Big Orange—Big Ideas. That is the talk around campus these days. This brand perfectly suits the BCMB Department. The BCMB major continues to grow in numbers, and our students continue to perform exceedingly well. Our undergraduate curriculum is experiencing a BIG change, becoming more student-centered and involving some of the most innovative teaching methods around. We have consulted a document drafted by the American Association for the Advancement of Science called “Vision and Change in Undergraduate Biology Education: A Call to Action” to craft a new approach to teaching and a new curriculum that involves small group work and an early introduction for our majors to active engagement with the scientific method through exposure to research topics and methods as early as freshman year. We have a BIG focus on undergraduate research and are breaking through to new discoveries, with almost 100 UTK undergraduate students working with faculty on independent projects. Graduation happened in May and we had many BIG things to celebrate! Several of our students earned top honors at graduation. Su Ji Jeong was recognized as the top graduate for spring 2012 from the BCMB Department, and Chelsea Knotts earned distinction as the torchbearer. BCMB majors have excelled at the Exhibition of Undergraduate Research and Creative Activity and in the annual Honors Symposium. We can now look back on this academic year and celebrate a job well done by students, faculty and staff in the department.

As we look forward, we know what it will take to continue on our positive trajectory and maintain momentum for our BIG ideas. We need input from you, our valued alumni and devoted supporters. We want you to be involved. Be on the lookout for opportunities to support the department, to visit and become involved and to nominate outstanding alumni colleagues for recognition. We also want to hear from you about your experiences at UTK as a Biology major and ways that we can more effectively interact with the broader community. We welcome your BIG ideas so that BIG ORANGE can prosper. Are you interested in a campus visit and a chance to see things for yourself? If so, please contact me directly at cbpeters@utk.edu. For now, have a great summer and GO BIG ORANGE!
Hello! After almost a year now, I think it’s about time I introduce myself to those who don’t interact with the BCMB office on a daily basis. My name is Jenna McVey and I am the Communications Coordinator for the BCMB department. I graduated from the University of Florida in Spring 2011 with a B.S. degree in public relations and minor in business administration, and went straight to graduate school at the University of Tennessee. Currently I am a candidate for a M.S. degree in Communication and Information, and I plan on graduating in December 2012! In BCMB I am mainly in charge of coordinating, designing, and writing articles for the department newsletters. I also maintain the BCMB Department website. If you would like to mention any interesting BCMB news or have a story to share, please let me know! You may email me at jmcvey1@utk.edu.

Interesting Facts about me:

**Hometown:** Naples, FL

**Something biologically interesting about me:** I have an identical twin sister!

**Places I have traveled to:** China, Spain, Germany, United Kingdom, France, Costa Rica, Bahamas, Hawaii, Canada, Mexico, Grand Caymans, Jamaica and many states in the U.S.

**Favorite thing to do in Naples, FL:** Fish! I have spent many hours on the boat thanks to my Dad. I won Grand Champion at a fishing tournament when I was about eight years old.

**Plans after graduation:** I want to be in corporate public relations. When I decide I have had enough of the corporate world, I would like to own a bakery. I love to bake!

**Something I never thought I would do:** Play my violin in Carnegie Hall, NYC in high school.
Looking Back

Dr. Bruce McKee and Dr. Cynthia Peterson at the 2012 Awards Reception

Dr. Bruce McKee is a professor in BCMB dating from the summer of 1990. He earned his Ph.D. at Michigan State University in genetics.

What were your experiences in being a faculty member before you came to Tennessee? You were at Wisconsin prior to coming to UT?

Dr. Bruce McKee

There were really two big problems. One, there’s no Ph.D. program. The other thing was that the collegial atmosphere in the department wasn’t that good. The senior faculty members were not researchers, did not value research for the most part, and resented having junior faculty who had lighter teaching loads because they were doing research. It got worse after I got an NIH career development award, maybe my fourth year there, because that required the university to really cut my teaching load.

A career award like that seems pretty unusual for someone at an institution like that. You must have been extremely competitive, and in spite of the circumstances, really flourished at that institution?

Yes, things went well. I had a lab and the administration was supportive. I got funding from NSF in December of the first year I was there; I actually wrote it while I was finishing my post-doc, after I’d accepted the position. This was a standard NSF research grant. I had an idea about what I wanted to do, and I figured the sooner I got funding the better. It got funded the first time through. So I had funding from the beginning, could buy research supplies and had supply money, so that was important. And equipment money, too. Then shortly after that, I got a second grant from NIH, a small grant targeted at universities that didn’t have much research funding. So actually, I had two grants for a while. The NIH-supported project was to test a hypothesis that the ribosomal genes in the X chromosome were pairing sites and that worked great. That was the basis of an application for an R01 grant and for the Career Award, and I got both of those.

It wasn’t long after that you were looking for jobs and found a job here, right?

Yes, things went well. I had a lab and the administration was supportive. I got funding from NSF in December of the first year I was there; I actually wrote it while I was finishing my post-doc, after I’d accepted the position. This was a standard NSF research grant. I had an idea about what I wanted to do, and I figured the sooner I got funding the better. It got funded the first time through. So I had funding from the beginning, could buy research supplies and had supply money, so that was important. And equipment money, too. Then shortly after that, I got a second grant from NIH, a small grant targeted at universities that didn’t have much research funding. So actually, I had two grants for a while. The NIH-supported project was to test a hypothesis that the ribosomal genes in the X chromosome were pairing sites and that worked great. That was the basis of an application for an R01 grant and for the Career Award, and I got both of those.

It wasn’t long after that you were looking for jobs and found a job here, right?

Yes, I decided that with some success behind me there, I might be able to get a job at a place that was more research-intensive, and would have a Ph.D. program. That’s what I was looking for. Fortunately, there was a position in the Zoology Department, in genetics. Kwang Jeon was Chair of the committee, and Mary Ann Handel was on the committee. This job was a good fit. The transition has been mostly positive. I had close colleagues to work with here, especially Mary Ann. I was able to recruit graduate students right away, got some pretty good ones. And post-docs, too. We didn’t have a lot of post-docs here when I came, but we had a few, and it’s been growing. We certainly have quite a few more now.

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That's good! You’ve been here what, 20 years, now?

Yes, University of Wisconsin, Eau Claire. It was considerably smaller, about 11 or 12,000 students. They were nearly all undergraduates, except there is a small Master’s Program there. Two Master’s students got their degrees in my lab while I was there, and I also had a bunch of undergraduates in my lab. It wasn’t really a research-intense university but was actually a place that was in transition. The only research faculty member was the fellow who recruited me. He was a quite distinguished cytogenetist, John Lynn. It was the administration that was interested in research, and was really pushing it, wanting us to apply for grants. So the department head was supportive, he thought becoming more research-oriented would be good for the university. The central administration was very supportive. They had a grants office. It only had one full-time person, but that full-time person was far and away the best grants administrator that I’ve ever known. I had one of maybe two NIH grants on the entire campus, and he knew all about it. So it was a very supportive environment that way.

There were really two big problems. One, there’s no Ph.D. program. The other thing was that the collegial atmosphere in the department wasn’t that good. The senior faculty members were not researchers, did not value research for the most part, and resented having junior faculty who had lighter teaching loads because they were doing research. It got worse after I got an NIH career development award, maybe my fourth year there, because that required the university to really cut my teaching load.

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That’s good! You’ve been here what, 20 years, now?

Yes, or 21. I came in the summer of 1990. I was at Eau Claire for six years. I was tenured and promoted to Associate Professor, so there wasn’t much issue about that here. Although it took a year or two to actually do it formally.

You came in to a Zoology department and about five years after you got here departments were reorganized and BCMB was formed from Biochemistry and about half of the former Zoology faculty. Did that really influence your own personal agenda in terms of running your lab, and access to students? Did it have any positive impact on what happened in your professional life?

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Doing What He Wants

Peter Mazur

Dr. Peter Mazur is a Research Professor in BCMB. He has been in that position for 12 years.

You worked for many years at ORNL and now you are at the university. I am curious about your views on how your ability to do your research has been affected by being involved in those two different sets of circumstances.

That has a somewhat complex answer. First, you have to distinguish between them. I was in the Biology Division at ORNL for 38 years. You have to distinguish between the Biology Division the first 20 years I was there under Alex Hollander and now. Hollander’s genius was that he recognized that his success was dependent on the work of individuals within the Division, so he hired, almost like a university, stars with their own smaller domains. He gave them the autonomy to follow their own ideas, which is pretty much university-like. But he was the boss, in terms of who was hired and who was fired. But he did recognize the importance of the individuals. I think that contrasted with his successor, Alvin Wienburg’s philosophy, which was that the national labs were meant to study large, important problems that the universities couldn’t handle. But he did make an exception for biology because he was convinced that biology couldn’t be managed in that same way, so it was more of a college-type set up, sort of enterprise. Biology was set up in three sections: mouse genetics, radiation biology, and physiology. So, biology was more like a university. We differed in the funding apparatus. When I first arrived we weren’t even allowed to work for outside funds. I was not allowed to go to a funding agency. Gradually that changed. So then it shifted from not going after your own funds to becoming mandatory to go after your own funds. But the funding structure was different, because the main source of funds was the DOE, and they would fund roughly the equivalent of NIH grants. DOE determined the research areas it would fund. They could, and did, wipe out whole sections of research, like photosynthesis for example, if they didn’t fit into DOE’s overall mission. It subsequently became a problem because biology became less of the DOE mission.

Back to your original point then, I think that my transition has certainly been easy, from a life in a national lab to here. It’s not that different. Because of my field, which was small potatoes at ORNL, and different from most of the others I was left to fend for myself. It is the same thing here, which I like.

What impact do you think that the end of the Cold War had on the way that science has been conducted out at Oak Ridge?

DOE has had a hard time finding a well-defined mission for Oak Ridge. A lot of the justification for the research done at ORNL was based on all the nuclear work that was done. When the bombs were dropped in 1945, there was really very little knowledge of what the effects of radiation would be. It was limited to some of the people who painted on the watches, some of them died of mouth cancer because they would lick the brushes to get a nice fine point. So there was some knowledge, but none of the in utero or other things.

So when it became a DOE facility, I think it was, and still is to some extent, struggling with giving an identity to itself. Biology now, out there, has been reduced to pretty much biofuels, computational biology, and molecular biophysics.

At the same time, Peter, and this is one person’s view on it, I think with the bioenergy initiative, that fits the DOE’s mission better than any other biology they have. In that sense it may be, although I’ll remain skeptical, a mission that they stay with a long time.

It may be. Still, you look around, here’s an example too, I assume photosynthesis should fill some important role in bioenergy I would think, and yet they wipe that entire area. Some very good people, Rod Clayton, and some others here, and they used to have a whole photosynthesis program at Michigan State.

So that’s Oak Ridge. What about your efforts here at the university, and how has that worked out for you?

Very good. From my point of view, it has been a real win-win situation. I had acquired some success. I had a lab full of equipment that ORNL let me take over here, the second was space, and the third was funding. I had most of the major equipment I needed. I was given space that was made available at the facility on Pellissippi Parkway. I had grant money from the National Science Foundation, enough money in grants to pay my rent for the space at Pellissippi. The only disadvantage was that it was somewhat lonely because there were not many other labs out there. When the news came that they were going to close the Pellissippi facility I fought against it.

Continued on page 15
Dr. John Koons interviewed Yukihiro Yamada. Below is what this graduate student had to say!

What event or person was most influential in your decision to pursue science in school?
I’m not sure if there was one event or person that was most influential, but as a freshman, I was driven to learn about diseases and physiology. Many things, including my future, were really unclear to me at that time, but I felt science was my central educational need.

Where did you do your undergraduate work and why there?
It’s hard to explain what I was going through in high school and how I made my decisions. I was (and still am) heavily invested in my life here in Knoxville, especially with family and friends. After having moved several times in my life, I wanted to stay here and experience the opportunities at UT.

What was your undergraduate major and what led you to choose that?
I majored in biology with a BCMB concentration and a double major in philosophy. As I realized more and more that I needed to address my weakness in analysis, logical and critical thinking, philosophy was very helpful and interesting. I believe it has helped focus my scientific education.

What led you to BCMB as opposed to a program in something like chemistry or pharmacology or microbiology?
My interest in (non-infectious) diseases led me to BCMB over the other choices, plus it is a very comprehensive program.

What was your greatest challenge upon entering graduate school?
Time management. Teaching, taking courses, and doing research every day was hard to adjust to, in addition to the many responsibilities and professionalism required.

Why did you choose Dr. Prosser’s laboratory?
Dr. Prosser is a great person to work for because she is very understanding and professional. I was really interested in neuroscience and learning to work with mice. I enjoyed the experiments and felt Dr. Prosser had strong research ideas and goals.

What motivates you most as a graduate student?
It is definitely rewarding when you are getting good results and can see the progress being made, especially in terms of contributing to science. However, from day-to-day, it is working with people to solve problems and teaching students how to become independent in their research.

What excites you the most when you come to the lab every day?
Learning something new, and not just about science. I especially get excited when the undergraduate students have results to show me because I know they are working hard and are smart.

Is there anything you think we could do better in terms of curriculum or the overall environment?
In general, I like when labs collaborate or have discussions about research/science, so I would like to see more cellular, molecular, and neurobiology labs in our department. I wish we had more career-building workshops/opportunities also.

What advice would you give to other students as they begin to think about the decision making process regarding application to graduate school and selection of a mentor?
As many already know, good research experience is crucial to deciding about graduate school. While working in a lab, make sure to talk to as many (nice/unstressed) graduate students as possible, including outside of the lab. Don’t be afraid to learn new things, even when thinking about which program to apply to. As for mentors, it’s better to have more than one, as each mentor has different perspectives, skills, connections, and virtues. Picking your supervising mentor (PI) is tricky. In addition to virtues, a good PI has grants and collaborations, optimally, but a good personality fit is very important.

Why did you decide to come to graduate school as opposed to other options like medical school or another type of postgraduate education?
I was fascinated with biology and wanted to learn more. With the opportunity to work in Dr. McKee’s lab, I learned more about research, and I increasingly felt that graduate school was the right fit for me. I learned the joy of research through the experiences there.

Who was the most influential in helping shape your decision regarding coming to graduate school?
I had many great biology teachers, but Dr. Hall helped me decide on graduate school. He has been a great source of advice and inspiration.
Su Ji Jeong

The BCMB Department is proud to note that the Top Graduate for BCMB this year was Su Ji Jeong. Not only did she graduate with honors from the BCMB, but she was also in the Chancellor’s Honors Program.

Su Ji said her undergraduate research experience has been the biggest part of her undergraduate years. She started her research experience when she was in the 11th grade. She did an internship at ORNL in Dr. Brynn Voy’s lab for two years. In Dr. Voy’s lab, Su Ji studied how ionizing radiation affects adipokine production in mice. Adipokines are signaling molecules secreted by fat (adipose) tissues. She later joined Dr. Nebenfuehr’s lab her freshman year, and has been working in his lab since then. Su Ji’s honors thesis project is about elucidating the mechanism of organelle transport in Arabidopsis. She studies how myosin proteins, which are molecular motor proteins, interact with organelles, and how this process is regulated.

“I really enjoy working in the lab. I first started working in a laboratory because I wanted to have a taste of the culture of research and life as a scientist. After a few months, I came to realize that a research career is a good fit. Making even small discoveries, I can contribute to the advancement of biology, even as an undergraduate. I think this is the biggest merit of working as an undergraduate researcher.”

Outside of lab, Su Ji is a founding member and Community Outreach Director of Nourish International. Nourish International is a relatively new student organization that addresses global poverty. Throughout the school year, they run small businesses called ventures on campus to raise money to fund their international projects in summer. Each summer, members travel to a developing country and implement sustainable development projects using funds they raised. In 2011, they built a vegetable garden and a classroom in Uganda, and this year, the members are traveling to Peru to build a portable water system in Peru.

In March, Su Ji Jeong was invited to interview for a prestigious Gates-Cambridge Scholarship, which was the final stage of the selection process. The Gates-Cambridge Scholarships were founded in 2001 by the Bill & Melinda Gates Foundation. The scholarships award students who wish to study at the University of Cambridge. The scholarship covers the full cost of studying at the university, as well as exceptional academic achievement. The Gates Scholarship Trust looks for individuals who are committed to not only academic achievement but also to improving the lives of others.

Su Ji applied to the Gates program because she said the program is one of a few scholarship programs that aim to make the world into a better place by making visible changes. Su Ji said bright students are recruited who share the same goal: improving the lives of others. She said the program has such a fantastic community where the scholars exchange ideas and come up with a creative approach to solving global problems. Even at the interview, Su Ji said she met so many amaz-
Chelsea Knotts

In April, Chelsea Knotts was awarded the Torchbearer. The Torchbearer is the highest honor the university gives to its students. It is awarded to seniors who have served their Alma Mater with overall excellence. From creating a homeless running club through Redeeming Hope Ministries to foster a sense of wellness and community within a group that is often marginalized, to directing the first annual Running with Hope 5K and 1 Mile Fun Run to benefit Redeeming Hope Ministries, raising over $8,000 to benefit the organization, Chelsea certainly was busy during her undergraduate years and is an excellent recipient of the award.

Chelsea Knotts with Torchbearer award.

Dr. Jerome Baudry said, “Chelsea is a Lady Vol student, it says a lot about her dedication and fortitude that she managed to work in a research lab in addition to her very busy academic and athletic schedule. She was never discouraged by the occasional technical difficulty, and was always positive.”

Chelsea said that being an athlete for the Lady Vols track and field team and a BCMB major was very challenging at times, but also very fulfilling. She took so many interesting classes through the department, many of which prepared her for the MCAT last summer and she said they will be a good foundation for school in the fall. Chelsea plans on attending medical school at West Virginia University.

Chelsea will miss the faculty whom she has connected with in the BCMB department and other departments throughout the university. She said they have been so helpful to her throughout her college experience and have contributed heavily to her success here. She will always be grateful for their availability, openness, and willingness to help.

Chelsea’s advice for undergraduates:

“It never hurts to ask! If you want something, ask for it, and you may be surprised with the answer you receive. Don’t get overly stressed about school and classes and forget to have a little fun. I think incorporating relaxing activities into my schedule was important for my success in every other aspect of my time here.”

Su Ji was admitted to the MPhil in Therapeutics and Translational Medicine Programmes (TMAT). Among the nominated students, the Gates trust selects 100 students (out of 750 applicants) from the U.S. round and 120 students from the international round (out of 4,500 applicants) for the interview. Su Ji is not a U.S. citizen, so she was in the international round. After the interview, the trust selects about 40 U.S. students and 50 international students for the scholarships. Due to tough competition, she was not selected for a scholarship, but that is not stopping her from achieving her goals.

This upcoming fall semester, Su Ji will start the Ph.D. program in life sciences at Northwestern University’s Feinberg School of Medicine in Chicago. She is interested in studying cardiovascular diseases and developing innovative ways to combat the diseases.

Torchbearer is the highest honor the university gives to its students. It is awarded to seniors who have served their Alma Mater with overall excellence.
Exciting Years Ahead

Jason Lancaster

Jason Lancaster received the C.W. Fite Scholarship his senior year and is headed to Virginia Tech for a Ph.D. program.

Jason Lancaster’s undergraduate experience was exciting and stressful at the same time. After transferring from Pellissippi State with most of the general requirements done, he had a sense that he wanted to be in chemistry and/or biology. After his first semester, he was leaning more toward biology so when he went to declare his major, Dr. Caponetti asked him if he wanted to go into plant or animal research. Jason was hesitant to choose plant research because he knew very little about the subject but he loves nature and went with his gut reaction. Jason notes that this turned out to be one of the best decisions of his undergraduate career.

Jason’s first research lab was with Dr. Beth Mullin in the fall of 2010. Jason said that research labs are very different from class labs and he would encourage anyone serious in a scientific career to seek out a research lab. Dr. Mullin’s research was on the symbiosis between the Black Alder tree and a bacteria called Frankia which fixes nitrogen for the plant. Jason said it was a great experience and Dr. Mullin was very patient. He learned some important basic lab skills in her lab and he felt like he had really accomplished something.

Jason’s second research lab was with Dr. Barry Bruce. He applied and was awarded the Chancellor’s Undergraduate Summer Research Internship to work in his lab last summer. One of the projects in the Bruce lab was applying Photosystem I from plants to sustainable green energy projects. Jason’s work was to attach a section of the protein he was working on in Dr. Mullin’s lab to Photosystem I and test it for faster electron transport. Jason said he learned so many lab techniques in Dr. Bruce’s lab, everything from cloning and construct design to protein analysis and mass spectrometry. Jason said it was an amazing opportunity and he got to meet many new people and see just how open plant research is.

“If I were to give any advice for new undergraduates it would be to focus on your post undergraduate goals, work in groups, and to be optimistic. Some classes will be very hard but they’re supposed to be hard! If it was easy, everyone would be doing it. And apply to things you may think you don’t qualify for. I’ve received awards and research opportunities by being proactive and having a little faith. At one point I was taking Organic Chemistry, Physics, Genetics, independent research, was an undergraduate TA, and I got married all in the same semester. You can do it.”

To Jason’s delight, he was awarded the competitive C.W. Fite Scholarship for 2011-12, his senior year. He said it was a great boost in confidence and would encourage others to apply for opportunities that may seem out of reach. He said, “You may not get whatever it is, but you definitely won’t if you don’t try.”

Jason was recently accepted into Virginia Tech’s Molecular Plant Sciences Ph.D. program and he is very excited. He will be working toward a Ph.D. in Plant Pathology and staying in academia doing research and teaching. He said Virginia Tech’s program has a very wide range of plant pathogen projects and a well-funded facility. Jason hopes to do research on the gene-for-gene hypothesis with microbes and possibly parasitic plants like dodder and broomrapes.

From Jason’s research: Separating photosystem I in a sucrose gradient in Eppendorf tubes
Ryan Rickels

Ryan Rickels won a NST-GRF grant and is headed to Stowers Institute for Medical Research for a Ph.D. program.

The National Science Foundation Graduate Research Fellowship (NSF-GRF) is an annual grant awarded to about 2,000 doctoral-level students in STEM fields at U.S. institutions. It pays the student a $30,000 annual stipend over three years, plus a $12,000 cost-of-education allowance to the institution. The NSF-GRF application consists of three, two-page essays: a personal statement, a description of previous research experiences, and a proposed plan of research. Ryan said the third essay was tricky for him because he had no idea which school he was going to be accepted to, let alone which lab he would join. He said most applicants are already in graduate school, and so their research proposal describes whatever they are actually working on for their doctoral thesis. Ryan had to come up with his own research project, which actually ended up being a fun exercise for him. Ryan took what he had read from separate research papers describing two seemingly unrelated topics (salamander limb regeneration and human embryonic stem cells) and came up with a testable hypothesis connecting the two concepts. From there he went about designing a hypothetical experiment utilizing molecular techniques that he was already familiar with. Ryan said his project proposal (which involved amputating lots of salamander limbs) seemed pretty harebrained; however, he felt like winning this fellowship is vindication that he can think like a scientist and that he is not completely crazy!

About a year ago, Ryan became interested in a researcher named Alejandro Sanchez Alvarado who studies tissue regeneration in planaria (flatworms). Ryan saw he had recently left his position at the University of Utah School of Medicine and moved his lab to the Stowers Institute for Medical Research in Kansas City, Missouri. Ryan had never heard of the place before, so he decided to look into it. Ryan said the Institute’s webpage had an in-depth biography and research summary for every scientist there, and realized there were many other researchers at Stowers who would also interest him. He said there is a big emphasis on stem cell and chromatin biology at the Institute, which happen to be the two topics he is most interested in. Ryan saw this was the first year that Stowers would be accepting graduate students to their new Ph.D. program, the stipend was 32K, and all incoming graduate students will receive a free laptop. There was also no application fee, so he figured “what the hey.”

Ryan received an interview at Stowers and was blown away by his visit there. He said Stowers has been described as a “research Xanadu” or “Disneyland for scientists” and he saw that those claims were not exaggerated. Ryan said the institute is funded by a $2-billion dollar endowment from local philanthropists Jim and Virginia Stowers, both cancer survivors. During his visit, he saw robots changing fly stocks, buffer solutions being purchased from vending machines, and met a lot of people whose enthusiasm for science made him feel right at home. Upon leaving, Ryan told himself that if Stowers made him an offer, he would take it.

Ryan’s plan is to study planarian regeneration under Dr. Sanchez Alvarado. He said planarians have the ability to regenerate every tissue type of their body after injury. Ryan said if you cut it into eight fragments, those fragments will regenerate eight new worms and it was determined that a fragment as small as 1/279 of the organism can regenerate a whole worm. Scientists have been intrigued by planarians for centuries, but until now it was impossible to study their molecular biology. Ryan said Dr. Alvarado has developed a high-throughput screening assay, using RNAi, to identify genes necessary for regeneration to occur in the planarian species, Schmidtea mediterranea. His lab was also pivotal in publishing S. mediterranea’s genome and transcriptome, which has helped make the planarian a more accessible and attractive model organism to study.

Ryan said he is really going to miss working for Dr. Mariano Labrador. Having worked in a couple different BCMB labs, he is starting to see what personality types he works well with and, as a grad student, what kind of mentor he would like to have. Ryan said he has learned so much over the last year working in the Labrador lab, and has really enjoyed being given the freedom to plan out and perform his own experiments.

Ryan Rickels was featured in the Fall BCMB newsletter for taking initiative and leading a biology high school “OUT-reach” program!
On May 9, 2012, the BCMB Department celebrated by honoring its top students, faculty and staff. This event that took place in the East Skybox of Neyland Stadium recognized the outstanding achievements of certain individuals. The department always looks forward to socializing with the students and parents, faculty and staff at this event. We are proud to note that the Top Graduate for BCMB this year was Su Ji Jeong. Graduates with BCMB honors include: Caryn Brehm, Michelle Brown, Angela Frantz, Su Ji Jeong, Young Jeong, Bonnie Lynch, Matthew Ramsey, and Benjamin Spire. BCMB graduates in the Chancellor’s Honors Program include: Amanda DeBuhr, Angela Frantz, Susan Gregory, Su Ji Jeong, Chelsea Knotts, and Bonnie Lynch. We also boast a 2012 Torchbearer, Chelsea Knotts, among our honorees and congratulate Brent Sterling for receiving an Athletics Board Achievement Award. The department recognized undergraduate scholarship recipients, graduate students as researchers and teachers, staff who make our mission possible by all of their hard work, and faculty who make a difference in their students and their scholarship each and every day. Congratulations to those who received recognition and awards this year! We look forward to celebrating again in the spring of 2013 to recognize excellence and achievements within this department!

Listed below are the individuals recognized at our 2012 reception:

**Undergraduate Awards & Scholarships for BCMB**
- C.W. Fite Professional Promise Award: Elizabeth Brogdon
- BCMB Research Scholarship: Eric Farell
- Emmett and Nannie Hale Fellowship for Pre-Dentistry: Mariko Crocker

**Graduate Student Awards & Fellowships**
- Wright Research: Randy Lacey
- Kouns Excellence in Teaching Award: Tihami Qureshi
- Holton Plant Science Award: Rebecca Wilson
- Fite Fellowship: Kai Sha

**Staff Awards**
- Technical Service Award: Andy Loy
- Staff Excellence Award: LaShel Brown

**Faculty Awards**
- Faculty Outstanding Teaching Award: Jim Hall
- Junior Faculty Distinguished Scholarship Award: Jerome Baudry
- Senior Faculty Distinguished Scholarship Award: Engin Serpersu
- The Charles W. Postelle Professorship: Bruce McKee
First Ever Honors Cell Biology Class

This semester, Dr. Gladys Alexandre was in charge of the first ever BIO 148 Honors cell biology. The reason this class was offered was to expand the amount of honor courses available and also because a similar BIO 138 (Honors ecology and evolutionary biology course which is prerequisite to BIO 148) has been offered. Dr. Alexandre said one of the main reasons this course was offered was to keep the honors students challenged!

In BIO 148, there are more hands-on activities and more student-led discussions. Students may not derive knowledge that is written in black and white in the textbook, but rather derive it from looking at experimental data or analyzing them. Dr. Alexandre also assigns students additional readings that are current topics in the literature. She tries to challenge their thinking about cell biology. She said that in order for students to be successful, they are expected to come to class prepared. Dr. Alexandre tries to minimize the lecture time and increase the time spent discussing implications or ramifications of certain topics. For example, she introduces contemporary topics in every class with particular questions associated with these topics to try to encourage students to think further about every topic discussed. Dr. Alexandre would like to think that the format of the class pushes the students to think more in-depth about what they learn and what all these fundamental concepts really mean.

"The group of biology instructors at UT have engaged in a major revision of the curriculum that includes a re-evaluation of what the benefits of lectures are and an evaluation of other ways so we can productively enhance students’ experiences. This effort is lead by Beth Schussler, an inspiring leader in this endeavor. I think that my experience teaching BIO 148 is challenging my way of teaching and lecturing more than I expected. I hope I am becoming a more efficient instructor as a result. I also think that we are at a crossroads where we (lecturers/instructors) have to rise to the expectations of a group of students accustomed to wireless technologies and instant information, and perhaps with an attention span that is a lot more difficult to capture. Getting such students engaged in the material covered in class and involved will be increasingly challenging and it won’t get any easier, unless we re-assess how we are teaching and identify what skills and concepts are essential to hone in on,” said Dr. Alexandre.

Dr. Alexandre notes that the class is fun to teach simply because she gets to talk about her passion: how does science produce knowledge and how does one go about critically evaluating scientific evidence. She believes this is a skill that anyone could benefit from, even non-science majors.

"I enjoy being able to work with students who are self-motivated and thus can take on additional course loads because I really expect a lot from them in terms of course preparation and participation.”

-Dr. Alexandre.

Undergraduate students hard at work!
BCMB is always looking for ways to keep its students informed with excellent opportunities. This semester, the department introduced an “Opportunities” page on its website. This page is constantly updated with opportunities such as graduate school programs, undergraduate summer programs, Ph.D. positions, award/scholarship opportunities, and general opportunities. This initiative was started to increase awareness of other programs and scholarships within and outside the university and to encourage students to apply to these prestigious opportunities.

http://web.bio.utk.edu/bcmb/ugopportunities.html

Jerome Baudry and Yinglong Miao, who are jointly affiliated with ORNL and the BCMB Department, are working with supercomputers. Two supercomputers they use are: the Jaguar, which is the world’s most powerful open science supercomputer and the Kraken, which is the world’s most powerful academic supercomputer. “We are very special. No one has what we have,” said Baudry. Baudry and Miao are working with the Kraken supercomputer to create simulations to observe the motions of water molecules in a class of enzymes called P450s. Baudry said it is very important that we understand how they work as these enzymes are in everyone, and they will modify a drug chemically.

“We simulated what happens in this enzyme over a time scale of 0.3 microseconds, which sounds very fast, but from a scientific point of view, it's a relatively long time,” Baudry said. “A lot of things happen at this scale that had never been seen before. It’s a computational tour de force to be able to follow that many water molecules for that long.”

Baudry said it was the first time they were able to understand how water molecules move in and out of the protein’s centrally located active site. As a result, this allowed the team to answer a contradiction between experimental evidence and theory. X-ray crystallography, which provides a static snapshot of the protein, had shown only six water molecules present in the active site, whereas experimental observations indicated a higher number of water molecules would be present in the enzyme.

“We found that even though there can be many water molecules -- up to 12 at a given time that get in and out very quickly -- if you look at the average, those water molecules prefer to be at a certain location that corresponds to what you see in the crystal structure,” Miao said. “It’s a very dynamic hydration process that we are exploring with a combination of neutron scattering experiments and simulation.”

Credit: Information and picture are from the Department of Energy’s Oak Ridge National Laboratory.
Life from the Inside Out

A Musical With a *Cause*

Andy and the Beats

Last year, Andy Rogers brought his senior project to life and did it again this year.

Andy, who majored in Biochemistry, Cellular, and Molecular Biology and minored in theater, and has now graduated, put on the musical “Andy and the Beats,” for the second year. Andy was showcased in our newsletter in spring 2011 where he told us he went beyond the required research paper for his major by writing, producing and directing the musical that is focused on the Type 1 Diabetes, which he and his sister suffer from. Andy discovered he was diabetic when he was trying to mow the yard one afternoon. He couldn’t produce enough energy to start the lawn mower and realized he had been extremely tired and irritable for several weeks. This is when he realized something was wrong.

The musical follows young Andy on his journey from discovering he has the disease, to studying to learn everything he can about it, to developing an unsuccessful homemade cure, to ultimately finding comfort in other children who also have juvenile diabetes. This year there were three new characters, one of which is Andy’s best friend named Sam. Sam added a completely new and necessary element to the show: friends of Type 1 Diabetics. How are they supposed to deal with this disease when they don’t necessarily have it themselves? How are kids at schools supposed to treat type 1 diabetics? Coping with this disease is hard enough said Andy, but it is even more difficult for these youths to face the challenges of school, making friends, and growing up with the additional stress of a chronic disease. Also, there were two new songs and revised scenes that added to the length and depth of the musical. This year’s production was a staged reading/concert version. So all the actors had their books on stage as they tackled this story together. This way, the actors were focusing on the words and the story as opposed to the spectacles that sometimes distract the audience from the real story.

At the core of it, the story of hope, strength, and courage was still the same. Andy still had to battle this disease and learn about the social and physical ailments he will have to endure every day. With this new band of characters and a larger Type 1 Diabetic chorus that joined Andy for the finale, they all learn to walk for the cure together.

“I honestly wasn’t going to tackle this project again. I had my fun and I thought it was a great turn out, but something was missing in the story the first time. I read through the script and watched the DVD and tried to figure out what element would make this story better, and it happened to be Sam. So many times I’ve heard of kids being made fun of at school for having to carry around an insulin, or kids not taking type 1 diabetes seriously. This kind of behavior has to stop! We have to teach these kids to respect themselves and others. It’s a fine line between making light of this disease and making fun of it, and Sam is the perfect tool to teach these kids and give hope to those Type 1 Diabetic kids,” said Andy. “My goal with this musical is to have it ready to be licensed so any theatre group can take on the challenge of teaching their communities about Type 1 Diabetes. The more awareness we create for this disease, the closer we will be to finding a cure,” said Andy.

This year the musical took place at 7 p.m. on June 24, 2012 at the Bijou Theatre. Donations for the musical went to the nonprofit Juvenile Diabetes Research Foundation (JDRF).

Andy was also featured in the Spring 2011 newsletter!
Yes, it did have some impact, but not right away. My research program can be described as a pretty clearly-established niche. There are things I’m good at, that not many other people study. I’ve exploited it. I didn’t change direction in any serious way when the departments reorganized. But, over time, the exposure to more protein-based methods, and becoming familiar with colleagues in that area, has had an influence. My lab now has a biochemistry side-line, in that we apply biochemical techniques that we’ve never used before. I don’t know if that would have happened as easily if I wasn’t in this department. For example, if I didn’t know Hong Guo, would I have tried to model protein structure? We did homology modeling with Hong’s help, and that homology model suggested directions for the research that have been fruitful. I think that the exposure to people with expertise in protein structure and function was real positive. It has broadened the approaches we take in the lab. There’s always a loss when you reorganize. I don’t interact nearly as readily with the evolutionary geneticists. But given that I’m a mechanistic, cell-oriented biologist, and don’t study evolution very much, it was the right thing for me and I think it’s been helpful.

I think the graduate student population has improved over the past 10 or 15 years, not just in terms of intellectual ability but perhaps intellectual curiosity. Because of the breadth of the department they see the value of these different areas, and what may be applicable to what they do. I definitely think the students are better. As we were talking earlier, having 20 posters instead of just 4-5, that’s another source of intellectually curious people.

Are there areas of research that you would like to see enhanced in the department?

Yes. We’ve built a remarkably powerful group in the protein structure computational biology area. But I think that overall we’re not nearly as strong in genetics and genomics as I would like to see us be. It’s partly just bad luck; you know we’ve had some losses lately. In experimental genetics we lost some people, but some day I hope we will build that back up. But you’re right, people that use computational techniques to study genomes would be great to have.

Mostly for research purposes, but also for teaching purposes. There was a call from NIH, in which they announced they’re targeting millions for innovative sequencing technologies to try to get the price of sequencing a human genome down to less than $1,000. It won’t be long before it happens, and there are several aspects of this discussion. First of all, how will this information be analyzed? Who’s going to do the annotation of each of these genomes? The other aspect of it is, who should have access to this information, and how is society going to deal with all these issues?

Yes, it’s going to be a very complex area to work through. It would be good if we had people who were really experts in this.

You became department head in 2000 and continued to run your laboratory. My recollection is that at the time Elias Fernandez was being recruited to the department.

Yes. We had just recruited Chris Dealwis. We were in the process of recruiting Jae Park. He just came when I started out. I chaired that search committee. I think the first search we did was for a structural biologist. We wanted to get another X-ray crystallographer to complement Chris Dealwis. After hiring Elias we hired Nitin Jain not too long thereafter, and then Hong Guo. So it was a big structural biology period for the department. That coincided with support coming from the Center of Excellence for Structural Biology, that Engin was director of. That Center was composed mostly of faculty in our department, and a few other others. For a period of about three years, our emphasis was in recruiting faculty with an emphasis on structural biology. We added Chris Dealwis, Elias Fernandez, Nitin Jain, and Hong Guo.

It was also during that period that Mary Ann retired from UT and went to Cold Spring Harbor.

Yes. Mary Ann got quite frustrated with UT. She put together a cross-campus group in genomics, animal genomics, and got people involved in an application for one on these Centers of Excellence. She had tried to push some of her ideas about genetics and bioinformatics at the institutional level, and hadn’t gotten anywhere.

With Mary Ann leaving that opened up this notion of hiring people in the cell and molecular area.

Right. We had a couple of searches in that area, too. The best part of being department head in that era was we had a number openings, so we got to do searches almost every year, sometimes for two people at a time. That’s the most enjoyable part of the job, recruiting assistant professors, and helping them get started. It was pretty satisfying. We got some really good people hired. Turned out they didn’t all work out quite as well as we hoped, but that’s just the way it goes. We had a search for two cell biologists at one point, and I think that’s when we got Ana Kitazona and Mariano Labrador. Although, before that Sundar Venkatachalam was hired before Mary Ann left. We were looking for a mouse geneticist then. So we hired Sundar, who was studying cancer and aging. When we recruited him, his background was in cancer, but he was really going to focus more on the genetics of aging, because he had discovered an aging-related phenotype in the mouse model that he’d used to study P53: something about premature aging.

Continued on next page
We hired quite a bit in genetics and cell biology too, during that period. Then it was around 2005, we had another administrative revolution and wound up absorbing parts of the Botany department. There was a lot of effort involved in that, figuring out where they were going to be. Integrating the Botany people into the department actually I thought went pretty smoothly. At first, some of them were a little bit concerned about the change in culture and standards and so on, and would they be accepted by the new department, how would they do when they came up for tenure, and all that. But those concerns dissolved after a couple of years, and they’ve integrated great. That’s now one of our strongest groups.

Yes. So, it’s been what, three or four years, since you were head? What’s life like now?

It’s much less stressful. The other part of being department head is that you’re juggling a lot of stuff. I’m running a lab that’s fairly busy, I’m keeping a research program going that’s grant-funded. There’s a lot of work to begin with, and combining that with running a large department, is just a lot of things to keep track of. Very time demanding. Since then, my life is more focused. I can be more focused on my research, less stressed and more relaxed. Which I like!

Do you feel that your research program has improved? Do you feel like, because you’ve had more time to devote to it, you feel more strongly about it now than when you were department head?

Well, most of what I do at this point is writing papers, running grants, and supervising grad students, post-docs, and undergraduates in the lab. And giving talks now and then. I feel much less rushed in my approach to these things. I feel like I generally do a better, more thorough job. I guess I expected that when I stepped down as department head, that I would go back to the lifestyle that I lived before, which involved a great deal of time in the lab as well. I was very active doing experiments. It turned out that eight years away from being in the lab was probably too much; I’ve never really gotten back into doing experiments myself to any significant degree. Now and again I’ll do a little bit, but not much. So I have more time for teaching, but I’ve also had a lot more time to just live. That wasn’t quite what I expected, but it’s certainly an improvement in lifestyle.

Bruce, thank you for taking the time to reflect on these experiences. It will be interesting to see what the future holds.

I still think it was not wise because it represented space halfway between Oak Ridge and the campus here.

Although I must say, I’m glad I did it. It doubled my commute, but that’s not bad. I do enjoy the students and there’s so much energy here, that’s sort of lacking at places like ORNL.

I agree with that 100%. The sense of energy when the university is in session, when all the students are around is so invigorating! It’s a great environment.

I couldn’t agree more.

What keeps you motivated? Obviously, you could have retired a long time ago.

That’s a good question. I think number one is that I find the field so fascinating in the sense that it is so highly interdisciplinary and calls on my interpretation and my involvement. Anything from some stuff in cloud physics, physical chemistry, reproductive biology, not so much chemistry, more physical issues. That, and the fact that it’s still amazing to see some of the specific chemical laws that describe osmosis and reactions really work. I actually look forward to coming in. Another thing, again, one of the most important things to me, in my whole career, is to be sovereign in what I do. I do what I want to do, I don’t want to do things other people tell me to do. That’s been very important to me. So that’s an advantage in some ways, but then again it means that whether I sink or swim is up to me. Fortunately, I am still swimming with grant support.

And in fact you just got a new one! That’s terrific.

Yes, I’m pleased. It’s an independent measure that somebody thinks what you’re doing is worth it.

I’ve often thought, and expressed it on occasion, that being a faculty member, or in a position like you’re in, is the epitome of being a small businessman.

Exactly.

Well, Peter, thank you.

My pleasure.
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