I completed my first year as department head this past August and I am approaching my twenty-seventh anniversary as a faculty member at UT. Thinking about the department when I arrived and considering it now, I can say that the transformation and evolution of our department during my tenure here is nothing short of remarkable!

We have grown from a small unit of nine all male faculty to a diverse and robust multidisciplinary and multicultural department with expertise in computational and experimental biophysics, genetics, neurobiology, and molecular plant biology. BCMB now occupies a vibrant and pivotal position at the university as a center for modern investigation of molecular and cellular biosciences. The department is also noted for expert training of doctoral students as well as providing a critical undergraduate major for students interested in a career in research and the health professions.

During the past academic year, we have celebrated many successes and achieved a number of milestones. Our major remains the most popular of the natural sciences in the College of Arts and Sciences with 449 undergraduates declaring a BCMB concentration as of Spring Term 2014 (up from 370 in 2009). Over sixty percent of our undergraduates perform independent research in faculty labs, one of which is showcased in this issue. A number of instructors in the department are pursuing innovative teaching strategies such as inquiry-based instruction and service learning, as well as developing new courses that emphasize modern computational approaches to molecular and cellular biology, and biophysics. Also, with the help of BCMB faculty, a new inquiry-based curriculum that focuses on the development of critical thinking skills will be launched in the Division of Biology in Spring Term 2015.

We continue to recruit and retain stellar faculty in all areas of emphasis. In this issue of Discoveries, we feature a new assistant professor, Maitreyi Das, who performs research at the cutting edge of Cell Biology. In the past year, Jerome Baudry (Computational Biophysics) and Brad Binder (Plant Biology) were promoted from assistant to associate professor with tenure, and Jae Park (Neurogenetics) and Gladys Alexandre (Microbial and Plant Biology) were promoted from associate to full professor. We hope you share our pride as you read about the innovative teaching, impactful research, and student success that are driving the department’s growth and excellence.
What influences did you experience that made you want to pursue science?

**MD:** I grew up in Mumbai, India. Mumbai is a very big and very crowded city but it is also very diverse and vibrant. In many ways it is very different living in Mumbai as compared to any other place in India. It is a huge melting pot with people from all over the world coming there to “make it big”. This allowed me to have a very open and inclusive attitude towards different types of people. I went to school in Mumbai, and then moved to the neighboring state of Gujarat to work on my master’s degree at MS University of Baroda. I was pleased to be accepted because this was a prestigious institute. I then moved back to Mumbai to complete my doctoral degree at the Indian Institute of Technology.

The individual who had the greatest positive influence in my decision to pursue science was, without any doubt, my father. He was my biggest cheerleader. He always encouraged me and made me realize my potential in studying science. He had this very smart approach where he would never answer a question directly but would lead me to the answer instead. And then he would praise me for figuring out the answer myself. Needless to say, this was a big morale booster and I find myself using this approach with my students, too. Because science always fascinated me, my mother would buy these books for me called *Tell Me Why*. These books would pose and then answer all types of scientific questions in a manner understandable to kids. I was totally hooked on those books and really enjoyed them.

Later on during the summer of 1997, when I was a master’s student, I worked during the summer at the Bhaba Atomic Research Center in the lab of Stanley D’Souza. That summer I worked on purification of an enzyme, beta galactosidase, from the yeast Kluyveromyces lactis. I enjoyed the intellectual process and that is when I truly realized my passion for science.
Any advice you would offer to new graduate students?

MD: Nowadays students always tell me in very definite terms what they want to study in graduate school. This I feel is very sad since these decisions are mostly based on the latest trend and not due to a real understanding of the field. As a result, the students limit themselves very early on and sometimes do not realize their full potential. For graduate school I think the more basic the research the better. That is the only way to get a proper understanding of a biological system and build a strong foundation. Once you have a strong foundation then you can diversify to any field later. I know I am biased, but I do believe that yeast research does allow us to build the strong foundation.

Can you describe for us the path that led you to your current area of interest?

MD: When I first started working with fission yeast I realized that some mutants would display very distinct cell shape defects. I often wondered what would lead to such changes. At around the same time I had heard Professor Fulvia Verde give a talk at a meeting about cell shape control in fission yeast. I was immediately captured by the elegance of the work. Her project was very exciting and still at a very early stage. I could see that it had tremendous potential. At the end of the talk she put up this slide: “post doc wanted.” I knew I had to talk to her about joining her lab! I worked with Professor Verde for 6.5 years. Joining her lab was the best decision I ever made.

The idea of building a career in an academic research and teaching setting was not my initial goal. Throughout my life I was sure I was going to start my own business and completing a doctoral degree was a means to not only satisfy my passion for science, but also to gain the knowledge I would need to start a science-oriented business. But somewhere in the middle of my postdoctoral position I realized that my interest was changing. I was always thinking about my work and trying to come up with new ideas, to solve challenging problems, and to discover something new. In other words, I was addicted to science and I could not see myself doing anything else other than exploring the basics of biology. Now as I am setting up my lab I have to admit I do feel all this is a lot like setting up a small business. Another strong motivator for me was that I loved teaching.

Is there any advice you might give to others in managing the various transitions from one career stage to another?

MD: When I have a chance to offer advice to undergraduates who want to do research I tell them to read a lot. There is no substitute for knowledge; doing research without understanding it is futile. Do not hesitate to ask questions, as there are no stupid questions. When given the opportunity to advise graduate students looking for postdoctoral positions, I tell them to first look at the research and make sure it really appeals to you. See if this is something you can make your own. Also, the lab needs to have a stable track record of publishing and producing successful post docs. Always ask the Project Investigator (PI) during the interview what his or her vision is for you. Where does the PI want you to be in say, 3-4 years? If the PI’s answer does not match your career plans and goals, you are better off looking for another position.

I’m just starting my position as a new faculty member and I remember the advice I received from my post doc mentor regarding being a new faculty member was, “It is not a race but a marathon”. Take things easy and do not stress too much or be too hard on yourself. Believe in yourself and sure enough, ideas will follow.
What started three years ago with twenty-five faculty from UT, the UT Medical Center, and Oak Ridge National Laboratory (ORNL) has now expanded to a group of more than seventy-five scientists. NeuroNET has received funding from the UT Office of Research and Engagement, the UT Medical Center and the Graduate School of Medicine, the College of Arts and Sciences, College of Engineering, College of Nursing, and the College of Veterinary Medicine, as well as the Department of Audiology and Speech Pathology affiliated with UT Health Sciences Center in Memphis. The group has also received a $10,000 grant from the Kavli Foundation, a non-profit institute supporting scientific research and public science awareness.

With that support NeuroNET has funded collaborative seed grant research projects, brought in seminar speakers, held retreats the past two fall semesters, organized a variety of research networking activities, and supported graduate student travel to neuroscience conferences. NeuroNET also co-sponsored a conference at ORNL this past spring: “The Multi-Scale Brain: Spanning Molecular, Cellular, Systems, Cognitive, Behavioral, and Clinical Neuroscience”.

Organizing NeuroNET also led to the creation of an undergraduate Interdisciplinary Major Concentration in Neuroscience, with Professors Prosser and Hall as Head and Associate Head, respectively. The Neuroscience concentration, which has an Honor’s option as well as a minor, combines courses from multiple departments and colleges, and provides undergraduates with a broad introduction to neuroscience. Its strong emphasis on research experience has already paid off – one of the first Neuroscience majors, Ashley Charest, just started an internship at National Institute of Health (NIH) working in the neuroscience lab of Professor Dax Hoffman. Although just in its second year, there are already more than seventy neuroscience majors, and there are many students combining the neuroscience major with BCMB. There is also a neuroscience opportunity fund, where donations will support undergraduate research and travel.
Meng Li was born in a rural area by Dongting Lake in Hunan Province, China. His parents are farmers who grow rice, cotton, canola, vegetables and some fruit to meet their family’s needs and some surplus for income, in a combined area less than an acre. They believe that good education is the base for their child’s bright future, so they encouraged Meng to work hard in school instead of in the rice field. Meng met his parents’ expectation and went to one of the best high schools in his area. In his high school biology class, he learned and was fascinated by the fact that biologists can manipulate microbes and get the desired products. As a result, Meng went to college at China Agricultural University where he majored in biological sciences. Soon after he got into college, he was overwhelmed by the classification classes where lots of memorization was necessary. He only remembers that cyanobacteria can emit hydrogen gas under anaerobic conditions from his plant sciences book. However, this single piece of information helped Meng in making the decision regarding the direction of his graduate study.

In his senior year, he looked around to see who was studying hydrogen production using cyanobacteria. Coincidently, Professor Barry Bruce published a paper in Nature about the hydrogen production using cell free system that year. Meng contacted Professor Bruce from China for the access to the full text of that publication and Professor Bruce encouraged him to apply to University of Tennessee. Meng’s graduate research in the Bruce lab involves the investigation of the structural organization and evolutionary origins of the photosynthetic photosystem I complex (PSI). PSI is one of the largest membrane proteins in nature and a key component for oxygenic photosynthesis. Specifically, Meng has been investigating the structural complexes of this critical photosynthetic center in higher plants and in ancestral Cyanobacteria (aka blue-green algae) species which are evolutionary progenitors of higher plant chloroplasts. His recent work is on the photosystem I complex (PSI) from an unusual species of cyanobacteria, Chroococcidiopsis sp. TS-821 (TS-821) found in hot springs from northern Thailand. Meng’s structural work shows that unlike higher plant PSI which monomeric and ancestral cyanobacteria which are trimeric are, the Chroococcidiopsis PSI complex forms an unusual tetrameric complex. From analysis of the structure and phylogeny of the key protein (PsaL) which affects PSI oligomerization, Meng and co-workers have generated a novel PSI evolutionary model: the tetrameric PSI may be an evolutionary intermediate between the ancestral trimeric and the modern monomeric plant PSI. This also provides additional insight regarding the cyanobacterial origin of plastid evolution.

Last spring this work was published in the prestigious journal *The Plant Cell*. In the spring of 2014 Meng received UT Science Alliance awards in recognition of his research accomplishments.
And that is what Andre Agassi, a senior BCMB student, is studying. Andre is from Nashville, Tennessee and decided to go to the University of Tennessee at a young age because many of his family members graduating before him from UT. Currently, Andre is an undergraduate research assistant in the lab of Professor Jim Hall. Much of Andre’s work has centered on the sand fiddler crab, Uca pugilator. Crabs hear sound differently than humans because they live under water and they lack ears. Crabs sense changes in water pressure with tiny hair all over their hard shells and antennae. Andre has assisted in obtaining intracellular recordings of neuron firing from the crab’s brain as well as extracellular records of vibration receptor activation from the crab’s walking legs in an attempt to better understand how the animal localizes and identifies vibrational stimuli from a variety of directions. Both neuronal firing rate and response delay were shown to encode directional differences.

Last year along with his research partner, Andre presented their findings at the Undergraduate Research Symposium. Andre’s research experience prepared him for an internship with radiation therapy center 21st Century Oncology where he served as a research fellow this past summer. In addition to his research, Andre is very involved on campus where he is a president of Mortar Board and a SAA member. Andre is currently writing his Honors Thesis under the guidance of Professor Hall. Through Professor Hall’s mentorship, Andre’s undergraduate lab research has greatly heightened his experience at the University. Last spring Andre received the Dr. John R. Staley, Jr. Scholarship that has been established to recognize an outstanding BCMB undergraduate who intends to attend medical school after graduation from UT. John R. Staley is a UT graduate and president of physician recruitment and retention at TeamHealth. Andre recently took the MCAT exam and plans to go to medical school in the near future.
Giving opportunities

Your gifts make a difference! Over the years, we have been fortunate to receive generous donations from a variety of supporters, including former graduates. These gifts have made it possible for us to offer undergraduate and graduate scholarships. Other donations have been used for Research Incentive Awards to faculty who propose pilot projects that promise to lead to extramural grant funding from national agencies. Our generous donors have made all of these things possible.

To contribute online, please visit: bcmb.utk.edu/support-the-department and click on “Give to UT”.

Congratulations graduates!

Congratulations to the 130 BCMB undergraduates who graduated in 2013-2014!

Congratulations to the graduate students of 2013-2014:

Master Degrees Awarded:
Tuo Zho (Associate Scientist at GlaxoSmithKline)

Doctor Degrees Awarded:
Shih-Jui Hsu (Postdoc at University of Cincinnati)
Stephanie Madison (Lecturer at University of Tennessee, Knoxville)
Pintu Masalkar
Katelyn Rosendall
Rebecca Wilson
Jianzhuang Yao (Postdoc at the University of Kentucky)
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