



Paul Hopkins, Chair

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Dear Friend of Chemistry,

Greetings from Chemistry at the UW. Beginning with this issue, we are trying out a new publication schedule, with two short issues in Spring and Summer and a longer issue at year's end.

As I write, Congress and President Obama have failed to prevent our nation from tumbling over the fiscal cliff. As a result, it is estimated that the UW could lose \$100 million in research funding, yielding job losses and damaging research programs. Loss of revenues to our state government may lead to reduced state funding for the UW. In turn, that will inevitably shift more of the cost of undergraduate education to students.

On a bright note, we have nearly completed another recruitment cycle for new faculty members. We are excited that one will join our ranks; we await word from others. I realized in this round that we increasingly find ourselves competing with the very best institutions in the country, and occasionally even in the world. This speaks volumes about the quality of our existing programs and bodes well for our future.

Last month, we completed renovation of the third of four undergraduate labs in Bagley Hall in which freshmen experience introductory laboratory instruction. The airy, well-lighted, remodeled spaces are an incredible improvement over the dark and crowded labs built in the late 1930s.

Our students and faculty members regularly receive prestigious awards for their accomplishments. I was especially pleased recently to learn that two of my colleagues, Professors Michael Gelb and Frank Tureček, have been selected to receive the Gustavus John Esselen Award for Chemistry in the Public Interest. This award is presented annually by the Northeastern Section of the American Chemical Society. Past recipients include luminaries whose discoveries have changed our lives, such as F. Sherwood Rowland and Mario Molina, who taught us about the devastating impact of chlorofluorocarbons on our planet's ozone layer, and Carl Djerassi, who contributed to the development of birth control pills. Professors Gelb and Tureček are being honored for the development of the first sensitive, specific, and inexpensive assay to detect lysosomal storage diseases in newborns. These diseases are rare, but devastating. In many cases, early detection affords the best chance for therapeutic intervention. These assays appear destined to join those

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Pauling Medal Symposium

On October 6, 2012, the Department of Chemistry hosted the 47th Annual Pauling Medal Symposium and Award Banquet in honor of Robert J. Cava, the Russell Wellman Moore Professor of Chemistry at Princeton University. The Linus Pauling Medal Award is jointly sponsored by the Puget Sound, Oregon, and Portland Sections of the American Chemical Society.

From left to right: Neal Yakelis, Chair, Puget Sound Section; Whitney Schmidt, Rosa Grajczyk, Geneva Laurita-Plankis, Representatives of the Oregon Section and Oregon State University graduate students; Robert J. Cava, 2012 Pauling Medalist; James M. Mayer, 2012 Symposium Chair; William P. Reinhardt, 2012 Pauling Medal Award Chair; David Terrell, Chair, Portland Section; Not pictured: Richard Nafshun, Chair, Oregon Section

Photos: above: Nancy Wade
in masthead: Jupiterimages/photos.com
right: Kevin McHugh





Sean Fischer

Gary Drobny



Courtesy of Deborah Wiegand

Deborah Wiegand

After six years as Associate Chair for Undergraduate Studies, Professor Philip Reid has stepped down to take on a new role as Associate Vice Provost for UW-IT Academic Services. Taking the reins are Professor Gary Drobny, now Associate Chair for Undergraduate Studies, and Dr. Deborah Wiegand, recently appointed as Director of Entry-Level Programs.

A short conversation with the two reveals their concern for and commitment to today's students whose need and cost to attend college are greater than past generations.

How has the undergraduate program changed in the past 10-20 years?

Debbie: There is more structure in the 100-level program. Each professor used to make his or her own decisions on the logistics of each class. Now there is a framework for the 100-level courses that provides consistency and some efficiencies. In addition, technology has changed the way we manage our classes with a course learning management system, new communication pathways, and a web-based artificial intelligence homework system.

Gary: The Department's increase in enrollment is greater proportionally than the University's due, in large part, to the biochemistry major introduced in 1990. However, there are broader changes as well. Three decades ago, people went to college because they could; their taxes paid for it. The last few tuition increases have caused a change in attitude at the UW to serve the undergraduates well for the money they spend to be here.

What are the challenges?

Gary: For the first time, we are teaching a generation that has never lived without the Internet. The bar is raised as to the amount of material students expect to receive.

Debbie: The increase we see nationwide in online learning opportunities challenges us to examine our use of technology, or lack of use, to ensure we are enhancing student learning.

What are the opportunities?

Gary: We have to prepare students to do well in the world they live in. Knowing what to look for and how to use that information should be the focus of our teaching.

Debbie: The questions being asked about teaching and learning are an opportunity for us to create a more effective learning environment for our students. Several Chemistry lecturers are exploring the feasibility of "flipping the classroom," where material is presented electronically before class and active-learning is the focus of class time. Continuing these discussions is crucial to improving our program for the thousands of students in entry-level classes each year.

Debbie, you are back in the Department of Chemistry after a decade as a UW administrator. How are you different?

Debbie: My role in Undergraduate Academic Affairs required that I represent the entire University and all undergraduate students. Spending 12 years thinking about how undergraduates find their way at the UW and how the University can enhance the student experience, and learning what they need for their future, means I now think differently about the students in my classes and my role in their UW experience. Coming back to the Department, I bring a broader understanding of how the University works as well as an awareness of the challenges across campus and how they have been met.

Welcome, Gary and Debbie, to your new roles in the Department!

—LETTER FROM THE CHAIR *continued from page 1*

that are already applied to all newborns in our country and elsewhere. As a result, many lives will be changed for the better. It will be my great pleasure to be present at Harvard University in April when the award is presented.

I hope you enjoy this and every issue of the ChemLetter. Please accept my best wishes, and please stay in touch!

Paul B. Hopkins
Professor and Chair

Karen Goldberg receives Hopkins Faculty Award

On March 15, Karen I. Goldberg, Nicole A. Boand Endowed Professor of Chemistry, received the 2012 Paul B. Hopkins Endowed Faculty Award. Her lecture, "Collaboration in Chemistry: Growing the Center for Enabling New Technologies through Catalysis (CENTC), the first NSF Center for Chemical Innovation," highlighted her experiences transitioning from a sole-investigator research program to a lead role in a large-scale multi-investigator collaborative effort to solve big problems in chemistry. She spoke about CENTC's work that put it in the forefront of the NSF Chemistry Center program where it has become a model for encouraging collaboration over competition in science. She also described the Center's origins, its diverse activities, and the lessons learned along the way about how to assemble and direct a successful center-based research program.

Goldberg joined the University of Washington from Illinois State University in 1995 as Assistant Professor of Chemistry. She was named the Raymon L. and Rosellen M. Lawton Distinguished Scholar in Chemistry in 2007,

and in 2010 she became the inaugural Nicole A. Boand Endowed Professor of Chemistry. Goldberg is the director of the NSF-funded CENTC, a collaborative effort among 18 principal investigators and their students at 14 institutions across North America (www.nsfcentc.org).

She is a Fellow of the Alfred P. Sloan Foundation and the American Association for the Advancement of Science, and a member of the Washington State Academy of Science. She has trained more than 40 graduate students and postdoctoral research associates and almost 50 undergraduate students in her research group.

The Hopkins Award is presented to a faculty member of the Department of Chemistry to honor outstanding achievement in any area of professional responsibility. Previous Hopkins Award recipients include Michael Gelb, Charles T. Campbell, Alvin L. Kwiram, James M. Mayer, and František Tureček.



Courtesy of the Dept. of Chemistry

Karen Goldberg

In Memoriam: Bruce Kowalski, Professor Emeritus

Bruce R. Kowalski, 70, alumnus and professor emeritus of chemistry at the UW and a pioneer in the field of chemometrics, passed away on December 1, 2012, from a rare form of lymphoma.

Kowalski (Ph.D., 1969) returned to the UW in 1974 after working as a chemist and geophysicist at the Shell Development Company, a chemist at Lawrence Livermore Laboratory, and an assistant professor at Colorado State University. He became Endowed Professor of Analytical Chemistry in 1991.

His primary research interest was in the application of pattern recognition and other artificial computer intelligence methods to chemical and biological problems, and ultratrace metal analysis by mass spectroscopy. Kowalski was a founder of the field of chemometrics—the science of extracting information from chemical systems by data-driven means. He was the founding editor of the journal *Chemometrics* and the founding director of the NSF-funded Center for Process Analytical Chemistry at the UW. He founded the company Infometrix in 1978.

His numerous accolades include the Malcolm E. Pruitt Award from the Council for Chemical Research (1988),

Theophilus Redwood Endowed Lectureship from the Royal Society of Chemistry (1989), and the Torbern Bergman Medal from the Swedish Chemical Society's Analytical Division (1993).

As an educator, he touched the lives of many of his students and colleagues.

Following his retirement in 1999, Kowalski joined the Fort Lewis Mesa Fire Department in Durango, Colorado, where he specialized in HazMat. He and his companion dog, Chaco-Bob, were a key part of the district's canine search and rescue program.

Kowalski is survived by his wife of 38 years, daughter, son, and two siblings.



Courtesy of Sandy Torgeson

Bruce Kowalski and his dog Chaco-Bob

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FOCUS ON RESEARCH

The absolute configurations of the bitter acids of hops determined

Werner Kaminsky, research associate professor and department crystallographer, has recently determined the absolute configurations of the acids from hops that give beer its characteristic bitter flavor. The absolute configurations, or “handedness,” of several types of humulone molecules were determined by x-ray crystallography. The research, done in collaboration with researchers at KinDex Therapeutics, was reported in *Angewandte Chemie*.

Humulones are bitter substances from hops (*Humulus lupulus*) that act as natural preservatives. When beer wort is heated with hops, chemical reactions occur forming rearrangement products. These products—bitter compounds known as *trans*- or *cis* iso-alpha acids—give beer its characteristic flavor. When humulone molecules rearrange, a ring containing six carbon atoms is converted into a five-membered ring where two different side groups can be arranged in four different ways. The determination of the configuration of these compounds is complex because the isomerization process of humulones results in a large number of very similar compounds that must be separated, purified, and converted into suitable salt crystals.

These absolute configurations contradict some of the results previously reported in the scientific literature. Earlier reports relied on indirect methods to determine the configuration of alpha acids. The findings of Kaminsky, *et al.* raise the question of how suitable the indirect methods (Horeau method, Cotton effect) really are.

The researchers have also been able to determine in detail the mechanism of the rearrangement. There are some indications that the hops' bitter acids, when isolated from beer and enriched, may have positive effects on diabetes, some forms of cancer, inflammation, and weight loss. However, the effects seem to vary substantially depending on the absolute configuration. KinDex is working to develop a therapeutic drug to treat people with glucose management issues and insulin sensitivity, pursuing trials on humulone derivatives. Now that their stereochemistry is definitively known, the role of these molecules can be seriously tested, since the binding of alpha acids to proteins requires that their “handedness” be compatible with each other.

