Lebanon Valley College's Department of Chemistry

Chemistry News

Spring 2011

Lebanon Valley College
DEPARTMENT OF CHEMISTRY

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A Note from the Chair

The Chemistry Model

Tony Neidig '43, H'04 may never have used the term, The Chemistry Model, but in 1948 he introduced the idea that chemistry students can be motivated most effectively by immersion in meaningful research projects. Shortly after his return to LVC after earning his doctorate, Tony convinced four undergraduates to work with him over the summer months to study the mechanism of oxidation of secondary alcohols. That first student-faculty research team published an article in the prestigious *Journal of the American Chemical Society*, a feat almost never accomplished by undergraduate researchers in those days. Later, Tony went to Research Corporation for funding to support future summer research students.

Now, more than 60 years later, Tony's original idea has become the educational model that undergirds our chemistry program at LVC. We have become convinced of the efficacy of an undergraduate research-based model because we have seen so many of our research students catch fire, so to speak, and never look back. Research students want to learn because chemistry suddenly means much more to them. Our research students energize the classroom with new-found questions, they are bound together by the camaraderie of the shared research experience, they travel to scientific meetings and present their work, inviting critiques by experts in the field, and they continue on in significant numbers to pursue advanced degrees in a variety of chemistry-linked fields or move into positions in excellent labs and companies.

This summer, 27 undergraduates worked on research with six chemistry professors in the labs of the Neidig-Garber Science Center. Students also worked on projects during the academic semesters, putting in from four-to-twelve hours per week in the lab. In 2010, 15 of our research students fanned out across the country to present their work at scientific meetings. Posters from those meetings proudly line our hallways in recognition of their work. In 2010, more than five major grants were operative within the department, providing funds for undergraduate research, student travel to meetings, and new research-grade instrumenta-

The Chemistry Department's faculty and staff. *Front Row: Barb West, Owen Moe, Wally Patton. Back row: Tim Peelen, Marc Harris, Cindy Johnston, Marcus Horne, Andy Marsh*

NEWS FROM FACULTY AND STAFF

Marc Harris

Hello from the Harris lab, where work has continued on projects involving the design and synthesis of macrocycles and long-chain oligomers that display the abilities to cross liquid-liquid membranes and extract specific cations from an aqueous environment. One of my research students, Stephanie Velardo '12 recently presented her work at the University of Maryland, Baltimore County, and was awarded first place in the chemistry division. I am on sabbatical this spring semester, a much-needed break earned from serving in the "general chemistry trenches" for the past 11 years. My sabbatical is focused on preparing follow-up manuscripts to our earlier published work. I have also been quite involved in a leadership role at the College as a full member of the Board of Trustees during this exciting time of healthy enrollments, the newly-started renovation of the Mund College Center, and the new growth of undergraduate research programs on campus. If you find yourself on campus in the near future, please don't hesitate to stop by, as we would be happy to "host" you for a lab tour.

Andy Marsh

On the research front, my students and I have been working primarily in the areas of nanoscience and catalysis investigating ketone and aldehyde hydrogenations in water using Pt nanocatalysts. I've also had students conducting research on photocatalytic reactions using colloidal ZnS semiconductor nanocrystals for environmental remediation and phototherapeutic applications. We've continued to collaborate with Wally Patton, two biology faculty members, and their students on these projects. My latest interests have been to look at photoreactions on interstellar ice dust surfaces leading to amino acid formation. To do so, we've built an ultrahigh vacuum surface science chamber at LVC. In addition to teaching physical and general chemistry lectures and laboratories, I've branched out to teach an advanced course on chemical kinetics, and I also have taught freshman writing courses on the topics of nanotechnology and Harry Potter. Being at LVC has allowed me to be involved in areas outside of our department, particularly in our General Education Program. Beyond LVC, I've been active in the local ACS section as webmaster and I've served on two committees writing ACS standardized exams for general chemistry.

tion. The research emphasis has created a sense of energy and vitality within our department. I simply cannot imagine our chemistry program without the research component—it would seem woefully incomplete.

As a part of our 2010 assessment report in chemistry, we carried out a study of students who participated in summer research projects between 2005–2010. The results were most encouraging. In the 2005–2010 time period:

- 54 students participated in our summer research programs
- 96 percent of those summer research students graduated in four years
- 57 percent of our summer researchers entered Ph.D. or M.S. programs
- 19 percent entered M.D., D.O., D.D.S., and other medical professional schools
- 98 percent of summer students found placement within their field after graduation

The study also showed that 71 percent of our chemistry and biochemistry majors were involved in either summer or academic year research during their careers at LVC. We have been fortunate to have had the resources to be able to engage so many students in relevant, interesting projects.

And our research experience at the Valley is made even better by the high-tech labs and the bright, inviting interior of the Neidig-Garber Science Center, shown on page 5. If you haven't been back in a while, please stop by when you are in the area. We really enjoy seeing and talking with our alumni, and having the chance to get reacquainted. And we like to show off our labs and latest instruments too. Remember to visit us at www.lvc.edu/chemistry as well.

We send you all warm greetings from the faculty and staff in the Chemistry Department at LVC.

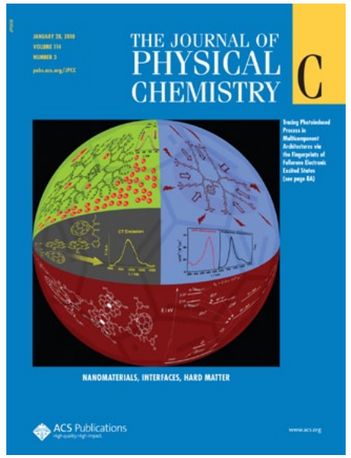
—Owen Moe, March, 2011

Published Research

Once again, the Chemistry Department has made a strong showing in published research originating from LVC laboratories and involving LVC research students. Below is a list of seven papers published in the past year that involved 17 LVC students and three faculty members. Asterisks indicate undergraduate researchers.

1. Andrew Yeagley*, AuBrei J. Weigand-Heller*, Derek Hinds*, Ashley K. Gerrish*, Corey D. Weaver*, and Owen A. Moe, "**Substituent and Solvent Dependence of the One-Electron Reduction of 5-Substituted-N-Methylisatins in Aprotic Solvents,**" ***Journal of Electroanalytical Chemistry,*** **2011,** 651, 228–232. DOI:10.1016/j.jelechem.2010.11.013

2. Kimberly A. Manbeck*, Nathan E. Musselwhite*, Lindsay M. Carl*, Carrie A. Kauffman*, Oliver D. Lyons*, Jason K. Navin*, and Anderson L. Marsh, **Factors Affecting Activity and Selectivity during Cyclohexanone Hydrogenation with Colloidal Platinum Nanocatalysts,** ***Applied Catalysis A,*** **2010,** 384, 58–64. DOI:10.1016/j.apcata.2010.06.007



The Journal of Physical Chemistry C; *January 28, 2010; Volume 114; Number 3.*

3. Oliver D. Lyons*, Nathan E. Musselwhite*, Lindsay M. Carl*, Kimberly A. Manbeck*, and Anderson L. Marsh, **Synthesis, Characterization, and Reaction Studies of a PVP-Capped Platinum Nanocatalyst Immobilized on Silica,** ***Langmuir,*** **2010,** 26, 16481–16485. DOI: 10.1021/la101383s

(continued on page 3)

4. Nicholas C. Boaz*, Nathaniel C. Bair*, Thanh T. Le*, and Timothy J. Peelen, **Activation of Fmoc-Protected N,O-Acetals Using Trimethylsilyl Halides: Mechanistic and Synthetic Studies,** ***Organic Letters,*** **2010,** 12, 2464–2467. DOI: 10.1021/ol100494z

5. Michael W. Porambo*, Heather R. Howard*, and Anderson L. Marsh, **Dopant Effects on the Photocatalytic Activity of Colloidal Zinc Sulfide Semiconductor Nanocrystals for the Oxidation of 2-Chlorophenol,** ***Journal of Physical Chemistry C,*** **2010,** 114,1580–1585. DOI: 10.1021/jp907061d

6. Carrie A. Kauffman*, Amanda L. Muza*, Michael W. Porambo*, and Anderson L. Marsh, **Use of a Commercial Silver-Silver Chloride Electrode for the Measurement of Cell Potentials to Determine Mean Ionic Activity Coefficients,** ***The Chemical Educator,*** **2010,** 15, 178–180.

7. Mark D. Thomas*, Kenneth F. Potter II*, Adam M. Shipe*, Adam D. Wier*, Timothy J. Peelen. **Addition of Carbon-based Nucleophiles to Ester-substituted, Fmoc-protected N,O-Acetals as a Method for the Synthesis of b-Amino Acids,** ***J. Und. Chem. Res.,*** **2010,** 12, 2464-2467. DOI: 10.1021/ol100494z

New Summer Research Program Brings Incoming Freshmen to LVC Labs

The summer of 2010 was the inaugural run for the Chemistry Department's new Research First program. Research First provides opportunities for incoming freshmen to carry out research with student/faculty research teams for 4–6 weeks in the summer immediately before they begin their studies at LVC. Last summer, we invited four incoming freshmen, Collin Straka '14, Heather Tran '14, Karly Siffin '14, and Hannah Salapa '14 (pictured above from left to right), to participate in the program.

After completing their first semester at LVC, the students shared their thoughts about their pre-freshmen research experience. Overall, the opportunity to spend time in the research lab prior to their freshman year was one they couldn't pass up. "Research First was the reason why I chose LVC," admits Hannah Salapa, who worked with Wally Patton's research group. "I learned basic lab techniques that are used in formal laboratories, basic chemistry concepts, and how to make dilutions, etc."

Collin Straka ultimately had graduate school in mind when he set out to choose an undergraduate program. Research First clinched the deal: "When LVC offered me the ability to take not only three years of research, but an additional one, I immediately decided that this is where I wanted to go." Collin, who synthesized nanocatalysts, said his summer research in Andy Marsh's group enhanced his knowledge of advanced concepts. Karly, who worked with the Harris research group, agrees: "Dr. Harris and the other people in my lab were very helpful in teaching me everything I needed to know. By the end of the six weeks, I felt very comfortable performing procedures and syntheses by myself."

Heather Tran, who worked with Tim Peelen's group, says that spending the summer on campus with upperclassmen better prepared her for freshman year. "I really loved the people I worked with. They all made me feel at home. I felt like I was getting my own private view of college life and experiences. It was amazing!" The students all emphasize that Research First wasn't only about learning; the summer research experience helped with the transition into the college experience. And it was fun

NEWS FROM FACULTY AND STAFF

Wally Patton

Greetings—The last year has just flown by. Fortunate to have earned my first sabbatical as a faculty member at LVC, I spent spring 2010 at the "Med Center" in Hershey as a visiting scholar in the laboratory of Dr. James Connor (Department of Neurosurgery). Neurosurgery, you may ask? I had the unique opportunity to work on ferritin which, as a carrier of iron, is important in many biological processes. Ferritin is a really large protein that forms from 24 H or L monomers (~20 kDa each). The resulting native protein is a macromolecular "soccer ball" of sorts with a hollow interior that binds ~4,500 Fe2+ atoms and stores them as an Fe3+ mineral core to the particle. (Just Google ferritin...it is really a cool molecule, trust me). I am interested in whether I can exploit the fact that ferritin self-assembles so I can generate ferritin molecules with specific functions. Also, we continue to investigate GMPS and, among other things, what causes it to dimerize. Protein work and MALDI are what we do most these days. One of these days I really need to generate a good website so I can just say, "go see what we have been up to." Lastly, this is the third and final year of our Merck-AAAS grant that has allowed faculty in chemistry to work collaboratively with faculty in biology. That is it for now... be in touch occasionally, and I will do my best to do the same.

Barb West

Chances are that if you graduated within the past 15 years you've had some contact with me here in the chemistry office. Forgive me if I brag, but I have one of the most awesome jobs on campus. I work with a brilliant team of chemists and biochemists, whom I'm proud to also call my friends. When "my" faculty isn't in the classroom relaying sometimes-complicated material to students, they're overseeing undergrad researchers in the lab, who are working on some very cool projects. And when our students aren't in class or lab, they can usually be found right outside my office in a cozy area that overlooks the Neidig-Garber atrium, studying, sharing a cup of coffee and a laugh, and even napping between classes! It's the social interaction with the students and our alums that makes this job extra special. I maintain our chemistry alumni records, so please email me when you have a change in your life. And drop by the new LVC Chemistry facebook page for a visit. Outside of LVC, I'm a freelance journalist and photographer for the Lebanon Daily News. When you have a spare hour or two, let me tell you about my four grandchildren!

NEWS FROM FACULTY AND STAFF

Tim Peelen

It's been a busy few years since I started at the Valley in 2005. In addition to teaching Organic Chemistry and the labs to 40–50 students each year, there's been lots of activity in the research lab searching for new organic reactions and methodology, particularly strategies for accessing unnatural amino acids. Special thanks go to the 30+ students that I've had the good fortune to work with. Our hard work has begun to bear fruit; the group has published three papers in the last couple of years with a few more in the pipeline. Last year, our research project was awarded a National Science Foundation RUI (Research at Undergraduate Institutions) award that will provide $144,000 for equipment, summer student stipends, and travel over the next three years. At home, like at the College, things continue to change. Daniel (now 5) has started kindergarten and loves soccer, Legos, and Star Wars. Anna ("Panka," age 3) is in preschool and likes animals and anything her brother does. Finally, last May, Dora and I welcomed our third child, Matthew, into our family. He is a pleasant and rapidly growing boy.

Recent years have seen a growth in our capstone departmental seminar program. Each fall, our seniors introduce their projects through a literature survey along with a research proposal, and in the spring, each senior prepares a research presentation. Furthermore, each semester the department welcomes four or more external speakers from area research universities, from research-active colleges, and from industry. The seminar program has been embraced by our undergraduates and typically attracts 20–30 students from all classes. We are especially happy to welcome back alumni (both "old" and "young") and hear what they are up to. Our students are intrigued and inspired by the paths followed by those LVC students who have preceded them. If you are interested in contributing to the seminar program in the future, contact Tim Peelen (peelen@lvc.edu) or Andy Marsh (marsh@lvc.edu) to make arrangements.

Mark Thomas '10, Allix Sanders '10 and Kimberly Manbeck '10 at the Lebanon Valley College Commencement Ceremony on May 15, 2010.

Class of 2010

Again in 2010 we had a strong and relatively large graduating class of chemistry (CHM) and biochemistry (BCMB) majors. This year, we had a greater percentage/number of graduates enter Ph.D. programs. The table below shows the positions accepted by 2010 graduates for whom we have current information.

Name	Major	Position of Program Entered
Ellen Adams	CHM	Ph.D. Program, Surface Chemistry, Ohio State University
Nicholas Boaz	CHM	Ph.D. Program, Organic Chemistry, Princeton University
Richard Carr	BCMB	Ph.D. Program, Molecular Pharmacology, Thomas Jefferson University, Philadelphia
Philip Domeier	BCMB	Research Assistant, Pennsylvania State University Medical Center, Hershey
Tracey Fortugno	BCMB	Laboratory Technician, Pennsylvania State University Medical Center, Hershey
Matthew Kartzman	CHM	Ph.D. Program, Chemistry, Duquesne University, Pittsburgh
Kimberly Manbeck	CHM	Ph.D. Program, Physical Chemistry, University of Rochester, N.Y.
Brandon Parks	CHM/BCMB	Ph.D. Program, Organic Chemistry, University of Pittsburgh
Robyn Powell	BCMB	M.S. Program, Pharmacology, Northeastern University, Boston, Mass.
Allix Sanders	CHM	Ph.D. Program, Chemistry, Johns Hopkins University, Baltimore, Md.
Charles Schmidt	BCMB	Ph.D. Program, Biochemistry, University of Virginia, Charlottesville, Va.
Mark Thomas	CHM	Quality Assurance Analyst, Bayer Healthcare, Myerstown
Stephenie Thomas	BCMB	Post-Baccalaureate Intramural Research Training Award Fellowship, National Institutes of Health, Bethesda, Md.

Assessment Testing in Chemistry

Each spring we ask all graduating seniors in chemistry to take the Educational Testing Service Major Field Test in Chemistry. This two-hour exam tests knowledge in all areas of chemistry, giving us information needed to assess learning in our courses. The results of the past three years are included in the table below and we have been pleased, to say the least, with the stellar performance of our graduates. For each year below, the graduating chemistry cohort from LVC is compared with cohorts from other universities nationwide. The percentile scores rank LVC's cohorts nationally.

ETS Major Field in Chemistry for LVC Chemistry Graduates

Three Year Summary (2008–2010)

Years	Physical	Organic	Inorganic	Analytical	Total	Biochem	Critical Thinking	N (LVC)
2008	85%	80%	93%	86%	84%	76%	76%	9
2009	85%	69%	83%	91%	83%	76%	76%	10
2010	96%	99%	97%	97%	97%	97%	97%	8
Average	88%	83%	93%	93%	90%	87%	87%	27

If you would like to support the chemistry department simply fill out this form and mail it with a check to:

Office of Development, Lebanon Valley College, 101 North College Avenue, Annville, PA 17003.

Name(s): _____

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Address: _____

I am pleased to support the Chemistry Department at Lebanon Valley College by donating to the:

❑ Neidig Chemistry Research Fund ❑ Neidig Fund for Chemistry Scholarships

Donation Amount: $_____ (make check payable to Lebanon Valley College)

Thank you for your support of LVC Chemistry!

THE NEIDIG FUNDS PROVIDE OPPORTUNITIES FOR GIVING

Not only did Dr. Tony Neidig '43, H'04 build a nationally recognized chemistry program at Lebanon Valley College and serve as chair of that department for 35 years, Tony and Helen Neidig also had the vision to create two endowed funds in chemistry that provide critical support of quality experiences for students.

The Neidig Chemistry Research Fund has been invaluable to us in running our summer research experience in chemistry. It provides undergraduate summer stipends, chemical supplies, and travel expenses for students presenting at American Chemical Society meetings.

The Neidig Fund for Chemistry Scholarships provides aid to promising chemistry majors who have financial need. Both of these funds speak to the vision of Tony and Helen.

We would be pleased if you would be willing to help us make the Neidig funds grow. If you would like to support either fund, please use the form to the left. Please send your check and form to:

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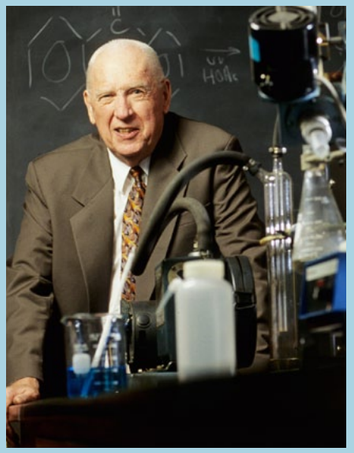

Dr. Tony Neidig '43, H'04

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