



Biochemistry & Molecular Biology

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UNDERGRADUATE NEWSLETTER



With this issue of the **BMB Undergraduate Newsletter**, we are pleased to return to our series of interviews with BMB faculty. This semester we feature Dr. J. Martin Bollinger, Professor of Biochemistry and Molecular Biology.

UN (Undergraduate Newsletter): *What is the immediate goal of the research being conducted in your laboratory?*

Dr. Bollinger: We seek to define in atomic detail the mechanisms of metal-containing enzymes that use molecular oxygen to oxidize biomolecules. We detect, trap, and characterize by rapid kinetic and spectroscopic methods extremely reactive intermediates in these processes. We ultimately determine their electronic and atomic structures by a combination of several spectroscopies and computational methods (e.g., density functional theory).

UN: *What are the possible larger implications/applications for the findings of your research?*

Dr. Bollinger: The implications are two-fold. First, we believe that by understanding Nature's strategies for these kinds of chemical transformations, we can point the way to the design of new chemical and catalytic processes. Second, we believe that by understanding the mechanisms of the enzymes, we can rationally design inhibitors and inactivators that may ultimately be used as drugs against cancer, viruses, and diabetic complications.

UN: *Why did you choose to pursue a career in academic research and why in this particular field?*

Dr. Bollinger: I got hooked in graduate school on the exhilaration that goes with understanding an aspect of life's inner workings that no one has previously understood or even conceived of.

UN: *What do you look for in selecting an undergraduate student to do research in your lab?*

Dr. Bollinger: First, I want to see decent grades. Poor grades are, to me, an indication that a person is willing to accept fail-

ure. In research, temporary failures abound, and good researchers have to be determined to overcome. Second, I try to assess if someone is actually interested in science for its own sake. Majoring in pre-med is a bit of a negative to me, because I know how hard it is to get into med school, and I immediately suspect that a student is just trying to make his/her application look better by doing research. Third, I try to assess whether someone's personality fits into my group. Self-confidence and motivation are the big keys. My group works hard, and the grad students and post-docs are busy. A good undergraduate student will have to be a little bit of a pest to get the training needed to become independent. Fourth and foremost, I try to guess if a student will ever become independent. It's hard to guess, but I take a shot.

Kudos to Faculty

Because winning prestigious awards brings honor not only to the individuals who win the awards but also to the department and school in which they conduct their research, it is always a pleasure to recognize faculty who are singled out by their peers in national competitions. The BMB Department is doubly fortunate to have Drs. Katsuhiko Murakami and Carsten Krebs designated as a Pew Scholar and Beckman Young Investigator, respectively. Each of these awards carries with it multiple years of support for research programs. The benefit to students in the majors of the BMB Department is that these investigators will have funds to purchase equipment and supplies to be used, in part, to support the research of undergraduate students in their labs.

We're having a Mixer.....Y'all come!

The annual BMB mixer for students who are new to the University Park campus, i.e., First Year students, transfer students, and international students, will be held September 8, from 3:30-5p.m. in the plaza area between Althouse and Frear Labs. The mixer affords an opportunity for new students to meet BMB faculty – maybe their advisor?! – and some of the officers of the student clubs. Oh, and did we mention food? Come, join together for a pleasant time of informal conversation and snacks. Who knows, you just might meet some new friends and future instructors!

BMB Welcomes 4 New Faculty

The BMB Department is pleased to announce the addition of the following new faculty members to its ranks:



Dr. Stephan Schuster comes to Penn State from the Max-Planck Institute for Developmental Biology in Tübingen, Germany, where he served as head of the genome center. Dr. Schuster's research involves high quality sequencing of prokaryotic and eukaryotic genomes. His lab has completed 5 bacterial genome projects which involved not only sequencing but also annotation and comparisons of the genomes, i.e., bioinformatics. Future research projects will involve screens for specific sets of genes, genome dynamics and maintenance, and functional genomics. Dr. Schuster's office is located in 314 Wartik Lab.



Dr. Andrey Krasilnikov received his Ph.D from the Institute of Chemical Physics, Russian Academy of Sciences. He comes to Penn State following two postdoctoral positions in the Department of Molecular Genetics at the University of Illinois at Chicago and the Department of Biochemistry, Molecular Biology and Cell Biology at Northwestern University. Dr. Krasilnikov's research focuses on the high-resolution structure of Ribonuclease MRP (Mitochondrial RNA Processing) and the biochemical and biophysical characterization of protein-ribonucleoprotein complexes. Dr. Krasilnikov has his office in 106 Althouse.



Dr. Kathleen Postle arrives at Penn State from the School of Molecular Biosciences at Washington State University in Pullman, Washington, where she held the rank of Professor and served as Associate Director of the School's Graduate Program. Dr. Postle's research investigates how gram negative bacteria (using *E. coli* as a model) transduce energy generated in the cytoplasmic membrane to the energy-deficient outer membrane, using the energy transducer protein, TonB. Dr. Postle's office is located in 306C Althouse.



Dr. Yanming Wang earned his BS in Biochemistry from Shan-Dong University, his MS in Developmental Biology from Shang-Hai Institute of Cell Biology in the Chinese Academy of Science, and his Ph.D. in Molecular, Cellular and Developmental Biology from Iowa State. Dr. Wang conducts research on the regulation of chromatin function via molecular and epigenetic mechanisms that include methylation and phosphorylation of histones in the fruit fly, *Drosophila*. Dr. Wang has his office in 332 South Frear.

The BMB – Forensic Science Connection

As many of our readers may already know, the University is now offering a [Forensic Science](#) major which is housed in the Eberly College of Science. Dr. Robert Shaler, who will serve as Director of the academic program, and Dr. Mitchell Holland, who will serve as the chief academic officer for the undergraduate curriculum of the major, have been granted professor and associate professor appointments respectively in the BMB Department. Their offices will be in Whitmore Laboratory.



Dr. Robert Shaler received his Ph.D. in Biochemistry from the BMB department's historical predecessor in 1968. He undertook a postdoc at the University of Pittsburgh before joining the faculty in Medicinal Chemistry at Pitt. With a growing interest in forensic science, Dr. Shaler took a position in the private sector, and over the next several decades, developed forensic tests and worked in homicide investigations in New York City. In 1990, he established the largest forensic biology department in the United States in the Medical Examiner's Office of NYC. It was Dr. Shaler who assumed responsibility for identifying the 2749 people who died in the 9/11 World Trade Center attacks. In March, he was the recipient of the first Penn State Graduate School of Arts and Sciences Humanitarian Award.



Dr. Mitchell Holland received his Ph.D. in Biochemistry from the University of Maryland in 1989 and next took a postdoctoral position at Johns Hopkins. Until 2000, he worked in the Armed Forces DNA Identification Laboratory. He then became the founder of Forensic DNA Consultants in Manassas, Virginia. Dr. Holland will also be teaching a section of BMB/Micrb 342 and BMB 401 for Forensic Science majors.

Cooperative Education – A Growing Program

Each semester, students in the three majors of the BMB Department take advantage of the opportunity to apply what they learn in the classroom and instructional laboratories in a work-place setting. Students who undertake cooperative education acquire a better appreciation for the science they study at Penn State, for the importance of particular subjects and classes that are required or that they may elect to take, and for the professionalism that will be expected of them when they enter the work force on a full-time basis. Biotc majors in the General Option are especially encouraged to consider cooperative education, but BMB and Micrb majors who are not contemplating graduate study or professional school would do well to think about the co-op experience.

To provide some idea of the value of a co-op experience, we share part of the findings of a survey conducted by the College's Co-op Office of SP04, SU04 and FA04 graduates who participated in the co-op program.

Question: *Do you believe your co-op experience had an impact on your acceptance to graduate or professional school or in securing a full-time position in industry? Please explain.*

38 (97%) of 39 respondents answered "yes". Respondents commented that co-op experience was discussed during interviews, showed grad schools they were well-rounded, provided them with solid references, etc.

Question: *Did your co-op experience help you with your courses at Penn State (i.e., resulted in better lab performance, clearer understanding of concepts covered in classes, etc.)? Please explain.*

69% of respondents answered "yes". Respondents commented they believed they were more focused on school after their co-ops, that labs and lectures became more meaningful, and that they had a higher level of comfort and confidence with material. Those who said "no" to this question indicated they had completed all of the relevant courses prior to their co-op assignments, or their assignments were not directly related to their courses.

Questions: *Would you recommend co-op participation to other science students? What words of wisdom would you like to share with other students considering co-op?*

100% of respondents answered "yes". Most comments encouraged students to take advantage of what the program can offer in terms of networking, gaining experience to help with future employment prospects, developing a broader skill base to help with post-graduation career choices, learning about yourself and your interests, etc.

To give readers an idea of where coop opportunities exist and to identify classmates who might be willing to share their experiences, herewith is a list of students who engaged in the co-op program in SP05:

Study Abroad – What a Way to Learn!

Every year, about 7-10% of undergraduates in the College of Science choose to study abroad. That means that 90-93% of students in the College are missing out on a fabulous opportunity to study, travel, make friends, acquire new perspectives, and simply absorb the rich differences between the US and another culture – all this while making normal academic progress toward their baccalaureate degree. Ask yourself at what other point in your lifetime are you likely to have the opportunity to spend an extended length of time living in another country and experiencing another culture? On Tuesday, September 27th, from 11 a.m.-5 p.m. in Alumni Hall in the HUB, the Education Abroad office will hold its annual study abroad information fair. In addition to representatives from the Study Abroad office, the Eberly College of Science will have available faculty and staff who have visited several sister institutions in the United Kingdom that are a part of the College's Student Exchange Program. Students who have participated in the Study Abroad program will also be available to share their experiences and views on the program. It is never too early to begin the planning process for study abroad.

The following students from the BMB Department will be studying abroad for the entire 05-06 academic year:

- **Yana Miteva** (BMB) at the University of Louis Pasteur in Strasbourg, France.
- **Bryan Ferlez** (BMB) at the IES Center and various local institutions in Milan, Italy.

The following students will be studying abroad for the FA05 semester:

- **Mary Bryson** (Micrb) at the Umbra Institute and Università per Straniere di Perugia in Perugia, Italy.
- **Seraphim Thornton** (BMB) will study at the IES Center and various local institutions in Paris, France.

This summer, **Peter Barth** (BMB) studied at the CIEE Study Center for Language and Culture in Seville, Spain.

DON'T MISS AN OPPORTUNITY THAT IS LIKELY TO COME JUST ONCE IN A LIFE TIME!

Undergraduate Fellowships

The University's Undergraduate Fellowships Office has information about the many prestigious national fellowships for which outstanding undergraduates may wish to apply. Information regarding two of these fellowships has recently arrived in the BMB Department.

Fulbright Grants – Fulbright Grants pay for one year's study or research or teaching in 140 different countries outside the US. A grant covers travel, insurance, tuition and living costs. Applications are made at the start of the senior year and, if successful, students take their grant in the year following graduation. 1100 Fulbrights are awarded every year. For more information, plan to attend an informational meeting on September 1 in the Grandfather Lounge of the Schreyer Honors College at 2 p.m. or in 169 Willard at 6 p.m. Other sessions will be held on September 7 at 6 p.m. in 203 Willard and on September 8 in 167 Willard at 6 p.m.

Gilman International Scholarships for Undergraduate Study Abroad – Gilman Scholarships were created by Congress to enhance the student population that studies abroad, especially in nontraditional destinations, by supporting undergraduates who traditionally have been underrepresented in study abroad. *Underrepresented* includes student's with high financial need, students in fields such as the sciences and engineering, students with diverse ethnic backgrounds, with disabilities and who are of nontraditional age. Deadline for application is September 20, 2005.

Over the years, many students in the 3 majors of the BMB Department have won Fulbrights and other prestigious national awards. The BMB Department has had Goldwater, Marshal, Gates/Cambridge, and St. Andrew's Society scholarship winners. Just remember, one cannot win a scholarship if one does not *apply* for a scholarship. For more information on these and other scholarships, go to www.ufo.psu.edu.

Undergraduates Win Awards

Several undergraduates in the BMB Department were honored with University Awards in the Spring and Summer of this year.

Luis M. Agosto (Micrb 05) received the Multicultural Resource Center's Academic Scholarship Award for 2005. Luis, also a McNair Scholar, will begin his graduate studies at the University of Pennsylvania this Fall. Luis conducted his undergraduate research in the lab of Dr. Eric Harvill in Vet. Science.

Yana Miteva (BMB) was the recipient of a 2005 Undergraduate Summer Discovery grant awarded by the University through the office of the Vice Provost for Undergraduate Education. Yana carried out her summer research in the laboratory of Dr. Robert Schlegel.

Attention Junior Clinical Lab Science Students...

An informational meeting for students of at least Junior standing in the Clinical Laboratory Science option of the Biotechnology major who will have completed all University-based courses by the end of SP06 will be held on Wednesday, September 7th, at 7 p.m. in 101 S. Frear. Information regarding the professional opportunities, selection of a clinical site, admission to clinical sites, grading policy, and a timeline for applying will be discussed. A Q&A session will follow. If you cannot attend this meeting, please see Dr. Mohr in 124 S. Frear as soon as possible. Students who think they may be interested in this program or who simply want to learn more about the profession are also invited to attend.

Looking for a Profession with Guaranteed Job Placement?

In the Sunday, July 10, 2005, edition of *The Washington Post*, a lead article was titled Med Techs in Short Supply. Salient points made in the article were: 1) qualified CLS personnel in the US has reached a critical level, 2) the Bureau of Labor Statistics estimated that 13,000 new CLS professionals would be needed *each year* between 1998-2008, 3) fewer than 5,000 new CLS professionals are graduating from clinical programs resulting in a shortfall of 8,000 professionals each year. For those willing to enter the profession, this means competitive salaries, sign-on bonuses, and incentives to cover less popular shifts. That, of course, is in addition to a solid base salary plus an excellent benefits package. Clinical laboratory personnel are considered the 'linchpin' in the diagnosis and treatment of disease. They play a critically important role...they are the 'wizard behind the screen' according to the *Post* article. Undecided about a major and profession? Maybe a look at the CLS Option of the Biotechnology major is in order??

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