John Lamerdin, who was working in Engin Serpersu's lab told me. He said that he had been a lot of places, had grown up in California, and I can tell you that the faculty here are interested in you succeeding. That is why I came here and that is why I like it here. You didn't offer the biggest stipend I could get but after visiting the department I thought it would be the best move for me.

Q. Did your chemistry background influence your choice of a Ph.D mentor?

A. Yes it did. For my Masters degree I had worked with a toxicologist using rat liver micro-

somes. And I'll be honest with you, when I left Murray State I wasn't going to do any more animal work. When I was a graduate student I had always liked structure. So I knew I wanted to do something with molecules and structure. I chose my first year rotations with Engin Serpersu and Dan Roberts. I enjoyed both of them. Dan's lab was really good. I got to purify calmodulin and do some different experiments with it but I ended up choosing to work in Engin's laboratory. He was just starting to work on a new enzyme, an aminoglycoside phosphotransferase and I figured I would be getting in on the ground floor. In addition, John Lamerdin, whom I'd met when I visited here, was working in Engin's' lab.

Q. You've mentioned John Lamerdin several times. Did the student environment in the department benefit your overall education here?

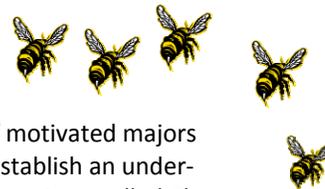
A. Certainly. For obvious reasons the student's with whom I interacted most were those in Engin's lab; Kamesh Pappu, John Lamerdin and Enrico DiGiammarino. I also interacted with students like Jennifer Dodd in Dan Roberts' lab because our labs were next to each other and with Angelia Gibson in Cynthia Peterson's lab and with Robert Ivey in Barry Bruce's lab. We would frequently go to lunch together. And we had a good time.

Q. Who had the greatest influence on you as a graduate student?

A. Dr. Serpersu because he was a great mentor. He liked to give the impression that he was going to be really tough on you and tried to come off as stern but he did a lot of good things for us. In Engin's lab we laughed a lot. He was an excellent person to work for. I don't think I could have asked for any better. He helped all of us a lot and we learned a lot from Engin. As a new graduate student the NMR seems like a big piece of equipment and is pretty scary. When we first began to use it as a new graduate student he would come over to help us. He loved to do that kind of stuff. We got personal attention from him rather than being assigned to a postdoc or to a more senior graduate student. He always made himself available to us regardless of what he was

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The BCMB Buzzzzzzz



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students have an opportunity to participate in the Exhibition of Undergraduate Research and Creative Achievement, sponsored by the Office of Research. Last spring we had several students participate; these students earned four of the total eight awards given across the entire College of Arts and Sciences. These outstanding students include Michael Jungwirth, Jennifer Laird, Arwa Zakaria, and Danielle Harris, who was the William Harris III Undergraduate Research Award winner. Congratulations to them all!

We also have established three new scholarships for our undergraduate majors. The award for the Emmett and Nannie Hale Fellowship for Pre-Dentistry went to Kevin Kuo. Our BCMB Research Scholarship was given to Stacey Lee, and the C.W. Fite Fellowship for Outstanding Professional Promise was awarded to Payal Sharma. Each of these awards is for \$2000 to be paid toward student tuition. BCMB is also proud to have many of their majors win scholarships from the College of Arts and Sciences for the current year. Winners of the Ed Hawkins Memorial Scholarship Fund include Mohammed Al-Wadel, Heather Williams, Brandon Birkhead, Nathan Stebbins, Jenna McKinnie, Reem Hussein, Brett George, Wesley Dutton, Charles Lanman, Jonathan Lockhart, Noah Ehinger, and Alison Charruf Frey. The Dr. and Mrs. Donald Bradley Sr. Scholarship were awarded to William Buckley Lyman, Alicia McClintock, and Eric Mason.

During recent months a team of motivated majors has worked closely with me to establish an undergraduate honors club. This organization, called Chi Omega Lambda, is an affiliate of the American Society for Biochemistry and Molecular Biology (ASBMB), a national professional organization for our discipline. The organization has sponsored a number of activities, including talks about graduate school opportunities, a discussion of medical school admission “dos and don’ts” and a workshop on internships. One of our undergraduate researchers has been awarded a travel scholarship to attend the national ASBMB meeting and present research findings.

For the first time, BCMB is hosting a summer “Research Experience for Undergraduates” this June and July of 2010. Our theme is “Sensing and Signaling,” featuring research projects that can be pursued in several BCMB faculty laboratories using cutting edge tools to study the ways living organisms and cells sense their surroundings. Students will be selected in a competition to come to campus for research activities, seminars and social gatherings. They will earn a nice stipend at the same time!

As you can see, we have taken our charge to “improve the quality of our undergraduate education efforts” seriously. Stay posted for more to come! We look forward to seeing more in the news about the accomplishments of our outstanding undergraduate majors.

Chi Omega Lambda

Chi Omega Lambda is the Student Honor Society of ASBMB (American Society for Biochemistry and Molecular Biology). The Honor Society Recognizes outstanding undergraduates interested in pursuing careers in molecular life sciences and provides a mentoring network to assist in attainment of their goals. The Society will recognize outstanding juniors and seniors for the scholarly attainment, research accomplishment and outreach activities in the molecular life sciences. Faculty Advisor is Dr. Elias Fernandez.

Members include:

President: Payal Sharma

Vice President: Michael Jungwirth

Secretary: Jenna Hagermaker

Brandon Birkhead, Alex Manole, Aaron Mauner, Nathan Stebbins, Pelumi Osibanjo, Megan Williamson, and Alaina Willet



Drs. Bruce McKee, Albrecht von Arnim and Beth Mullin at the Fall Retreat.

As a result of being a member Michael Jungwirth has received a travel award from ASBMB to present his research at the annual national meeting of the society.

Dr. April Pyle, Speaker at the BCMB Retreat



*April Pyle
Former Ph.D. student of Dr.
Mary Ann Handel.*

April Pyle is an assistant professor at the University of California, Los Angeles (UCLA). Her scientific journey however began at the University of Tennessee, Knoxville (UTK) where she obtained both her Bachelor of Science and Ph.D. in BCMB. April developed an interest in science from conversations with her undergraduate mentor, Dr. Mary Ann Handel who would later become her Ph.D. mentor. After mastering her basic science courses, Dr. Handel suggested that she take the upper division Molecular/Developmental Genetics Lab class instructed by Drs. McKee and Handel. Here she became fascinated in learning molecular biological approaches for studying disease. To nurture this interest, as an undergraduate she volunteered at the University of Tennessee Hospital with Dr. Wimalasena studying cell cycle and hormone action in cancer. Upon graduating from UTK, she moved to Seattle to work in the biotechnology sector at Genetics Systems Corporation. Although this provided an opportunity to learn about the private sector, April realized that she wanted to learn more about developmental biology and genetics and went back to UTK to join Dr. Handel's laboratory. Dr. Handel, committee members and excellent faculty provided April with extensive training in scientific writing, research and hypothesis driven science. Her Ph.D. project focused on understanding the origins of chromosome nondisjunction or aneuploidy using mouse models of spermatogenesis. Her project also involved key collaborations with Drs. Lee Russell and Gene Rinchik at Oak Ridge National Laboratory (ORNL). This close and successful interaction with UTK and ORNL expanded her scientific interests in developmental biology and stem cell biology.

Dr. Pyle believes that the hands on training and individual interactions she had with outstanding faculty in the BCMB department, provided unparalleled scientific training that allowed her to obtain a postdoctoral position with Dr. Peter Donovan at Thomas Jefferson University in Philadelphia, PA and later at Johns Hopkins University in Baltimore, MD. This was a natural transition for April as Dr. Donovan's laboratory research focuses on both mouse models of reproduction and the development of stem cells from primordial

germ cells. This also coincided with the timing one of the major breakthroughs in stem cell biology, the development of human embryonic stem cells from the inner cell mass of human blastocysts. In fact, Dr. Pyle took the first human embryonic stem cell training class with two world leaders in stem cell biology, Drs. Martin Pera and James Thomson. During her postdoctoral work, she became one of the few scientists at the time to develop culture conditions for improving human embryonic stem cell growth in culture and was funded by NIH postdoctoral fellowships. This allowed Dr. Pyle to develop her own laboratory that focuses on human pluripotent stem cell growth and differentiation in culture. Equally important in her transition to UCLA to start her own laboratory was the interest by the state of California to obtain funds to support human embryonic stem cell research. This provided an opportunity for Dr. Pyle to develop her laboratory around stem cell research in a supportive environment. Human pluripotent stem cells offer tremendous potential for regenerative medicine and understanding and harnessing the true developmental potential of these cells remain the main focus of Dr. Pyle's laboratory at UCLA.

The training Dr. Pyle received at UTK and under the guidance of Dr. Handel has greatly influenced her training of students and fellow in her own laboratory. Dr. Handel spent countless hours developing her scientific writing and critical thinking skills and it is this example that Dr. Pyle strives to achieve in her own laboratory. In between experiments and teaching in her own laboratory, Dr. Pyle spends time with her husband Robert Clouse and they take advantage of the many beautiful sites including the California coast and mountain sports. They enjoy hiking, and taking their two dogs, Sophie and Marla to the beach to enjoy the waves.



*Drs. April Pyle, Andreas Nebenfuhr &
Ranjan Ganguly at the Fall Retreat*

SCALE-IT is a graduate fellowship program at the University of Tennessee designed to train scientists to apply appropriate computing tools to solve quantitative problems at all scales of biology. It is funded by the National Science Foundation.



SCALE-IT
Scalable Computing and
Leading Edge Innovative Technologies

Faculty Honors

Dr. Gladys Alexandre won a Professional Development Award from the UTK Graduate School for her work on the "Role of Class III PAQR in modulating lipid composition of membranes in bacteria." Her work is aimed in part in characterizing the bacterial protein as a model for understanding the function of this class of proteins in human diseases such as diabetes

Dr. David Allison was an invited lecture at ChinaNANO2009 in Beijing.

Dr. Brad Binder was selected as the Quest Scholar of the Week of Oct 26, 2009. He received his first grant funding from NSF, his work is focused on ethylene signaling of plants.

Dr. Barry Bruce along with his team was featured in *Nature Nanotechnology* for their quest to make hydrogen a clean alternative fuel source.

Dr. Ranjan Ganguly has been awarded a Pilot Project grant from the Office of Research.

Dr. Liz Howell was selected for the College of Arts & Sciences Senior Research/Creative Achievement Award for the academic year 2009-2010.

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what she was doing. I was in Seattle for three and a half years and was studying signaling by plant plasma membrane receptors in Arabidopsis. It was a big switch from the biochemistry research I did in Ohio. I had to learn a lot of new techniques in genetics and cell biology so it was rather challenging again. But I had three good publications in *Plant Cell*, in *Development* and the one I am most proud of in *Science*. At this time I was married, and my husband still lived in Portland three hours drive from Seattle. I was ready to find a way to live together with him so I was looking for a permanent position.

Q. You ended up in academia. Did you ever consider working in industry or in a research institute?

I would not mind working in a research institute but there are not that many positions. I did consider companies, but they weren't my top choice. I wanted make my own decision about what to work on. I think in industry you have much less choice. You have to switch projects when you're told to switch as well as other considerations. I was very glad that I got a position at UT. I like UT a lot. I find it such an excellent place to work. I think the department is very strong. I enjoy having so many plant colleagues around. Many universities have very little opportunity like that in biochemistry departments.

And students here are great. I have had several very excellent undergraduates. When I just came here, I had a student,

Dr. David Joy has been elected a Fellow of The Microscopy Society of America and received his award at the recent meeting of MSA in Richmond, VA. This distinction is limited to just 0.5% of the membership and Dr. Joy was cited for his work on Scanning Electron Microscopy and Monte Carlo modeling in addition to 30+ years of service to the Society including stints as Board Member, Annual Meeting Chairman, and President.

Dr. Mariano Labrador served on NSF panel member. Spring 2009. Division of Molecular and Cellular Biosciences Eukaryotic Genetics

Dr. Cynthia Peterson presented an abbreviated version of her talk for the "Faculty Showcase, "Building a Biological Camera" to the Board of Trustees, on October 8th. Then presented at the "Faculty Showcase" before the Georgia game on October 10th.

Dr. Engin Serpersu has been given an award from the Humboldt Foundation for work he will pursue with Professor Ullman at the University of Bayreuth from May 10 through June 7, 2010. Engin is a former Humboldt Fellow.

Spencer Willet. He was one of the best undergraduates I ever had. When we got equipment in the lab, I would just tell him, "Go set it up, and tell me how it works." And he did!

Q. He must have loved it. You gave him responsibility and freedom to get work done.

Spencer was a very smart student. He didn't have the best grades. He was a student who loved the lab, loved doing research. But he didn't like lectures, being constricted, learning what he was told instead of what he wants to learn. He is now a graduate student at Vanderbilt, and doing very well. Spencer's younger sister Alaina came to my lab her first week on campus, saying she wanted to do research. She has been in my lab for two years now and is going to continue until she graduates. She got two scholarships this past summer, one from the American Society of Plant Biology and one from UT. So she worked all summer, full-time. Allie is outstanding, being so motivated, so organized, and being able to do her work independently when I wasn't around this summer staying at home with my newborn baby.

Q. And your graduate student, Rebecca Wilson?

She's doing excellent work. Rebecca worked as a technician for a couple of years before coming to UT so she had a lot of lab experience. She is also extremely sharp which actually could be somewhat challenging sometimes. She keeps me on my toes.

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ents:

Dr. Gladys Alexandre-Jouline, NSF, Title: Chemotaxis and the Regulation of Multiple Cellular Functions in a Bacterium, three year award for 587,546.

Dr. Bruce McKee, NIH, Title: Mechanism of Meiotic Pairing in *Drosophila*. This award provided a \$100,000 to buy a Zeiss Axioobserver Z1 inverted microscope and imaging system.

Dr. Jae Park, NSF, Title: Programmed Cell Death During Post-Embryonic CNS Development, three years totaling \$549,582.

Dr. Cynthia Peterson, NIH, Title: Program for Excellence & Equity in Research (PEER). This award added an additional \$207,242 to the current PEER grant for two years.

Dr. Engin Serpersu, NSF, Title: Dissection of Promiscuous Enzyme-Ligand Interactions, four year award totaling \$782,240.

Jordan Grubbs, undergrad student says "YES, DO IT!"

My name is Jordan Grubbs and I am a Junior at the University of Tennessee. I grew up in Greeneville, Tennessee, and attended Greeneville High School. During my high school years I participated in several clubs including: National Honors Society, Anchor Club, and Fellowship of Christian Athletes. I was also a cheerleader for both my high school and a competitive cheer squad- Top Gun All Stars of Kingsport, Tennessee.

I am majoring in Biochemistry and Cellular and Molecular Biology and am in the Honors program. My plans are to apply to Medical School for the Fall of 2011. While school and research do take up a lot of time, I am also involved in several activities on campus including: Campus Crusade, The National Society of Collegiate Scholars, Alpha Epsilon Delta, Clinic Vols, and Tumbling Club.

Interview:

How did you first learn about the opportunity to work with Dr. Howell on an undergraduate research project?

An acquaintance informed me that she was researching with a professor at her campus. Until speaking with her, I was unaware of undergraduate research opportunities; however, her work sounded very interesting and very beneficial to her undergraduate experience. When I returned to campus in the fall, I made an appointment with Dr. Kovac, my Honors General Chemistry professor, to find out about what research opportunities were available to me. Knowing I am Biology major, he connected me with the BCMB department. They were aware that Dr. Howell was looking for an undergraduate student to assist in her lab. Dr. Howell set up a time to meet with me and pro-

vided me with an overview of her work. Dr. Howell subsequently offered me the opportunity to work in her lab.

Can you describe for us the nature of your work with Dr. Howell?

Dr. Howell is an enzymologist. Her current focus is R67 dihydrofolate reductase (R67 DHFR), which is an enzyme that reduces dihydrofolate to tetrahydrofolate with the use of NADPH as a cofactor. It is interesting because it possesses 2-2 symmetry, making asymmetric mutations impossible to obtain in the wild type enzyme. Since I began working in the lab in the fall of 2008, I have worked with Dr. Howell on several projects pertaining to this enzyme. Most notably I have worked with Quad4 and chromoso-



UTK
External
Research
Funding

Doubles for FY2009, research has increased to more than \$175 million from various funding sources.

UT Knoxville Chancellor Jimmy G. Cheek says, "Research Funding is key to the success of any institution, and an increase of this magnitude is just one year is extremely rare and reflects the hard work of our faculty in generating successful funding proposals."



Jordan Grubbs,
BCMB Undergraduate

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mal DHFR.

Quad4 is the protein product of a tandem array of the R67 DHFR gene, created to allow asymmetric mutations to be induced, while simultaneously reducing the likelihood of recombination that was seen in the previous Quad3 construct. While characterizing this protein, I learned the methods of executing a protein prep and purifying the product. This involved knowing how to use columns to clean up the protein and how to make and run gels in order to tell if the protein was actually purified. I also learned the processes of performing assays to find the enzyme activity, and of finding the extinction coefficient of the protein in order to know the concentration. I was introduced to the processes of kinetics, allowing us to find the k_{cat} and K_m values. I had the privilege of learning the process of sedimentation velocity in order to determine if the Quad4 protein was in monomer or dimer form. I learned how to determine the pH dependence of the enzyme using a fluorimeter to make fluorescence measurements in order to determine at what pH the enzyme experienced a conformational change from the active form to an inactive form. Chromosomal DHFR (ecDHFR) has been our most recent focus. Here we are studying the osmolyte effects on the binding of the ligands in order to understand the role of water in the reaction. This involves the use of Isothermal Titration Calorimetry in order to find the enthalpy of the reaction in varying solutions and in varying concentrations of osmolytes. The exact osmolality was determined with the use of an osmo-

meter.

Essentially, working with Dr. Howell has given me many valuable and important experiences. I have not only learned how to work with this one enzyme, but I have also been introduced to a magnitude of lab techniques that I never would have experienced in the classroom-based labs. I have spoken of many of the large techniques that I have acquired; however, if I were to list all of the skills that I have learned during this time it would take pages. Working in the lab is the difference between obtaining textbook knowledge and having real world experience. I cannot count the number of times that I have been in a lecture and clearly understood what the professors were talking about because I had actually performed the experiment discussed or because it easily related to knowledge I have obtained by working with R67 DHFR.

Another factor I love about working with Dr. Howell is the work environment. Dr. Howell is always available if I have questions, but it is not like classroom labs where you have a TA explaining each step. If I were to be honest, this was somewhat overwhelming at first. It seemed there were so many steps, and how could I possibly know what to do by myself? However, it is so apparent now how this has enabled me to not simply follow directions, but to understand. I can clearly remember my first two days in the lab. The first day Dr. Howell showed me how to do a BCA in order to find the extinction coefficient of the enzyme. The second day, she left me in the lab to perform this procedure on my own. I believe it

took me two hours longer, but by the end I did know how to do it. I thought it was so hard, and now I laugh because it really is quite simple. I could relate many similar examples. The point is that working in a research environment forced me to learn and understand. Now I get excited instead of overwhelmed because I can often figure out steps on my own; although, certainly not always. I definitely still have plenty of questions that Dr. Howell gladly explains.

Did your research with Dr. Howell affect your attitude toward your coursework or your career path in any way? It definitely has made my biology classes more interesting and understandable. As stated early, the experience I have gained in the lab so often relates to lectures, which truly has made material more comprehensible. As far as my career path, I feel that undergraduate research will be very helpful in making me a competitive applicant to medical school. It has also helped me understand the importance of research in all areas of life. I feel that the experience I have gained will give me a better understanding of new research that I will undoubtedly encounter in the medical field. I also feel that it keeps many doors open, giving me the option of pursuing a PhD or MD/PhD program.

Do you have any message for undergraduates who may be reluctant to participate in undergraduate research? Yes, DO IT!! And get started early. I started researching the fall of my sophomore year. Many students wait until their Junior or Senior year to start.

“Yes, Do It!”

“Essentially, working with Dr. Howell has given me many valuable and important experiences.”

(Continued from page 4, Ricky Cox interview)

he would immediately give us his attention. Sometimes it is tough to stop what you are doing and help someone else. Now that I'm a faculty member and know how I am pulled in so many different directions I have even more respect for his ability to do so many different things and still

have the time for his students. He established a nurturing, caring environment and at the same time created a culture of productivity and accomplishment that included carrying our work through to publication. I like to think that this is how I deal with students today, in large part because of the example that Engin .

Rebecca Wilson, Graduate Student of Dr. Elena Shpak

This past summer Rebecca Wilson, a BCMB graduate student working in the laboratory of Dr. Elena Shpak, received an NSF predoctoral fellowship. These are very competitive awards made to outstanding students who are in their first year of two or graduate school.

Q. Where did you do your undergraduate work?

I went to Messiah College near Harrisburg, Pennsylvania. Although I grew up near Rochester, New York, several students from my high school went to Messiah every year. It is a pretty small school. Class sizes in the introductory courses ranged from sixty to one hundred students but the upper level classes had twenty or less students. Messiah had a really strong science program and lots of science laboratory courses. My undergraduate degree was in biochemistry, offered through the Natural Sciences department.

Q. When did you graduate?

I graduated in 2003 and got married shortly thereafter. My hus-

band had graduated there year before me and had begun working on his Ph.D. in chemistry at Penn State. So I went there and worked as a lab technician doing Biology research lab for about two and a half years. Then I transferred to the Chemistry Department and worked in Dr. Blake Peterson's synthetic chemistry lab for about one year.

Q. Did working as a technician motivate you to want to go to graduate school?

Yes, very soon after I started working in the first lab, the professor asked me to join his other graduate students, but I thought my husband would graduate soon, and I would just wait. But then it ended up taking him much longer than expected to graduate. I probably could have finished up in the afternoons. But then, I wasn't quite sure what area I was interested in. I decided to change to the Chemistry Department and see what that research was like before I decided on a graduate program.

Q. And so, how did you end up here?

I got an NSF grant last year, and I was able to hire two post-docs. Rucha Karve got her PhD from Clemson University, and DanYu Kong is from Beijing, China.

My husband's got a post-doctoral position with Dr. Hinde in the Chemistry Department. So I applied to graduate school here. Well, I was more interested in Biology when I came here. I really liked working in that lab. So I ended up going for the Biochemistry, BCMB Department, and I ended up coming in December, and the graduate program didn't accept us until the beginning of the fall. So I pretty much e-mailed tons of labs, and Dr. Shpak was the only one that was able to take me.

Q. In a way, it was just serendipity that you ended up in Elena's lab.

Yes. I was pretty nervous about coming to a bigger university because I had heard rumors that the professors don't really care so much about teaching, that they are really focused on their research. But I have found that the professors I took classes with have been very, very helpful, and more than willing to spend time with you. Most of my teachers have been very good, some of the best teachers I have ever had.

(Continued from page 7 - Shpak)

Rebecca recently got her own NSF grant, which she and I are very happy about. It is very competitive and prestigious.



(Continued from page 9 - Grubb)

However, the longer you are in the lab, the more you will learn. Starting out can be very overwhelming, but learning anything new is often overwhelming. I encourage you to put the necessary time into it to get past this point. I feel you will find it very rewarding if you do. Finally, do not let a lack of knowledge of available research positions prevent you from this experience. Contact a biology teacher, your advisor, or the department; they will be glad to assist you in finding a professor with whom you can work.

Student Accomplishments

Amber Bible won the Hollaender award for 2009-2010

Danielle Harrell (Undergrad student) won the EURCA overall competition (Harris IIIrd) and was the Biology winner in the spring fair

Poster awards from the Fall Retreat:

Senior Graduate Students (post-prelim): Bijoyita Roy and Jui-He Tsai

Junior Graduate Students (pre-prelim): Ansul Lokdarshi & Yuzhuo Chu

Undergraduate: Alaina Willet

BCMB Mission Statement

We strive to provide an excellent, comprehensive education and to perform high impact, fundamental research at the cutting edge of the molecular and cellular biological sciences. Our aim is to enhance existing strengths by increasing resources and recognition for our work, which integrates approaches spanning the continuum from molecular to organismal biology. We draw upon the diversity of the department to provide a collaborative environment with a breadth of expertise that fosters personalized mentoring and training at the undergraduate, graduate and postdoctoral levels. Our vision encompasses advancing the scientific literacy and understanding of the biological and biochemical sciences within the university and the community at large."

How do you get involved?

Your gifts make a difference! Over the years, we have been fortunate to receive generous donations from a variety of supporters, including former graduates, corporate sponsors, and philanthropists. These gifts keep the donors involved in the mission of the BCMB department,

These gifts have made it possible for us to offer three new undergraduate scholarships for the 2009-2010 academic year. Three Research Incentive Awards have been made to faculty who propose pilot projects that promise to lead to extramural grant funding from national agencies. The gifts sponsor graduate fellowships that support dissertation research on cutting-edge topics in modern biology. As you see from our article entitled, "Celebrating Excellence," we held a departmental awards reception to recognize our top students, faculty and staff. We were able to provide \$17,000 in scholarships, fellowships, and awards at this event.

There are many different forms of gifts that can be made. We receive both large and small sums that can be made as one-time undesignated gifts to our BCMB enrichment fund. With a contribution of \$25,000 or more, an endowment can be established for which the principal is invested and interest earned becomes available for departmental use. Endowments can be specified for use according to the donors' wishes and they can be given over a 5-year period. Some examples include endowments specified to benefit graduate students in BCMB, to fund faculty research, or to sponsor undergraduate scholarships. All of the gifts to BCMB are coordinated through the development officials at UTK, and appropriate tax benefits are always considered. For more information about gift giving to BCMB, please contact the Department Head, Cynthia Peterson (cbpeters@utk.edu, 974-5148) or Randy Atkins in the College of Arts and Sciences Development Office (matkin11@utk.edu, 974-2365).



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