



Chemistry News

Lebanon Valley College Chemistry Department Faculty and Staff:

Dr. Owen Moe, chair
Vernon and Doris Bishop Distinguished Professor of Chemistry

Dr. Donald Dahlberg
Professor Emeritus of Chemistry

Dr. Marc Harris
Associate Professor of Chemistry

Mr. Marcus Horne '92
Environmental Safety Officer

Mrs. Cynthia Johnston '87
Lecturer of Chemistry

Dr. Anderson Marsh
Assistant Professor of Chemistry

Dr. Walter Patton
Associate Professor of Chemistry

Dr. Timothy Peelen
Assistant Professor of Chemistry

Ms. Barbara West '98
Administrative Assistant

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Message from the Chairman

We send you greetings from the Chemistry Department at Lebanon Valley College. After a hiatus of two years, we are again sending out our departmental newsletter.

These last two years have been a period of great change but also of great success for the LVC chemistry program.

We have now moved into the completely renovated Neidig-Garber Science Center, and what a wonderful facility it is. The seemingly endless process of moving

back and forth during construction now seems so much shorter in retrospect. The new layouts for our teaching labs, the abundant influx of daylight, moving into our own dedicated research labs, and living in the beautiful interior design of the new building have made us forget the inconveniences of getting to this point.

The past year has been a period of sorrow in losing **Tony Neidig**, who was our departmental chair-for-life and our strongest supporter. We miss Tony greatly.

The year was also a time of deep satisfaction. Both **Wally Patton** and **Marc Harris** earn tenure and were promoted to associate professor in May. It is bittersweet that Tony did not live to see the completion of the building named in his honor or get to congratulate Wally and Marc, as he was such a strong supporter of both the building project and of our young chemistry faculty.

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Neidig-Garber Science Center Dedication

We look forward to seeing many of our alumni when we hold the dedication of the newly renovated Neidig-Garber Science Center on October 17, 2008. There is much to see in the new building and in the Chemistry department.

We have acquired an impressive array of research instrumentation that includes our new reflectron MALDI mass spectrometer and even newer liquid chromatograph-mass spectrometer (LC-MS).

We greatly appreciate our new individualized research labs; one for each student-

faculty research team.

We have also set up a nanotechnology laboratory and an associated ultrahigh vacuum laboratory. We'd like you to see our new biotechnology suite, designed to encourage interdisciplinary work with biology.

You won't recognize the

place with its grand atrium and stunning labs.

Immediately following the dedication, we will begin the fourth annual science symposium, *Disappearing Boundaries, Critical Thinking and Research in the*

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LVC Performs Well on National Exam

In line with the recent national emphasis on assessment in higher education, the Chemistry Department for the last four years has been administering the Educational Testing Service (ETS) Major Field Test in Chemistry to all graduating seniors in chemistry. The ETS exam tests knowledge from the full four years of training in chemistry and provides break-out scores for each of the major divisions of chemistry and for critical thinking.

We now have data for four consecutive years of graduates. A data summary that includes all of the four most recent graduating classes, shown below, indicates a strong performance by our students. The data compares average scores from the LVC graduating classes with average scores of graduating classes from other college and universities nationwide.

LVC Rankings

Physical Chemistry	75%ile
Organic Chemistry	70%ile
Inorganic Chemistry	91%ile
Analytical Chemistry	82%ile
Critical Thinking	89%ile
Overall Chemistry	78%ile

Data from 2005–2008

LVC Student–Faculty Publications (2006–08)

1. Timothy Garrett*, Jeremy Umbenhauer*, Gary Romberger*, Amy Smith*, Mandy Goulden*, Justin Engle*, and Marc Harris, **NOSYL as an Efficient Protecting Group for the Synthesis of Bipyridine Aza-Crown Ether Macrocycles**, *Journal of Undergraduate Chemistry Research*, **2008**, 7(1), 36-43.
2. Marc Harris, Kenneth Houser*, Johanna Scarino*, Scott Wallace*, Brandon Arndt*, Amy Smith*, Gary Romberger*, and Allix Sanders*, **Ethylene oxide-bridged bipyridine oligomers that function as selective host molecules for the encapsulation of small alkali cation guests**, *Journal of Inclusion Phenomena and Macrocyclic Chemistry*, **2008**, 60, 153-161.
3. Mollie G. Kedney*, Kevin B. Strunk*, Lisa M. Giaquinto*, Jennifer A. Wagner*, Sidney Pollack, Walter A. Patton, **Identification of bacteria using matrix-assisted laser desorption ionization time-of-flight mass spectrometry**, *Biochemistry and Molecular Biology Education*, **2007**, 35, 425-433.
4. Jessica L. Abbott*, Jordan M. Newell*, Christine M. Lightcap*, Mary E. Olanich*, Danielle T. Loughlin*, Melanie A. Weller*, Gary Lam*, Sidney Pollack, and Walter A. Patton, **The Effects of Removing the GAT Domain from *E. coli* GMP Synthetase**, *The Protein Journal*, **2006**, 25, 483-491.
5. Michael Porambo* and Anderson L. Marsh, **Synthesis and Photoluminescent Properties of Doped ZnS Nanocrystals Capped by Poly(vinylpyrrolidone)**, Submitted for publication in *Optical Materials* July 2008.
6. Thomas Gordon* and Anderson L. Marsh, **Temperature Dependence of the Aqueous Phase Oxidation of 2-Chlorophenol by Goethite**, Submitted for publication in *Chemosphere* September 2008.

Harris Research Group Studies Host-Guest Complexes

Eleven students who worked with **Associate Professor Marc Harris** on multi-year projects in inorganic chemistry have recently co-authored two scientific papers with Dr. Harris (see box above).

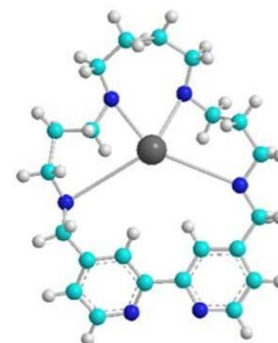
One paper, published in the *Journal of Inclusion Phenomena and Macrocyclic Chemistry*, describes the synthesis and characterization of two types of organic ligands that can wrap themselves around alkali metal ions to form what are called host-guest complexes.

The Harris group showed the selective complexation of alkali ions by the two ligands: the smaller ligand was

selective for the smaller sodium ion and the larger ligand for the larger cesium ion. These metal-ligand complexes can be extracted from aqueous solution into organic solvents suggesting their possible use in remediation of nuclear waste by the selective removal of radioactive cesium in aqueous waste streams.

The second paper, **“NOSYL as an Efficient Protecting Group for the Synthesis of Bipyridine Aza-Crown Ether Macrocycles,”** describes a study of aza-crown macrocycles. The cyclic macrocycle molecules contain pockets in the middle that can bind to metal ions in

host-guest interaction. By varying the size of the ring and the atoms in the central pocket, the Harris group attempts to “tune” the macrocycles to specifically bind one type of metal ion.



Aza-Crown Macrocycle Host-Guest Complex with Li⁺ Ion

Biochemistry Major Wins Neidig Award



Julia Cupp was the recipient of the prestigious Howard Anthony Neidig Award at graduation on May 10, 2008. The Neidig award is presented annually to the top graduating senior at LVC.

Julia, a biochemistry and molecular biology major, and mathematics minor, was nominated for superior academic performance, research achievements, and extensive service contributions.

Among Julia's research accomplishments were her presentations at the American Chemical Society Regional Meeting in Binghamton, N.Y. and at the 9th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences in Baltimore.

Julia served as a research assistant in biochemistry (with Dr. Patton), organic

chemistry (with Dr. Peelen) and cell biology (with Dr. A. Wolfe) at LVC from 2005 through 2007.

She is currently involved in a two-year Intramural Research Training Award Fellowship at the National Institute of Health in Bethesda, Maryland, under the direction of Dr. Forbes Porter, an expert in inborn errors in cholesterol metabolism. Julia plans to attend medical school.

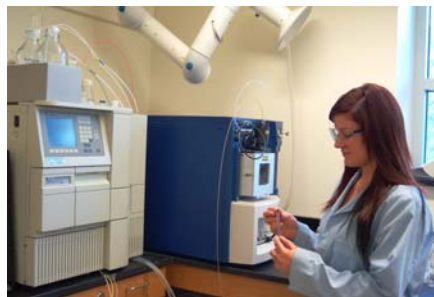
**What do LVC chemistry grads do after graduation?
See page 4**

NSF Supports New Liquid-Chromatograph Mass Spectrometer

The National Science Foundation has awarded a grant of \$149,999 to Lebanon Valley College to support a project titled *Project-Based LC-MS Experiments at the Interface of Chemistry and Biology*. The proposal, written by **Dr. Timothy Peelen** as primary investigator (PI) and **Drs. Wally Patton** and **Owen Moe** as co-PIs, outlines the plans for developing three new inter-disciplinary laboratory projects based on the use of liquid chromatography-mass spectrometry (LC-MS).

The grant allowed for the acquisition of an LC-MS for use in the three laboratory projects and in student research.

In organic chemistry, students will use parallel synthesis strategies to develop small libraries of lidocaine analogs,



Allix Sanders '10 works with new LC-MS

confirming their reaction products by LC-MS.

These libraries will then be incubated with liver microsomes and their rates of metabolism will be analyzed by LC-MS.

Students taking analytical chemistry will determine how the aerobic and anaerobic digestion methods used in wastewater treatment plants affect the levels of alkylphenol endocrine disrupters that are produced by

microbial degradation of detergents.

Biochemistry students will use LC-MS to identify and quantify lipids involved in cellular signaling events. These new experiments will enhance the laboratory experience by asking students to address challenging, relevant questions while giving them the cutting-edge instruments they need to answer these questions.

LVC Students Present 68 Research Talks in 2006-08. Conferences Attended Listed Below

72nd Annual Intercollegiate Student Chemists (ISC) Convention, Elizabethtown College, Pa., April, 2008

235th American Chemical Society National Meeting, New Orleans, La., April, 2008

10th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences, Baltimore, Md., October, 2007

234th American Chemical Society National Meeting, Boston, Mass., August, 2007

National Meeting of the American Society for Biochemistry and Molecular Biology, Washington, D.C., April 2007.

9th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences, Baltimore, Md., October, 2006.

35th Northeast Regional Meeting of the American Chemical Society, Binghamton, N.Y., Oct, 2006.

232nd American Chemical Society National Meeting, San Francisco, Calif., September, 2006.

38th Middle Atlantic Regional Meeting of the American Chemical Society, Hershey, Pa., June, 2006

70th Annual ISC Convention, Ursinus College, Colleagueville, Pa., April, 2006.

American Association Advancement of Science (AAAS) National Meeting, St. Louis, Mo., February, 2006

The Neidig Funds—Opportunities for Giving in Chemistry

Well after his retirement in 1985, Tony Neidig continued to provide essential leadership for the chemistry program at LVC. He consulted with us regularly and encouraged all of us, students and faculty alike. But it was the vision and generosity shown by Tony and Helen Neidig in creating two endowed funds in chemistry that have provided the most enduring impact on the quality of the chemistry program.

The **Neidig Chemistry Research Fund** has been invaluable to us in running our summer research experience in chemistry. The research fund provides undergraduate summer stipends, chemical supplies, small equipment, and travel

expenses for students presenting at American Chemical Society meetings. The **Neidig Fund for Chemistry Scholarships** provides valuable aid to promising chemistry majors who have financial needs.

If you have been thinking of making a gift to Lebanon Valley College and would like that gift to provide direct support to chemistry, please consider donating to one or both of these Neidig Funds.

Simply write the fund name on your donation check and send it to Barbara West at the chemistry departmental address given on page 1 of this newsletter.

You can also give to these funds online by selecting “**Other**” under the “**Direct my gift to:**” entry on the

College’s online gift form. You’ll then need to enter the name of the fund in the box provided (exact names are in blue in this article).

These funds speak to the vision of Tony Neidig who wanted to undergird the viability of the chemistry for years to come. We would be pleased if you would be willing to help us make the Neidig funds grow.

“I am really grateful that I have a background in chemistry. It influences me all the time by encouraging a rigorous molecular and quantitative approach to problems.”

—Francis Collins, M.D., Ph.D.
Pioneer in Sequencing the Human Genome

What Do Our Chemistry Students Do After Graduation?

We tell our prospective students that the chemistry and biochemistry undergraduate degrees are among the most versatile and valuable baccalaureate degrees that can be earned. The career paths taken by our graduating seniors, year in and year out, clearly demonstrate that versatility. The quality of the positions accepted by our graduates points to the value of the chemistry degree from LVC. Consider the career choices of LVC graduates from the **past three classes**, as summarized below:

- **13** LVC graduates entered Ph.D/M.S. programs in chemistry, food science, geochemistry, materials science, pharmacy, and biochemistry at Princeton, Columbia, and Penn State Universities, The Universities of Pennsylvania, Virginia, Illinois, Delaware, Pittsburgh, Nevada–Reno, and Maryland, Baltimore County.
- **4** LVC graduates entered medical school, **1** entered a physician’s assistant program.
- **2** LVC graduates are teaching high school chemistry.
- **2** LVC graduates entered post baccalaureate training programs at the National Institute of Health and the FBI, and **1** entered a clinical laboratory training program.
- **9** LVC graduates took positions in industry and are now working at GlaxoSmith-Kline, Armstrong World Industries, Lancaster Laboratories, Charles River Labs, Ralston Purina, and Chesapeake Biological Labs.
- **2** LVC graduates are doing biomedical research in academic laboratories.

(Data collected from 2006-2008)

Message From the Chairman (continued from pg. 1)

I want to assure all of our alumni that the LVC tradition of undergraduate research is alive and well in the Chemistry Department. This past summer 22 LVC students worked with professors in chemistry to carry out a wide range of research projects. Our students have been remarkably successful in the lab, not only in completing projects but also in presenting their work as professionals at scientific meetings all across the nation (see sidebar on page 3).

What an incredible experience for those students to be fully participating members of the larger scientific community. And our young faculty members have been extraordinarily active, winning highly competitive grants and publishing the work of many of their students in peer-reviewed scientific journals.

Our alumni have been supportive and generous, making many additions to the two endowed funds initiated by Tony and Helen Neidig and, in two cases, providing major gifts to support research and instrumentation.

In this newsletter we try to provide details on our departmental achievements and to give you a sense of who we are. Please try to stop by and see us when you’re in the Annville area – we’d love to see you, show you around, have you meet our young, exciting faculty members, and catch up on what you’ve been doing in your lives.

Best wishes from all of us at LVC,

Owen Moe, Chair

*We’re on the Web!
Visit us at:
www.lvc.edu/chemistry*

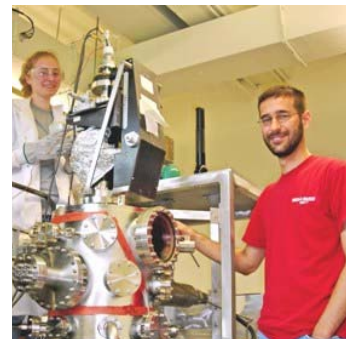
LVC Students Study Interstellar Reactions

Dr. Anderson Marsh of the LVC Chemistry Department received a two-year grant of \$44,820 to allow his research group to study the mechanism of formation of amino acids within nanoscale ice films on model interstellar dust surfaces.

The surprising discovery of the presence biological amino acids in carbonaceous meteorites has raised questions about how such

molecules could be formed in the deep space environment.

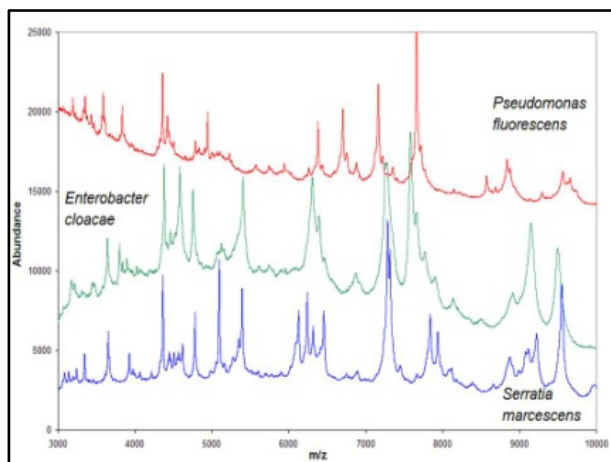
The Marsh research group will address these questions using an ArF eximer laser to initiate photoreactions of simple molecules on highly-oriented pyrolytic graphite surfaces, simulating surfaces of space dust, using ultrahigh vacuum surface science techniques.



Marsh research students
Heather Howard '11 and Michael Porambo '09

LVC Students Identify Bacteria by Mass Spectrometry

Associate Professor Walter Patton and student co-authors have published a paper on the identification of bacteria by MALDI-TOF mass spectrometry, in *Biochemistry and Molecular Biology Education* a journal of the International Union of Biochemistry and Molecular Biology. Using MALDI mass spectrometry, intact bacteria produce laser-induced spectra that can be used as a fingerprint for the purpose of identification. Spectral peaks, most less than 20,000 amu, are primarily derived from cytosolic proteins that are basic in nature. The Patton paper was published as an upper-level laboratory experiment that allows students to apply advanced chemical instrumentation to an important type of biological analysis.



MALDI-TOF spectra from three bacteria

Chemistry Department Grants and Major Gifts 2006 –2008

2008—Research Corporation, **\$44,830, Elementary Photoreactions for the Synthesis of Amino Acids on a Model Interstellar Surface** Principal Investigator, Dr. Anderson Marsh

2008 —National Science Foundation: **\$149,990, Project-based LC-MS Experiments at the Interface of Chemistry and Biology** Principal Investigator, Dr. Timothy Peelen

2007 —Dr David Sheetz (deceased) '48 Bequest, **\$100,000, Acquisition of a Bruker Microflex Reflectron MALDI Mass Spectrometer** Gift to Chemistry Department

2007–08 Dr. Tibor Sipos '64 Gift, **\$100,000, Study of Enzymes Associated with Inborn Errors of Metabolism** Principal Investigator, Dr. Walter Patton

2007—National Science Foundation , **\$144,600, Selectivity Control in Ketone Hydrogenation on Nanoscale Platinum Catalysts** Principal Investigator, Dr. Anderson Marsh

2006 —Research Corporation , **\$43,758, Direct Synthesis of Fmoc-Protected Amines via Acyl Iminium Chemistry** Principal Investigator, Dr. Timothy Peelen

Neidig Garber Science Center Dedication continued from pg. 1

Education of Scientists. Craig E. Nelson, professor *emeritus* of biology at Indiana University will serve as the symposium's keynote speaker. LVC science will be on display on Saturday the 18th, as our students and faculty invite you in for demonstrations and participation. Finally, a number of our alumni will serve as panelists in a discussion of the role of research in science education. To register, please contact the Office of Alumni Programs at 717-867-6320, 1-800-ALUMLVC (1-800-258-6582), or online at www.lvc.edu.



Can you identify these people? And the building? If so, send your answers to chemistry@lvc.edu.

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