BCMB Newsletter

May, 2011

Volume 1 Issue 3

Life from the Inside Out

Keeping you up to date about:

Biochemistry and Cellular and Molecular Biology at UTK

Inside this issue:

The BCMB Buzzzzzz .....

Dr. Cynthia Peterson, BCMB Department Head

Welcome again to the Department of Biochemistry and Cellular and Molecular Biology (BCMB) at the University of Tennessee. This third edition of our newsletter continues to offer good news and insights into what is going on with our undergraduates, graduate students and faculty. As we come close to the end of the current academic year, with graduation in May approaching rapidly, I reflect on the accomplishments of the year and notice the way **our academic mission has broad impact**. The BCMB Mission Statement from our strategic plan says the following:

> **"The mission of BCMB is to provide a high quality, scholarly educational experience for our undergraduate and graduate majors that prepares them for a wide variety of career options, to promote science awareness and literacy in the broader community, and to advance scientific knowledge through our research efforts."**

Those principles are nicely reflected in this newsletter. We feature a current undergraduate student, Andy Rogers, who has just debuted his senior project. Yes, I did say "debuted." Andy approached me about doing a unique research project on Type I diabetes that would combine his interests in science and theatre. He was adamant about reaching out to the community with an educational effort. The result was a musical featuring a teenager who is diagnosed with Type I diabetes that was performed for three days at the laboratory theatre at the Clarence Brown Theatre on campus. This effort raised several thousand dollars in donations for the Juvenile

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Andy and the Beats

A senior in the College of Arts and Sciences at the University of Tennessee, Knoxville, is integrating two disciplines and bringing them to life in his senior project.

Andy Rogers, who is majoring in biochemistry and molecular biology and minoring in theater, went beyond writing the required research paper for his major; he has written, produced, directed and soon will be starring in a musical in the form of an independent project centered on a disease he and his sister suffer from: Type I Diabetes.

Called "Andy and the Beats," the musical aims to entertain and inform its audiences about the disease.

"I have been involved with this disease for so long and I wanted to know more about the disease that affects not only my sister and me, but millions of kids who didn't ask for it," said Rogers. "The musical is a reflection of my research paper and will shed light on the ins and outs of the disease and what it actually entails -- the daily struggle, the lifelong fight, the long-term consequences and the misconceptions."

Cynthia Peterson, professor and head of the department of Biochemistry, Cellular and Molecular Biology, said Rogers' project is the first of its kind for her department. "I decided to give him free reign to pursue this work and unleash his creativity," she said. "Andy will be bring-

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Interview with Associate Professor Dr. Gladys Alexandre

Dr. Gladys Alexandre arrived in our department in 2005 from Georgia State University in Atlanta.

When I went to Georgia State, I actually did not even know if I wanted to be an independent scientist. I was working with Dr. Igor Jouline at Georgia Tech. One day we saw this advertisement about the position at Georgia State, and it was about three miles from Georgia Tech. He told me that it fits me totally, and encouraged me to apply, telling me it would be good for my training. In fact, that's why I applied, I never thought about it, and I got the job. That was very strange, because I never thought I would be independent.

When I got the position at Georgia State I started writing grants probably the month after I accepted the offer. And that's how I got my first grant, which was a NSF CAREER award. Initially I felt more pressure and I was convinced I couldn't do it. I thought I'll just give it my best shot, get some feedback, and see how it goes.

" you really want to mentor them in ways where they respect others, are curious and enthused, and have an open-minded attitude."

In this job, there's no pressure other than the one you are willing to impose on yourself.I think you will succeed as long as you can say something relevant, really try to do your best, and keep in mind you need to make others interested in what you do. The motivation has to be from within. Getting the faculty position at Georgia State opened up whole new horizons for me. I found I had an interest in the teaching. When you accept the offer, you think hard about your research, and then you are put in front of a classroom of 80-something people. It was really hard, and I had zero mentorship for that part. I had colleagues, and that's where you realize that your colleagues are your best resource. We had a lot of evening students and students with a full-time job. Many of them were minorities. One of them was a night guard and a concierge in one of the hotels. I remember because he was coming to the class and then he was working his shift. Sometimes he would tell me he could look at the material during his shift. It made an impression on me that some people were doing that.

Q. What prompted your interest in Biology to begin with?

Azospirillum Colony

A. I got into biology because I always liked it. As far back as I can remember I wanted to be a nurse. Not because I wanted to take care of people but because I like the explanatory aspect of it. But nobody in my family is a biologist or even inclined to biology. Somebody called me a "mutant" one time. My father worked for Eastman Kodak as an engineer. My mom was a stay-at-home-mom. Maybe because my parents didn't go to college they didn't try to influence what I was going to do as an adult? My father graduated from high school and then did night classes for seven or eight years and worked up the ranks in his job. My mother had a high school degree.

I got my Ph.D. at Claude Bernard University in Lyon, France in microbial ecology. When I was a graduate student I had a problem with an experiment. I told my mentor, "I have this problem, but I know somebody in the US who can help me with that problem." And he said, "Okay, find the money for your trip and we can arrange this, and you can go." So I got a fellowship and I conducted this work with Dr. Jouline. I went to three or four different places to do some work in the course of completing my Ph.D. When I went to the US, it was probably the last year before I graduated. They had a post-doctoral position available and they asked me to come. I said, sure! So I came as a post-doctoral fellow planning to come back to France but never did. The postdoctoral position was in California in the medical school at Loma Linda University.

It's really a privilege to have the kind of job we have. You satisfy your own curiosity in a way that should align with funding, but still, it's your own curiosity. You get to work with young people all the time. You have colleagues who do interesting things, and are in the same state of mind. I believe in the notion of responsibility in this work. You work hard because you are responsible for your productivity, whether it is teaching effectively, being responsive to student needs, taking care of your lab, being responsive to the people in the lab, writing papers, all of this. Nobody is there saying, "Oh, Gladys, where were you at 9:15 today?" Having a successful research career means that you have to generate the money to support it. That means you have to convince the funding agencies that the work is worth doing, or you wouldn't get the money. Research is always on your mind, it is obsessive.

Q. You mentioned earlier, and we've talked about this in the past, when you first started teaching it was kind of intimidating because you walked into a room with 80 students and you'd never done this before. So think about how different your attitude about the teaching has changed in that nine-year period. I'm curious, how has that influenced the way you think about going into the classroom today?

A: I'm not stressed or anxious about going into the classroom anymore. I see my role more as helping the students. I try to identify a few important things, and I have less pressure. I'm more confident in my teaching. I think a lot of the other important aspects of teaching are experiences you want to share with them, which are also very important when you are in college, you know all the things you can pass on, but if they don't remember it that's fine. I think I'm a lot less stressed but I'm also a lot more challenged. I think a lot more about my teaching and

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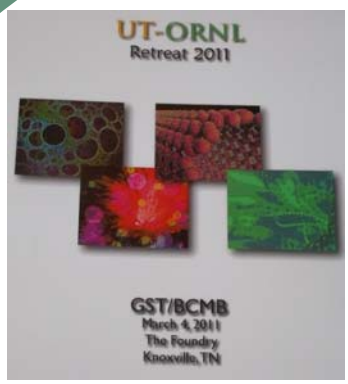
Graduate Spring Retreat and Recruiting Day

Submitted by Dr, Andreas Nebenfuehr



Following our new tradition, the BCMB Department joined forced with our friends from the Genome Science and Technology Graduate Program and for the third time celebrated our students' research with a retreat at the Foundry at World's Fair Park on March 4. As in previous years, this event was coupled to our annual Recruiting Day during which 18 applicants to our graduate program visited campus for interviews and to learn about our department. This year's crop of interviewees was particularly strong and the admissions committee now has the difficult task of ranking them and selecting the best for admission offers. The long list of well-qualified applicants makes it particularly painful that we only have a limited number of open positions available.

The Spring Retreat began with a poster session where 20 BCMB graduate students presented their research. The topics covered reflected the broad diversity of our department and ranged from computational studies on enzyme mechanisms (Jian Zhuang Yao from the Guo lab) to copper effects on the circadian clock (Yuki Yamada from the Prosser lab) and everything in between. The poster session not only gave all of us the opportunity to learn about the great work of our students, it also provided several of them with the first opportunity to present a poster at a scientific meeting. Combined with the posters from the GST students (11 of which came from BCMB labs), this poster session gave an impressive overview of the research activities at both UT and ORNL.

The retreat ended with a series of short talks by graduate students. For the benefit of the applicants visiting that day (and for everyone's enjoyment), the student talks were prefaced by an overview of BCMB research presented by Dr. Gladys Alexandre. Following this introduction, Pintu Masalkar (Roberts lab) presented his research on "Interactions at the Symbiosome Membrane: Transporters and Enzymes in Symbiotic Nitrogen Fixation in Soybean Nodules." Next, Shaofei Zhang (Labrador lab) talked about "Elongating RNA Polymerase Meets Chromatin Insulators: A Role for Chromosome Architecture in Transcription Elongation," before Tihami Qureshi (Peterson lab) closed out the session with her seminar on "Stabilizing Metastable Serine Protease Inhibitors." The research presented by these students, as well as the presentations themselves, were of very high quality and attested to the excellent training our graduate students receive in our program.

The Spring Retreat ended with a joint dinner for all participants from both BCMB and GST.

Focus on an alumnus: Angelia Gibson

Angelia and family

Dr. Angelia Gibson attended UT and was an undergraduate major in Biochemistry. She continued with her studies in Knoxville and earned a PhD in the BCMB Department in 1998 working on a project with Cynthia Peterson. Dr. Peterson was a new faculty member at the time, and Angelia was her first PhD Student. Angelia is now a faculty member in the Chemistry Department at Maryville College.

What led you to your interest in biology and how did that lead to an interest in biochemistry or cell and molecular biology?
As a child I spent a lot of evenings watching my father train for emergencies with the Sevier County Rescue Squad and shadowing my mother on her nightly nursing rounds at Fort Sanders Regional Medical Center. With these experiences and a love for school and especially science, I always assumed that I would pursue a profession in the health care field. A high school biology module with *Drosophila* focused my interests towards genetics and molecular biology. Having the ability to control genetic crosses and predict their outcomes and then relate that to transmission of a gene was a fascinating process for me. During my junior and senior years in college the collective experiences of taking biochemistry courses, working as an assistant in an otolaryngology office, and conducting an undergraduate research project in Cynthia Peterson's lab helped me to realize that what really drove my interest in the health fields was a desire to understand the molecular basis of health and disease. I was particularly interested in the relationships between protein structure and biological functions that related to questions of human health.
Who was the biggest influence in your decision to pursue college? I always admired and wanted to be like my Great Aunt Jerrie. She was the first person in my family to complete any education beyond high school. I always admired her independence and dedication to her professional life. I have a picture of her in nursing school in the 1950's holding a sign that says "genetics". The photo has always been an inspiration to me. It not only reminds me of the amazing discoveries that were being made in molecular biology during that decade, but also is symbolic on an important social level--it is a photo of a young woman pursuing higher education when the cultural norm for women of her generation was fulltime homemaking. On a much more personal level, the photo is a sentimental reminder of a common affinity for science and healthcare that I share with my mom and my Aunt Jerrie.
What led you to postgraduate work in BCMB at Tennessee? I had spent a great deal of time during my senior year of college doing undergraduate research in Cynthia Peterson's lab. Having taken numerous undergraduate courses taught by BCMB professors, I knew that the environment was great, that the instruction and mentoring would be exceptional, and that there was faculty who were addressing the kinds of research problems that interested me.
Can you describe your experiences here at UT and how they might have shaped your future activities: e.g. your experiences in Cynthia's lab, with the other faculty and with the other graduate students in the department? I truly believe I learned to teach and mentor from some of the best: Cynthia, Liz Howell, John Koontz, Mary Ann Handel (now at the Jackson Laboratory), and Dan Roberts. These professors expected academic excellence from their students but provided a supportive and nurturing environment for realizing it. Cynthia and I still laugh about a time when I had written an abstract that "needed some revising". She eventually sat down with me and patiently helped me revise it sentence-by-sentence, explaining the importance of each change we made. At the time, my pride was injured, but it was possibly one of the most important educational moments of my life. I try to emulate that gentle, but demanding, kind of mentoring. Graduate school is such a special "protected time" for growing, learning, and working with brilliant people. I learned so much about science and life from my friends during that time: Christine Schar, the best lab mate and the tidiest, most systematic scientist I have ever met, always entertained and inspired me with her hiking, kayaking and snow-shoeing adventures. Friends like John Lamerdin (the model of a multi-disciplinary thinker), Ricky Cox (whose educational background was similar to my own), Jennifer Cobb (a great friend and wonderful scientist), Yaa Osei (who overcame huge personal hurdles to pursue graduate school) and many others enriched the experience of graduate school for me!
What led you to your postdoctoral experience? My husband and I planned to move to Texas after I finished graduate school so that he could attend Dallas Theological Seminary. I wasn't exactly sure what I wanted to do; a post-doc seemed logical. Mary Ann Handel actually suggested that I look at Dave Garber's lab at UT

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

The BCMB Buzzzzzz

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Diabetes Research Foundation. I was proud to support this unusual scholarly effort that truly did advance science awareness in the broader community. Another feature is an interview with Dr. Angelia Gibson, a former student in BCMB. In fact, Angelia was an undergraduate and UTK who became so enthralled with biochemistry that she enrolled and received her PhD in the BCMB Department. Angelia chronicles an interesting career that has involved science writing. She now has returned to an academic setting, where she is on the faculty at Maryville College. Dr. Gibson is a popular instructor in the Chemistry Department at Maryville College, and we have worked closely with her in recent months to establish a partnership whereby Maryville students can pursue research in the BCMB Department at UTK for work toward their senior thesis. Our faculty feature this month is Barry Bruce who has high impact research in the area of bioenergy. He engages many students at both the undergraduate and graduate levels in this pioneering work, and he has been a thought leader and principal figure in bringing a large $20 million grant for work across the state of Tennessee in this important area. In March, we held our annual recruiting event to interview graduate student prospects. At this event, we hosted a research fair where all of our graduate students were able to talk about their exciting research results with posters and short talks. We are proud to showcase all of the good things that are happening in BCMB, and we are eager to **continue in our mission for research and education excellence that impacts our students, their careers, and the welfare of the state of Tennessee.** Many thanks to you, the reader, for your interest and support.

(Continued from page 4, Gibson)

Southwestern Medical Center. It was a fantastically energetic lab filled with great people doing exciting work.

What factors led to your choice to build a career in an academic versus industrial setting and/or did you always know that is what you wanted? I knew I didn't want a career that was exclusively focused on laboratory research. I was hoping that some outside-of-the- box opportunity existed, but wasn't sure what it was. After my post-doc, I took a position as a medical writer and editor for an oncology education company. I definitely enjoyed the corporate setting: the fast pace and tight deadlines. It was just the sort of outside-of-the-box experience I hoped for and a fantastic opportunity to learn about clinical research, business, and the regulation of the pharmaceutical industry. I enjoyed all aspects of the work, especially the researching and writing, but it seemed that there was something missing. I prepared a lot of educational content but never got to deliver it. I missed the reciprocal learning that happens when you teach and mentor in an academic setting. I think I also craved the creative leeway that is available in academia (designing courses, activities, projects, etc.).

What kind of challenges did that create when you started a search for an independent position of your own: e.g. did you limit your search to a geographical location? My searches have always been geographically limited, so it was important not to be limited to a tight professional niche. When we decided to move back to TN for my husband to work in his family's business, I continued working remotely for the company in Dallas for a few years until I received a faculty appointment at Maryville College. I've have been lucky enough to find rewarding positions in spite of geographic constraints. That has definitely paid dividends. We have 3 sons and are in the process of adopting a little girl. I'm not sure we could have been a 2-career household without the help our families provide.

Now that you are heavily involved with working with undergraduates what are your greatest challenges? Time and energy management! In a typical semester I teach 3 different classes, one of which is interdisciplinary or outside the chemistry major (such as Global Poverty and Public Health or US Food and Drug Laws) and the other 2 are chemistry/biochemistry classes with labs that I prep myself. I advise many students; most of who are searching for summer research experiences or applying to grad schools, and mentor several senior thesis projects. It is challenging to stay on top of the academic/administrative obligations while supporting students who always are in very diverse places academically, vocationally and emotionally.

What do you like the most? It sounds romanticized, I'm sure, but having an opportunity to invest in the lives of young people who are making positive contributions to the world is definitely the best part of my job.

What advice might you give to students about career choices in the sciences beyond the health related professions? Medical school is not the only option for students who are drawn to science because of its implications for human health. It's also important to be open-minded and to think creatively about potential paths that may not seem direct or obvious. Health-related sciences are incredibly interdisciplinary and require contributions from all sorts of backgrounds, so it is important to get a broad education in ethics, politics, and economics as well as science. When I interviewed for the medical writing position (with no formal training in clinical medicine, oncology, or science writing) and then for a faculty position at Maryville College after having been out of academia for several years, it was important for me to think creatively (and to convince those who were interviewing me) about how my experience and skills could be utilized in those professions. Solid training in biochemistry along with a growing understanding of the clinical applications and social relevance of the biomolecular sciences ultimately were important qualifications for both of those positions.

Andy and the Beats ...continued

ing biochemistry to life and I feel very fortunate to be able to support this unique project."

Andy Rogers

Rogers discovered he was diabetic one summer afternoon when trying to mow the yard. He couldn't muster the energy to start the lawn mower and had been extremely tired and irritable for several weeks. This is when he realized something was wrong.

"My life has definitely turned upside-down from my experience with the world of Type I Diabetes," said Rogers. "It's a lifestyle change for everyone involved: different foods in the refrigerator, how to take care of your sibling when she isn't feeling well, what signs to take note of in case of emergency, and so much more."

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.

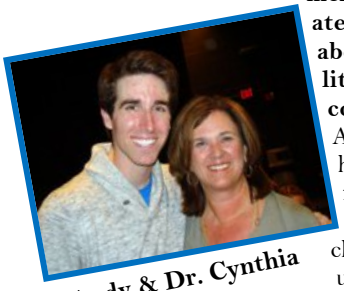
Rogers says these children are the true stars of the show.

"I can stand up on stage and sing to people all day about the struggles of a diabetic, but kids have this innocence and enormous amount of power to move people. Their addition to the show in the finale really shows that this disease is real. It's not often that actors actually *have* the disease they are portraying," he said.

Donations for his shows went to the non-profit Juvenile Diabetes Research Foundation (JDRF).

Andy Rogers, a senior in BCMB in December, was interviewed by Dr. John Koontz because he has a unique way of teaching people about Diabetes.

Q: The department has a newsletter and in every issue we interview an undergraduate student to talk about their experiences. Cynthia recommended you because of the unusual undergraduate research project that you have. So we'll talk about that a little bit, but I just want to get a little background information. How did you come to UT? Are you from Tennessee?



Andy & Dr. Cynthia Peterson

A: I am from Tennessee. My whole family went here for college. My brother played tennis here for four years, and my sister also came here and studied communications. It was just the next choice for me. Both my parents and a lot of my uncles and aunts attended here so this was the next choice for me.

Q: How did you choose BCMB as a major?

A: I originally started off in Biomedical Engineering. In high school, I was really into math and science. I particularly loved math, but I knew I wanted to do a major that would be pre-med, without exactly having to major in pre-med. I wanted something that would cover all my classes. My best friend was majoring in biochemistry, and I thought that was a good choice to get my pre-med classes in.

Q: You've mentioned pre-med a couple of times. Your goal is to go to medical school?

A: It was at the time. Right now, I know I want to take a little more time off. My major is biochemistry, but my minor is theatre. So it's two contrasting ideas in my head, even contrasting ways of living and philosophies. I think I want to give the acting part a little bit of a shot before I decide on something really definite. With medical school, that's it, you go and you keep going, you do your residency, you do your internship, then you're a doctor. There is no turning back. With me, I change my mind all the time, so if I do med school, I'm really going to have to make sure that that is something I am 100% wanting to do and put all my focus on that. With this acting and musical theatre route that would be too much on my mind if I didn't pursue that a little bit.

Q: Being a physician would not prevent you from having the acting experience as part of your life. There are a number of physicians who have gone on and done other things with their life and have dual lives.

A: There's an actor now, who's a comedian, he's in a lot of popular things. Sometimes he'll play a doctor, but he's a doctor in real life. The reason the whole med school thing has always been looming in the future for me, is my dad is a doctor, my uncle's a surgeon, my granddad's a surgeon, and every time I see him it's like I'm supposed to be the next one to go on and continue his legacy of a Dr. Rogers in the family.

Q: I brought it up because, as you pointed out, it takes an incredible commitment. You know that since all the members of your family are physicians. How did you come upon this project that you're doing? You might explain the project.

A: It's different, definitely different. Probably more so than anything that's been seen in the Biochemistry Department. When I came back to school from taking that year off, I knew I was coming back into biochemistry, and still doing theatre as a minor. The good thing about theater as a minor is you can learn a lot about acting and about that art, by doing. The more shows you're in the more you're going to experience what it feels like to be an actor. So I knew that I was going to be fine if I was pursuing both, but I knew that I wanted to do an independent project. The same friend who was majoring in biochem, turned me on to Dr. Mullin as an advisor. I told her how I love theatre, but how I need and want to do biochem. If I were going to do something I would want to do a little bit more, make it a little more me. Something that I could bring to the table. So I put that in the back of my mind and I thought about things I could do. Immediately I thought, I want to study something pertaining to Type I Diabetes. I've lived with it personally for seven years of my life, since I was 15, but also six years previous,

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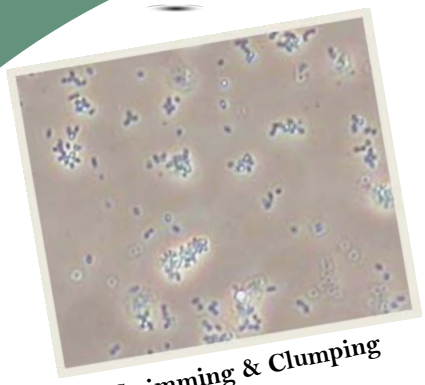
Gladys Alexandre...continued



Swimming & Clumping

actually start being a little more obsessive about the teaching and what can be done in the classroom. It's a lot more challenging. One other thing that I like about this job, that I never thought I would like, is having both the research and the teaching. Research is very slow and frustrating most of the time. But I think if you teach you will always get one form of feedback or another and it is very rewarding in this way. I don't know how people could do only research, and not get totally mad.

Q. How do you compare mentoring graduate students with working with students in the classroom?

A: Part of it is that graduate students are already self-motivated. They know they want to earn a Ph.D.

The hardest thing for me to do in working with a new graduate student is to accept that he or she may not be working the same way that I do, and to recognize that this person may still be worthwhile. it's very hard to put yourself in someone else's shoes, to see their value. I'm thinking about some students who have amazed me with the type of progress they were making. They surprised me in ways I never thought they would. Sometimes you have to say praise to them and sometimes you have to criticize them. Nobody wants to hear, "I don't think that what you wrote here makes a lot of sense". And it's very hard to detach your intellectual work from your own personality. So that's why it's very important we get along with each other. I think it takes a very strong, mature person to be able to recognize where you're wrong. Some students just don't have that ability at the start. They always want to be right, and to me, that's a big flaw in a scientist. To be a scientist, you always have to question yourself, and if you can't do it, you are doomed, because you will never learn much. The essence of being a scientist is to be a skeptical person.

One thing I believe in, in my role as a mentor, you train people who are going to behave in the way they've been treated. I think the way you teach is more visible to the students because you spend a lot more time with them. But you really want to mentor them in ways where they respect others, are curious and enthused, and have an open-minded attitude.

Q: Have you had an opportunity to participate in activities in other colleges?

A: Yes, I've done very interesting things. I got pulled in a little bit to the library and scholarly communication. That's a very interesting one. I found that the university is a group of people who do not work the same way, who are very different. That was really interesting for me, just to get to learn this.

I think having a Ph.D. or any type of terminal academic degree, entitles you to take on some sort of leadership. Leadership is how you can affect your community. For example, when I have my students do graduate work, we also do outreach in middle schools. We went last Friday to South-Doyle, which is not a very well-funded, well-supported school. I have students who come off quiet in the lab, but put them in front of kids and they blossom. Because, to go back to the value of Ph.D., they realize how much they know and how much they've grown

Q: What you're doing, it's great as outreach but it's also very good for your students.

A: It's wonderful for them. I think that helps their confidence, too. When we say we try to give graduate students some type of leadership skills, that's what it is.

Q: Equally as valuable. I think the situation you just described, that is going out and working with the middle school science group, having your students go out there, is providing great value. Not just for you and your students, but for the state as a whole.

A: You know, I received a letter from a mom from one of the schools we visited last year, Bearden, who said, "My daughter came back home so excited, could not stop taking about this experience." She said, "She thought she could not do science, and now she really wants to. You and your students did such a great job inspiring this kid." That, you never get from a grant review! Never get it from a peer review! These people then say, "These UT people, they really care about what my kids do." That makes a huge difference.

Q. Now you've mentioned two schools, Bearden and South-Doyle. Have you done others?

A: We are trying to work with Northwest. We're trying to reach whichever school wants us

It's need based. They tell us what they need, and we bring experiments to illustrate certain concepts. As a microbiologist, you can basically do anything with microbes, and in ways that are really usually easy. What is funny is that we have to be really creative sometimes, because the kids make remarks that you really don't expect.

Q: So it sounds like a lot of fun for you, as well.

A: Oh, it's a lot of fun, but it's also a lot of work. I have a lot of ideas, but I always need a little time to think about it, make sure it's okay. And also, I work with the teacher. I prepare a proposal, send it to them, I want them to approve that it's okay. We bring everything, on our little carts.

Barry Bruce, Sustainable Energy and Education Research Center

Professor Barry Bruce joined the faculty in the BCMB Department in 1994. Dr. Bruce is a leading expert in sustainable energy research; his work focuses on adapting the biological machinery in plants to produce electricity and biofuels. Barry is a co-principal investigator and one of three scientific thrust leaders of a NSF $20 million grant, announced on September 9. It is the largest NSF grant ever awarded in Tennessee. The project, "Tennessee Solar Conversion and Storage Using Outreach, Research and Education" or TN: SCORE, will help create a collaborative culture among the state's universities and community colleges, to promote the state's science and engineering capabilities, enhance research competitiveness, and stimulate economic development. In September of 2010, he joined a group of 15 scientists selected from around the country to converge on Asilomar, California, for an "Ideas Lab" entitled, "Surpassing Evolution: Transformative Approaches to Enhancing the Efficiency of Photosynthesis," sponsored by the National Science Foundation.

Dr. Bruce with Bioreactors

Q: We are interested in learning about the kind of activities you've ventured into with respect to the Sustainable Energy and Education Research Center. What led to that and what has come out of it? Did this start when you began your efforts in renewable energy, when you started working with a colleague at Oak Ridge?

A: The Oak Ridge collaborator was Elias Greenbaum. We published our first paper, in 2000 or 2001. We published another one about 3-4 years later. My first USC student was a chemistry student from Maryville College interested in doing something at Oak Ridge. So I decided we would try to work on the project between Elias and myself. She used this as her senior chemistry project at Maryville College and with my encouragement joined the GST graduate program. She earned a Masters and her thesis got published. Then with Hugh O'Neill, whom I still collaborate with, we pursued a second project that also got published.

As a result of that, there was a DARPA initiative for Sustainable Energy Program, Elias had invited one of the program participants, Mark Baldo from MIT, for a seminar, and invited me to interact with him. So I met this really sharp, young assistant professor from MIT who was involved in organic photovoltaics but had not ever worked with biological systems. I subsequently flew to MIT and spent three days discussing with Mark how we could do together. He and I decided to start working together providing biological samples that my student Evan Reddick made and him trying to integrate them into solid state devices.

Then we wrote this NSF NIRT Grant (Nanoscience Interdisciplinary Research Team) with a third co-PI, Shuguang Zhang who is the Associate Director of the Center of Biomedical Engineering at MIT. That was a five-year grant that got funded in 2005 and ended last August. That was a good triangular relationship. I collaborated individually and together with both of the co-PIs parts and we probably had maybe six papers collectively, and individually we've had a few papers. I'm continuing that work right now. We currently have another paper that we are trying to get published in Nature Nanotechnology. That work also involved a Swiss scientist, Michael Graetzel. In each of these collaborations there is an essential component for a biological person that does the molecular biology and biochemistry with the biological materials, and a material scientist who's more on the physics side and can build and characterize the devices. As a biologist we would say we're making macromolecular assemblies, and from the engineering side they say they're making devices.

Right now I am working with Paul Frymier in Chemical Engineering to genetically engineer different proteins in such a way that photosynthetic reaction center complexes produce hydrogen. This involves a variety of different proteins and microorganisms and lots of trial and error to see what will work. We've now had to engineer three different organisms to have three different pieces made in three different proteins, all put together in order to do something that nature never would have anticipated. That is the recurring theme, molecular reconstruction of systems: i.e. bioengineering. So we think we can assemble all these things together directly by molecular engineering. Now, if we do that, it would be an exciting accomplishment. We'll still have one main problem and that is PS II (Photosystem II). PS I is like the Energizer Bunny which is one of the most robust macromolecular complexes that you can work on. It's really durable. We've had experiments where it lost almost no activity in nearly 90 days. Where as the half-life of PS II is about 12 hours, depending on the conditions. So if we make this complex, we're going to have a really durable system and a very labile system. But this is a problem everybody in the world is aware of. The hope is that someone will work on engineering additional stability into PS II. Now, the cell has a repair mechanism that's extremely robust. So in nature, it is constantly repaired. I think it might be easier to engineer it so it doesn't break. But that's a challenge presently beyond the scope of my lab.

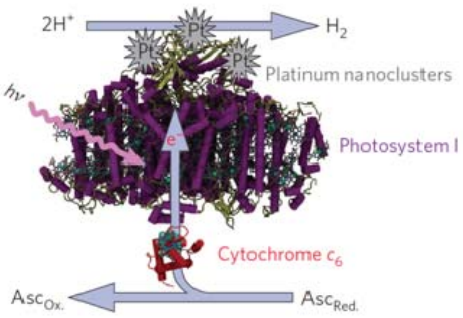
Q: This is probably the most fascinating thing we could talk about, but I need to "engineer" us a little bit more toward how this has affected your career.

A: Well, it's biochemistry and that's what I worked on as a graduate student and now I've come back to what I worked on then. This is 2010, so I have been isolating chloroplasts for 36 years. My first undergraduate research project was working on PS II in the Physics Department at the University of California. I learned to isolated spinach chloroplasts in 1974, when I was a sophomore in college. We worked on PSII type reaction centers in photosynthetic bacteria, and then I came back and worked on PS I in plants. So I basically worked on almost all the photosynthetic complexes out there. Then when the reaction center crystal structure was solved, there

(Continued on page 9)

Barry Bruce….continued

was a general feeling that photosynthesis was solved and that research in photosynthesis was completed. We had the crystal structure and it seemed that everything we wanted to know was now known and you should go on and deal with something that's a bit more challenging. That's when I decided I would leave photosynthesis directly, and I would move out into the cell from the proteins in the thylakoid membrane to the chloroplast envelope. I was awarded an NSF Postdoctoral Fellowship in Interdisciplinary Plant Biology in to work with Dr. Ken Keegstra investigating how proteins get into the protoplasm. So it wasn't direct photosynthesis but it was sort of this key element on biogenesis of chloroplast. Then when I started on the bioenergy work I went back to PS I.



Schematic diagram of platinized photosystem one producing light driven hydrogen evolution.

Q: What led to your being the Associate Director of SEERC, the Sustainable Energy and Education Research Center.

B: Scattered around campus were people who worked in some area of energy. SEERC is largely composed of faculty from material science, chemical engineering, chemistry, and a very small set of biological engineering people. Most members work with non-biological materials. In my case I work on how you can engineer biological and non-biological materials to be assembled together. Although there is some biomolecular engineering as a part of SEERC most of this is in the College of Engineering. I'm the only biologist in it, I believe. There are faculty who do biological work in Chemical Engineering who are members of it. The idea was that we would divide the responsibilities of SEERC; one would be bioenergy or biofuels and one would be nonbiological. Early on I worked to develop the Center including things like the logo and web page. I also worked as a co-PI or PI on many large interdisciplinary grants to NSF, DOE and USDA. The most recent grant that I wrote was a large USDA grant for bioenergy education. It was called BRITE: Bioenergy Research and Industrial Training in Tennessee. That was to really focus more to trying to provide a new set of college graduates that could work in what the USDA thinks of as an emerging industry. The USDA decided that bioenergy as an agricultural activity is going to grow in the next fifty years, and that it's going to be different than the food industry. There needs to be a training platform to build scientists who can work in agricultural activities associated with bioenergy. So they're forward thinking, they have a new structure called NIFA (National Institute on Food and Agriculture) which is taking a much more aggressive approach towards it than what has been traditional with the USDA in a research program. So we put in for that, we made it through the first cut, and we're waiting to hear.

Q: What about the IGERT (Interdisciplinary Graduate Education and Research Traineeship)? You are involved with.

A: There's an NSF IGERT called STAIR: Sustainability Through Advanced Interdisciplinary Research. I am a co-PI on this and I work in the thrust associated with Bio-hydrogen production. The whole proposal is centered around technical issues associated with shifting to a hydrogen-based fuel system.

Q: Did that also result from SEERC?

A: Yes, everybody who's a PI on the IGERT is a SEERC faculty. We would like to think of SEERC as an umbrella organization that coordinates research in the Sustainable Science. Bamin Khomami is the Director and I helped submit an EFRC (Energy Frontier Research Center) grant. We also submitted an MRSEC, Material Research and Science Engineering Center for NSF. Each of these proposals were designed to provide infrastructure support: to build a facility that can do engineering research and each request was approximately $15 million but unfortunately neither of these were selected for funding.

Q: What about the statewide initiative that you're part of, with funding from the National Science Foundation?

A: TN EPSCOR (Experimental Program to Stimulate Competitive Research)? It is $20 million grant, $4 million a year for five years. That's the largest NSF grant the state of Tennessee has ever gotten. But it's not a typical research grant. It's an RII, Research Infrastructure Improvement Grant. When they say improvement, they're talking about the entire state of Tennessee. So the intent is to improve the research capabilities and the research infrastructure in the entire state of Tennessee.

We have three thrusts. One is called TASCIT, the Tennessee Advanced Solar Conversion Innovation Team, that I'm the thrust leader of. There's another one that's based at UT, which is essentially conversion and storage, which is largely fuel cells and batteries. This is lead by Tom Zawodzinski who is a Governors Chair in Chemical and Biomolecular Eengineering (CBE). And then there's a group that's at Vanderbilt run by Sandra Rosenthal, Novel Nanomaterials and Nanostructures. That can be used for either of our other thrusts. She is the director of the Vanderbilt Institute for Nanoscale Science and Engineering. Her interest is really to work on a fabrication and research facility for making nanomaterials and nanostructures, which are important in their own right, but can also be partnered with some of us.

We will be happy if each of these groups works well independently well but hope they would work independently well and together also.

Q: In essence to form a synergy of efforts?

A: I think that there are certainly people who will be involved in more than one thrust. But we have a lot of metrics that we have to achieve, and most of them are geared towards things that we would view as education and outreach. We want to bring more grants to the Tennessee Board of Regents (TBR) schools and to the private colleges in the state of Tennessee. We also want to bring more people and students into the two-year colleges. The challenge is to integrate efforts at

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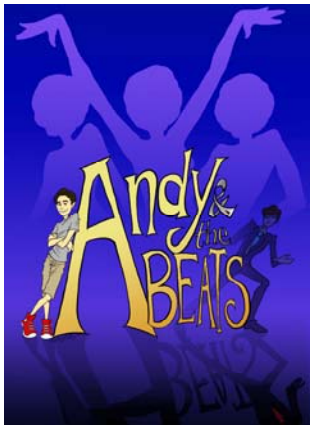


(Continued from page 6 Andy and the Beats)

because my sister was diagnosed when she was 9. It's a life-style change for the entire family, even if you're not the one diagnosed. I've always been interested in it. I've always had a passion for looking for ways to support different cure options, like with Juvenile Diabetes Research Foundation, or the ADA. So I knew that Type I Diabetes was going to be my focus for an independent project. And I knew that is biochemistry related. At first, I thought I was going to study just specific ways or aspects of options for a cure, like stem-cell research, or even causes of why it happens. It's growing to be more and more evident in kids, it just wasn't as common as it is now among kids. I'm reading a couple of books now that are talking about diabetes as an epidemic.

I started to seriously think about the musical. I was taking a run around campus, and I would play through what I would want to accomplish with a musical, and if I could get school credit for it then that should be my research project. So I wrote down an outline of the story, with me as the star, or the protagonist. If you're going to write a musical, you have to write it about yourself. To know a character, you have to know what he's been through, and I feel like I have the most experience to play myself. So I wrote down what I thought would be good, what I would want to teach to the audience, and then, I thought this is the perfect way to combine my theatre minor and my biochemistry major. And to combine arts and sciences, this is one way to do both. I really didn't think it would be passed as getting credit. That was the one deciding factor. I wrote down my purpose for the show, I wrote down a synopsis, what I would do on top of it, which was a research paper. Right then, the research paper was going to be studying stem-cell research, or something very specific, just something to accompany so that it has a little more basis in biochem than just a flashy musical. I sent it to Dr. Mullin, and asked, "Is there any way of getting credit for this? And she said, "This is unusual. We're going to have to think about this." She sent it to Dr. Peterson and she emailed me, and she said, "Go for it. You'll have a three-hour class credit for it." By the end of this semester, I'll give you the musical in book form, and I'll give you the research paper." So that's where it started, and then it's snowballed into something bigger than I expected, which is good. The paper is more of a guide to my musical, on top of a research paper. So, when people come to see the show, I want them to know that it's founded in basic science. It's something to make them believe what I'm saying. There's of course aspects of music theatre fantasy, because you have to make it entertaining. But with theatre, with art, with drama, everything has a reason for being there, and everything has a symbol. So I explain why I use different things in the show; why is there a virus as the villain? It's an autoimmune disease, but it's not going to be an impact on the audience if all of a sudden I fall asleep, then I wake up and have an autoimmune disease. There has to be some sort of villain. There have to be reasons, actions, and objectives. I explain a lot of things in the musical. It turns more into a guide, kind of a hitch-hiker's ride of what it means to be a Type I diabetic. It talks about stereotypes, I put in personal experiences, and I try to make things on the biochemical level be relatable to someone who wants to understand, or doesn't read those things every day. I try to make it relatable and easier to understand, so that everybody knows about Type I diabetes. I've finished the musical guide, and I finished the musical. Terry Silver-Alford is a musical theatre professor, and he's transcribing my music. The music was one of the harder parts. I don't really write music. My mom is a singer-songwriter. So she helps me out a lot with the music. I send it to Terry, and Terry listens to what we're doing, and transcribes it onto paper. It's a really interesting and very lengthy process. It's a lot more work than I expected. But it's already been rewarding.

Q: Have you tried to do all that with professionals, or have you tried to enlist other students that are engaged in these kinds of activities in their own majors?

A: At first, students. It was really all going to be student-based at first. Aside from transcribing the music. That's a difficult process and I wanted to make sure that was right. I've done several shows with Terry Weber, and he came to me and said, "If you need help with this, I've written musicals before and I can help you." People are offering to help a lot. All my actors are students here, which is great. It's a good opportunity for them to originate and create a character. My stage manager is also a student, though not here. He's a high school student who I've done a show with before. It's a good opportunity for him to take charge and to learn. My student involvement is mostly with the theatre aspect and not as much with the biochemistry. It is becoming bigger than I expected because Dr. Peterson has really spread the word that she likes the project. She told Lynn Champion at the College of Arts & Science, Sara Hayward who's writing about it for a magazine, Whitney in Media Relations. Mrs. Champion has really helped me out. My mom always taught me that if people want to help, let them. I want to have a reception after the opening, the world premier of the musical. I'm going to have a meeting soon with the culinary department and nutrition. We're going to try to make diabetic-friendly foods, have the foods set up, and explain to people coming to the show, if you are a diabetic, here is how you approach your food. Here's a serving of what you're going to eat, this is how many carbs are in this food, and you're going to have to count that and then give insulin based on your carb ratio. To really make the audience feel like they are diabetics, too, or at least what it really feels like. The culinary students will have an opportunity to be a part of the project, the theatre

(Continued on page 12)

Faculty Awards & Recognitions

Gladys Alexandre was contacted by NSF recently asking to include her as one of the NSF "highlights." They wish to highlight her broader impacts section of her NSF award and have asked for some information and pictures for their highlight.

Dr. Jerome Baudry

Jerome Baudry was QUEST's Scholar of the Week, December 31, 2010, for his work in adapting a widely used existing software to allow supercomputers to sift through immense molecular databases and pinpoint chemical compounds as potential drug candidates. His research was published in the *Journal of Computational Chemistry* as "Task-parallel MPI implementation of Autodock4 for docking of very large databases of compounds using High Performance Super-Computers." Quest: http://quest.utk.edu/2010/jerome-baudry/

Barry Bruce gave a research seminar on February 11, 2011 at Appalachian State University. He also used this time to promote the department using slides provided by the Andreas Nebenfuhr and the Graduate Recruiting Committee.

Ranjan Ganguly was invited to give a talk at the Entomology Department, University of Arizona, Tucson and also give talk at the Biochemistry & Biotechnology section of the 108th Annual meeting of the Southern Association of Agricultural Biochemists.

Dr. Hap McSween, Dr. Dan Roberts & Lynn Champion

Andreas Nebenführ went to North Georgia College and State University for a seminar and recruiting trip. The research seminar was followed by a brief overview of what grad school is like and what kind of careers this can lead to. At least one student later mentioned interest in our graduate program.

Dan Roberts was recently honored with an award from the Tennessee Junior Science and Humanities Symposium acknowledging his efforts to foster pre-collegiate research and science education throughout Tennessee. The award was presented at the 46th annual Tennessee Junior Science and Humanities Symposium (TJSHS).

Governor's Chair Jeremy Smith is bringing supercomputer simulations and experimental results closer together by identifying common "fingerprints." Smith collaborated on devising a method — dynamical fingerprints — that reconciles the different signals between experiments and computer simulations to strengthen analyses of molecules in motion. The theoretical technique was first developed at the Department of Energy's Oak Ridge National Laboratory (ORNL). Smith's research was published in the Proceedings of the National Academy of Sciences. "To learn more about Dr. Smith and his work, see the Featured Scholar Spotlight that was published on the UTK website on October 26, 2010: http://quest.utk.edu/2010/uncovering-lifes-secrets/"

Dr. Jeremy Smith

Two of our faculty members were recognized with awards at the 2010 Winter Convocation for the College of Arts and Sciences. **Dan Roberts** received the Senior Faculty Teaching Award from the college and **Gladys Alexandre** was recognized with a Junior Faculty Teaching Award.

(Continued from page 10, Andy and the Beats)

students, anybody that wants to be involved. I guess it could be as big as we could make it.

Q: It seems to me that this has been as educational an experience for you as any course you've ever had.
A: More so than any course.

Q: The whole notion of doing undergraduate research is what led to this?
A: Yes. Absolutely. That is the only thing that led to this. I didn't have the idea at all before. I didn't say, "Hey, I have this great idea for a musical, and I'll make it my undergraduate research." I thought, "I want to do undergraduate independent research. Let's do Type I diabetes. Why don't I write a musical?"

Q: Don't you think that this experience in undergraduate research, regardless of whether it is something as visible as what you're doing, or something that never sees the light of day is valuable.
A. Absolutely. I wouldn't take it back for anything. I encourage any undergraduate to take advantage of this.

Q: Of course. Now, it occurs to me, after listening to you talk about this, and getting a sense of your passion for it, that you won't go to med school!
A: Here's what we can do. We can decide if I need to go to med school after seeing the show. You may be saying, "You need to be behind the scenes!"

Q: No, five years after you've graduated is the time to ask if you should have gone to med school, right?
A. That's true; we'll see you around then.

Q: It will be very interesting to see what you do with your life.
A: I'm interested, too!

Dr. Peterson named Kenneth & Blaire Mossman Professor of Biomedicine

Edward Peterson, Dr. Cynthia Peterson & Michael Mossman (brother of Dr. Kenneth Mossman)

At the most recent meeting of the Dean's Advisory Board for the College of Arts and Science, Cynthia Peterson was honored. She has been awarded the inaugural Kenneth and Blaire Mossman Professorship for Biomedicine. This endowed professorship was established in January of 2011 through a generous gift from the Mossmans to the College of Arts and Sciences with the intention of recognizing a faculty member who is working in the area of biomedical science and who has worked to build research ties between the university and Oak Ridge National Laboratory. Dr. Kenneth Mossman earned his PhD in radiation biology from the UT/ORNL School of Biomedical Sciences and is now a Professor of Health Physics in the School of Life Sciences at Arizona State University. In comments that Dr. Mossman prepared for the meeting of the Dean's Advisory Board, he stated, "Establishing this professorship is something Blaire and I wanted to do for many years. The professorship is a way for us to give back to the University of Tennessee, an institution that has been so important to us in our lives. We met at the University in 1968 and were married in 1970 while still students. Blaire received her Bachelor's degree in French (with highest honors) and I received a Masters and Doctorate here. We moved to Washington DC in 1973 and both embarked on careers in higher education." Dr. Mossman's brother, Michael, was present at the advisory board meeting for the professor announcement of the Mossman Professorship.

Dean Hap McSween, Dr. Cynthia Peterson and Michael Mossman

Student Highlights

BCMB Major Madelyn Crawford Awarded Goldwater Scholarship

The prestigious Barry M. Goldwater Scholarships are awarded to recognize outstanding students who are interested in research careers in mathematics, natural sciences or engineering. This year one of our BCMB majors, sophomore **Madelyn Crawford**, was among 3 scholars named at the University of Tennessee. Madelyn will receive the Goldwater scholarship for her remaining two years at UTK. Madelyn Crawford is a Farragut native who was highly recruited to UTK as a member of both the Chancellor's Honors and Haslam Scholars Programs. She has been pursuing independent research in the laboratory of microbiologist Jeff Becker. The article on the three UTK Goldwater Scholars for 2011 that was published in **Tennessee Today** can be found at http://www.utk.edu/tntoday/2011/04/04/2011-goldwater-scholars/.

Madelyn Crawford

Four BCMB Majors Earn Top Honors at Spring Commencement

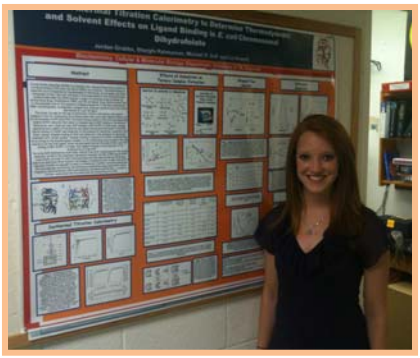
Four seniors majoring in BCMB have earned the distinction of Top Graduates from Arts and Sciences in spring of 2011. Each of these students has a perfect 4.0 GPA at graduation. They are **Hannah Eberle** from Knoxville, TN, **Jordan Grubbs** from Greeneville, TN, **Michael Massaro** from Maryville, TN, and **Heather Williams** from Germantown, TN. Heather, Jordan and Michael will attend medical school at the University of Tennessee Health Science Center in Memphis in the fall. Hannah will be attending Pharmacy School at the UT Health Science Center in Memphis. Congratulations to these outstanding students!

Cameron Landers has performed undergraduate research for his junior and senior years in Cynthia Peterson's laboratory. He will graduate in May and will begin an MD/PhD program at Baylor School of Medicine in Houston in the fall.

Undergraduate Researchers in BCMB Earn Honors

The University of Tennessee's 15th Annual Exhibition of Undergraduate Research and Creative Achievement (EUReCA) was held March 30 & 31 at the University Center. Twenty BCMB students participated in the exhibition, and several earned awards:

1. **Madelyn Crawford** is a sophomore BCMB Major pursuing research with Dr. Jeffrey Becker, head of Microbiology. Her award was for research on "Structure and Functional Analysis of a Model G Protein-coupled Receptor"
2. **Pawel Kosentka** is a senior BCMB major who worked on a group project with Sarah Sprague under the direction of EEB faculty member Dr. Brandon Matheny. The title of their project is "Evolution of Fungal Toxines in the Mushroom Family Inocybaceae. This project also selected as the top project from the Biological Sciences to earn the Phi Beta Kappa National Honor Society Award.
3. **Jordan Grubbs** is a senior in BCMB who has been working with Dr. Elizabeth Howell since here sophomore year in college. Her award-wining project was entitled, "Use of Isothermal Titration Calorimetry to Determine Thermodynamic and Solvent Effects on Ligang Binding in *E. coli* Chromosonal Dihydrofolate Reductase."
4. **Cameron Landers** is a senior in BCMB who has worked in the laboratory of Dr. Cynthia Peterson. His award was given for research on "Recombinant Production of Vitronectin and Insights Into Its Structure and Role in Fibrinolysis."



Jordan Grubbs is a May 2011 Top Graduate from Arts and Sciences graduate with a major in BCMB. She has pursued undergraduate research with Dr. Liz Howell for three years and now has a paper in press as a first author with Dr. Howell. She appears in front of a poster describing her work that was presented at the Southeast Enzyme Conference in Atlanta, GA on April 2, 2011.

Barry Bruce…. continued

(Continued from page 9, Barry Bruce interview)

the two-year colleges and four-year teaching schools that have a limited research emphasis together with the UT system institutions as well as Vanderbilt. It means spreading this capital toward improving research and education across the entire state of Tennessee. In order to impact the greatest number of students we are emphasizing interactions with faculty across the TBR system. You know the UT system has about 50,000 total students including undergraduate, graduate and professional schools while the TBR system enrolls close to 200,000. So there is a considerably larger number of students going through the TBR system and the question is how can we make those students stronger in STEM (Science, Technology, Engineering and Mathematics) areas. STEM is really the gathering focus of all of this. We're trying to do it strategically. We know we can't do everything, but if we can find 20-30 faculty members out there who are working in somewhat related areas and get them intimately involved, the idea is that they'll take some of that research activity back to their home institution, and attract undergraduates to work with them. We'll pay for undergraduates at their school, for a research budget, for some equipment that may be essential for them to work at their home institution, and at the end of five years those people will hopefully have created an active research program compatible with their school.

Q: You mentioned metrics that the program will have to achieve. Are those built into the requirements for applying for the funding and getting it?

A: This is a very highly scrutinized program. NSF does not give you this much money without really watching. NFS representatives were at the strategic planning session. They were there to make sure that we were on the right track so to speak.. The strategic plan has to be submitted by about the end of January. Then NSF has to review that plan, and then we have another 60 days to reply to that.

We have the money for this year, but the future years are going to be based on our annual participation and our annual progress. I-Learning Inc. is going to help us do assessment, and do it in as close to real time as possible. We're going to have an on-line database that every participant will be able to access and up-load any of their activities that are geared towards the metrics. My personal task is to stir the pot trying to keep them working toward completion of the metrics. I'll have to evaluate whether they are really good participants in the program. It's a service, really, to the State of Tennessee, to the taxpayers of Tennessee. The money comes through us, but then goes back out. We're generating dozens of subcontracts, that are paid from UT to institutions such as King College, ETSU, Tennessee Tech, Tennessee State, Austin Peay, and the University of Memphis.

Q: How did the word about this get spread to those institutions?

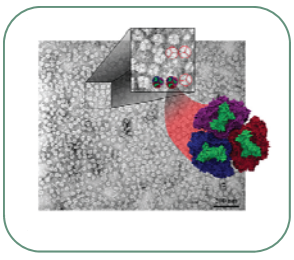
A: There were two levels. One involved an email from the Tennessee Board of Regents system office to the appropriate contacts on each campus seeking nominations of faculty who were involved in what was loosely called energy-based sciences, or energy related research. We compiled a database of all of these replies. My job was to go through those and identify find people I felt could fit, the best ½ dozen or so. I think I have 8. Then I had to communicate with those people, find out in more detail what they were doing, what their interests were, if they knew of other people. Then I had to create collaborations between these participating university faculty and the research institution mentors. We call them research nodes. Each node is going to be a somewhat autonomous research activity that is topically directed towards a specific question or research area. Each node will have research mentor from UT Knoxville or Vanderbilt and support a fully funded graduate research assistant. It will include one or more participating university faculty members from one of these TBR research schools. It will have undergraduate students from those schools.

Q: It's very exciting, actually.

A: Then it will probably support an undergraduate program such that every year we will do a state-wide REU (research experience for undergraduates). Based on their interests and what the node needs are those students will be distributed to these nodes. Probably each thrust will have 8-10 nodes, so that's 24 or so, statewide. The idea is that the node will become an incubator, and people will come and go but the project would move forward by the activities of all the node participants. At the end of five years there will be node metrics including manuscripts published, conferences attended and presentations given, students that went on to graduate school, grants that were generated from the preliminary data that the node produced from that TBR school. There may be graduate students that come to UT or Vanderbilt from the TBR schools. There will be research grants and there may be patents. Collectively, we may even go after more large grants, like the DOE Energy Frontier Centers. I just submitted a similar proposal to USDA called BRITE. We hope to bring together statewide activities and submit large infrastructure-building proposals that will further stimulate research in the State. So the goal is to make these nodes have a life of their own and have everyone become somewhat personally invested in the node. I, myself, will have a node, but I will oversee the performance of 8-9 nodes, but I won't be involved in their day-to-day operation.

Q: But they'll be responsible, in a sense, to you.

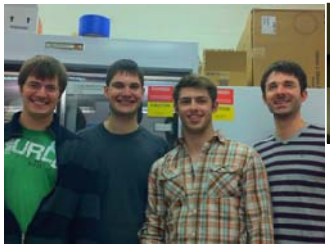
A: Right, and I will help as best I can. I will try to encourage node participants to maintain persistent and active effort, paying more attention to both outreach and reporting functions. In some cases it might simply be an educational role, the participants need to realize that this is not a typical research grant, and that the expected outputs are much broader than just research papers. Should this all work as planned, the principal benefactor of this is going to be the State of Tennessee not just the research universities (UTK or Vanderbilt). To create as Stacy Patterson coined, a Culture of Collaboration which in many ways is a change in perspective.



Single particle TEM images of *Thermosynechoccocus elongates*, photosystem I trimers with crystal structure overlay.

Chi Omega Lambda now ASBMB UAN

This year, the organization formerly called Chi Omega Lambda has changed its name to American Society for Biochemistry and Molecular Biology Undergraduate Affiliate Network (ASBMB UAN). Students still have the opportunity for induction into the Chi Omega Lambda honors society; however, this is done on an individual basis. The UTK chapter of the ASBMB UAN is open to all biology related majors and aims to offer professional development opportunities, as well as assistance in finding internships and research experiences. Past semesters activities included: graduate and medical school advising, an undergraduate research symposium, and scholarship/fellowship workshops. Additionally, NSF fellowship recipient Todd Schoborg, and Director of Biological Teaching and Learning Beth Schussler spoke about graduate school admissions, choosing a principle investigator, and life as a graduate student. UTK's ASBMB UAN was led by Chapter President Michael Jungwirth, an undergraduate researcher in Dr. Rose Goodchild's laboratory, and supervised faculty advisor Dr. Elias Fernandez. For more information regarding this organization visit our website at http://web.bio.utk.edu/bcmb/chiomegalambda.shtml.



Alaina Willet

Ryan Rickels, Michael Jungwirth (President), Brandon Birckhead, Nathan Stebbins

BCMB Vision 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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