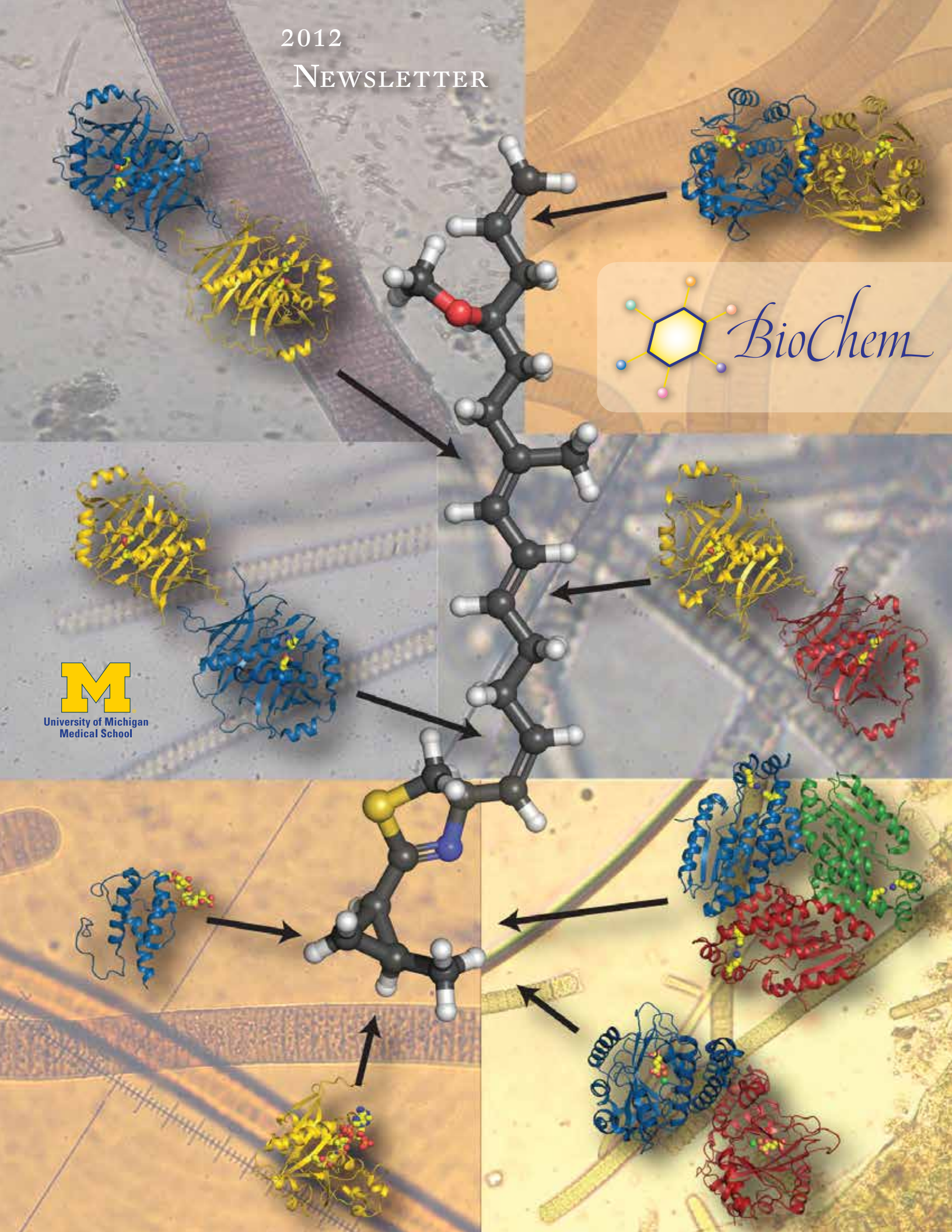

2012
Newsletter
BioChem
University of Michigan
Medical School

A Letter from the Chair : Dr. William L. Smith

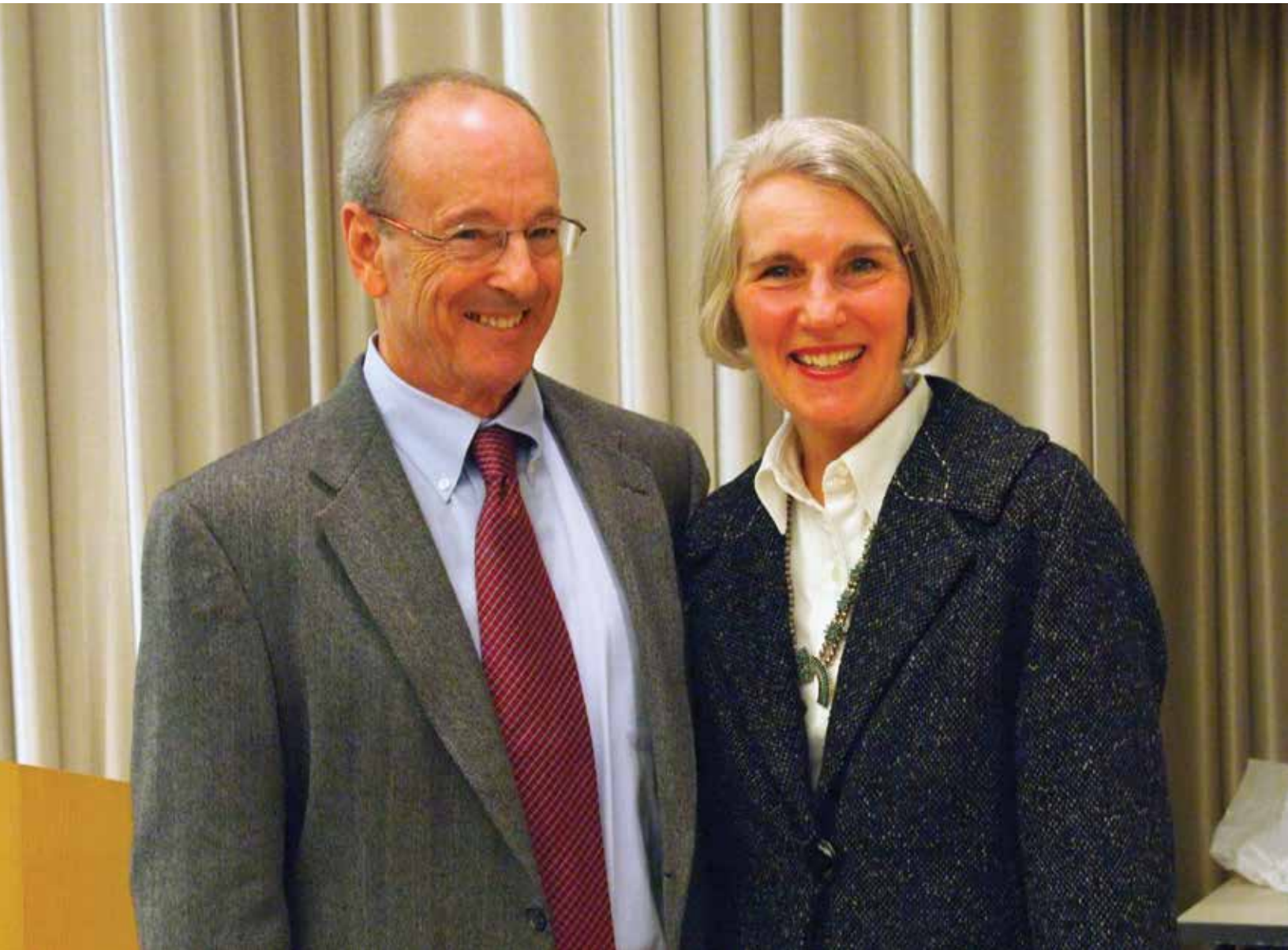
Dear UM Biological Chemistry Friends,

As I write, it is mid-Fall in Ann Arbor, football season is progressing and basketball season is in the offing. The remnants of hurricane Sandy passed through The Water Winter Wonderland of Michigan two nights ago and removed the leaves from almost every tree in a single day. Today there are clouds and few leaves . . . . you get the picture.

Things are never dull in Biological Chemistry and this year was no exception.

We continue to recruit excellent faculty. There have been two stellar additions this past year—one from without and one from within. Uhn-Soo Cho is a new Assistant Professor recruited from a highly successful postdoctoral position at Harvard Medical School. He studies the structure and function of centromeres. John Tesmer is a new Professor whose laboratory is located in the Life Sciences Institute. John's tenure home remains in Pharmacology. He received the ASBMB Young Investigator Award in 2010. John, who is still a young investigator, is a crystallographer

Bill and Andrea Smith



who has made brilliant contributions to our understanding of G protein function.

As all of you know, funding for science and particularly basic science has become increasingly competitive over the past ten years. Indeed, grant writing has become a near full-time faculty activity. Fortunately, departmental faculty have had many successes. Of note, Patrick O'Brien received an American Cancer Society faculty development award (Pat was promoted to Associate Professor in September 2012), Aaron Goldstrohm received an American Cancer Society Research Scholar Grant, and Ray Trievel and Bruce Palfey both were awarded NSF funding. I also congratulate Steve Ragsdale on his new NIH MERIT Award and Georgios Skiniotis being named one of 96 recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE).

Although no one really completely retires from Biological Chemistry, Bob Zand is formally retiring on December 31, 2012, Paul Weinhold retired on June 30, 2012, and Dave Ballou began a retirement furlough this fall. Bob plans to retain an office in Biophysics and to train undergraduate students. Paul has plans to spend more time traveling with his family and to guide me as I do my best to take over a section of his teaching in the medical school course. Dave has agreed to continue orchestrating Biol Chem 415, a key survey course for undergraduates for the next few years. There are now some 700 students enrolled in three different sections of this course. This fall Dave had a frightening and near catastrophic bicycle accident in which he broke his C-2 vertebra. This exempted him from lots of teaching. Fortunately, he seems to be recuperating well, and he expects to have his neck brace removed in the next few days. Hopefully, he will ride his bike a bit more slowly in the future.

Sadly, this year marked the passing of several former faculty and students – Fred Hoch, Jim Fee and Bill Peterson. You will read tributes to each later in the newsletter.

I informed the faculty and the Dean almost a year and a half ago that I planned to step down as Chair at the end of my term in May 2013. I've always been of the opinion that it is in the best interest of academic departments to install new leadership every ten years–by that time there is always a need for a fresh face and renewed enthusiasm. As a prelude to this, the Department undertook an internal review nicely orchestrated by Ruma Banerjee this past winter. Major suggestions for improvement that we are in the process of implementing include enhanced mentoring of young faculty, increased emphasis on grant submissions, particularly involving clinical colleagues, and implementation of an MS program.

I would like to conclude with my annual reminder that we need you to keep us informed of goings on in your world. Please feel free to send me a note (smithww@umich.edu), and I will ensure that all the relevant information is included in next year's newsletter. Alternatively, you can send us an update at the Alumni and Friends page of our BioChem website (http://www.biochem.med.umich.edu).

I hope all is well for each of you and that you have all had productive and healthy years. Best wishes for a safe and pleasant Holiday Season.

Best personal regards,

In this Issue

Faculty Spotlight Vitamin B12 in action

In a paper published in *Nature*, Stephen Ragsdale and UM alum Catherine L. Drennan (Ph.D., Martha Ludwig lab, 1995) – now a professor at MIT and an HHMI Investigator – report they have created the first full 3-D images of B12 and its partner molecules twisting and contorting as part of a crucial reaction called methyltransfer.

The reaction is vital both in the cells of the human body and, in a slightly different way, in the cells of bacteria that consume carbon dioxide and carbon monoxide. That includes bacteria that live in the guts of humans, cows and other animals, and help with digestion. The new research was done using B12 complexes from another type of carbon dioxide-munching bacteria found in the murky bottoms of ponds.

The 3-D images produced by the team show for the first time the intricate molecular juggling needed for B12 to serve its biologically essential function. They reveal a multi-stage process involving what the researchers call an elaborate protein framework – a surprisingly complicated mechanism for such a critical reaction.

The computer-generated image on the following page shows how Vitamin B12, a small molecule shown in dark green and dark blue, interacts with much larger molecules during the reaction known as methyltransfer that is vital to humans, some animals and certain bacteria. The ribbon-like structures represent the large complex molecules that position B12 in different ways during the reaction. It's the first time scientists have been able to see this reaction in progress.

Steve Ragsdale notes that this transfer reaction is important to understand because of its importance to human health. It also has potential implications for the development of new fuels that might become alternative renewable energy sources. "Without this transfer of single carbon units involving B12, and its partner B9 (otherwise known as folic acid), heart disease and birth defects might be far more common," explains Ragsdale. "Similarly, the bacteria that rely on this reaction would be unable to consume carbon dioxide or carbon monoxide to stay alive – and to remove gas from our guts or our atmosphere. So it's important on many levels."

Stephen Ragsdale

In such bacteria, called anaerobes, the reaction is part of a larger process called the Wood-Ljungdahl pathway. It's what enables the organisms to live off of carbon monoxide. Ragsdale notes that industry is currently looking at harnessing the Wood–Ljungdahl pathway to help generate liquid fuels and chemicals.

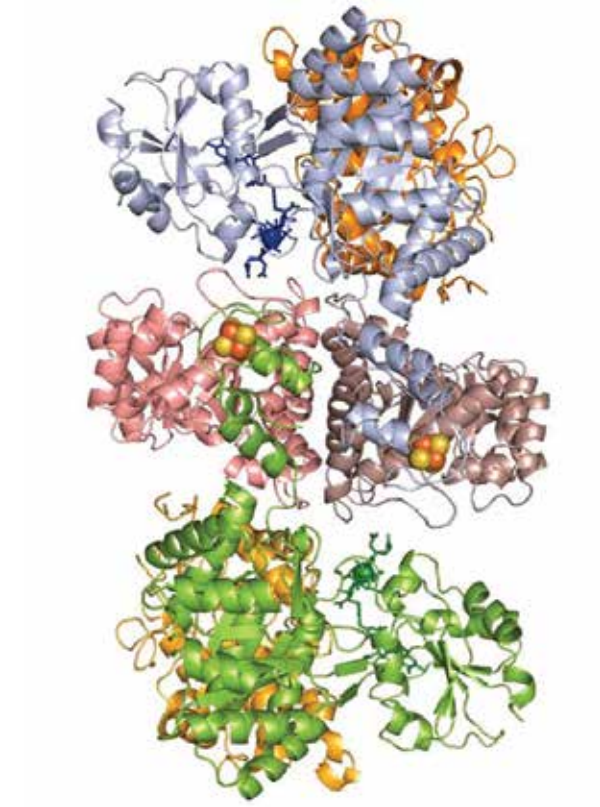
In the images created by the team, the scientists show how the complex of molecules contort into multiple conformations – first to activate, then to protect, and then to perform catalysis on the B12 molecule. They had isolated the complex from *Moorella thermoacetica* bacteria, which are used as models for studying this type of reaction.

The images were produced by aiming intense beams of X-rays at crystallized forms of the protein complex and painstakingly determining the position of every atom inside.

"This paper provides an understanding of the remarkable conformational movements that occur during one of the key steps in this microbial process, the step that involves the generation of the first in a series of organometallic intermediates that lead to the production of the key metabolic intermediate, acetyl-CoA," the authors note.

Corresponding author Catherine L. Drennan adds, "We expected that this methyl-handoff between B vitamins must involve some type of conformational change, but the dramatic rearrangements that we have observed surprised even us."

In addition to Ragsdale and Drennan, the research team included first author Yan Kung from MIT; co-authors include UM's Gunes Bender, MIT's Nozomi Ando, former MIT researchers Tzanko Doukov and Leah C. Bla-



The gymnast in action: *This computer-generated image shows how Vitamin B12, a small molecule shown in dark green and dark blue, interacts with much larger molecules during the reaction known as methyltransfer that is vital to humans, some animals and certain bacteria. The ribbon-like structures represent the large complex molecules that position B12 in different ways during the reaction. Photo credit: MIT/UM*

siak, and the University of Nebraska's Javier Seravalli.

The research was funded by the National Institutes of Health and the MIT Energy Initiative. Two U.S. Department of Energy-funded synchrotron facilities were used to produce the crystallographic images: the Advanced Photon Source and its Northeastern Collaborative Access Team beamlines supported by NIH, and the Advanced Light Source. The atomic coordinates for the structures published by the team are deposited in the Protein Data Bank under accession codes 4DJD, 4DJE and 4DJF.

Citation: Nature doi:10.1038/nature10916

Adapted from the University of Michigan Health System news release at http://www.uofmhealth.org/news/vitamin-b12-0327

Lectures

Irwin J. Goldstein Lectureship in Glycobiology

Gerald Hart, Ph.D.

"Crosswalk Between O-GlcNAcylation & Phosphorylation: Roles in Signaling, and Metabolic Disease"

September 13, 2011

Dr. Gerald W. Hart is the Director & Professor of Biological Chemistry at Johns Hopkins Medical School. He began his research on glycoconjugates about thirty-eight years ago as a graduate student, and he has been active in the field of glycobiology ever since. In the early 1980's, while probing cells with glycosyltransferases, Hart's laboratory discovered cytoplasmic and nuclear protein glycosylation by O-linked N-acetylglucosamine (O-GlcNAc) (e.g., *J. Biol. Chem.* 259:3308; *J. Biol. Chem*. 261:8049). Since that time, the Hart laboratory has published nearly 200 papers on O-GlcNAcylation, identifying and cloning the enzymes controlling cycling, characterizing O-GlcNAcylation and its interplay with phosphorylation on hundreds of proteins, and they have developed many of the tools and methods in use today to study this modification. In 1989, Hart founded the leading journal in the field, *Glycobiology*, serving as Editor-In-Chief until 2001. Hart received the first International Glycoconjugate Organization (IGO) Award in 1997, the Karl Meyer Award from the Society for Glycobiology in 2006, and is currently the president of the IGO. To date, Dr. Hart has published about 247 papers all in the area of glycosciences.

William E.M. Lands Lectureship on the Biochemical Basis for the Physiology of Essential Nutrients

Vadim Gladyshev, Ph.D.

"Selenium and Redox Biology"

October 25, 2011

Dr. Vadim Gladyshev is a Professor of Medicine at Harvard Medical School and the Director of the Center for Redox Medicine, Brigham and Women's Hospital. Dr. Gladyshev received his M.S. (1988) and Ph.D. (1992) degrees from Moscow State University, Russia. Following postdoctoral training at the National Heart, Lung, and Blood Institute, and the National Cancer Institute, he became a faculty member in the Department of Biochemistry at the University of Nebraska, Lincoln, in 1998. In 2009, Dr. Gladyshev joined the Genetics Division, in the Department of Medicine at Brigham and Women's Hospital, Harvard Medical School. He is a recipient of several NIH grants, including a MERIT award from the National Institute of General Medical Sciences and a Eureka award from the National Institute of Aging. Dr. Gladyshev is well recognized for his contributions to selenium and redox biology, for which he was elected an AAAS fellow and received a Gabriel Bertrand Award. His research combines computational and experimental approaches and focuses on thiol-based redox regulation, selenium biology, mechanisms of aging, comparative genomics, and the genetic code.

The Gladyshev lab is working on the understanding of basic mechanisms of redox regulation of cellular processes by studying selenium, reactive oxygen species and oxidoreductase functions of cellular components. Little is known about how oxidant and antioxidant signals are specifically transmitted in the cell. To understand mechanisms of redox control, one needs to know the identities and functions of participants in the redox process. Thus, his group is developing various bioinformatics approaches and carrying out genome sequencing, proteomics and functional genomics studies, which are followed with in vitro and in vivo tests of identified targets. He is particularly interested in the redox control that involves specific and stochastic oxidation of cysteine and methionine residues in proteins, as well as the role of selenocysteine residues in biology.

Martha Ludwig Lectureship in Structural Biology

Venkatraman Ramakrishnan, Ph.D.

"Unraveling the Structure of the Ribosome and its Role in Decoding"

November 7, 2011

Dr. Venkatraman (Venki) Ramakrishnan was born in India, where he received his bachelor's degree in physics from Baroda University. In 1971 he moved to the USA, and

pursued his Ph.D. in physics from Ohio University under the direction of physicist Tomoyasu Tanaka; he received this degree in 1976. Between 1976–78, Dr. Ramakrishnan was a graduate student, studying biology at the University of California San Diego. In 1978, he began postdoctoral work with Peter Moore at Yale University, where he first began working on the ribosome. From 1983–95 Dr. Ramakrishnan was a staff scientist at Brookhaven National Laboratory. In 1995 he was recruited as a professor of biochemistry at the University of Utah. In 1999, he became a

group leader at the MRC Laboratory of Molecular Biology in Cambridge, England, where he is currently located.

In the mid 1990's, after working on components of the ribosome for 15 years, Ramakrishnan's lab began working on the structure of the entire 30S subunit. In 2000, his laboratory determined the atomic structure of the 30S ribosomal subunit and its complexes with ligands and antibiotics. This work has led to insights into how the ribosome "reads" the genetic code, as well as into various aspects of antibiotic function. In the last few years, Ramakrishnan's lab has determined the high-resolution structures of functional complexes of the entire ribosome at various stages along the translational pathway. This has led to insights into how the ribosome operates during decoding, peptidyl transfer, translocation and termination. From 1983–1998, Ramakrishnan's lab simultaneously worked on chromatin structure, determining the structure of the linker histone H1/H5, its location in the 30 nm chromatin filament and the first structure of a histone modifying enzyme, the acetyltransferase Hat1. He has also made contributions to methods for phasing crystallographic data using multi-wavelength anomalous scattering.

Ramakrishnan is a Fellow of the Royal Society, a member of the European Molecular Biology Organization (EMBO) and a member of the National Academy of Sciences. He received the Louis-Jeantet prize for medicine in 2007 and shared the Nobel prize for chemistry in 2009 for his work in resolving the structure of the ribosome. Structure studies of the ribosome have helped scientists to understand how antibiotics attack bacteria, and have paved the way for improved antibiotics that will someday help people treat multiple infectious diseases. Dr. Ramakrishnan is world renowned as an authority on ribosomal structure.

G. Robert Greenberg Lectureship in Biological Chemistry

Geeta Narlikar, Ph.D.

"Mechanistic Analysis of Heterochromatin Assembly: A tale of how recognizing oneself helps recognize others"

May 1, 2012

Dr. Geeta Narlikar earned her B.Sc. and M.Sc. in chemistry from the Indian Institute of Technology in Bombay, India in 1992. She did her graduate work with Daniel Herschlag at Stanford University from 1992-1998. In her Ph.D. work she asked how RNA enzymes achieved their large catalytic capabilities. Her work helped uncover common principles underlying catalysis by RNA and protein enzymes.

Narlikar did her postdoctoral work in the Department of Molecular Biology at Massachusetts General Hospital, Boston with Dr. Robert Kingston. Here, she studied how a new type of molecular motor used the energy of ATP to alter chromatin structure. Her work suggested that chromatin remodeling motors worked akin to chaperones, us-

ing the energy of ATP to allow chromatin to rapidly access multiple different conformations.

In 2003, she was appointed Assistant Professor in the Department of Biochemistry and Biophysics at UCSF, becoming Associate Professor in 2010. Narlikar and her group are interested in understanding the biochemical basis for the different biological functions of chromatin remodeling motors. Their work has shed light on how chromatin-remodeling motors have evolved strategies to tackle the unique challenges associated with altering chromatin structure. In the last five years, Narlikar and her group have also developed an interest in understanding the molecular basis for heterochromatin spread.

Her honors include the Beckman Young Investigator Award (2006), the Leukemia & Lymphoma Society Scholar Award (2007), and the Outstanding Faculty Mentorship Award presented by UCSF graduate students (2011).

The Distinguished Graduate Lecture

Martin Hemler, Ph.D.

"Roles of Palmitoylation, Diffusion, and Tetraspanin Association During Integrin-Dependent Carcinogenesis"

May 22, 2012

Dr. Martin E. Hemler is Professor, Cancer Immunology/AIDS, Dana-Farber Cancer Institute, and Professor, Department of Pathology, Harvard Medical School. He obtained his Ph.D. with William E. M. Lands in 1978; his thesis was *Purification, stabilization, and autoregulation of cyclooxygenase-catalyzed prostaglandin formation*.

Cell adhesion is a basic process in cell biology, controlling cell growth, death, differentiation, movement, and tissue organization in normal cells, as well as the proliferation and metastasis of tumor cells. Dr. Hemler's laboratory focuses on the molecular basis for cell adhesion and migration. In particular, he is interested in the structures and functions of heterodimers in the INTEGRIN family. For example, studying mechanisms whereby integrin functions are rapidly turned on and off, and different integrins link to distinct cellular signaling pathways; and other cell surface transmembrane proteins that associate with integrins. Remarkably, his laboratory has recently learned that transmembrane linker proteins, called tetraspanin proteins, allow the membrane proximal extracellular domains of integrins to play key roles in the recruitment of intracellular signaling enzymes such as protein kinase C, and phosphatidylinositol 4-kinase. Hemler's other interest is studying how certain integrins may be linked to regulation of matrix metalloproteinase (MMP) production, a key process during cell and tissue remodeling and tumor cell

metastasis. Most recently, he has deleted the tetraspanin CD151 gene from mice, and is using those mice to investigate the role of CD151 during tumor progression.

Faculty News

Ruma Banerjee became an Associate Editor of *Chemical Reviews*, a publication of the American Chemical Society, on October 1, 2012.

Mary Sue Coleman, President of the University and Professor of Biological Chemistry and of Chemistry, accepted the 2012 Simon Award from NAFSA: Association of International Educators, for U-M's outstanding global engagement. The Simon award jury considered a wide range of factors, including size of international student body, foreign language requirements, number of students in study abroad programs, relationships with education partners overseas, and cultivation of alumni support abroad. Students and scholars from more than 130 countries are currently studying and doing research at the University of Michigan.

Jack Dixon, former Professor and Chair of our department, was named one of eight new foreign members of the Royal Society. Now a professor at the University of California and the outgoing vice-president and chief scientific officer of the Howard Hughes Medical Institute, he was granted lifetime membership for his "elegant studies that have radically advanced our understanding of cell signaling and the molecular basis of pathogenesis," the society said in a statement. Early in his career, Dixon was a leader in research on the biosynthesis and post-translational processing of polypeptide hormones. He subsequently became a pioneer in studying the structure and function of the protein tyrosine phosphatases and their role in cellular signaling.

Pat O'Brien was awarded a Research Scholar Grant from the American Cancer Society for his studies of "Novel Roles of Base Excision Repair in Frameshift Mutagenesis." The generous award of $720,000 over 4 years was made possible by gifts from numerous individuals who support the mission of finding new cures for cancer.

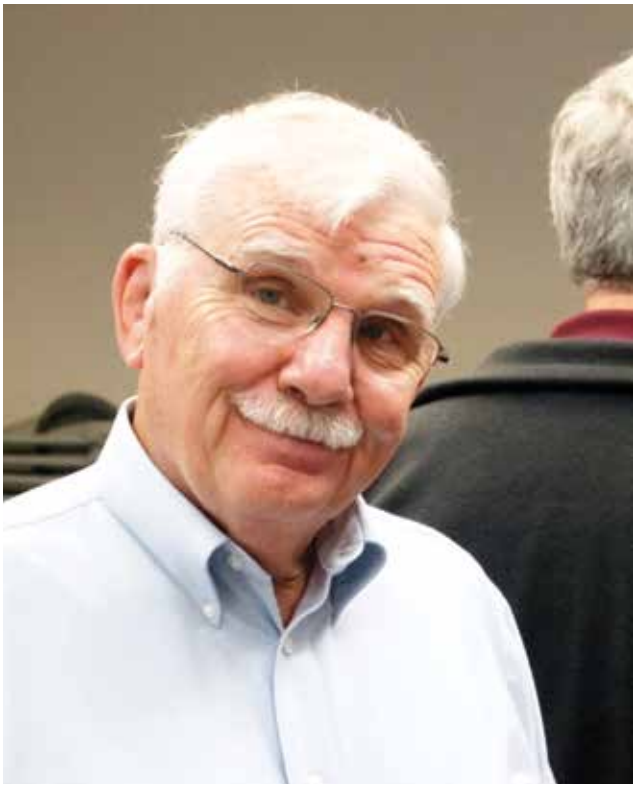
Stephen Ragsdale was the recipient of a five-year "Method to Extend Research in Time" (MERIT) award from the National Institute of General Medical Sciences. NIH MERIT awards, "allow investigators the opportunity to take greater risks, be more adventurous in their lines of inquiry or take the time to develop new techniques." Less than 5 percent of NIH-funded investigators are selected to receive MERIT awards. Steve joins Dr. Jerry Menon, who is funded by the National Institute of Child Health and Human Development, as one of two BioChem faculty MERIT awardees.

Rowena Matthews and Pat O'Brien

Georgios Skiniotis was named by President Barack Obama to be one of 96 recipients of a Presidential Early Career Award for Scientists and Engineers (PECASE), "the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers." Each year, eleven federal departments and agencies nominate the most meritorious funded scientists and engineers whose early accomplishments show the greatest promise for assuring America's preeminence in science and engineering and contributing to the awarding agencies' missions. Dr. Skiniotis was nominated by NIH.

William L. Smith was honored by the University of Michigan Medical School with the 2012 Distinguished Faculty Lectureship Award. This award is the highest honor bestowed by the Medical School upon a faculty member for research in the biomedical sciences. Dr. Smith is nationally and internationally recognized for his leading research contributions in nutritionally essential fatty acids, prostaglandins, cyclooxygenases in thrombosis and colon cancer, and cyclooxygenase biochemistry including modulation by aspirin, ibuprofen, coxibs and fish oil.

Paul Weinhold retired on June 30, 2012. Dr. Weinhold received his Ph.D. in biological chemistry from the University of Wisconsin. From 1961 to 1963 he was a captain in the U.S. Army Medical Service Corps, serving as chief of the chemistry section in the 5th U.S. Army Medical Laboratory at St. Louis, MO. From 1963 to 1965 he conducted postdoctoral research in the Department of Biological Chemistry, Harvard Medical School. He joined the University of Michigan in 1965 as assistant professor of biological chemistry and assistant professor in the Department of Internal Medicine and supervisory biochemist in medical research at the V.A. Hospital. Dr. Weinhold was promoted to associate professor of biological chemistry in 1972 and professor in 1984. He is recognized internationally for his significant contributions to understanding the role of phospholipids in function of pulmonary surfactant. Throughout his career, Dr. Weinhold was dedicated to the teaching of medical students. For over 40 years, he taught biochemistry to medical students as lecturer and director of the biochemistry course given to first year medical students. In recognition of his skills as a teacher, Dr. Weinhold received in 1994 the Kaiser Permanente Teaching Award for Excellence in Preclinical Teaching.



Paul Weinhold at his retirement party

New Faculty

Uhn-Soo Cho, Ph.D. The Department of Biological Chemistry is pleased to announce that Dr. Uhn-Soo Cho joined the department as an assistant professor on September 1, 2012. Dr. Cho received his Ph.D. in Biological Structure from the University of Washington in 2007 and comes to us from the lab of Dr. Stephen C. Harrison at Harvard Medical School, where he has been since 2007. Dr. Cho is also a Special Fellow of The Leukemia & Lymphoma Society.

During Dr. Cho's postdoctoral research, he studied the molecular mechanisms of kinetochore formation in budding yeasts. In particular, using biochemical and structural approaches, he sought to understand the assembly of the initial kinetochore complex on centromeres. Centromeres are the regions of each chromosome where sister chromatoids comprising a chromosome are linked and are the site at which chromosomes segregate during mitosis. Structures called kinetochores assemble on centromeres and are involved in the segregation of chromosomes. To elucidate the mechanisms of inner kinetochore assembly in budding yeast, Dr. Cho addressed three aims: (1) to analyze the specificity of the Scm3 chaperone for CENP-ACse4; (2) to characterize the function of the CBF3 component Ndc10 and elucidate its role in inner kinetochore assembly; and (3) to visualize the centromere recognition of the CBF3 complex and eventually the whole inner kinetochore assembled on the centromeric DNA.

Dr. Cho is currently working to visualize the CBF-3complex using cryo-electron microscopy in collaboration with Thomas Walz at Harvard Medical School. Dr. Cho has expressed and purified the K1 CBF3 core complex (Ctf13:Skp1:(Cep3)2) from insect cells, and obtained 3D reconstructions of this complex using single-particle EM of negatively stained samples. Since the structures of Cep3, Skp1, and the Ctf13 homolog Skp2 are available, he has been able to fit the atomic structures of each CBF3 component into the cryo-EM reconstruction. Additionally, he has expressed and purified all of the inner kinetochore components including Cbf1, the CBF3 core com-

Uhn-Soo Cho, Alex Ninfa, Dave Ballou and Aaron Goldstrohm at the annual summer retreat

plex, Ndc10, Mif2, Scm3, and Cse4 nucleosome in vitro. Using the 3D reconstruction of the CBF3 core complex as a model, he plans to reconstitute the entire inner kinetochore together with centromeric DNA with the goal of visualizing, for the first time, the entire inner kinetochore complex assembled on centromeric DNA.

John J.G. Tesmer, Ph.D. The Department of Biological Chemistry is also pleased to announce the joint appointment of John J.G. Tesmer, Ph.D. as a Professor without tenure in the Department of Biological Chemistry beginning September 1, 2011. Dr. Tesmer currently holds an appointment as Professor with tenure in the Department of Pharmacology as well as an appointment of Research Professor in the Life Sciences Institute.

Dr. Tesmer earned his Ph.D. in 1995 in Biological Sciences under the direction of Professor Janet L. Smith at Purdue University in Indiana. As a Howard Hughes Postdoctoral Fellow, he performed his postdoctoral training at UT Southwestern Medical Center in Dallas under the guidance of Dr. Stephen R. Sprang. Dr. Tesmer was appointed as an Assistant Professor in the Department of Chemistry and Biochemistry at the University of Texas at Austin in 1999. In 2005, he was given a dual appointment as an Associate Professor in the Department of Pharmacology at UM and as a Research Associate Professor in the Life Sciences Institute.

Dr. Tesmer's research interests include the molecular basis of G protein-coupled receptor (GPCR)-mediated signal transduction, principally via the technique of X-ray crystallography. GPCRs are responsible for the sensations of sight and smell, for regulation of blood pressure and heart rate, and for many other cellular events. Extracellular signals impinging upon GPCRs in the cell membrane induce a conformational change that allows these proteins to activate specific heterotrimeric G proteins within the cell. The activated G proteins then bind to various effectors that initiate downstream cascades, leading to profound physiological change. Activated GPCRs also specifically interact with GPCR kinases (GRKs), which function to inhibit signaling by heterotrimeric G proteins and to initiate G protein-independent signaling cascades. By determining atomic structures of these signaling proteins both alone and in complex with their various targets, the Tesmer lab provides important insights into the molecular basis of signal transduction and of diseases that emerge as a result of dysfunctional signaling.

John Tesmer

Alumni, Alumnae and Postdoc Updates

Adam Avery (Ph.D., Anne Vojtek lab, 2006) is now a postdoctoral associate in the Department of Genetics, Cell Biology and Development at the University of Minnesota.

Shaun Black (Ph.D., Jud Coon lab, 1982) is the Senior Lecturer in Biochemistry in the Department of Chemistry at the University of Texas in Tyler. Shaun was selected by the University of Texas Board of Regents for recognition with the prestigious Regents' Outstanding Teaching Award. He recently received the award at a meeting in Austin honoring him for his commitment to teaching through the delivery of the highest quality undergraduate instruction.

John Chiang (Postdoctoral Fellow, Jud Coon lab, 1976-1978) is Professor of Biochemistry and Molecular Pathology at Northeast Ohio Medical University. John is widely known for his pioneering research on bile acids and cholesterol metabolism in the liver and the role of bile acids and nuclear receptors in the regulation of glucose, lipid, and energy metabolism in liver diseases, diabetes, and obesity. He gave lectures recently at the Society of Toxicology meeting in San Francisco, the International Bile Acid meeting in Vienna, and the American Society for Study of Liver Disease Workshop on Bile Acids and Metabolic Signaling in Boston and serves on the editorial boards of *Hepatology* and the *Journal of Biological Chemistry* as well as on *Drug Metabolism Review*.

Zhiyong (Max) Cheng (Postdoctoral Fellow, Charles Williams and Dave Ballou labs, 2004-2006) recently accepted a position as an assistant professor in the Department of Human Nutrition, Foods and Exercise, College of Agriculture and Life Sciences at Virginia Tech in Blacksburg, VA.

Rebecca Fagan (Ph.D., Bruce Palfey lab, 2009) received a three-year American Cancer Society Postdoctoral Fellowship, during which she will attempt to characterize and identify inhibitors of DNA methyltransferase 1, a protein that plays an essential role in cellular transitions to malignancy.

Fred Guengerich (Postdoctoral Fellow, Jud Coon lab, 1973-1975) stepped down from the directorship of Vanderbilt's Toxicology Center after 30 years. He continues to serve as an Associate Editor of the *Journal of Biological Chemistry* and now oversees its Mini-reviews and Thematic Series. For two weeks this July, Fred was a Visiting Professor at the University of Tokyo.

Rebecca Haeusler (Ph.D., Dave Engelke lab, 2007) was selected as a 2012 Columbia University Schaefer Research Scholar in recognition of her outstanding work into how impaired generation of 12-hydroxylated bile acids links hepatic insulin signaling with dyslipidemia.

Mary (Millard) Mayo (Ph.D., Dale Oxender lab, 1979) is Director of Clinical Chemistry at St. Louis University Hospital and Associate Professor of Pathology at Saint Louis University School of Medicine. She was Board certified in Clinical Chemistry in 2009.

Xiaojun Ren (Postdoctoral Fellow, Tom Kerppola lab, 2010-2012) has accepted a position as Assistant Professor in the Department of Chemistry at the University of Colorado, Denver.

Rebecca Taurog (Ph.D., Rowena Matthews lab, 2005) is a Visiting Assistant Professor in the Department of Chemistry & Biochemistry at Middlebury College.

William Ziehler (Ph.D., Dave Engelke lab, 2000) became an equity partner in the law firm of Fraser, Clemens, Martin & Miller, which specializes in intellectual property law.

Supporting BioChem

The Department of Biological Chemistry relies upon the philanthropic generosity of donors to fund many aspects of its operations. Gift funds are essential to supporting activities beyond our basic operations. From endowed professorships and lectureships, to graduate student fellowships, seminar speakers, and gifts in direct support of research, donations help make the department an intellectually exciting and vibrant community. As a benefactor of the Department of Biological Chemistry, you can direct your gift in several ways:

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Craig Reynolds, Chief Administrator
Dept. of Biological Chemistry
1150 W. Medical Center Dr., 5301 MSRB III, SPC 5606
University of Michigan Medical School
Ann Arbor, MI 48109-0600
T: 734.763.0185 / F: 734.763.4581
E: creyno@umich.edu

Please Note

For 2012 charitable deductions and credits, the IRS has ruled that credit card gifts are deductible only in the year the bank processes the transaction. To be processed for tax year 2012, credit card gifts by mail must reach the University by December 14, 2012; OR you may call 888-518-7888 (toll free) or 734-647-6179 (local), M-F 9 AM – 4 PM EST between December 15 and December 31, 2012 to donate over the phone. Your gift by check must be postmarked by December 31, 2012. Thank you!

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Askelina B. and Erik R. P. Zuiderweg

Alumna Spotlight: Evelyn Pease Tyner

Biological Chemistry Development Officer Greg Witbeck recently had a chance to catch up with 1950 alumna Evelyn Pease Tyner during a Basic Sciences Showcase in Chicago. Dr. Tyner, who earned her Ph.D. in the laboratory of H.B. Lewis for her dissertation on "The anti-lipotropic activity of cysteine," reflects on a life dedicated to science and environmental conservation below.

Q. *You eventually earned three degrees from the University of Michigan. What initially drew you to UM, and what was it about Chemistry and Biological Chemistry that first attracted your interest?*

A. Born in 1924 in Evansville, Indiana, I was interested in nature (and then science) from an early age. Before I knew how to use a dictionary, I remember asking several people, "What is chemistry?" I never got a satisfactory answer. My high school biology teacher drew three intersecting circles for biology, chemistry and physics, with overlaps. The center of course was math. It was the first time I recognized biochemistry as a potential field of study.

While attending Evansville College (now the University of Evansville) for two years, I worked as a lab assistant in the research department of Mead Johnson & Co. They were interested in me because I had been named one of the winners of the first Westinghouse Science Talent Search (1942).

My cousin Lucy, who lived in Ironwood, Michigan was attending the University of Michigan. She was one deciding factor as I considered where to transfer. The other main factor – SNOW. The possibility of skiing entranced me. Most of my friends were attending Indiana University or Purdue. (I was actually offered a scholarship in Home Economics at Purdue – no interest for me!)

Q. *It would have been unusual for a woman to pursue an advanced degree in the sciences in the 1940's and 1950's. What were some of the challenges you encountered, and how did you address them? Who gave you encouragement along the way?*

A. At the urging of my high school chemistry teacher, I entered the first Westinghouse Science Talent Search in 1942. The essay assignment was "How Science Can Help Win the War." My idea was to solve the rubber shortage with "Rubber from Weeds." I enclosed samples of three rubbery substances I had prepared – e.g., one from the common milkweed. (At that time the STS did not require or suggest experiments or projects.) I was chosen one of forty, nine of whom were female. The trip to Washington, meeting and being quizzed by scientists like Harold Edgerton and Harlow Shapley clearly firmed up my decision to be a scientist. From then on, I was encouraged by the Westinghouse staff and STS, as they kept track of me for years. Of course my parents, Warren and Aline Pease, were the greatest source of encouragement! My challenges were the usual academic ones, and I was sometimes discouraged. Money was tight, but I worked at Mead Johnson & Co. during the summers. I continued to learn from and get encouragement from, especially, Dr. C.E. Billis.

Evelyn Pease Tyner

Q. *Please describe your life and career after completing your doctorate in Biological Chemistry.*

A. While a graduate student at UM, I took physiology at the Marine Biological Laboratory in Woods Hole, Massachusetts. It was a wonderful chance to work with cells of marine invertebrates. During those busy graduate years, I met and married David A. Tyner, a chemistry student returning after working on the Manhattan Project! His research professor, Dr. W.E. Bachman, suddenly died, and to finish his degree in organic chemistry (steroid synthesis), we moved to the University of Wisconsin at Madison. I took a post-doc fellowship and worked on a time-study of the syntheses of DNA (before its structure was elucidated), RNA and proteins in livers of normal and cancer-

bearing rats, using C14 and P32. We didn't solve the cancer enigma, but our paper showed the A-T and G-C connections. My colleague commented "That has something to do with structure" as we went on with our cancer research.

After that, the Drs. Tyner moved to Skokie, Illinois where Dave worked at G.D. Searle and I was overwhelmed with our first baby. Not even part-time work in biochemistry was available to me while the family grew: Terry, David, Carol and Jenny. (Starting in 1954, though, I organized and became director of the extracurricular Science Seminar at Niles West High School in Skokie. We involved local scientists to work with students who wanted to enter the Science Talent Search. I was paid $1 per year to make it official!)

When Jenny was in school, I accepted a teaching job in the Physical Science Department of Loop College (now Harold Washington College, one of the City Colleges of Chicago). I taught chemistry, geology, the survey course, and – once – an environmental course.

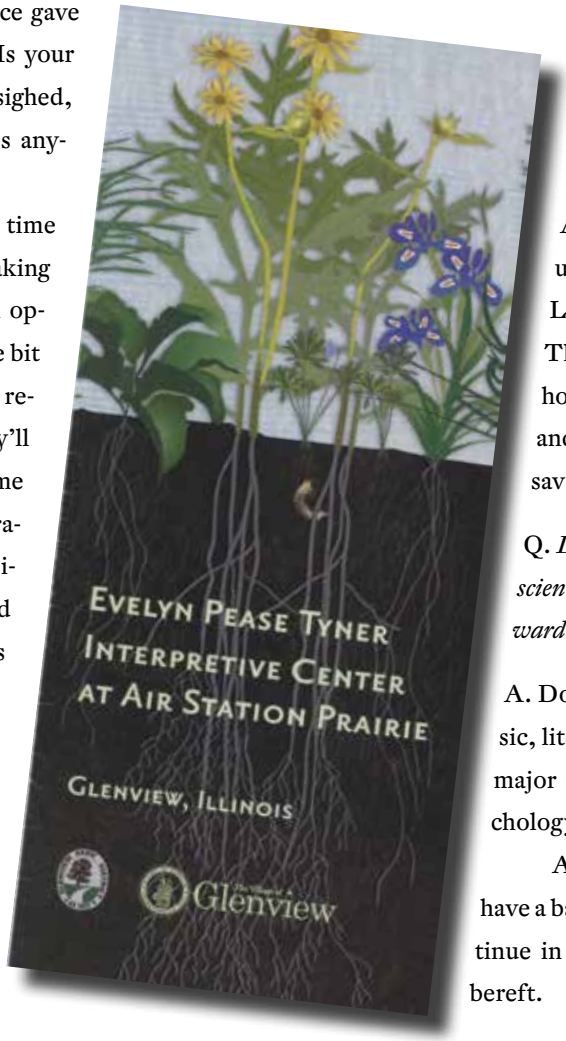
I cherish the answer Terry once gave when her young friend asked, "Is your mommy really a doctor?" She sighed, "Yes. But not the kind that does anybody any good."

About 1963, when in my spare time I was busily marching and speaking about peace and fair housing, an opportunity arose to help save a rare bit of virgin prairie in Glenview. I remarked, "If we don't save it, they'll put a McDonalds here!" After some hectic, happy years as a photographer, I rejoiced that the University of Illinois at Chicago purchased what is now known as the James B. Woodworth Prairie Preserve. It's open to the public, who can stave off their hunger at the McDonalds NEXT DOOR! National Geographic has a picture of this odd juxtaposition (Vol. 157, #1, 1980).

"Save the Grove!" became the next imperative. The home of naturalist Robert Kennicott and much more, it is now owned by the Glenview Park District, and is a National Historic Landmark, a great resource for our school children and all of us. The referendum for its purchase was a cliff-hanger!

Hardly breathing after that triumph, we found that the Glenview Naval Air Station – over 1,000 acres! – had been given to Glenview, and it became logical to preserve 33 acres of it, now the Kent Fuller Prairie. A LEEDS Platinum interpretive center was built and named for me, an overwhelming honor.

I love to travel, especially if it involves canoeing or scuba diving. I have over 600 logged dives! With Earthwatch Research Expeditions I participated in a study of the tiny butterfly fish *Chaetodan Multicinctus* in the Pacific near Hawaii. At Roc de Marsal (a cave in Dordogne, France) I was thrilled to help excavate Neanderthal artifacts with Earthwatch. With Northwest Passage I kayaked partly around Crete.



Today I keep up my interests and volunteer as needed at two prairies and a Grove. Educational endeavors indeed, whose multiple aspects were clearly nurtured at UM! In 2012 the Audubon Society presented several of us with the Grassroots Conservation Leadership awards, a beautiful plaque. There is also a bronze tablet at the Grove honoring and listing all ten of us "Frog and Fern Ladies" who are credited with saving the Grove.

Q. *Do you have any advice for young aspiring scientists today who are taking their first steps toward a graduate degree?*

A. Do not neglect to take classes in art, music, literature and other courses outside your major interest. (I missed sociology and psychology as well as the arts.)

And a caution to women scientists who have a baby: I urge you to find some way to continue in your profession. I could not and felt bereft.

Annual Student Awards

The Minor J. and Mary Lou Coon Award

Presented to the student who exhibits overall excellence in research, teaching, and service to the department, this award honors Professor Coon, former Chair of the department, and the late Mary Lou Coon, who provided the gifts that support this award.

Awardee: *Gerwin Westfield*
Mentor: Georgios Skiniotis, Ph.D.

The Lee Murphy Memorial Prize

Presented to the student who embodies the highest ideals of scientific integrity and who has published a paper or a series of papers judged most significant by the Awards Committee, this award is named in honor of Lee Murphy, an alumnus of this department.

Awardee: *Swathi Krishnan* (*Unavailable for photographs*)
Mentor: Raymond C. Trievel, Ph.D.

The Dziewiatkowski Award

Dedicated to the memory of late faculty member Dominic D. (Jay) Dziewiatkowski, this award is presented to the student who has submitted the most outstanding Ph.D. dissertation during the last academic year.

Awardee: *Valentin Cracan*
Mentor: Ruma Banerjee, Ph.D.

The Adam A. and Mary J. Christman Award

Presented to a third-year student judged to be the most outstanding in that class, the Christman Award is named in memory of former long-time faculty member Professor Adam Christman.

Awardee: *Chase Weidmann*
Mentor: Aaron C. Goldstrohm, Ph.D.

The Halvor N. and Mary M. Christensen Award

Presented to a second-year student on the basis of academic record; this award is given in honor of the late Mary M. and Professor Emeritus Halvor N. Christensen who served as Chair of Biological Chemistry from 1955–1970. Mary and Halvor Christensen generously provided the original gift that supports this annual award, their daughter Karen Christensen-Gray has also generously donated funds to support this award.

Awardee: *Michael Howard*
Mentor: Carol A. Fierke, Ph.D.

The Anthony and Lillian Lu Award

Presented to a student on the basis of academic background, achievement in the graduate program, and potential as a scientist, this award is made possible by a generous donation from the Lu family.

Awardee: *Stewart Cao*
Mentor: Randal J. Kaufman, Ph.D.
(*Unavailable for photographs*)

Student News

Jennifer Gehret McCarthy (Janet Smith lab) received the 2012–2013 EBS Endowment for the Development of Graduate Education (EDGE) Award.

Manila Hada (Roland Kwok Lab) received a 2011–2012 Rackham International Fellowship in the amount of $10,000.

Jenna Hendershot (Pat O'Brien lab), **Erin Miller** (Pat O'Brien lab), **Claudia McDonald** (Bruce Palfey lab), and **Chase Weidmann** (Aaron Goldstrohm lab) presented posters at the Rackham Graduate School Centennial Research Symposium "Michigan Graduate Students in the World" on February 16, 2012. The Symposium highlighted the global impact that graduate students make through their research, and displayed the quality, breadth, and diversity of graduate education at Michigan.

Jenna Hendershot (Pat O'Brien Lab) was appointed as a member of the ASBMB Education and Professional Development Committee. She also recently completed a summer internship at Dow AgroSciences in Indianapolis. Jenna is a trainee in the Cellular Biotechnology Training Program, which made this internship possible.

Swathi Krishnan (Ray Trievel lab) and **Claudia McDonald** (Bruce Palfey lab) were awarded Rackham Predoctoral Fellowships for 2012–2013. One of Rackham's most prestigious fellowships, it is awarded to candidates with outstanding research who have achieved academic excellence in their graduate career.

Claudia McDonald (Bruce Palfey lab) was inducted into the Bouchet Honor Society. Named for the first African American doctoral recipient in the United States (in Physics from Yale University in 1876), the Edward Alexander Bouchet Graduate Honor Society recognizes outstanding scholarly achievement and promotes diversity and excellence in doctoral education and the professoriate.

Mark Taylor (Pat O'Brien Lab) was awarded an American Heart Association Predoctoral Fellowship for 2012–2014.

Science Olympics at the Summer Retreat

In Memoriam

Frederick L. Hoch, M.D., Professor Emeritus of Biological Chemistry and Internal Medicine, died peacefully at home on February 14, 2012. His caregiver Wendy Cooper indicated that Fred "was strong and lucid to the very end." Dr. Hoch had retired from active faculty status on December 31, 1986.

Dr. Hoch came to the University of Michigan in 1967 as a visiting scientist in the Biophysics Research Division of the Institute of Science and Technology. He was appointed as an Associate Professor in the Department of Internal Medicine in 1968 and received a joint appointment in the Department of Biological Chemistry in 1970. He was promoted to Professor of Internal Medicine and Biological Chemistry in 1976. Dr. Hoch's career was exceptional in that he was one of the first clinicians at the Medical School to be recruited because of his outstanding biochemical training and accomplishments to represent both medical and basic science departments in the clinical and basic science curriculum for fourth year medical students. He also contributed to the teaching of residents and fellows in the Division of Nuclear Medicine, through his involvement in the Thyroid Clinic. In addition, he served as supervisor for clinicians in the Clinical Radioisotope Facility. Dr. Hoch also made significant contributions to the teaching programs of the Department of Biological Chemistry, where he served from 1972–1985 as director of the introductory biochemistry course taught to first-year medical students. Because of his expertise in the basic and clinical sciences, his presence in this course provided both a challenging blend of medical education to students and a valuable liaison between Medical School departments. Faculty who taught biochemistry with Dr. Hoch during this period remarked that he "had high standards and was very popular with students" and that he provided "sterling leadership to the medical biochemistry course . . . and was instrumental in implementing many innovations that could only have been carried off by a physician. He was a gentle leader but there was never any doubt as to who was boss. He was largely responsible for the good reception of the course by the students during that time."

Frederick L. Hoch

In addition to teaching, Dr. Hoch performed research in mammalian energy metabolism publishing a book entitled *Energy Transformations in Mammals: Regulatory Mechanisms* in 1971. Between 1955 and 1998 Fred authored or coauthored over 50 publications focusing largely on the effects of thyroid hormones on various biological and biochemical processes. He was an expert in the area of hyperthyroidism and hypothyroidism. Toward the end of his academic career he published several important reviews on the effects of thyroid hormones on mitochondrial lipids.

Dr. Hoch was born in Austria and immigrated to the United States from Vienna obtaining his B.S. degree from City College of New York in 1939 and his M.D. degree from New York University College of Medicine in 1943. Following an internship at Michael Reese Hospital in Chicago from 1943–44, he served as a captain in the Army Medical Corps from 1944–1946. After serving as a resident in pathology at Mt. Auburn Hospital in Cambridge, Massachusetts, he became a Research Associate at Massachusetts Institute of Technology, where he received the M.S. degree in Quantitative Biology in 1951. From 1951–53, he served as a Research Fellow in Biochemistry at Massachusetts General Hospital. In 1953 he began working in the new biophysics laboratory at Peter Bent Brigham Hospital as a junior associate in medicine at Harvard Medical School. He progressed there to assistant professor of medicine and senior associate in medicine in 1962 before moving to Michigan.

While at Harvard Fred met his future spouse, Martha L. Ludwig, who at the time was a postdoctoral fellow in the Lipscomb lab. At the time Fred was a young M.D. doing research on carboxypeptidase in the laboratory of Bert Vallee. Martha was sent over to the Vallee laboratory to collect some distilled water, because in Fred's words, "The Vallee laboratory had the purest (lowest conductivity) water in the world at that time. We collected it in a quartz bucket." Fred continues, "I set my eyes on that woman." They were married in 1961 and enjoyed a happy 45 year marriage until Martha's death in November, 2006. They shared a passion for red convertible sports cars, skiing, tennis, hiking, bird-watching and cooking. In Fred's words, "We cooked some fancy grub together." It was during their time in Boston that Martha and Fred became friends with Tom and Joan Steitz. They hiked together in Switzerland, New Hampshire, Vermont and Minnesota. Tom recalls that "Martha and Fred introduced us to hiking in Switzerland on two trips, and I have gone on many Swiss hiking trips since."

Dr. Hoch graciously and generously supported the endowment of the Martha L. Ludwig Professorship in Protein Structure and Function in the Medical School. The Ludwig Chair is currently held by Dr. Janet L. Smith.

Those who would like to make a contribution in Fred's memory, should make contributions to the Martha Ludwig Lectureship in Biological Chemistry.

Materials excerpted for the commentary above are from "A Biographical Memoir of Martha L. Ludwig" by Rowena G. Matthews, Proc. Natl. Acad. Sci. U.S.A. 2011, a memoir from the Faculty History Project of the University of Michigan (http://um2017.org/faculty-history/faculty/frederic-l-hoch-0), and personal communications from Wendy Cooper, Rowena Matthews, Charles Williams, Jud Coon, Irwin Goldstein and Tom Steitz.

James A. Fee passed away April 17, 2012 in San Diego at the age of 72 after a battle with prostate cancer. Jim's scientific work on superoxide dismutases and the respiratory oxidases from thermophilic bacteria constitute seminal contributions that have provided important insights into the structure and function of these enzymes. Jim was best known for his pioneering work in bioenergetics, an area that was the focus of his research interests during most of his career.

Jim's scientific education began in 1961 with a double major in Chemistry and History at Pasadena College in California, followed by a Ph.D. in Biochemistry at the University of Southern California in 1967. He was an NSF Postdoctoral Fellow at the University of Göteborg with Bo Malmström and Tore Vänngård between 1967–1969. Jim began his independent academic career in 1970 as an Assistant Professor in the Department of Chemistry at the Rensselaer Polytechnic Institute. In 1974, he moved to the University of Michigan as an Associate Professor, and a few years later became a Full Professor in the Department of Biological Chemistry. Never one to be easily categorized, Jim left UM in 1985 to become the Director of the NIH Stable Isotope Resource at the Los Alamos National Laboratory, and a Section Leader in Biological Chemistry. He also maintained an appointment as an Adjunct Professor of Biochemistry at the University of New Mexico Medical School, 1989-1993. In 1993 Jim moved to the University of California, San Diego, as a Research Scientist, where he remained until 2001, at which point he moved to the Scripps Research Institute as a Professor of Research.

James A. Fee

During the course of his career, Jim made fundamental contributions to our understanding of redox metalloproteins, and his scientific achievements are reflected in more than 150 publications. Jim was well funded, attesting to the vitality of his research program and the high esteem of his peers. He also provided service to the science community by serving on NIH study sections and the editorial boards of journals. Jim gave many research talks at conferences and universities, both within the US and abroad and was a regular participant in the Metals in Biology Gordon Conference, serving as a Vice-Chair (1976–78) and Chair (1979–1980). Jim's honors included the Harry J. Duell Award from the University of Southern California and a National Science Foundation Fellowship at the University of Göteborg, Sweden. He was a member of the American Association for the Advancement of

Science, American Chemical Society, and American Society for Biochemistry and Molecular Biology.

Excerpted with permission from a memorial written by Ólöf Einarsdóttir (UC Santa Cruz), Robert Gennis (University of Illinois, Urbana-Champaign), David Stout (Scripps Research Institute), and Joan Valentine (UCLA).

Julian A. "Bill" Peterson, internationally respected for his nearly 45 years as a researcher and professor in biochemistry and biophysics and recognized for his social concerns, died at age 72 of bladder cancer at his Dallas home on March 25 of this year. He received his bachelor's degree from Wittenberg University in Springfield, Ohio in 1961 and his master's and Ph.D. degrees in 1964 and 1967 from our Department, where he became well known for characterizing rubredoxin as an electron carrier in bacterial omega-oxidation. He was recruited by Dr. Ronald Estabrook as a postdoctoral fellow at the University of Pennsylvania and then moved to Dallas when Ron Estabrook became chairman of the Biochemistry Department and professor at Southwestern Medical Center in 1968. Bill Peterson retired in 2011 and was named professor emeritus. He had specialized in studying bacterial cytochrome P450 enzymes that metabolize foreign compounds and synthesize important drugs such as antibiotics. He volunteered on numerous fronts, from his East Dallas home to City Hall, to improve his community. He was appointed to the Dallas Senior Affairs Commission in 2006 and to the Dallas City Plan Commission in 2009, served as chairman of the executive committee for the Dallas Police Crime Watch, and was honored as the group's outstanding volunteer. His anti-graffiti paint-out became the model for a city-wide effort. He excelled as a citizen as well as a scientist.

Bill Peterson

About the Cover

Jennifer Gehret McCarthy (BioChem 2012)

The marine environment, full of bioactive natural products, is largely untapped. Natural products, including those found in the marine environment, exhibit an impressive array of chemical diversity and often potent bioactivity, which can be harnessed for therapeutics. Many unusual enzymes reside in natural product assembly-line pathways, and create the diverse collection of chemical functional groups found in natural products. The study of enzymes in natural product biosynthetic pathways can reveal new modes of catalysis, unique chemical transformations, and novel biosynthetic tools. The antimitotic natural product curacin A is a perfect example of interesting chemistry found in the marine environment.

Curacin A (center), produced by the marine cyanobacterium *Moorea producens* (background), contains many interesting chemical groups including cyclopropane and thiazoline rings, an internal *cis* double bond and a terminal alkene. Equally interesting are the structural details of the biosynthetic pathway that produces curacin A (arrows), giving insight into how each unique chemical group is made. Shown are the published structures from the curacin A biosynthetic pathway (starting from the top left and moving counter clockwise): a dehydratase that produces a *trans* double bond[1], a dehydratase that produces a cis double bond[1], an acyl carrier protein involved in cyclopropane biosynthesis[2], a loading enzyme with dual decarboxylase and acetyltransferase activities[3], an Fe^{2+}/α-ketoglutarate dependent halogenase involved in cyclopropane biosynthesis[4], a decarboxylase that establishes regiochemistry for cyclopropane formation[5], a dehydratase that produces a *trans* double bond[1], and a β-sulfate specific thioesterase that produces a terminal alkene[6].

1. D. L. Akey, *et al.*, *Structure* 18, 94 (2010).
2. A. Busche, *et al.*, *ACS Chem Biol* 7, 378 (2012).
3. L. Gu, *et al.*, *Science* 318, 970 (2007).
4. D. Khare, *et al.*, *Proc Natl Acad Sci* U S A 107, 14099 (2010).
5. T. W. Geders, *et al.*, *J Biol Chem* 282, 35954 (2007).
6. J. J. Gehret, *et al.*, *J Biol Chem* 286, 14445 (2011).

Ph.D. Degrees Granted

Valentin F. Cracan, December 12, 2011
Structure, Function and Metabolic Roles of IcmF-a Fusion Between the Radical B12 Enzyme and its G-protein Chaperone
Mentor: Ruma V. Banerjee, Ph.D.

Heather M. Dickson, April 25, 2012
Insights into the Molecular Mechanism of Axon Outgrowth by Myelin Associated Inhibitors
Mentor: Anne B. Vojtek, Ph.D.

Jennifer Gehret McCarthy, October 15, 2012
Production of Terminal Alkenes in Natural Product Biosynthesis: Structural Studies of Sulfotransferase and Thioesterase Didomains
Mentor: Janet L. Smith, Ph.D.

Corissa L. Lamphear, December 8, 2011
Molecular Recognition of Substrates by Protein Farnesyltransferase and Geranylgeranyltransferase-1
Mentor: Carol A. Fierke, Ph.D.

Dave A. Pai, December 16, 2011
Spatial Coordination of tRNA Genes
Mentor: David R. Engelke, Ph.D.

Donald D. Raymond, August 13, 2012
Structural Studies of Genome Packaging in Phleboviruses
Mentor: Janet L. Smith, Ph.D.

Shameka J. Shelby, August 14, 2012
MERTK-mediated Signaling in the Retinal Pigment Epithelium: Insights into the Mechanism of RPE Phagocytosis.
Mentor: Debra A. Thompson, Ph.D.

New Ph.D. Students & Postdoctoral Fellows

New Ph.D. Students

Robert Fick received his Bachelor of Arts in 2011 from Augustana College, Sioux Falls, SD.
Mentor: Raymond C. Trievel, Ph.D.

Bryan Dunyak received his Bachelor of Science in 2011 from Michigan State University, East Lansing, MI.
Mentor: Jason E. Gestwicki, Ph.D.

Anna Ganios received her Bachelor of Science in 2011 from the University of Akron, Akron, OH.
Mentor: Debra A. Thompson, Ph.D.

Bradley Klemm received his Bachelor of Science in 2011 from the University of Wisconsin Eau Claire, WI.
Mentor: Carol A. Fierke, Ph.D.

Andrew Sikkema received his Bachelor of Science in 2010 from Northern Michigan University, Marquette, MI.
Mentor: Janet L. Smith, Ph.D.

Samuel Slocum received his Bachelor of Arts in 2011 from Earlham College, Richmond, IN.
Mentors: Janet L. Smith, Ph.D. and David Sherman, Ph.D.

Eric Tse received his Bachelor of Science in 2010 from the University of California at Los Angeles, CA.
Mentor: Dr. Daniel Southworth

New Postdoctoral Fellows

Mehmet Can received his undergraduate degree from Bilkent University in 2006 and his Ph.D. from the University of Rochester in 2012.
Mentor: Stephen W. Ragsdale, Ph.D.

Eric Carter received his undergraduate degree from Western Michigan University in 2005 and his Ph.D. from Michigan State University in 2011.
Mentor: Stephen W. Ragsdale, Ph.D.

Daniel Eyler received his undergraduate degree from Georgetown University in 2004 and his Ph.D. from Johns Hopkins University in 2012.
Mentor: Patrick O'Brien, Ph.D.

Matthew Larson received his undergraduate degree from the University of Wisconsin, Madison in 2004 and his Ph.D. from the University of Alabama, Birmingham in 2011.
Mentor: Mark A. Saper, Ph.D.

Dave Pai received his undergraduate degree from Johns Hopkins University in 2004 and his Ph.D. from the University of Michigan in 2012.
Mentor: David Engelke, Ph.D.

New M.S. in Biochemistry Unveiled!

The Department of Biological Chemistry is pleased to announce it is currently recruiting the first class of students for admission into its newly established direct-admit Master's in Biochemistry. This intensive one-year program consists of didactic coursework in biochemistry and a laboratory research experience, culminating in a written thesis dissertation. The program is intended for individuals seeking to increase their skills and research experience for employment opportunities or for application to highly competitive Ph.D. programs. Online applications for the May 1, 2013 deadline are available from the Rackham Graduate School at http://www.rackham.umich.edu/admissions/, however earlier application in December or January is advised.

UNIVERSITY OF MICHIGAN MEDICAL SCHOOL
DEPT. OF BIOLOGICAL CHEMISTRY
1150 W. MEDICAL CENTER DR., 5301 MSRB III
ANN ARBOR, MI 48109-0600

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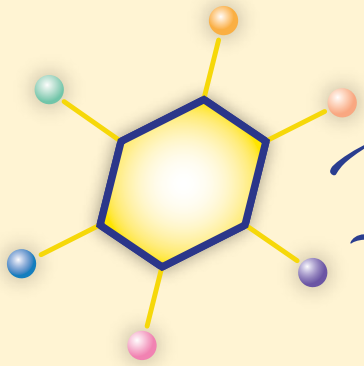

BioChem

University of Michigan
Medical School