Mudd In Your Eye

Newsletter of the Department of Chemistry, Lehigh University

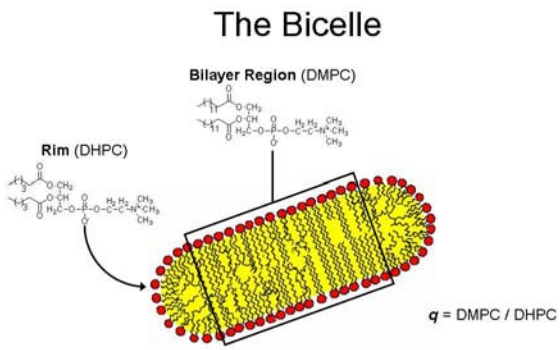
Number 37 • September 2009

"Great importance is given to chemistry as an elementary branch of learning." — Lehigh Register 1866

Cell Membrane Research at Lehigh

As a protein biochemist, K. Jebrell Glover studies cell membrane proteins that are associated with the phospholipid bilayer. One of the difficulties with membrane proteins is that they are extremely insoluble and hard to work with, but because they are about one-third of most genomes, there is an increased interest in them because little is known about how protein membranes operate.

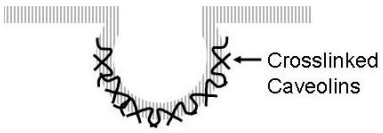
A crucial aspect of handling membrane proteins is to create an environment that simulates the cell membrane. Suitable mimics are hard to find, Glover points out. Frequently detergents are used to form micelles, even though a micelle really doesn't look like a lipid bilayer. Instead, Glover's research uses a membrane mimic called the bicelle, from the term "bilayered micelle." A bicelle consists of two types of phospholipids that are very "native," phosphatidylcholine derivatives. The long-chain of 14 carbons (DMPC) will spontaneously form bilayers while the short 6 carbon chain (DHPC) has a wedge shape that will form spherical micelles. When the two are mixed a bicelle automatically forms in which the lipids are segregated, with the short chain at the rim and the long chain forming a bilayer in the center. Further, the size of the bicelle is determined by the molar ratio of DMPC to DHPC (q) and the thickness of the bicelle is determined by the length of long-chain phospholipid (DMPC) which is about 40 Å, typical of most cell membranes.



Bicelles have some interesting magnetic properties. At high values of q (>3.5) they will align in a magnetic field, which is useful to determine the polypeptide orientation with solid state NMR. At low vales of q (< 1) the bicelles are no longer aligned, which is suitable for solution phase experiments using NMR, fluorescence and analytical ultraacentrifugation.

The cellular feature Glover is interested in are caveolae, which are cell surface invaginations. Proteins called caveolins are responsible for curving the membrane, and this is what sparked Glover's interest – how do these proteins curve the membrane? Caveolins are involved in a number of cellular processes including membrane trafficking, signal transduction, calcium signaling, and lipid recycling. Misregulation of caveolins has been implicated in Alzheimer's disease, cancer, and muscular dystrophy.

There are three types of caveolins which have very similar amino acid sequences and topology. The unique feature is that both the N- and C- termini are on the same face of the membrane, which is unusual for transmembrane domains. It is postulated that this unusual structure allows it to curve the membrane and form the caveolae.



Representation of a caveola within the plasma membrane. The crosslinked-caveolin proteins are highlighted.

"Our goal," Glover indicates, "is to use a series of biophysical techniques to understand how this structure relates to the function of caveolins." The caveolins oligomerize, interacting with each other to form a scaffold that creates the curvature in the membrane. Glover adds, "In particular, we want to ask about the extent of the oligomers that form and what amino acids are crucial for this process." Another interest is the structure of the hairpin-like loop itself. Preliminary results indicate that it is highly helical. "We think it might be two alpha-helicies that are connected by a turn, and maybe they cross," Glover points out. Right in the center is a glycine residue. Because glycine has only an H for a side chain, it is not very sterically hindered and can get into conformations other amino acids aren't able to do. Glover believes the glycine is there to allow the very tight turns.

One of the first challenges was just expressing these difficult proteins. That has now been accomplished and the proteins have been purified ("Reliable expression and purification of highly insoluble transmembrane domains," *Analytical Biochemistry* **2009**, *384*, 274–278 (with C. Diefenderfer, J. Lee, Scott Mlynarski and Ying Guo)). Now Glover's group is starting to look at the oligormerization process and the structure.

Glover was born in Montclair, New Jersey but grew up in Piscataway. He received his undergraduate education at Williams College, followed by his Ph.D. at the University of California, San Diego and a postdoctoral fellowship at MIT (see *Mudd In Your Eye* No. 31, July 2006, p. 4). Admitting to always having an interest in science as well as having a chemistry set, Glover credits his high school chemistry teacher at the Peddie School with really sparking his interest in chemistry. He started out in inorganic chemistry in graduate school, but was drawn to biochemistry by the challenge of working with membrane proteins.

Left to right: Monica Reith, Rob DeJarnette, Jebrell Glover, Jinwoo Lee, Alison Jaworski.

Chair's Message

It is hard to believe that summer has come and gone and another academic year has begun. Over the summer: Norm Zheng joined the Department in July as the new Director of Instrumentation. He has been learning the ropes from Bill Anderson and is currently preparing for the upgrade of our 300 MHz NMR spectrometer. Andy Ho joined the Department as the new Manager of Undergraduate Labs in August. He has been organizing our general chemistry labs and working with faculty in the studio (lab) portion of General Chemistry 1. Andy replaces Jeanne Berk who moved to Cedar Crest College as a tenure track faculty member.

A number of important changes have also occurred with the faculty. Tianbo Liu was tenured and promoted to associate professor in May, 2009. He hasn't skipped a beat and was very busy over the summer publishing 3 papers in *Angewandte Chemie, International edition, Langmuir, and Dalton Transactions.* He also gave 3 invited talks at international meetings and was a session chair at the National Polymer Symposium of China in August. At the end of the 2009-2010 academic year, Kamil Klier will be retiring after 42 years of service to the University. Along with being a great colleague, Kamil is an internationally recognized researcher in the areas of surface chemistry and catalysis. The department is very proud of his accomplishments and congratulates him on a truly outstanding career. Kamil plans to remain active as an emeritus professor, continuing his studies in surface reactivity, optoelectronics, and theory.

In other faculty and staff news: Congratulations to our Newsletter editor, Jim Bohning, and to our faculty colleague, Ned Heindel, in being part of the inaugural class of 162 ACS Fellows. Jim and Ned were cited for "excellence in their contributions to the chemical enterprise coupled with distinctive service to ACS or to the broader world of chemistry," according to immediate past president Bruce Bursten who initiated the Fellows at the ACS Washington, DC meeting. Bursten remarked, "The ACS was late among professional societies in creating a Fellows Program" but doing so "has many advantages beyond celebrating the excellence of our own." *Chemical and Engineering News* ran the details of the new Fellows honor, July 27, 2009, p.62.

In addition, the instrumentation labs were renovated and cosmetically improved. We now have a mass spectrometry facility containing MALDI, LC-MS-MS, and GC-MS and are anticipating delivery of the 300 MHz solid state NMR upgrade to a modern dual-use solid state and solution system. Plans for an upgrade to the 500 MHz NMR are also being discussed. And continuing the faculty expansion initiative, Chemistry will conduct two searches this year in the areas of *organic* and *biochemistry*.

These are very exciting times! Thank you for continuing to send letters with updates and news. Your ongoing support of the department is greatly appreciated. If you happen to be in the area and want to see some of the changes that have occurred, please stop by.
—Robert A. Flowers, II

Associate Professor Robert D. Billinger (1899—1980), author of many papers in the history of chemistry, particularly as it related to the Lehigh Valley and Pennsylvania

Alumni News

David L. Carrick (Ph.D. 1983) has recently joined the Libra Technical Center (LTC) in Metuchen, NJ, as Technical Director. He was also elected Chairman of the Princeton (NJ) Local Section of the American Chemical Society. LTC specializes in industrial process, product, packaging, and forensics projects. Clients are primarily from the food, pharmaceutical, and specialty chemicals industries with an emphasis on prepared foods, lipids, botanicals, natural products, personal care items, cosmetics, and packaging.

Thomas P. Eskay (Ph.D. 1996) launched his pharmaceutical career as an analytical chemist at Abbott but is now an analytical expert for drug product development at Novartis.

HwaHae Jeong (M.S. 2009) lives in Osaka, Japan , and works in the Post Marketing Surveillance Department of Schering-Plough-Japan.

Jessica Latona (B.A. 2009) has been admitted to the New York Medical College, class of 2013.

Noureddine Maher (M.S. 2009) has left a drug discovery group at Johnson & Johnson to join the metabolism and pharmacokinetic group at Novartis Pharmaceuticals in Emeryville, CA. Maher is conducting drug metabolism studies by LC-MS.

Gerald A. Miller (M.S. 1976, Ph.D. 1980) is currently employed as senior programmer with Castle Communications in Timonium, MD. His firm was recently given primary responsibility for global set up of their SBW (Secure Billing Worldwide) billing system. Miller first joined that product team in 2006. Previously he worked on the SYNCHEM Project at SUNY Stony Brook. SYNCHEM is a large-scale program that is able to discover new synthesis routes for relatively complex organic structures without on-line guidance on the part of the chemist-user. According to Miller, it is "A knowledge-based domain-specific heuristic problem-solving program which has synthetic organic chemistry as its domain of expertise.'" Miller is coauthor of the 1984 IEEE Proceedings which published a detailed report ("SYNCHEM 2. A Case Study") on the development of this artificial intelligence product.

Melanie Rudnick (B.S. 2009) has been accepted by the New York Medical College, class of 2013, with a specialty in pediatrics.

Josephine H. Shen (Ph.D. 1974) is the President and CEO of ScinoPharm where she also was a founding partner. She has over 25 years of experience in the management of chemical & pharmaceutical businesses with in-depth experiences in strategic planning, business and organization development, technology transfer, supply chain management, quality control and assurance, environmental safety & health, cGMP compliance and formulation development and manufacturing. Before co-founding ScinoPharm, Shen was with Syntex for 14 years and Monsanto for seven years. At Syntex, she was Corporate VP for Pharmaceutical Technology & Operations. Prior to that, she was at Monsanto as Electronic Materials Plant Manager and Superintendent of Quality Control Engineering. (From the company web site at http://www.scinopharm.com/company/management.html)

Robert H. Seevers. Jr. (B.S. 1976) recently published a study on "The Use of Mean Kinetic Temperature in the Handling, Storage, and Distribution of Temperature Sensitive Pharmaceuticals" in the May/June 2009 issue of *Pharmaceutical Outsourcing.* Seevers is Principal Regulatory Scientist at Eli Lilly in Indianapolis, Indiana. He was formerly an examiner inside the FDA.

John L. Stuart (Ph.D. 1993) is Quality Control Manager for Operations at the Schwarz Pharma Manufacturing Division of UCB. John is located in Seymour, Indiana.

Dennis M. Todd (M.S. 1977, Ph.D. 1978) is president and CEO of Community Blood Services which supplies blood and blood products to more than thirty hospitals in New Jersey and New York (see their web site at www.communitybloodservices.org). They have recently joined with NJ Sharing Network, the organization that coordinates organ and tissue donations in New Jersey, to form Cellular Analytics, Inc., which will manage infectious disease testing for organs and tissues donated for transplant. According to Todd, "Cellular Analytics, Inc., enables us to strategically position our resources and expertise so that, as partners, we can insure thousands of New Jersey residents awaiting transplant can be given this lifesaving opportunity."

Debra Beth Waldron (B.S. 1980; M.D. New York Medical College, 1984; M.P.H., University of Minnesota, 2005) was appointed Director and Chief Medical Officer of University of Iowa Children's Hospital-Child Health Specialty Clinics, Iowa's Title V program for Children with Special Health Care Needs. She will be responsible for developing a state wide system of care for children with special health care needs that is community based and family centered. Waldron was also recently named the Medical Director of the Iowa Department of Health-Division of Health Promotion and Chronic Disease Management. She is a Clinical Associate Professor at the University of Iowa Carver College of Medicine. Waldron is presently a member of the American Academy of Pediatrics Committee on Native American Child Health and the section on Community Pediatrics. She serves on the Iowa Chapter's Board of Directors. She and Matthew Berg, (B.S. 1980; M.ChE Manhattan College) are the proud parents of Emily, a Lehigh University sophomore.

New Alumni Class of 2009

Ph.D. Chemistry

Kelley Corinne Caflin – *Dissertation*: Quantitative Solid State Nuclear Magnetic Resonance of Mixtures Utilizing Chemometric Techniques.

Melissa Lynne Kistler – *Dissertation*: Molecular Recognition and Size Control of Nanosized Self-Assembled Polyoxometalate Structures.

M.S. Chemistry

Habatallah M. Abbas, Wade Hampton Bailey III, Kyle Edward Bartosh, Kelly Anne Brush, James Scott Bryant, Erica Renee Bush, Megan Brynn Conrad, April Lynn Cox, Noorieh Hamidavi-MoHammad, Katrina Nicole High, Tricia Y. Hong, Gary Khac Huynh, Dong Li, Le Li, Sean Maguire, Eric C. Mangin, Boris Aurelio Martinez Lopez, Andrew Tadeusz Mlodak, Amjad Mahmoud Nasrallah, Piercen Michael Oliver, Andrew M. Stump, Jacques Patrick Thimote, Robert Stephen Thomas, Christina Maria Valvano, Kate Vaynshteyn, Kate Halene Vogel, Yuanyuan Yao, Scott Christopher Youells.

M.S. Pharmaceutical Chemistry

Jonathan Min-Yu Huang, HwaHae Jeong, Elizabeth Jean Koury.

M.Eng. – Polymer Science and Engineering

Stanley Charles Cook, Debra Pruett Kline.

B.A. Chemistry

Jessica Ann Latona (Highest Honors).

B.S. Chemistry

Christopher F. Caputo, Melanie J. Rudnick (Honors, Honors in Chemistry)

B.S. Biochemistry

Amanda Nicole Baranowski (High Honors), Laura Ann Bowen, Meghan Marie Brobst, Christian Michael Cole, Whitney Lee Colleran, Cynthia A. Eakin (Honors in Chemistry), Erica Jean Fratz, Leigh Kanner McGowan, Jeremy Daniel Olen, Nicholas John Voellinger.

B.S. Pharmaceutical Chemistry

Steven Osmond Han, Hana Iris Lim (Highest Honors, Honors in Chemistry).

Student Honors 2009

Leigh K. McGowan — American Chemical Society Award presented to the outstanding senior major in chemistry.

Amanda N. Baranowski— American Institute of Chemists Award presented to an outstanding senior majoring in chemistry, chemical engineering or biochemistry.

Erica J. Fratz — Merck Index Award presented to an outstanding senior chemistry major who has been active in student affairs.

Jessica A. Latona — Harry M. Ullman Chemistry Prize presented to the highest-ranking senior in chemistry.

Jessica A. Latona — William H. Chandler Senior Chemistry Prize, established in 1920 by Mrs. Chandler, presented to a high ranking senior in the chemistry department. The Chandler Prize is also awarded to a high ranking chemistry major in the sophomore and junior classes.

Steven R. Ackerman — Alpha A. Diefenderfer Award presented to the highest-ranking junior in analytical chemistry, sponsored by the American Chemical Society Division of Analytical Chemistry.

Erica J. Fratz — Hybercube, Inc. Scholar Award presented to a senior chemistry major who has shown outstanding promise in theoretical chemistry and molecular modeling.

Xiaofang Yang — The Newton W. (B.S. 1901) and Constance N. Busch Graduate School Fellowship established in 1972 by the estate of Constance N. Busch for graduate students pursuing an advanced degree in chemistry.

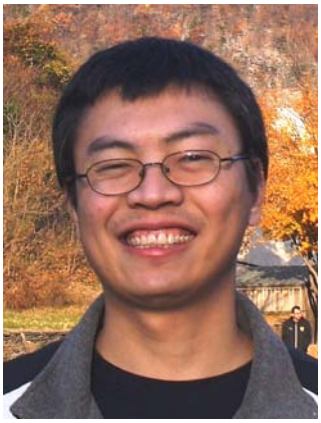
Piercen Oliver — The Andrew K. White (B.S. 1913) Graduate School Fellowship established in 1986 by the estate of Ruth D. White for graduate students pursuing an advanced degree in chemistry.

Brian Casey — The Edward D. Amstutz Fellowship, awarded to an outstanding graduate student pursuing a doctorate. It was made possible through gifts from family members, friends and former students. Amstutz was a chemistry department faculty member from 1938 to 1972 and served as department chair for eight years.

New Faces

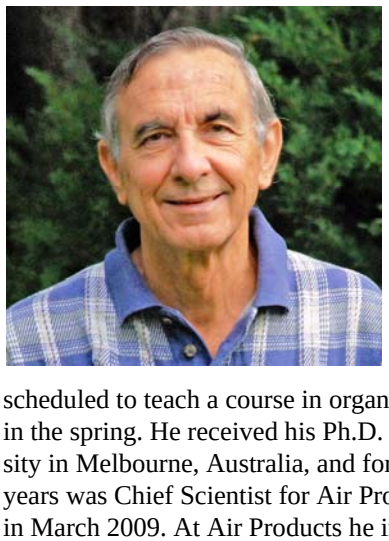
Andy Ho has been appointed manager of the General Chemistry Laboratories, replacing Jeanne Berk, who has taken a position at Cedar Crest College. His primary responsibility is to make sure that all of the laboratory sessions run smoothly. Ho did his undergraduate work at UCLA and went to Harvard for his Ph. D., where he worked with James G. Anderson, whose specialty is atmospheric chemistry. Lehigh was attractive to Ho because he is interested in chemical education and improving the undergraduate curriculum. “This position,” he says, “seems to be the ideal place to implement changes.” Ho anticipates modernizing some of the current experiments and “bringing in some real world relevance to the experiments that the students do.”

Norm Zheng has been hired as the Director of Instrumentation in the chemistry department. In this capacity he is responsible for maintaining all the instruments in the department as well as training students and faculty in their use. Zheng’s B. S. degree in chemistry is from University of Science and Technology of China in Hefei, China. He received his Ph.D. in chemistry from Michigan State University, where he worked with David Weliky in solid state NMR spectroscopy. Zheng says he was interested in this position because it involves a hands-on approach to many different instruments on a daily basis in support of the faculty research programs.



Jeffrey A. Campbell has been appointed manager of the Organic Chemistry Laboratories and adjunct professor. He teaches the organic chemistry laboratory course and has worked under the guidance of Keith Schray to make major improvements in the core curriculum. A medicinal chemist by training, Campbell received his Ph. D. from The Ohio State University with David J. Hart and did a post-doctoral fellowship at the University of California, Berkeley with Henry Rapoport. He was a Senior Research Scientist at both Hoffmann-La Roche and Bristol-Myers Squibb, and was group leader of a government funded oncology laboratory in Singapore. Using his industrial background, Campbell says he is “committed to revising the curriculum to create an improved and updated organic laboratory at Lehigh.” In his spare time, Campbell is writing a chapter for "Named Organic Reactions for Ring Formation," part of the multi-book series of "Named Organic Reactions" initiated by Nobel laureate E. J. Corey of Harvard Universiy. This series is aimed at graduate students and professionals in the field.

Guido P. Pez has been named a CESAR Fellow and began working with Lehigh Assistant Professor Kai Landskron’s group this past summer, mentoring a summer student from Cornell. He is also collaborating with Landskron on the synthesis of microporous organic crystals and their use as adsorbents for capturing carbon dioxide. Pez is also scheduled to teach a course in organometallic chemistry in the spring. He received his Ph.D. from Monash University in Melbourne, Australia, and for the past twenty-eight years was Chief Scientist for Air Products before retiring in March 2009. At Air Products he initiated and pursued both fundamental level and applied research in areas relating to the Company's interests in chemical process catalysis, specialty chemicals synthesis and gas separation and storage technologies. He holds 64 patents, and received the American Chemical Society Award in Inorganic Chemistry in 1994. Pez says that he has really enjoyed working with the students and teaching them the latest technologies and experimental research techniques.



Chemistry Department Open House, April 20, 1934

American Chemist (1870–1877) Now Available Digitally

When the British publishers of the American reprint of *Chemical News* decided to discontinue that publication in the United States in 1870, the Chandler brothers at Columbia University decided to "offer to the subscribers of that journal and to all who are directly interested in the progress of chemistry, a new journal:"

The Chandlers, who had purchased the subscription list and stock of the American reprint of *Chemical News*, intended "to present every thing of value in the English edition to the end of the current year [1870], but declared that as of the January issue of 1871, the *American Chemist* would be an "entirely independent journal."

Charles F. Chandler (1836–1925) earned a Ph.D. at Gottingen and had been on the faculty at Columbia since 1861. His younger brother William (1841–1906) had attended classes at Union College and was a student and chemistry assistant at Columbia. He subsequently came to Lehigh University in the fall of 1871 as Lehigh's second chemistry professor, replacing Charles Mayer Wetherill who had died unexpectedly that spring. (For more on the Chandlers see Robert D. Billinger, "The Chandler Influence in American Chemistry," *Journal of Chemical Education* **1939**, *16*, 253–257.) For the next six years Lehigh would be prominently mentioned on the masthead as the institution of the journal's coeditor.

The intent of the Chandlers was three-fold. First, they intended to publish original research papers when they were available and encouraged submissions from chemists. Secondly, they intended, under the title "Notes from the Foreign and American Journals," to review the important American, British, French and German journals and "present abstracts of papers … which involve chemical principles in their discussion." In a sense the *American Chemist* was a forerunner of *Chemical Abstracts* by more than 30 years. Finally, the Chandlers felt strongly enough to add to the mission of the journal the exposure of "humbug and fraud when they appear under the guise of science, and thus to aid in dispelling the too common prejudice against science which exists in the minds of many practical men who have been imposed upon by designing or ignorant pseudo-scientists."

One of the more intriguing issues was that of January, 1873, which included actual dyed fabric samples pasted in to each copy to illustrate a paper on dye-stuffs. The *American Chemist* is perhaps best known for its detailed accounting of the meeting of chemists in Northumberland in July 1874 to celebrate the centennial of the discovery of oxygen. There is no other comparable source for this information.

The *American Scientist* was a successful enterprise but its fate was sealed when Charles Chandler spearheaded the founding of the American Chemical Society (ACS) in April 1876. From the outset starting in May 1876, the ACS published a monthly *Proceedings of the American Chemical Society* which contained news of the society and some brief scientific notes, but it could not be considered a real technical journal. It was not until January 1879 that the first issue of the *Journal of the American Chemical Society* appeared, and for most of that interim the *American Chemist* served the dual purpose of reporting on the ACS and publishing original papers. In some respects, then it can be considered a forerunner of the Society's Journal.

The *American Chemist* ceased publication with the April 1877 issue. It contained papers on the adulteration of milk, milk analysis, qualitative analysis schemes as practiced at Columbia, and the analysis of onions, where the conclusion was reached that the strong odor of onions was due to a volatile organic compound containing sulfur. There was no mention of the cessation of publication. The April issue appears to have been printed with every intention of another issue to follow. But that never occurred, and the subsequent index continued the pagination from the last page of the last issue.

A total of seven volumes of the *American Chemist* were published, each issue covering a July to June period, beginning in July 1870. Copies of these volumes are rare and hard to find, and complete sets are even rarer. But now Google has made all copies available electronically, thanks to their massive digital project. The Google images were made in December 2008 from copies at the University of Michigan, and can be found at http://books.google.com/books?q=editions:LCCN04021886&id=wAXOAAAAMAAJ&source=gbs_book_other_versions_r&cad=1_2 or go to Google books and search for the *American Chemist*. (If you use the latter method, click on the "About This Book" tab and scroll down to find the "show more" button which will list all copies available. Each issue can be searched, downloaded, and/or printed.

The Google listing of eight editions is confusing. For example, the listing for 1871 is actually Volume 1 which is for July 1870-June 1871. This applies to other years as well. There are two listings for 1876, but one is Vol. 6 (July 1875–June 1876) and the other is Vol. 7 (July 1876–Apr 1877). Also available are the details of the Centennial of Chemistry meeting mentioned above, which was reprinted as a separate publication and is listed as "American Contributions to Chemistry" by Benjamin Silliman.

The *American Chemist* is an important journal for anyone interested in the history of chemistry and especially American chemistry in the nineteenth century. We are indebted to Google for digitizing this work, as well as a significant number of other important books of interest to chemists. This puts valuable resources right on the desktop, for either the casual reader or the professional historian.

(Reprinted in part from *The Octagon* **2009**, *92*, No. 5, 4–6, with permission.)

Spotlight on Alumni: Walter A. Patton

Born in Pennsylvania, Walter "Wally" Patton considers himself a central Pennsylvanian, so much so that he never left when it came to finding a professional home. Although he grew up in nearby Shamokin, Patton's parents were both employed at the Geisinger Medical Center in Danville. With his mother working as a nurse and his father as a histology technician, Patton says there was always "some sort of science chatter" at the dinner table. Further, after school he would visit his father's lab on many occasions, where he had the chance to look at slides under a microscope or see various organs and other samples that came out of the operating room. He attributes this combination to developing his early interest in health science.

In Shamokin schools, Patton was further encouraged by three teachers—Joe Clark taught a seventh-grade science class ("that was really a high level of chemistry for seventh grade"), Scott Anderson ran a rigorous biology class ("that in retrospect included a lot of biochemistry"), and Roger Williams taught chemistry and "instilled a positive attitude toward the rigors of doing chemistry." But Patton's grandfather, a Polish immigrant whom Patton was named after and who worked as a coal miner and later an electrician, taught him how to work and think with his hands. He attributes that skill as an important factor in keeping his interest in science over the years.

After applying to several institutions with more of a health science interest, including a pharmacy school, Patton's attention was diverted by a visit to his high school by a faculty member at Susquehanna University who was promoting their new biochemistry major. Seeing this as an ideal way to knit together his interest in health science and chemistry, Patton went to Susquehanna, where he received a lot of good "personal mentoring" and graduated in 1988.

"Not being overly adventurous at the time," Patton applied to mainly Pennsylvania schools for graduate work. The interview at Lehigh was the day after one at Hahneman in Philadelphia, and the stark contrast made it clear to Patton that he would be more comfortable at Lehigh, where the deciding factor was the faculty mentoring that was comparable to what he received as an undergraduate.

During several of his undergraduate summers Patton worked in the Weiss Center for Research at Geisinger, where he was involved with endothelial cells. That experience played a part in Patton's decision to work with Linda Lowe-Krentz at Lehigh, where his thesis was on molecules that are synthesized in endothelial cells and have a number of different functions there ("Structural Studies on Porcine Aortic Endothelial Heparin Sulfate Proteoglycans").

At the end of the first semester Patton helped pack up Lowe-Krentz's lab and reinstall it in the mountaintop facility. "There," he notes, "all of us who moved up to the hill formed an exceptionally tight group of graduate students who truly learned from each other as we earned our degrees." Aside from weekly seminars in Neville, one interaction with his colleagues on the lower campus occurred in the summertime with his participation in an intramural softball team appropriately called the Mudd Slingers.

Patton cites Ned Heindel and Linda Lowe-Krentz as his chief mentors at Lehigh, Heindel "for the amount of chemistry he knows and his ability to convey it," and Lowe-Krentz for "what I learned from her that has laid the foundation for everything I have done since Lehigh," including a current collaborative effort involving biological mass spectrometry to identify component sequences in a protein Patton isolated while at Lehigh.

After leaving Lehigh in 1993, Patton took a post-doc at the NIH which turned into an additional appointment as a Staff Fellow. In 1999 he was appointed a Dreyfus Foundation Fellow at Lebanon Valley College in Annville, PA, an institution that "has a rich history of doing something real with undergraduates in the laboratory."

As co-investigator with fellow biochemist and current department chair Owen Moe, Patton was successful in 2001 in obtaining an NIH R-15 research grant for an enzyme he is still working on. That grant was followed quickly by an NSF proposal that brought a MALDI mass spectrometer to Lebanon Valley. With success for his own funding as well as with additional joint applications, Patton credits Moe with mentoring him not only in grant writing, but in how to work productively with undergraduates and how to make a difference at the undergraduate level. (See the Lebanon Valley Chemistry Department web page at http://www.lvc.edu/chemistry/index.aspx?bhiw=1022, for the importance of student research to their program).

Patton admits that even while he was at NIH, he wanted to pursue his career at a place that was similar to where he had done his undergraduate studies. His goal at NIH was to learn as much as possible so that he could share his experiences and have students learn from them in a smaller setting, even though Lebanon Valley was not on his radar screen at that time.

Now a tenured Associate Professor, Patton says that as the first person in his family to go to college, rarely a day goes by that he doesn't appreciate what other people in his family that came before him did and what they experienced, that "allowed me to do what I've been able to do. I feel very fortunate."

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