

LAB NOTES

JUNE 2011

A LIFETIME OF HELPING STUDENTS

Virginia Peterson Leaves Biochemistry with Gifts of Student Success

After a 31-year career at MU, Virginia Peterson, teaching professor of biochemistry, can see the fruits of her work to excite students about science and help them enter careers well suited to their talents and aspirations. Her students are found all over the world in positions with industry and business, government, higher education, research, medicine and medical arts.

Her philosophy, she said, is simple — listen and connect with each student, understanding that each person is an individual with a unique history, learning style and aspirations. Her goal is to adopt her teaching approach to the student, rather than have the student adapt to the teacher's style.

"...you know it was worth it when the student looks up and says, 'oh, now I get it.'"

Most teachers, she said, are auditory learners and teach that way. Unfortunately, most students are visual or kinesthetic learners — people who learn by doing. A classroom lecture, she said, is among the worst ways to teach scientific subjects to these students. To better succeed at reaching them, the trick is to learn what kind of learning style is strongest in each student and then teach in that method.

That often means getting innovative. A little cheerleading and some pom poms to show a chemical relationship? Why



Virginia E. Peterson, Ph.D., Teaching Professor, Division of Biochemistry, University of Missouri

not, it gets attention and demonstrates a concept that fails on the blackboard. Instead of one more verbal description, sometimes a student needs an adventurous project to go through an individual discovery process. "Yes, it takes more time with this approach," she said. "But you know it was worth it when the student looks up and says, 'oh, now I get it.'"

Peterson came to MU in 1980 to teach biochemistry. Two years later she was assigned to advisory duties. Later, she became Biochemistry's Director of Undergraduate Advising. She saw at least 8-10 students a day and "answered e-mails all of the time." Questions range from navigating the academic process to career advice to help with personal problems.

Her pre-professional students have gone into a wide variety of occupations and their questions can touch on ophthalmology, pharmacy, pre-med and pre-vet, anesthesiology, law

and intellectual property rights, as well as landing a job in research, government and higher education. With help, she has seen students overcome financial and illness problems and then go on to successful careers.

"Often, it's most gratifying to talk to students who think they need to be doctors," Peterson said. "After we have given them opportunities to explore other career options and test their skills, they find the things that they really want to do and are good at. This is real success — when someone has a substantial lifetime involvement in what they really are excited about in life."

Peterson attributes her success as a teacher to two things: knowing the material and understanding the best way to present it. In addition to the typical blackboard-based lecture, she has used pom-poms and a bit of acting showmanship to reach visual learners. In a writing-intensive Capstone class, she coached stu-

dents on how to think, organize and communicate, as well as the material being studied.

This kind of effort earned Peterson several teaching awards including one for helping students with various challenges to succeed in a science-intensive program. In 2006 she was named the Missouri Academic Advising Association's Outstanding Faculty Advisor. To honor her, the Biochemistry Department will endow a scholarship in her name.

She will still contribute to student success even after she leaves MU. Royalties for her best-selling textbook, *Fundamentals of General, Organic and Biological Chemistry*, will help fund a scholarship.



Dr. Peterson dances with Professor Emeritus Joe Polacco at her retirement reception, May 2011

Inside this issue:	
Scholarship Toss-Up	2
Twice as Nice for Faculty	2
Biochemistry: A World of Career Opportunities	3
Zhang Finds Missing Link	3
Biochemistry Majors are Hughes Research Scholars	4
Virginia Peterson Scholarship Fund	4
Lubahn Directs New NIH Center	4

SCHOLARSHIP TOSS-UP

Mizzou biochemistry student throws a football for national scholarship

During the Dec. 4, 2010, Big 12 Championship Game in Dallas, Alison Schwartz, a Mizzou junior from Lee's Summit, Mo., competed in Dr Pepper's Throw for Scholarship Dough contest for a \$123,000 scholarship. Schwartz was one of five semi-finalists. Each participant threw 10 footballs into a 2-foot hole cut into an 8-foot-tall soda can during a 30-second period.

As a semi-finalist, Schwartz was provided with airfare, lodging, game tickets and meal accommodations for three days in Dallas.

Future in Medicine

Schwartz intends to go to medical school after earning her bachelor's degree. Having studied piano, her initial undergraduate coursework at MU combined the creative disci-

plines of biochemistry and music. She later switched to biochemistry and English, with a minor in women's and gender studies.

"Throwing a football — well, my experience with that is exactly zero"

Schwartz is getting a jump on her medical training by working in the lab of Thomas Mawhinney, a professor of biochemistry and the director of the Agricultural Experiment Station Chemical Laboratories. As a lab assistant, she helps study microorganisms associated with cystic fibrosis airway infection.

"This is an awesome opportunity," she says of her lab work.

"This is the best chance I have had to get experience in an important medical experiment. I'm even able to pursue a related research project of my own."

Lucky Break

Schwartz might be getting experience in the lab, but she hasn't had much on the football field.

"Throwing a football — well, my experience with that is exactly zero," says Schwartz, who has played soccer since she was 6 years old. "Kicking it — that I can do much better."

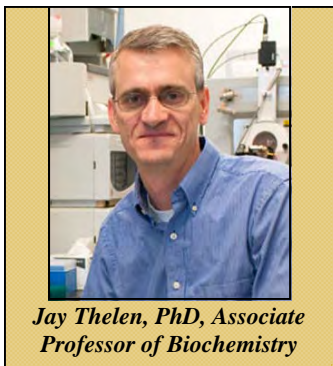
It was a serendipitous series of events that got her into the competition. She attended the ESPN College GameDay broadcast during Homecoming weekend, arriving at 2:30 a.m. with her face painted like a



Alison Schwartz, a Mizzou biochemistry student, won a \$5,000 scholarship in Dr Pepper's Throw for Scholarship Dough football throwing competition.

tiger's and accompanied by cape-clad, megaphone-using friends.

"I guess we were a little crazy looking," Schwartz recalls. A Dr Pepper representative approached her and asked her to submit a 30-second video for the contest. Out of more than 10,000 submissions, hers was among the top five. While she didn't bring home the Grand Prize (winner received \$123,000 and the runner-up \$23,000), as one of the other three finalists she won a \$5,000 scholarship.



Jay Thelen, PhD, Associate Professor of Biochemistry

Jay Thelen, associate professor of Biochemistry at the University of Missouri, recently was presented two important awards recognizing promising researchers.

On March 4 he was given the first President's Early Career Award from the University of Missouri System. Colleagues surprised Thelen with the award announcement during a weekly biochemistry seminar.

TWICE AS NICE FOR FACULTY

Thelen Receives Awards from Campus and System in the Same Semester

In April, he received notification that he was the 2011 recipient of the MU Chancellor's Award for Outstanding Research and Creative Activity.

The President's award recognizes a faculty member who exhibits exceptional promise in the first seven years with the UM System. This promise may be demonstrated in scholarship, research or creativity. The formal award will be presented in June at a Board of Curators meeting.

The Chancellor's award recognizes MU faculty members who are still in the developmental phases of their careers, have made outstanding contributions in research and/or creative activity, and have

great promise for achieving wider recognition. The selection committee chooses individuals whose accomplishments are impressive and yet, as mid-career professionals who are rising in their fields, have not yet reached the senior level in their particular field of endeavor.

Most of Thelen's research centers on the large-scale study of proteins and their post-translational modifications, an emerging discipline known as proteomics. His lab is involved in the development and validation of cutting-edge technologies used to identify and quantify proteins, requiring the use of advanced mass spectrometry instrumentation. Using these technologies, his lab is gaining

an understanding of plant seed development from the perspective of the proteins dynamically expressed in the cell.

"Jay combines a deep involvement in fundamental biochemistry with an ability to advance cutting-edge technology, said Jerry Hazelbauer, chair of Biochemistry. "His work has generated both basic insights and practical applications in the seed industry."

Since joining the Biochemistry Department in 2004, Thelen has received more than \$6.2 million in extramural funding, published 46 manuscripts in international journals and authored the book *Plant Proteomics*.

BIOCHEMISTRY: A WORLD OF CAREER POSSIBILITIES

Twelve biochemistry students have a new understanding about the future they could have after attending the inaugural CAFNR Biochemistry Industry Tour January 5-6 in St. Louis. This program, funded through a one-year grant from the Dugdale Trust, helps bright, beginning scientists better understand the career options that exist in industry, which is an area of employment that students do not often consider.

"This trip was an enlightening experience that allowed me to create a valuable relationship with potential employers, especially in an economically challenging time," said Lauren Fischer, a biochemistry student who helped plan the tour.

"It is crucial for all of us to see another side of science careers other than academia and medicine, which we are exposed to on a regular basis."

CAFNR Career Services, working closely with biochemistry professor Dr. Shari Freyermuth and biochemistry undergraduates Liam Smyth and Lauren Fischer, planned the two-day trip to explore opportunities at Monsanto, Solae, Sigma-Aldrich and



Front Row: Annette Mense, Lauren Fischer, Rachel Schmidt, Catherine Renna, Megan Dowdle
Back Row: Dr. Shari Freyermuth (Trip Advisor), K. Morgan Davis, Alexander Stokowski, Theodore Floros, Nick Calcaterra, Blake Welschmeyer, Liam Smyth, Emily Sellers

Sensient Colors. In addition to the company visits, CAFNR Advancement hosted a dinner during the tour as a networking opportunity for industry partners, St. Louis-area biochemistry alumni, biochemistry faculty and students.

"The contacts that you make during a program like this can help shape and guide you to be an extremely talented scientist, lawyer, or even business man," said Smyth. "There is no better way for a Mizzou student to

put his or her name out there and observe the types of careers they can have."

Companies were excited to have the opportunity to interface with future colleagues. As one industry professional indicated, "This tour really sets Mizzou apart as a place interested in preparing students."

Although formal evaluations from the tour have not been received, preliminary results indicate success. Student par-

ticipants said that the tour broadened their career horizons and that they now have a better idea of the value of their degree.

"Science is going to be what molds our futures," said Smyth. "A degree in biochemistry opens you up to limitless opportunities in a field that will always be in need of young, bright minds. I had no idea that I had so many career options!"

ZHANG FINDS MISSING LINK

Botrytis bunch rot, a disease caused by the fungal pathogen *Botrytis cinerea*, can devastate grape vineyards. Yet other plants can repel the invader and protect themselves by mounting a form of chemical warfare against the fungi through the production of antimicrobial substances, called phytoalexins.

Scientists at the University of Missouri report on a discovery in a key component in the signaling pathway that regulates the production of phytoalexins to kill the disease-

causing fungus *Botrytis cinerea*.

"When the mustard plant *Arabidopsis* detects the fungus *Botrytis cinerea*, it produces a phytoalexin, called camalexin, in response," said Shuqun Zhang, professor of biochemistry and senior author of the study. "Camalexin acts as sort of an antibiotic against the specific fungus, allowing the plant to successfully defend itself."

In previous work, Zhang and his colleagues showed a sig-



Botrytis cinerea on grapes

naling pathway, known as MAPK cascade, triggers the transcription activation of genes that make camalexin in *Arabidopsis*. This study shows that the target of this signaling cascade is the WRKY33 transcription factor.

Arabidopsis plants lacking the gene are unable to synthesize

camalexin and are more susceptible to the *Botrytis cinerea* fungus.

The finding provides an important missing link in the chain of molecules that tells the plant to mount an appropriate defense against an invading microbe.

"Phytoalexins are one important way plants defend themselves naturally against pathogens. Knowing how plants regulate this defense response may allow us to naturally enhance pathogen tolerance in plants," Zhang said.

BIOCHEMISTRY MAJORS ARE HUGHES RESEARCH SCHOLARS

Undergraduate Biochemistry students take advantage of Hughes Fellows program

More than half of this year's University of Missouri Hughes Research Scholars, four out of seven, are Biochemistry majors.

The Hughes Research Fellowship program is coordinated by the MU Office of Undergraduate Research. Fellows participate in a full calendar year of research, working on life science projects that include

computational biology or bioinformatics components. Fellows will also work closely with journalism students to communicate results through a science news portal, Sci-Xchange.

The program centers around a concept called C3 – Collaboration, Computation and Communication. The C3 program offers additional training opportunities for undergraduates

throughout the year, including a regional computational biology conference, summer biomedical informatics institute and a science journalism forum.

The C3 Program is supported in part by a grant to MU from the Howard Hughes Medical Institute through the Precollege and Undergraduate Science Education Program.

VIRGINIA PETERSON SCHOLARSHIP FUND

Biochemistry Department Endowing Scholarship to Honor Long Time Faculty Member

Dr. Virginia Peterson is a testament to incredible teaching. From her atomic watch to her unique ability to make the complex both fascinating and exciting, she has delighted us, enriched us and taught us what it means to be a great teacher, mentor and friend. Students, faculty, alumni, friends and family are creating the Virginia Peterson Scholarship Endowment Fund as a tribute to her dedication to her field, students, CAFNR and Mizzou for the past 31 years.

"Virginia E. Peterson Scholarship in Biochemistry" on your check) and send by mail to:

**CAFNR Office of Advancement
2-4 Agriculture Building
Columbia, Missouri 65211**

Or make a gift online at: donatetomu.missouri.edu/givedirect and go to the College of Agriculture, Food and Natural Resources Section and click on the image you see below; it's that easy.



Teaching Professor Dr. Virginia E. Peterson retires July 2011 after 31 years with the Division of Biochemistry.

How You Can Help

At the University of Missouri an amount of \$25,000 is needed to endow a scholarship. An anonymous donor has agreed to match funding for the endowment up to the first \$10,000. Join us as we raise funds to award a scholarship in her name.

How to Donate

Write a check payable to the University of Missouri (write:

Contributing writers for Lab Notes, newsletter for Biochemistry: Ginger Berry, Stephanie Chipman, Melody Kroll, and Randy Mertens.

We want to hear from you! Send us your Mizzou alumni updates:
<http://cafnr.missouri.edu/alumni/connecting-point.php>

Lubahn Directs NIH Botanical Research Center

Created with a new \$7.6 million grant from the National Institutes of Health, the Center for Botanical Interaction Studies is a collaborative effort that spans life sciences research at MU. The center is housed within the MU Biochemistry Department and will lead interdisciplinary and collaborative research on botanical dietary supplements.

The center will focus on five different plants and their abilities to aid in the prevention of strokes and prostate cancer, as well as improve resistance to infectious diseases. Botanicals that will be studied include: garlic, soy, elderberries, and sutherlandia, a common medicinal plant in Africa; and *Picrorhiza*, an herb that grows primarily in the Himalayan mountains.



"With the technology we have at MU, the potential for large impact, novel discoveries is tremendous." said Dennis Lubahn, PhD, principal investigator of the project and a professor of biochemistry and child health in the School of Medicine and College of Agriculture, Food and Natural Resources.

C3 In FOCUS



Derek Benham,
Junior

Webb City,
Missouri

Project topic: Determining the tertiary structure of light harvesting complex using UVR.

Faculty mentor: Jason Cooley (Chemistry)

Kayla Knuf,
Junior



Highland,
Illinois

Project topic: Determining & comparing sensitivity of different technologies in detecting heteroplasmic mitochondrial DNA mutations.

Faculty mentor: William Folk (Biochemistry)



David Kirby,
Junior

Columbia,
Missouri

Project topic: Enrichment of plant protein through targeted Lysine expression.

Faculty mentor: William Folk (Biochemistry)

Mitchell Padkins,
Freshman



Troy,
Missouri

Project topic: Using Proteomics to identify proteins that enable cancer cells to metastasize to other tissues.
Faculty mentor: Vladislav Glinskii (Anatomical & Pathological Sciences)