UNIVERSITY OF RICHMOND

FROM THE CHAIR

Dear Friends,

I hope this update finds you well. 2009-10 was another memory-filled year working with talented and hard-working majors, a surprisingly large first-year class, and an incredibly dedicated faculty and staff. We graduated a very strong class of nine chemistry and 11 biochemistry and molecular biology (BMB) majors, whose plans include medical school, graduate school, research positions, and taking a year or two off to explore future directions.

The department continues to focus on providing high-quality research experiences for our students. This graduating class did a great deal of research in their four years at UR. Morgan Vargo, Chris Maneri, James Eaton, and Lauren Firich all published peer-reviewed manuscripts as undergraduates, and many others will ultimately publish the work they completed here. In addition, many members of the graduating class traveled to regional and national meetings. Some even opted to spend this last summer, following graduation, finishing up research in the department, working alongside other UR undergraduates, high school teachers, high school students, post-baccalaureates, and post-docs—about 80 researchers in total.

A few special research-related events for the year included hosting Bruce Levin (Emory) as our fall HHMI keynote speaker and a UR chemistry alum, Kenneth Pearce (GlaxoSmithKline), as our spring Powell lecturer.

The department also continues to focus on adding new and interesting courses to its curriculum. Check out page 4 for a full list of new chemistry courses that are making their debut.

2009-10 Annual Report to Alumni

RESEARCH IN CHEMISTRY

Department of

Research program continues to grow in quality, quantity, and impact.

emis

The University of Richmond's Department of Chemistry values undergraduate research, and over the last ten years opportunities in this area have grown tremendously. This past summer, 73 Richmond chemistry students remained on campus to perform full-time research with our faculty. During the academic year, students continue their research for course credit, typically devoting seven to 15 hours per week to their projects. In each faculty member's lab, students conduct outcome-based, publishable research, and mentors take great care to select projects that are both of interest to the scientific community and achievable by undergraduates.

We recognize that early involvement in research and personal direction by a faculty member is critical to a student's success. Students at Richmond can begin research as early as the summer *before* their first year on campus. The university won a grant from the Howard Hughes Medical Institute that includes the provision of research stipends for 10 high school graduates planning to enroll at the university in the fall; two of those stipends go to students who are specifically interested in studying chemistry. The program introduces the 10 "pre-freshmen" to campus, the research process, and individual faculty research projects, and matches students with faculty research teams.

First-year students who don't come to campus early to conduct research still find plenty of opportunities to get involved the moment they begin their coursework in the fall. In fact, a series of talks called "Research Introductions" are presented by faculty to help new students determine the labs in which they might be the most interested in working. It has become the norm for students to work in the lab during both the academic year and the summer months, and summer research fellowships are available via the School of Arts & Sciences to support on-campus living during that time period. Chemistry faculty often use external funding to support the work of additional high school students as well as post-doctoral and post-baccalaureate fellows. The result of year-round research is that many students choose to continue their projects over multiple years in order to see their work through to its logical conclusion.

Our commitment to outcome-based research, along with the close student-faculty relationships that develop as a result of this work, supports a highly engaged undergraduate culture in which almost all of our students present their work at regional, national, or international meetings, and a significant number of them are coauthors on peer-reviewed publications. Because of these positive experiences, many decide to pursue the Ph.D. in the biological and/or chemical sciences, gaining admission to high-caliber programs because of the exceptional education they have received at Richmond—both in the classroom and the lab.

Perhaps the most telling evidence of our students' talent and the strength of their education is their success in a variety of nationally competitive programs. In the last two years, our research students have received a Barry M. Goldwater Scholarship, four National Science Foundation Graduate Research Fellowships, a Department of Energy

The American Chemical Society (ACS) Student Affiliates had another very active year under the leadership of Rob Miller. In June they treated 55 fifth graders from Overby Sheppard Elementary School to an hour of chemistry fun and applications at UR. The show was sponsored by Richmond's Center for Civic Engagement, the Department of Chemistry, and the ACS Student Affiliates. The fifth graders were so fascinated with the show that in November the student affiliates visited their school for an encore presentation.

This year we were fortunate to be able to welcome two new faculty members to the department: Diane Kellogg, director of instrumentation, and assistant professor of chemistry Kristine Nolin, whose focus is organic chemisty. Both have had excellent first years

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Computational Science Graduate Fellowship, and a National Defense Science and Engineering Fellowship.



2010 STUDENT AWARDS



CHEMISTRY

Garnett Ryland Award Morgan Vargo Awarded to the best graduate in chemistry.

ACS Award

Lauren Firich Diomedes Saldana Greco Awarded to a graduating senior deemed outstanding. Generally given to a senior who plans to attend graduate school.

Senior Research Achievement Award

James Eaton, John Pinski, and Diomedes Saldana Greco Awarded to the senior chemistry major who has demonstrated the most impressive research achievements.

Academic Award Tran Doan Awarded to a senior who has excelled in

chemistry.

Service Award

Tran Doan and Callie Dowdy Awarded for service to the Department of Chemistry and the university.

J. Stanton Pierce Award

Smaranda Craciun, Xin Jia, Maria Lindell, Anna Parker, and Heather Robinson Given to an outstanding junior chemistry major.

Analytical Chemistry Award Maria Lindell

Awarded to a chemistry major who demonstrates an aptitude and interest in pursuing a career in analytical chemistry.

Stuart Clough Organic Chemistry Award

Justin Cook Awarded to a student who demonstrates outstanding ability in the field of organic chemistry.

William Trout Award Kevin Kindler and Alexander Martin A CRC handbook is presented to the best student in general chemistry.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

BMB Sophomore Research Award Sarah Rhoads Awarded to a sophomore who demonstrates outstanding research potential.

BMB Junior Research Award

Matthew Bober Awarded to a junior who demonstrates outstanding research performance and dedication.

BMB Senior Research Award

Virzhiniya Lekova Awarded to a senior who demonstrates outstanding research performance and dedication.

Most Outstanding BMB Major

Award Lauren Folgosa Awarded to the overall best senior BMB major in research, academics, and service.

BMB Academic Award

Kaila Arnold Awarded to the senior BMB major with the highest academic aptitude in the major.

Gamma Sigma Epsilon

Graduating

Kaila Arnold

Lauren Firich

Chris Manieri

Adrian Pickar

John Pinski

Tran Doan

FROM THE DESK OF...

Catch up with the faculty in the Department of Chemistry. For a complete list of publications and presentations, visit chemistry.richmond.edu.

Dr. Will Case

Wow! It is hard to believe I have been here for three years now. The first class I taught will be graduating next spring and that will certainly be a bittersweet moment. This year I have been working on a new course for the fall semester entitled Catching Criminals with Chemistry. This will be a course for non-majors and will introduce students to the techniques used by forensic chemists. In addition, students will have a chance to consider the legal aspects associated with processing evidence and presenting such evidence in a courtroom. I am looking forward to this class! I hope all of our alumni are doing well.

Dr. Jonathan Dattelbaum

The big news is that my wife, Kristine, and I were blessed with a healthy baby girl, Grace Hanna, on April 30th. Grace brings much joy to our lives. In March, I learned that my tenure and promotion to associate professor at UR was approved. The new academic year will see me teaching new upper-level seminar courses and working with four students in my research lab.

Dr. Raymond Dominey & Dr. Emma Goldman

I (Dominey) will be on sabbatical this coming year working on several projects. Although I continue to be interested in fuel cell and battery development work, this past year I have refocused most of my efforts on one particularly exciting project, which focuses on our society's "energy problem" and is a collaboration with Andy Bocarsly at Princeton (see June 28, 2010 issue of C&E News, pg. 40-41, to read an article about the project) and my wife, Emma Goldman. The project has the potential to revolutionize the viability of solar energy by providing a massively scalable way to store electrical energy. Emma and I have also been collaborating for the past few years on a separate carbon dioxide reduction effort focused on the reduction of carbon monoxide with subsequent use of Fisher-Tropsch catalysis. We have a full lab with 8 to 10 students working on various aspects of the two projects. On a personal note, our daughter Diana will start high school this year and loves to torment us both by reminding us that in six months she can get a learner's permit.

Dr. Wade Downey

It's been another fun year for me at UR, highlighted by teaching a class on the other side of campus for the first time. We published a paper in the Journal of Organic Chemistry this summer, highlighting the work of research students Miles Johnson, Daniel Lawrence, Alan Fleisher, and Katie Tracy. Student Smaranda Craciun presented her work at two national ACS meetings. Our summer research group included: Smaranda Craciun, Jimmy Rague, Alan Fleisher, Chelsea Safran, and Christina Vivelo, all of whom are looking forward to presenting their work at SERMACS in New Orleans this fall. On a personal note, my son Finn has just turned one and is learning his alkali metals!

Dr. Lisa Gentile

It's been another exciting year in the department. In the area of teaching, alongside nine other faculty (including Carol Parish in chemistry), I was involved in the implementation of the new integrated quantitative science (IQS) course for first-year students, which was funded by a grant from the Howard Hughes Medical Institute. I hope this was as interesting and educational for the students as it was for the faculty involved. My research students continue to be bright, hardworking, creative, and a real pleasure to interact with. We are making very good progress toward our goals and presented our results at the national Protein Society meeting in San Diego this August. This summer my research group had the pleasure of working alongside Dan Fisher and Essie Brown in the research lab, in a program funded by the National Science Foundation. Dan is a high school chemistry teacher (and UR alum) at Church Hill Academy in Richmond, and Essie is one of his students who just finished her senior year. I hope to be able to continue these types of meaningful collaborations with Church Hill Academy in the future.

Dr. John Gupton

The past year was busy as our research group continued to pursue projects involving the use of vinylogous iminium compounds for the preparation of biologically interesting substances. Our current lead compound (JG-03-14) has been shown to have very good activity against breast cancer cell lines and more recently against both colon cancer cell lines and melanoma cancer cell lines. We are continuing to synthesize new analogs of our lead compound and have them bioassayed by our collaborators in Texas, Virginia, and New York. We continue to attract excellent students to UR chemistry and it is a great pleasure and honor to be associated with such a fine group of young folks. We also very much look forward to hearing from former UR alums regarding their families and their careers. On the home front, my daughter Emily got married and our family continues to enjoy the many things to do in Virginia, such as boating, hiking, and watching UR athletic events.

Physical Chemistry Award Smaranda Craciun

Awarded to a student who demonstrates outstanding ability in the field of physical chemistry.

Inorganic Chemistry Award Smaranda Craciun

Awarded to a student who demonstrates outstanding ability in the field of inorganic chemistry.

Junior Research Achievement Award Sally Fisher, John Mancini, and

Bernard Wittmaack

Awarded to the junior chemistry major who has demonstrated the most impressive research achievements.

Virginia Academy of Science Award

Sally Fisher Awarded to a returning student who is likely to pursue a career as a scientist.

Gamma Sigma Epsilon is the national chemistry honor society.

Graduating Class of 2010 Class of 2011 Bryn Allen Peter Barelli Matthew Bober Lauren Folgosa Smaranda Craciun Kendra Cunningham Paul Hargarten Virzhiniya Lekova Sally Fisher Xin Jia Tim McLarkey Jenna Landers Maria Lindell Anna Parker Brian Sacchetta Heather Robinson Diomedes Saldana Greco Drew Simmelink Morgan Vargo Angela Xie

Dr. Michelle Hamm

I was on parental leave in the fall and took a sabbatical during the spring 2010 semester. This past February, I learned that I obtained an NSF-RUI grant, "Chemical Investigations into the Bioactivity of the Damaged DNA Nucleotide 8-Oxo-2'-deoxyguanosine," for \$244,000 over three years.

Dr. Mike Leopold

For most of the academic year of 2009-10, I was on an enhanced sabbatical research leave. The fall semester was spent as a visiting scholar in the research laboratory of Professor Mark Schoenfisch at the University of North Carolina - Chapel Hill, and the spring semester was spent implementing my research program here at UR.

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and have contributed enormously to the success of the department. In addition, we added three new "junior" members to our department family: Wade and Eileen Downey welcomed a new son, Finn Downey; Michelle Hamm and Paul Nyffeler welcomed a new daughter, Megan Nyffeler; and Jon and Kristine Dattelbaum welcomed a new daughter, Grace Dattelbaum.

As time permits, please stop by, give us a call, or send an email letting us know how you are doing. We love to hear from you. For those of you who are financially supporting our program, we are very grateful. We rely on those funds to help support our summer undergraduate research program, to recognize deserving students with end-of-year awards, and to support community-building activities.

Thank you.

Lisa Gentile Chair, Department of Chemistry lgentile@richmond.edu



Chemistry major Sally Fisher named a Beckman Scholar

In March the Arnold and Mabel Beckman Foundation awarded the University of Richmond \$96,500 to name five students Beckman Scholars. The fellowship covers their costs and supplies for two summers and one academic year of research on campus, plus travel to an academic conference in California both

2010 GRADUATES

CHEMISTRY

Tran Doan - Pittsburgh, PA. Tran worked in two different research labs during her time at UR. She worked with Dr. Sam Abrash for three semesters and one summer. Her research projects were "Internal Hydrogen Bonding and Its Effect on the Conformations of Neutral Diamines" and "Photochemistry of SiCH20 Isomers on the Triplet Hypersurface." Her work in Dr. Mike Leopold's lab, where she worked for three semesters and two summers, was "Adsorption and Thermodynamic Properties of Azurin at Monolayer-Protected Film Assemblies: Evidence for a More Homogeneous Adsorption Interface," Her honors thesis was titled "Monodispersity Dependence of Azurin Protein Monolayer Electrochemical at Monolayer Protected Nanoparticle Film Assemblies." Tran will be pursuing a gap year between college and medical school in order to explore public health and social issues such as human slavery and trafficking, and their health implications.

Callie Dowdy – Murray, KY. Callie did research in Dr. Mike Leopold's lab for four years and two summers. The title of her project, which is in the process of becoming a journal publication, is "Enhanced Electrochemistry of Nanoparticle-Embedded Polyelectrolyte Films: Interfacial Electronic Coupling and Distance Dependence." Callie plans to spend the next year hiking the Appalachian Trail from Georgia to Maine, after which she plans to attend medical school.

James Eaton – Phoenixville, PA. James was in Dr. John Gupton's research lab for two and a half years. His project was "The Application of Vinylogous Iminium Salt Derivatives to Efficient Formal Synthesis of the Marine Alkaloids Lamellarin G trimethylether and Ningalin B." James will complete a one-year master's program in biophysics at Georgetown University before attending medical school.

Lauren Firich – Woodbridge, VA. Lauren conducted research with Dr. John Gupton for four semesters and one summer. Her project was titled "Syntheses of Key Intermediates of Ningalin C." She plans on working or volunteering for a year while deciding what to do next.



Leander Sinanan – Sangre Grande, Trinidad. Leander worked in Dr. Ellis Bell's research lab for all four years and summers. One of the recent projects she was involved in was "A Novel Mechanism of V Type Zinc Inhibition of Glutamate Dehydrogenase Results from Disruption of Subunit Interactions Necessary for Efficient Catalysis." In December, Leander will marry another UR chemistry graduate, Jimmy Marion. She plans on attending graduate school at VCU.

Gregory Springsted – Sewell, NJ. Greg worked in Dr. Carol Parish's lab for four academic years and three summers. His project was "Molecular Dynamics Analysis of HIV-1Protease Inhibitors." He is taking a year off and plans to apply to law school.

Morgan Vargo – Charleston, WV. Morgan worked in Dr. Mike Leopold's lab for three years. The title of her research project was "Distance Dependence of Electron Transfer Kinetics of Azurin at MPC Film Assemblies-A Homogeneous Adsorption Platform." Morgan will be attending the Medical College of Virginia-VCU School of Medicine.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

Kaila Arnold – Lebanon, PA. Kaila worked in Dr. Jonathan Dattelbaum's lab during her sophomore year on a project, "Characterization of the UreR Protein." She will be attending Temple University's Kornberg School of Dentistry this fall.

Brian Borkowski – Rocky Hill, CT. Brian did research in Dr. Lisa Gentile's lab for two years. His project was "Characterizing the Binding Domain of the NR2B Ionotropic Glutamate Receptor." He hopes to find a research assistant position in either Richmond or the Boston area. Virzhiniya Lekova – Pleven, Bulgaria. Inny worked in Dr. Ellis Bell's lab since her freshman year. During that time she worked on two projects. Her most recent poster presentation was on "The Effects of Nucleotides on Hexamer Stability of Glutamate Dehydrogenase." Inny will be pursuing a Ph.D. in cell and molecular biology at the University of Pennsylvania.

Claire Ligon – Niskayuna, NY. Claire did research with Dr. Michelle Hamm. The title of her project was "Studies into the Extension Past the Promutagenic DNA Lesion 8-oxo-2'-deoxyguanosine with Two Bacterial Polymerases." She will attend the University of Virginia's Curry School of Education where she will work toward a master's degree in communication disorders.

Tim McLlarky – East Lyme, CT. Tim's project with biology professor Amy Treonis was titled "Landscape-scale PCR-DGGE Analyses of Soil Microbial Communities in Mojave Desert Soils." He worked in Dr. Treonis' lab for four semesters and one summer. Tim will be attending VCU's School of Pharmacy.

Katie Nicholas – Ephrata, PA. Katie worked in Dr. Jonathan Dattelbaum's lab for two years, completing a project, "Marine Microbe Natural Product Isolation and Characterization." She will be pursuing a Ph.D. in microbiology and immunology at Vanderbilt University's Interdisciplinary Graduate Program in Biomedical and Biological Sciences.

Crystal Richardson – Fredericksburg, VA. Crystal worked for four academic years and four summers with biology professor April Hill. Her project was "The Development of a System to Study Sponge Bacterial and Zooxanthellar Symbiosis." Crystal will be working toward a Ph.D. in microbiology, immunology, and infectious disease at the University of Virginia.

Monica Rocha – Landenberg, PA. Monica did research with Dr. Lisa Gentile from the summer of her first year to the summer following her junior year. Her two projects were titled "Characterizing the Binding Domain of the NR2D Ionotropic Glutamate Receptor" and "Alzheimer's Disease: Exploring the Nicastrin-Presenilin Interaction in the Gamma Secretase." She will take a year off while applying to graduate programs in public health.



summers.

Since 1997 the Beckman Foundation has provided funding to colleges and universities to, in turn, support exemplary student researchers. Richmond received a Beckman Scholars grant in 2006, and was selected to receive one again in 2010.

In May, the university announced the selection of two Beckman scholars chemistry major Sally Fisher, '11, and biology major Andrew Massaro, '11.

Fisher has been researching the structure of the motor protein kinesin with chemistry professor Carol Parish since fall 2008. This summer she researched the properties of alternative fuels such as oil shale and domestic sand. She is a member of Gamma Sigma Epsilon chemistry honor society and Phi Eta Sigma and is a National Merit Scholar. John Pinski – Buffalo, NY. John worked in Dr. Sam Abrash's lab for three years. He had several research projects but the overall theme of his work can be summarized as "Ab Initio Calculations of Geometries, Energies and Mobilities of Products of Ion-Molecule Reactions." He is currently working at the National Institute of Health.

Diomedes Saldana Greco – Tocumen, Panama. Dio worked on several projects with Dr. Sam Abrash over the course of two summers and five semesters. Most recently, he has worked in the Parish lab on three projects, "Density Functional Theory of the Electrocyclization of Octadienediyne," "Ordering of the Low-lying States of Lauren Folgosa – Fayetteville, GA. Lauren worked for one year in Dr. Carol Parish's lab. Her project was titled "The Cyclization and Conformational Variations of Kedarcidin and Neocarzinstatin." She spent the remaining three years of her collegiate career working on "The Effect of Polysubstituted Pyrole Compounds on the Inflammatory Response" with biology professor Krista Stenger. Lauren will attend medical school in the fall.

Tyler Steele – Mountaintop, PA. Tyler worked in Dr. Carol Parish's lab for seven semesters and three summers. His two primary projects were "Energetic Analysis of Damaged DNA Base Pairs" and "Understanding the Conformational Preferences of Tenside Surfactants." After working at UR this past summer, he hopes to get a job in a research related field and eventually plans to attend graduate school.



Chemistry Department Gottwald Center for the Sciences B-100 University of Richmond, VA 23173

Department of Chemistry



New chemistry courses being offered at the University of Richmond

Theoretical and Computation Chemistry An upper-division elective designed by Carol Parish

Catching Criminals with Chemistry A non-majors forensic chemistry course designed by Will Case **The Souls of Scientists** A first-year seminar designed by Marty Zeldin

Neglected Tropical Diseases A special topics course in biochemistry designed by Jon Dattelbaum

Biological Pathogens A special topics course in biochemistry designed by Jon Dattelbaum Physical Organic Chemistry and Catalysis An upper-division elective designed by Wade Downey

Molecular Spectroscopy An upper-division elective designed by Sam Abrash

Thank You

The Department of Chemistry is pleased to recognize our recent donors. Your gift to the department helps create a learning environment for young students and offer them the full experience of the University of Richmond.

Ms. Paige C. Aderholt B'77
Ms. Kaila Arnold '10
Mr. Robert M. Bartholomew B'79

and Dr. Theresa Bartholomew
Ms. Cindy H. Browder B'81

Jeffry C. Burden Esquire '88

and Ms. Kathleen Decker Burden '06

Ms. Tran Thu Doan '10
Ms. Callie Elizabeth Dowdy '10
Mr. James E. Eaton '10
Mr. Chris Hamman '00
Mr. Jonathan E. Hempel '07
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Mr. John M. Pinski '10
Dr. Susan E. Plunkett W'89
Dr. Elizabeth T. Singewald W'91

and Christian J. Singewald
Esquire R'91

Ms. Katy Skimming '10
Mr. Carl J. Strobe

and Ms. Lynne R. Strobe
Ms. Morgan Lynn Vargo '10

Ms. Lynda Howell Weston B'81

and Mr. Ernest W. Weston Jr.

DESK CONTINUED FROM PAGE 2

Dr. Rob Miller

I have published the fourth edition of my organic chemistry laboratory manuals with the Academx Publishing Company. This fall I started my second year as the faculty advisor to the American Chemical Society Student Affiliates Club. Last year we had a productive year, which included three magic shows and two "glass room luncheons." The first luncheon was in October with UR chemistry graduate Caitlin Delaney, '04, a forensic scientist with the Virginia Department of Forensic Science, and the second, which was cosponsored by the Women in Math and Science (WIMS) group, was in April and featured Maureen Rouhi, the deputy editor of *Chemical and Engineering News*. I continue to update the current organic chemistry laboratory curriculum and explore my research interest in synthetic methodologies. When I have some free time, I enjoy climbing, hiking, and camping in the Appalachian Mountains.

Dr. William Myers

Hard-working students to mentor in research, responsive students to teach in class, energetic colleagues with whom to work, and a grandson who turned seven: How could this not be a good year? The fact that we got a few papers published was a bonus, as was the chance to see a former student, now an astronaut, take his second ride into space. The students stay the same age but I don't, so the gap continues to grow, compensated for only by the growing number of students from earlier years who stop by to say 'Hi' from

Ms. Beth F. Kelly B'80
Ms. Claire W. Ligon '10
Mr. Matthew S. Luchansky '08
Dr. Christopher L. Maestrello R'85
Mr. Cornelius J. McCormick and Ms. Mary A. McCormick

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Stay in touch

We love to hear from our alumni! Keep us updated by visiting *chemistry.richmond.edu/contact/alumni.html*.

time to time.

Dr. Kristine Nolin

I completed my first year in UR's Department of Chemistry. Once construction was completed on my lab, three students joined my research group for the 2009-10 academic year. I currently have an article, "Enantioselective Reduction of Ketones and Imines Catalyzed by (CN-Box)Re(V)-OxoComplexes," in press.

Dr. Carol Parish

This past year I have mentored 21 students who were responsible for 32 presentations at regional and national meetings. I also published two papers with Evan Wang, '09, in the *Journal of Organic Chemistry* and *Tetrahedron Letters*. To support my research group, I obtained external funding from the NSF-ROA and MRI programs as well as compute time on the national TeraGrid supercomputers. Together with René Kanters and Kelling Donald, we configured and purchased a new 876-core supercomputer, which will reside in the climate-controlled UR Data Center. I also worked with 14 UR colleagues to land a prestigious Beckman Scholars award to continue an intense level of support for our most productive science students. I presented guest lectures at the annual DOE Combustion Research meeting, the Southeastern Theoretical Association (SETCA) meeting, the Science Museum of Virginia, and Union College. I also co-organized the annual MERCURY meeting in computational chemistry. On the teaching front, I co-developed and team-taught a new interdisciplinary course, Integrated Quantitative Science, and developed a new course in computational and theoretical chemistry.