



Biochemistry & Molecular Biology

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UNDERGRADUATE NEWSLETTER



Continuing the series of interviews with faculty in the Department of Biochemistry and Molecular Biology, *BMB Undergraduate Newsletter* talks with Dr. Jean Brenchley, Professor of Microbiology and Biotechnology, about her research interests and what she looks for in a student who might wish to carry out research in her laboratory. Following are her answers to the questions posed by the *Newsletter*.

1. What is the immediate goal of the research being conducted in your laboratory?

Our research objective is to discover and characterize psychrophilic microorganisms and their potentially useful cold-active enzymes. We examine the microbial diversity of unique cold environments, isolate novel organisms, and examine them for the production of key enzymes such as beta-galactosidases and proteases. One project explores the microorganisms in a 120,000-year-old Greenland glacier ice sample where we discovered previously unknown ultra-small cells that can pass through the 0.2 micron filters often used to sterilize media. These results were highlighted in an American Society for Microbiology press release on "The small, cold, and hungry." Another project, also highlighted in the news, examined sub-seafloor sediments and found an abundant archaeal population with unknown physiologies and no cultivated isolates. We have extracted and sequenced DNA from this sediment and are using metagenomic analyses to explore the metabolic pathways of the archaeal cells.

2. What are the possible larger implications/applications for the findings of your research?

The detection and isolation of novel organisms adds information about the diversity, growth, physiology, and survival of microorganisms in different environments. We have isolated and characterized representatives of new genera and species and developed techniques for growing previously uncultured organisms. Our methods suggest new approaches for isolating members of this uncultivated prokaryotic majority that dominates Earth. In addition, the Greenland glacier ice and sub-seafloor sediment provide geological records of the Earth's past and we are collaborating with geologists to deter-

mine whether microbial metabolism may have altered the chemistry of these cores.

There are potential commercial applications for our isolate collection and the cold-active enzymes we have examined biochemically. The organisms may produce important antibiotics or other useful chemicals and the enzymes could have applications in processing refrigerated foods, low temperature laundry detergents, biological research, etc.

3. Why did you choose to pursue a career in academic research and why in your particular field?

Most of my career has been in academic research, but I was a research director at a small biotechnology company during the early (wild) days when "putting biology to work" was new. My few years in biotechnology were very rewarding and I learned the value of using recombinant DNA methods to convert microorganisms into high yielding production cells. For me, continuous learning is vital, and academic research provides both the opportunity to explore questions as they arise and to pass that scientific quest on to students. My fascination with microorganisms began when I realized that cells too small to be seen could do all the biochemistry we can do, plus much more! Our exploration of cold environments adds to our knowledge of the repertoire microorganisms have for surviving extreme conditions for hundreds of thousands of years and provides insight useful to astrobiologists considering the possibility of life elsewhere in the solar system.

4. What do you look for in selecting an undergraduate student to do research in your lab?

We enjoy sharing our excitement with enthusiastic, motivated students who think analytically and have a great desire to learn. Scientific research is a progression of asking important questions, designing and conducting experiments to test hypotheses, and interpreting (and often reinterpreting) data. The research process is similar to solving scientific puzzles where testing your own ideas and finding a result or solution that no one else knew is exhilarating. Unfortunately, experiments often yield confusing clues so we have to constantly reevaluate our ideas and data. Enthusiastic, inquisitive students are not discouraged when they obtain conflicting data, but use these events as opportunities to test their own ideas for solving a biological mystery.

4 Honors Students Receive Summer Research Scholarships

The BMB Department was honored to have four of its undergraduates named as recipients of a Summer 2006 Research Scholarship from the Schreyer Honors College. Receiving awards of \$1000 to conduct research over the Summer were: James Nasralla (BMB '07) in Dr. E. Koc's lab, Nicholas Spidale (Micrb '07) in Dr. Harvill's lab, Sean Xin (BMB '06) in Dr. Tien's lab and Anastasiya Yakhnina (BMB '07) in Dr. Keiler's lab. Congratulations on this fine recognition of scholarship!

5 Students Share Department Awards for Summer Research

Through the generosity of corporations and private donors, funds become available each year to support the research activities of outstanding undergraduates during the summer months. These funds are awarded to students on what is typically a very competitive basis. Funds come from monies that are given directly to the department or that are generated as interest from endowments. The BMB Department was pleased to have the following five students supported by these funds over the summer: Ryan Collins (Micrb '07) in Dr. Konan's lab, Chad Kuny (BMB '07) in Dr. Teng's lab, Khushbu Patel (BMB '07) in Dr. Ades' lab, Kristen Singer (BMB '08) in Dr. Babitzke's lab, and Holly Wolcott (BMB '08) in Dr. Reese's lab. We trust the summer's research efforts proved to be productive and rewarding!

Attention New Students!!

We're having a mixer.....don't miss it!

The BMB Department and student clubs will sponsor a mixer for all students who are new to Penn State or to University Park, that is, all First Year students and transfer students. Come meet BMB faculty, staff, student club officers and some of your peers in an informal setting with refreshments provided. The Mixer will be held on **Thursday, September 14**, starting at **3:30 p.m.** and ending around 5:30 p.m. The Mixer will be held in the courtyard between North and South Frear. Besides having a good time, this may be an opportunity to meet your academic and/or professional advisors and to begin some relationships that may even last beyond the four years of undergraduate study. Oh, and did we mention, free food will be available!!

.....and attention Clinical Laboratory Science students with 5th or greater semester standing

An informational meeting for students of Junior standing or higher in the Clinical Laboratory Science option of the Biotechnology major and who will have completed all University-based courses by the end of SP07 will be held on Wednesday, September 13th, at 7 p.m. in 101 S. Frear. Information regarding professional opportunities, selection of a clinical site, admission to clinical sites, grading policy, and a timeline for applying will be discussed. If you cannot attend this meeting, please contact Dr. Mohr 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.

Attention Sophomores & juniors.....

If you are considering the possibility of studying abroad or participating in Co-operative Education, it is never too early to begin the planning process. Ms. Susan Knell is in charge of both programs and would be more than happy to speak with you. The Co-operative Education/Study Abroad office has moved to a new location and is now in **108 Whitmore Lab**. Think about taking classes while living in the United Kingdom, France, Germany, Singapore, New Zealand, Australia. Is this any way to get an education!! **YOU BET IT IS!**

Join a Club? Yes...this is for YOU!!

As most students quickly come to appreciate, Penn State offers a tremendous number of clubs and organizations that match the interests of virtually all undergraduates. One important interest that students should realize they share with a subset of other students is their chosen or intended major. Just as it is important for a student to select a major that is 'right' for him/her, so it is *equally* important to find the 'right' social environment that complements the choice of what may become a life-long career. That is one purpose for student clubs.

The BMB Department supports two student clubs: **The Biochemistry Society** and the **Penn State student chapter of the American Society for Microbiology**. Membership is NOT exclusive. In fact, given the common science foundation required in BMB, Micrb and Biotc, you may wish to join both clubs regardless of your major! What do you get from your membership? Well, there is fun, information, peer advice, a sense of professionalism, and an opportunity for service to the Department, College, University and larger community to name just a few reasons. To get the greatest benefit from club membership, do not allow it to be just a listing on your resume. Like many other organizations, members get out of a club what they invest in it. These are student-run clubs. What do you want beyond the classroom and lab? Club membership may be the way to find what you are looking for, and YOU can play a role in the direction the club takes. Clubs usually meet once a month on a regular schedule. Check department bulletin boards for meeting announcements.

For 'Leisure' Reading....

Want a break from all the technical reading that classes in your major require? Want to curl up with a book that is light reading but still in the area of your major? May we suggest two books that fit the bill?

Global Disease Eradication: the Race for the Last Child by Cynthia Needham and Richard Canning (ASM Press, 2003). As described by the publisher, *The authors present the history of three separate campaigns to eradicate a major infectious disease worldwide. The first, against malaria, though undertaken with ambition and optimism, ultimately failed... In contrast, the campaign against smallpox succeeded for a wide variety of reasons. Now public health workers are within a hair's breadth of eradicating polio – the third campaign – but tremendous uncertainties still surround the effort. Needham & Canning contribute a clear evaluation of the social, political, scientific and economic considerations, both for the 3 specific campaigns described and for all future efforts toward protecting every child worldwide from deadly infectious diseases.* Pattee call number – RA651.N44

The Other End of the Microscope: the Bacteria Tell Their Own Story by Elmer W. Koneman (ASM Press, 2002). *This entertaining book offers a unique and fascinating look at the relationship between bacteria and humans, told from the bacteria's perspective. Gathered at an imaginary assembly, the microbes compare notes on their history and current coexistence with humans, from their own view of pathogenesis to the often derogatory manner in which humans assign their names. The fantasy culminates in a session at which the bacteria have a contest to rename Homo sapiens in an attempt to sensitize humans to be more prudent in the naming of future species of bacteria accentuating their positive, rather than negative qualities.* Pattee library call number – QR74.8.K664

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