creating the right chemistry

College of Pharmacy's Secret to Continuing Success

John W. Mauger, Ph.D.

By SUSAN SAMPLE
Researchers' Portraits by JAY A. BOROWCZYK

Updating a *curriculum vita* four times in nine months is an honor Dean John W. Mauger, Ph.D., welcomes, even when the awards being added aren't his.

- **Inaugural University of Utah Distinguished Mentor Award**
- **Utah Governor's Medal in Science and Technology**
- **U.S. Presidential Early Career Award for Scientists and Engineers**
- **President, International Society for Pharmacoeconomics and Outcomes Research**

Chris M. Ireland, Ph.D.
Recipient, Inaugural University of Utah Graduate Student and Postdoctoral Scholar Distinguished Mentor Award

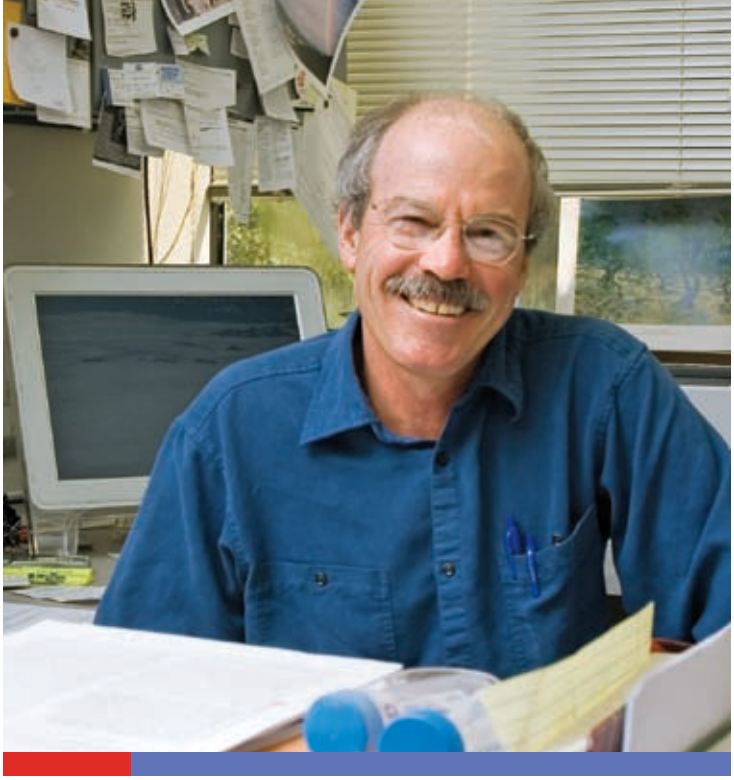
Technically, *curriculum vitae* summarize individuals' professional history and qualifications. But the Latin phrase for "course of life" is equally applicable to the U of U College of Pharmacy, where a history rich in faculty accomplishments accelerated its course last fall with awards bestowed from across the world as well as the campus.

Mauger isn't surprised. The College of Pharmacy has, for the past 31 years, ranked in the nation's top four pharmacy schools for the amount of research money awarded by the National Institutes of Health (NIH). Last year was no exception with the U ranked nationally at Number 2. Mauger credits the continuing success to a faculty persona the college has nurtured since early in its development.

"The tone for who we hire and what we expect of them—not only nice people who will be collegial, but those who have the potential and the drive to be successful in a competitive environment—was set many years ago by Ewart Swinyard," said Mauger, referring to the college's second dean. The first, L. David Hiner, Ph.D., is credited with creating the professional program and securing a building for the college. Harold H. Wolf, Ph.D., who served as dean from 1976-89, "was a visionary who reorganized the college and built innovatively on what Ewart began," said Mauger.

To define the characteristics of a successful faculty member, though, Mauger quotes Swinyard, who wrote in a 1976 article: " '...the quality of a faculty can be measured in terms of teaching skills, accomplishments in local and national circles, and ability to attract federal research grants and contracts.'

"It's an interesting academic genetics," noted Mauger. A Pennsylvania native who came to Utah from the University of Nebraska Medical Center, he began his 12th year as dean last October. When he joined the U, two of his predecessors and three of the college's founding department chairs were still



Glenn D. Prestwich, Ph.D.
Recipient, Utah Governor's Medal in Science and Technology

on faculty. "I was the outsider to this successful genetic pool. I've tried to be respectful of that history. I've looked at my job as simply to sustain."

Judging from the number of recent accolades, the U pharmacy college is not only sustaining its success, but drawing national attention to its unique chemistry that has created a community of prize-winning faculty.

A team of health economists from Columbia and Stanford universities last spring identified Chris M. Ireland, Ph.D., professor and chair of the U Department of Medicinal Chemistry, as being above the 95th percentile of the distribution of NIH grants over the last 25 years. The economists hypothesize that highly successful awardees "positively influence the research productivity" of their colleagues.

"My guess is there will be a clear correlation," said Ireland, though it's hardly conjecture on his part. The first to be honored at the U with the Graduate Student and Postdoctoral Scholar Distinguished Mentor Award, he regards mentoring not only as an essential responsibility of faculty, but also as an ongoing process that enhances colleagues' research.

"You need a series of mentors at different stages in your development. My Ph.D. mentor taught me how to critically evaluate information, to design experiments, to ask questions in an unbiased way," recalled Ireland, who earned his doctorate at Scripps Institution of Oceanography. "My postdoc mentor taught me how to run a lab of my own and be responsible for the oversight and direction of graduate students."

When he assumed his first faculty position at the University of Connecticut in 1980, he realized the need for a different sort of mentor. "The first time I wrote a grant, it was very unstructured: a free flow of my ideas. When the reviews came back, they said, 'Too bad you can't put your ideas together in a hypothesis.'

"A senior colleague re-read the critique with me and ripped the grant apart. It was probably the most humiliating experience in my life," said Ireland. He persevered, however, sitting down with his mentor every day for two weeks to rewrite the proposal.

"That grant was just renewed for the 25th year. I believe it's one of the longest-standing on this campus," said the researcher. With that NIH grant alone, he has brought $20 million to the U for investigations into anti-cancer properties of chemicals produced by marine organisms, including sponges and mollusks. Last October, he was awarded a five-year, $5.9 million grant from the National Cancer Institute to lead a National Cooperative Drug Discovery Group, a consortium of three university research teams.

To make the grant-writing process easier for junior faculty in the medicinal chemistry department, Ireland, along with the former chair, instigated a formal mentoring process five years ago. Every assistant professor has three mentors—one from the department, one from the pharmacy college, and one from outside the college—who provide support as well as sympathetic voices of experience. "The average time until you receive your first NIH award is five to six years into your career. You can feel humbled by the process. You want to talk to others."

Mentoring, from Ireland's perspective, is not limited to young faculty members and graduate students, however. "It starts with undergraduates, helping them with problem-solving skills and the ability to critically analyze information, not just memorize it." It's a responsibility he takes equally seriously and at which he excels. Ireland was honored with the college's Distinguished Teaching Award at convocation last spring.

Not all Ph.D. graduates from the U College of Pharmacy will pursue academic careers; three-quarters will enter industry, according to Glenn D. Prestwich, Ph.D., U of U presidential professor of medicinal chemistry. "But there are relatively few labs that directly prepare them. It's like a passing acquaintance. In my lab, they're steeped in commercialization."

For anyone who thinks of *commercialization* in negative terms, Prestwich has a ready response: "No technology reaches a patient unless it's commercialized. Period."

In December, he received the Utah Governor's Medal in Science and Technology. Last September, he was honored as a "Health Care Hero" by *Utah Business* magazine. Both awards recognize the contributions Prestwich has made through medical technologies he has created and helped commercialize. His invention of a unique hydrogel, for instance, has near-term applications in wound healing and stem cell research, and in making drug discovery more efficient. In the long-term, these hydrogels are integral to "organ printing": an emerging branch of medicine in which cells are taken from patients' damaged organs and used to literally print three-dimensional tissue for repairing diseased and damaged organs.

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Just as students need varied experiences to be competitive, faculty members need an environment that supports creativity and innovation. Prestwich, a self-described "serial entrepreneur," straddles the academic-industrial divide. He is a pharmacy faculty member who holds adjunct appointments in the chemistry, biochemistry, and bioengineering departments. He also has helped launch five spin-off technology companies related to his research: Echelon Biosciences, Inc., Sentrx Surgical, Inc., Carbylan BioSurgery, Inc., Sentrx Animal Care, and Glyocosan Biosystems.

"The university permits you to pursue your dreams and chase after ideas that may, or may not, become technologies," noted the researcher, who holds a bachelor's degree from the California Institute of Technology and a doctorate from Stanford University. "Business is about focus and focus and focus—and focus some more. It takes the cool ideas generated in the lab and goes with one. Small companies would crumble under the weight of too much diversity."

Not only does this variety of work stimulate Prestwich, but it also enriches students' education. "We're preparing them for careers in real time. By doing research, they learn the importance of focus and how to triage their own ideas," explained Prestwich. "They come in contact with scientists, engineers, business plans, marketing research, and people who deal with money and evaluate cash flow. A lot of universities don't recognize the educational value of this."

Another important partner in Prestwich's research is the State of Utah. Two programs he directs—the college's Center for Therapeutic Biomaterials and the Center for Cell Signaling—received funding from the state's Centers of Excellence Program. Along with those jobs comes another opportunity—"mentoring faculty on campus who have ideas that may have commercial potential," said Prestwich. "I really enjoy that."

The researcher attributes some of the college's success to a university-wide collaboration. "In my experience—30-odd years at various institutions—the U of U is unique in the seamless interdisciplinary exchange between the College of Pharmacy, the School of Medicine, and the College of Engineering. In most places, the walls were too high to jump over. Here, people say 'Yes, this is important to me, and I want to do it.'"

When Yihua Bruce Yu, Ph.D., was interviewing in Salt Lake City for his first faculty position in 2000, he was primed to make a major change: "I'd never been in a College of Pharmacy. I'd always been in more traditional departments—biophysics, biochemistry, or basic science." He had just completed a postdoctoral fellowship in peptide chemistry at the University of Alberta, preceded by another in nuclear magnetic resonance spectroscopy at the State University of New York, Buffalo. "I wanted to try something new."

What Yu didn't anticipate was taking a new direction with his research. Yet he has successfully met both challenges. The U assistant professor of pharmaceutics and pharmaceutical science was honored last July with a U.S. Presidential Early Career Award for Scientists and Engineers (PECASE). The government's highest award for promising independent researchers carries with it up to five years of research funding.

The common denominator in helping Yu make both decisions was the caliber of the Utah pharmacy faculty. "William Higuchi, Sung Wan Kim, Henry Kopeček—they're all top-notch in pharmaceutical sciences. To have the top players in the field in one department, that's quite unusual," he noted.

After Yu accepted his position at the U, the senior faculty members became his role models. "Through their examples, I've learned how to function as an independent investigator and educator. They do set high standards for me," he acknowledged, "but their achievements tell me that I can do the same thing."

Higuchi, Ph.D., distinguished professor, was assigned to Yu as his formal mentor, but all three faculty have served in that role. They lent him copies of funded grant proposals, so he could study the format and learn the system. Later they met with him to critique his early proposals on classic protein-folding research.

"My senior colleagues encouraged me to try something new," said Yu, who shifted his research to developing biocompatible and soft biomaterials for use in drug delivery and tissue repair. "I think that was very good advice."

But he didn't change the direction of his investigations solely on the basis of their words. "Observation is important," stressed Yu, who learned from studying the trajectory of his mentors' careers how to shape his own. "They constantly pursue new research topics. I think that's a key to their success.

Yihua Bruce Yu, Ph.D.
Recipient, U.S. Presidential Early Career Award for Scientists and Engineers (PECASE)

Diana I. Brixner, Ph.D.
President, International Society
for Pharmacoeconomics and Outcomes Research

"Here, I've learned to try to do something different—which is different from doing something trendy. Branch out: learn it and do it. That's very refreshing to me, especially from where I came." At Johns Hopkins University, where he completed his Ph.D., Yu saw how some faculty pursued the same line of research for 30 to 40 years.

"I used to do research based on how interesting the project was to me," he said. Although curiosity remains the driving force for his work, it is no longer the only consideration. "The question I ask now is: how useful is it to society and pharmaceutical science? That's quite a change."

Improving the global health economy through better decision-making is the goal Diana I. Brixner, Ph.D., has set as newly elected president of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR).

It's a far-reaching ambition. But you have only to scan her *cv* to see that Brixner, associate professor and chair of the U Department of Pharmacotherapy, has a history of translating her passion for scientific inquiry into innovations.

You'll also notice that she shares in the College of Pharmacy's "academic genetics": she earned a Ph.D. in medicinal chemistry from the U in 1987.

"The interest of the faculty in different disciplines to work toward common goals is powerful here. I recognized that as a graduate student," said Brixner. "The core values, and many of the core faculty, are still here in the college: very high standards and high quality. That all continues to carry through generations of faculty."

Since returning to the U in 2002, Brixner has made major changes. The pharmacy practice department she chairs has been renamed "pharmacotherapy" to better reflect the expanding role of professional pharmacists. Pharm.D. graduates continue to receive strong clinical training, but also learn to make better health-care decisions regarding drug therapy in patients through outcomes research.

"That's the science that's helping answer questions, such as 'What is the value of this drug? What is the benefit?' It's often called 'real-world studies,'" explained Brixner. "Outcomes research goes beyond what is found in clinical trials to show the benefit of drug therapies."

From her first job as a research scientist at NeoRx, a small biotech company in Seattle, Brixner has asked tough questions of the science she pursues. "When I was creating pharmaceutics to treat cancer, I wondered how will they be available to patients and who will pay for them?" When she moved into marketing with SmithKline Beecham Pharmaceuticals, Brixner, like the managed-care companies she dealt with, wanted to know the value of new drug therapies, so she created a group at the corporate level to find answers. At Novartis Pharmaceuticals, where she served as vice president for health-care management, she received the 1998 Pioneer Award for developing a collaboration with the Veterans Administration Hospitals Systems on ACE inhibitors.

At the U, Brixner has established the Pharmacotherapy Outcomes Research Center (PORC). Funded by contracts with the pharmaceutical industry, foundations, managed-care organizations, and the government, PORC conducts studies ranging from the cost-effectiveness of drug therapies to quality-of-life assessments to economic modeling. Students in the college's Pharm.D. track are offered six-week clerkships; two graduate students in the department's master's program also are studying at PORC. Executive director Brixner would like to add an outcomes research doctoral program in the department.

"Pharmaceuticals play an important role in health care. Outcomes research contributes to better decisions," said Brixner. "Drugs get a lot of attention, because the annual rate of utilization growth is faster than in other aspects of health care. Roughly 10 percent more is spent each year on pharmaceuticals."

U.S. researchers aren't the only ones studying the proliferation and benefit of new drugs. "How to allocate the budget for pharmaceuticals is a common goal," noted Brixner, who last October attended a meeting of the European Science Foundation in Copenhagen. "Internationally, entire countries are asking the same questions."

With PORC, an outcomes research center internationally recognized, and Brixner at the helm of the pharmacoeconomics international society, the U College of Pharmacy already is tackling those questions. When researchers eventually formulate answers, Dean Mauger no doubt will welcome adding yet more awards to the college's *cv.* ◩

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