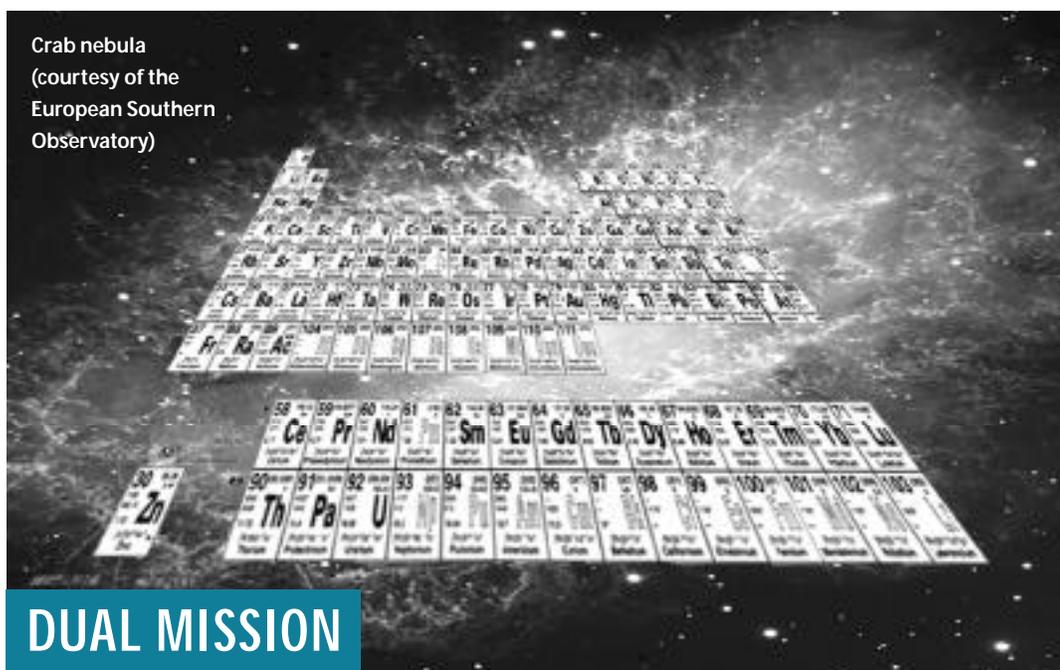


ChemNotes

{ TUFTS UNIVERSITY CHEMISTRY DEPARTMENT }

2002 • WINTER



Crab nebula
(courtesy of the
European Southern
Observatory)

DUAL MISSION

Education and Research

The Tufts University Department of Chemistry continues its commitment to the dual mission of education and research.

EDUCATION

The Cosmic Approach to Environmental Chemistry

BY JONATHAN E. KENNY

Over the past few years, graduate student and EPA STAR (Science To Achieve Results) Fellow Todd Pagano and I have been developing strategies by which science courses can be made more interesting, accessible, enjoyable, and rewarding for the nonscientist. The science distribution requirement, faced by about 2.5 million U.S. college and university students every year, usually produces the most anxiety for typical nonscience majors. Colleges and universities often offer a limited range of topics for science courses directed at nonscientists, many of which the

students find unappealing. Furthermore, the textbooks and pedagogy used in these courses are often inappropriate and ineffective. For example, the lecture mode is usually used exclusively, and assignments and exams overemphasize prowess in computation. As a result, students often skirt the science portion of the general education requirements by taking classes that will be the least intellectually challenging or easiest to get through, despite not having interest in the subject material. Students' objectives are not met, as they have little opportunity to explore the very science topics that truly interest them, for example, their place in the universe, their innate care for and curiosity about the environment, and other topics.

The severity of this problem is augmented by the fact that these classes are often the only post-secondary exposure to science that a large fraction of the vast audience will experience. Therefore, a poor experience in one of these classes can cultivate a feeling of science-phobia that the student seldom outgrows. The possibility of attracting

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Chair's Corner

MARY SHULTZ

This has been a very busy, productive, and challenging year for the department. In the tradition of our dual mission of excellence in teaching and research, we are particularly proud of three, university-wide awards received by department members. Dr. Chris Morse received the



Tufts Community Union (TCU) Senate award as teacher of the year. This award recognizes the tremendous energy and attention that Dr. Morse brings to our Chemistry 11/12 sequence. Professor David Walt received the University Faculty of the Year Award. This award recognizes Professor Walt's unprecedented success with technology transfer—more about this below. One of our graduate students, Henning Gröenzin received the university-wide graduate student achievement award for his combined outstanding contribution to undergraduate education and research achievements. On the bricks-and-mortar front, the building envelope has received a much need facelift including repairs to the roof. The scaffolding has been taken down and the façade looks great (see elsewhere for a shot of the refurbished capstone).

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capable nonscience students into a science major is vanishingly small.

Over a decade ago, the Chemistry Department introduced Environmental Chemistry, a course aimed at nonscientists. Our plan for the further evolution of the course addresses the problems cited above and includes the development of curricular material and pedagogy that should be transferable to many other science courses. The project has the following specific objectives:

Over the past two years we have experimented with the reorganization of our environmental chemistry course along the time line of the story of the science of Cosmic Evolution.

1. Develop a narrative approach to the subject matter. For the most part, in writing textbooks and organizing their courses, scientists have eschewed the story line in favor of the outline. The subject matter is organized according to some grand scheme, admirable in its elegance, which incorporates the overview achieved to date by practitioners of the discipline being presented. That this structure might not be fully appreciated by the neophyte is a reflection not generally entertained by the instructor, regardless of overwhelming supporting evidence. By contrast, the power of the narrative, both to capture the interest and attention of the listeners and to assist them in the process of assimilating the information, making meaning of it, and, in the process, actively making science, is well known among researchers in education. Despite the recognition of the importance of narrative structures in helping students assimilate knowledge, few attempts have been applied to the science for nonscientists curriculum. Granted, in some areas of science and technology it is not so easy to identify a story line on which to "hang" the material. Still, scientists are generally aware enough of the appeal of stories to include episodes in the history of science (or partial biographies of scientists) as supplementary material in their textbooks (the inevitable "sidebar") and courses. Recent Nobel Laureate in Chemistry Dudley Herschbach is currently working on a book of such episodes, to be used in general chemistry courses, titled *Chemical Parables*. Over the past two years we have experimented with the reorganization of our environmental chemistry course along the time line of the story of the science of Cosmic

Evolution. This is perhaps the most captivating story modern science has to offer: where we came from and where we are going, starting with the Big Bang, and ending with the discussion of how the environment on Mars might be manipulated to make it suitable for human colonization. One of the major themes of this story is the continual evolution of more complex structures from simpler ones, so the reorganization of subject matter in conventional textbooks is not highly problematic. Another theme of Cosmic Evolution that is especially relevant is the evolution of sentient beings, able not only to contemplate the Universe, but also to affect the course of its evolution. This theme is important for the students' understanding of the significant environmental impacts of humans (and other species, for that matter) and the possibility of using science, technology, and other human arts to address the environmental problems we now face as a result of those impacts.

2. Develop topical teaching modules for use in this and other courses. We are producing a series of modules that adhere to our narrative goals and may be adopted, individually or wholly, by many science courses, including those at other institutions. The first module covers nuclear chemistry, starting from the Big Bang, which produced only the smallest few chemical nuclei, and continues on to the nuclear furnaces of stars, where most of the light elements are produced, finally discussing supernova explosions, which produce the heavier elements crucial to life. Nuclear fission and fusion reactions are explained, along with element formation/distribution, the periodic table, atomic/mass numbers, and isotopes, and, finally, periodic trends. Similar successive modules throughout the timeline are also being produced, covering, for example, planet formation; the early oceans and atmosphere; geothermal energy; geochemistry; the beginning of life on earth; environmental impacts of single-celled organisms; biogeochemical cycles; the atmosphere, ozone and greenhouse effect; agriculture, fertilizers and pesticides; energy and industry; and using technology to solve technological problems. It can be seen in this context both how interdisciplinary a truly cosmic perspective on our environmental problems must be, and that chemistry is indeed a central science.

3.) Develop animations and visualizations of key ideas. Judicious use of appropriate technology can enhance the learning experience. Last year, TTT (Teaching with Technology at Tufts) which is supported by Tufts Information Technologies granted financial support to pursue our efforts. This award has been used to support two major

projects. A video illustrating the nuclear processes involved in the production of helium and lithium in stars has been produced by Todd Pagano and Dara Lynn Sheehan, the latter an undergraduate majoring in environmental studies, community health, and art history. Recent graduate Patricia Glaspie (double major in Spanish and Environmental Studies) has begun a series of *Flash!* animations of processes illustrating the capture of free energy for the production of work or the maintenance of complex systems. We will illustrate some other key topics, such as nutrient flow in ecosystems; energy flow in living organisms; the growth of complexity in chemically based systems; the distribution of the elements in the universe, on earth, and in the human body; and others, for use in this course and other courses. These will be rich in the use of color, motion, and suggestive graphics that let the picture tell the story.

4. Develop active learning and critical thinking pedagogy. Active learning, as championed by Harvard Physics Professor Eric Mazur and others, has shown success in some physical and natural science courses. A pure lecture format is abandoned in favor of small-group activities and discussions. Judith Herzfeld at Brandeis University, who also uses the cosmic approach in teaching the mainstream general chemistry course for science majors, developed a database of active learning questions for use in the general chemistry course for science students. We are developing a similar approach, suitable for nonscientists, that also reinforces critical thinking practices. In our environmental chemistry course for non-science majors, we introduced a method for evaluating scientific hypotheses from Ronald Giere's book, *Understanding Scientific Reasoning*. This method, briefly described in last fall's department newsletter, provides students with a tool for critical reading and analysis, which they use in both designated and undesignated journal entries, making them more careful to note important pieces of information and their interrelationships, both logical and temporal.

Students have found this approach interesting and enjoyable. We are currently pursuing additional funding for curriculum development and designing comprehensive assessment strategies. We have had very encouraging discussions with publishers and anticipate entering a contractual agreement for a textbook in the near future.

Todd Pagano contributed some of the material for this article.

RESEARCH

Faculty Profile:

Professor Samuel Kounaves

Professor Samuel Kounaves received his BS/MS degrees in chemistry from Cal State at San Diego. His doctoral work with Jaques Buffle at the Université de Genève in Switzerland focused on the development and application of electroanalytical sensors and techniques for monitoring trace elements in the environment. After completing post-doctoral studies at SUNY-Buffalo and Harvard, he was appointed Assistant Professor of Chemistry at Tufts in 1988 and Associate Professor in 1994.

In his first decade at Tufts Prof. Kounaves established a research program that applied electroanalytical chemistry to problems in environmental, materials, and analytical chemistry. One of his early research programs led to the development of several novel micro-fabricated electroanalytical devices for detecting toxic heavy metals in groundwater. Supported by grants from the EPA and NSF, these sensors were the first to use silicon-based micro-fabricated arrays of micron-sized iridium disks as substrates for performing anodic stripping voltammetry, a technique demonstrated to be capable of measurements down to sub-parts-per-billion levels. These sensors enable rapid on-site screening of natural water systems for heavy metals such as lead, cadmium, mercury, and copper.

In the late '90s Prof. Kounaves embarked on a challenging research program that stretched the limits of analytical chemistry to new frontiers. Building on his previous work, the underlying theme of Prof. Kounaves' current research is the use of modern electroanalytical techniques for in-situ planetary chemical analysis. In 1998 the Kounaves research group was invited to participate in the *Mars Environmental Compatibility Assessment* (MECA). MECA, designed and built by NASA's Jet Propulsion Laboratory in Pasadena, is an instrument package designed to investigate the surface of Mars, both for the hazards it may pose to future astronauts and to answer basic scientific questions. MECA was flight qualified and scheduled to be flown to Mars as part of the 2001 Lander mission. The loss of the 1999 Polar lander forced the cancellation of the '01 Lander and MECA is now



Professor Samuel Kounaves

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awaiting another flight opportunity, probably in 2005/07. During the next several years, with support from NASA/JPL, the Kounaves group will continue research to better understand and improve the MECA electrochemical sensors.

The work undertaken for the MECA project has also spawned several other areas of research and collaborations with NASA centers. One of these involves the application of a MECA-type sensor array in the quest for detecting possible microbial life forms on other planets in our solar system. The current research is aimed at trying to understand the processes involved in detecting

Prof. Kounaves is an avowed interdisciplinarian who believes that the most challenging and cutting edge research questions in science today can be unraveled only by collaborative efforts.

the small electrochemical changes caused by microbial growth. The *Life Detection Array* (LIDA) is a differential electrochemical sensor array that provides the ability to simultaneously monitor a specifically chosen set of chemical and physical parameters in two identical "growth" chambers. Minimal growth in one of the chambers will sufficiently alter the chemistry and ionic properties to produce a difference between the two sensor arrays and results in a measurable signal. This life detection system makes minimal assumptions about the nature of any life on Mars or Europa (a water covered moon of Jupiter). It assumes only that, after addition of water to a local soil sample, the microorganism replicates and in the process will produce small changes in its immediate surroundings by consuming, metabolizing, and excreting a number of molecules and/or ionic species. The "nanogram" inoculation eliminates chemistry as a causal agent. LIDA has been proposed for inclusion on the 2007 Mars Scout Mission.

In another collaboration with several groups at JPL, Prof. Kounaves and his group are addressing the measurement of ionic species in melted polar ice. The challenge is that the water will be created by a probe melting its way through the north polar cap on Mars. The probe, known as the CryoBot has already been shown to be capable of penetrating several 100 meters of ice on Earth. During the coming year the goal is to determine what chemical transduction schemes will work and to better understand how such measurements will be affected by the harsh

conditions encountered on Mars, including -100°C temperatures, high pressures, and unknown ice composition.

Kounaves is also involved with NASA's *Advanced Environmental Monitoring and Control Program* (AEMC). The aim of this program is to provide spacecraft with advanced, microminiaturized networks of integrated sensors to monitor and control the bioactive water purification system, allowing humans to explore and live in space safely and efficiently with self-contained water supplies. To accomplish these goals, Prof. Kounaves' group, in collaboration with NASA/JPL and Thermo Orion Research, has undertaken a research effort that will lead to an electrochemically-based integrated array of chemical sensors based on several novel transduction and fabrication concepts. The sensor array, labeled by NASA as an "electronic tongue," is exceedingly more capable than that. Working in conjunction with a neural network, it will provide both qualitative and quantitative information for a much broader range of components (cations, anions, inorganic and organic) than a human tongue ever could. The resulting technology could have a significant impact on the ability of humans to safely conduct long-duration space missions, enable more efficient exploration of the low-Earth-orbit environment in which the International Space Station operates, and also be used in exploration of the solar system beyond Earth orbit.

Prof. Kounaves is an avowed interdisciplinarian who believes that the most challenging and cutting edge research questions in science today can be unraveled only by collaborative efforts. This has been clearly demonstrated by the challenges faced in all the research to date that, without the collaboration of chemists, physicists, biologists, and engineers, would have been impossible to overcome. He also believes that this interdisciplinary environment provides a unique educational setting requiring students to be creative, resourceful, and willing to take the risks involved to solve the sometimes daunting challenges faced. Kounaves also believes that in-situ planetary chemical analysis is a new domain within which analytical chemistry can provide the unique tools that can enable space science to find answers to a whole slew of fascinating questions—from—"Can we grow plants in Martian soil?"—to—"Does microbial life exist on other planets?"

Student News

Undergraduates

Chemistry Major Awards Presented 2000-2001

The R.M. Karapetoff Cobb Award

Nicole Bosson
Tanya Gustafson

The M.D. Angell & H.B. Durkee Scholarship

Shari Cohen

The Durkee Scholarship

Shari Cohen
Timothy Oleson
Nicholas Spinelli

The Max Tishler Prize Scholarship

Tanya Gustafson

The Howard Sample Prize in Physics

Nicholas Spinelli

The Audrey Butvay Gruss Science Award

Melissa Passino

The Albert H. Imlah European History Prize

Lisa Schneiderman

The Thomas Harrison Carmichael and Emily Leonard Carmichael Prize Scholarship

Tanya Gustafson
Melissa Passino

Bachelor's Degrees Awarded

2001

Kristofer Bagdasarian
Emily Briggs
Tyler Carlage
Shari Cohen
Robert Dimitri
Ennis Duffis
Justin Friedman
Natalee Holt
Kristin Horton
Naveen Kankanala

Brian Kilfoyle
Jason Mayo
Fred Mo
Timothy Oleson
Melissa Passino
Syed Peeran
Louis Reines
Nicholas Spinelli
Kevin Waltrous
Deonca Williams

Graduate Students

Henning Groenzin received an award for "Outstanding Academic Performance" from the Graduate School of Arts and Sciences.

Mary Shultz, Department Chair, hosted several luncheon sessions for post docs and graduate students to help them become familiar with research endeavors within the department. The final luncheon for 2000-2001 was devoted to demonstrating do's and don'ts of the job interview process.

Doctoral Degrees Awarded

2000

Danielle Simonelli (Shultz) *Probing Vibrational Modes of Ammonia with the Nonlinear Optical Technique Sum Frequency Generation*

2001

Jane Ferguson (Walt) *Fiber Optic Chemical Sensors: The Evolution of High-Density Fiber Optic DNA Microarrays*
Georgia Marnera (d'Alarcao) *Synthesis of Chiro-Inositols and Some Chiro-Inositol-Containing Disaccharides*
Charles Tetzlaff (Richert) *Synthesis and Evaluation of Acylated DNA and RNA Oligomers*

Masters's Degrees Awarded

2000

John Birtles
Mark Jedrychowski
Paul Krieger
Stefan Lukow
Glen Rennie
Zhen Wu

2001

Alfio Fichera
David Matheka
Mauricio Senties
Vladislav Tarasov
Susan Willwerth
Hua Yu



The Isotopes, Chemistry Department Softball Team

Faculty and Staff News



Professor Shultz played an active role in the Gordon Research conference on visualization in Science Education and has been elected co-chair for the next meeting to be held in Europe in 2003.

Michelle DeBakey left the Chemistry Department in August to pursue a full-time career in film making. Members of the department had the privilege of viewing her documentary "Quality of Life" as part of her going-away celebration.

Chris Morse, lecturer for the Chemistry Department was named Professor of the Year by the TCU (Tufts Community Union) senate.

David Walt received the "Outstanding Faculty of the Year Award," recognizing his success in technology transfer.

Sarah Iacobucci, Manager of Undergraduate Laboratories, chaired the National Chemistry Week 2001 initiative for the Northeast Chapter of the American Chemical Society to organize events at the Museum of Science and Forsyth Institute. *See separate article.*



Scenes from the summer cookout to welcome new graduate students.



Semester Achievement Awards

FALL 2000

FACULTY

Prof. Krishna Kumar

STAFF

Janice Silva

TEACHING ASSISTANT

Alfio Fichera

SPRING 2001

FACULTY

Prof. David Walt

STAFF

Dr. Sarah Iacobucci

TEACHING ASSISTANT

Aida Herrera

National Chemistry Week

Celebrating Chemistry and Art

national chemistry week (ncw) is an annual event for celebrating the contributions of chemistry. The celebration originated in 1987 as National Chemistry Day and by 1989 had grown into an entire week of activities. During National Chemistry Week, local sections of the American Chemical Society organize activities that correspond with an annual theme. Events are held at museums, schools, libraries, shopping malls, and businesses, nationwide.

The theme for this year was *Celebrating Chemistry and Art* and the Northeastern section of the American Chemical Society (NESACS) held events in the Boston area. On Nov. 4, a *Celebration of Chemistry and Art* was held at the Boston Museum of Science where visitors participated in a paint and plaster workshop, an art forgery exhibit, and an art preservation demonstration. Among the highlights of the day, Professor Bassam Shkhashiri from the University of Wisconsin-Madison gave two presentations of his lecture *Picasso, daVinci, Shkhashiri: Artistry and Chemistry* which were enjoyed by children and adults alike. On Nov. 6, a symposium on *Chemistry and Art* was held at the Forsyth Institute. Topics of the lectures ranged from the uncovering of art forgeries to the role of chemistry in art conservation, and the chemical analyses of African artwork. Among highlights of the symposium were the showing and authenticity analysis of the impressionist's painting *Reading in the Forest* (on loan from

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Future scientists, Presley Silva (top), Tony Silva (middle) and Jennifer Gough (bottom), grandchildren of department staff, at the Museum of Science.



Continued from page 7

Brandeis University), presentations covering the role of medical conditions and neuroscience in artists' work, and scientific techniques for verifying, dating, and restoring works of art.

Numerous members of the Tufts Chemistry community were influential in making the events at the Museum of Science and the Forsyth Institute a great success. Three Tufts alumni, Dr. Sarah Iacobucci of Tufts University and the chairperson for NCW 2001, Professor Doris Lewis of Suffolk University and the Immediate-Past-Chair of NESACS, and Professor Christine Jaworek of Emmanuel College worked closely with members of the Museum of Science and the Forsyth Institute in organizing the events. Professor Lewis organized the ever-popular lectures by Professor Shkhashiri which approximately 600 visitors attended with *standing room only*. Professor Jaworek and Dr. Iacobucci developed plaster and paint making procedures that could be performed at the museum quickly and safely and still be interesting and educational. The paint making procedures involved extracting pigments from natural products using rubbing alcohol. Paints were prepared by extracting anthocyanins from cranberries for red, curcumin from turmeric for yellow, beta-carotene from paprika for orange and chlorophyll from pine needles for green. Black was prepared from

charcoal, and the brown from cocoa. The extracts were then combined with a binding agent and used to paint the plaster molds. The ACS student affiliates chapter at Emmanuel College perfected the paint and plaster procedures so that the procedures worked flawlessly for the event.

Volunteers from various colleges and universities in the Boston area (such as, Emmanuel College, Massachusetts Institute of Technology, Stonehill College, and Tufts University) joined together for the week's events. Tufts graduate students: Richard Smith, Kathleen Myers, Deno Del Sesto, and Ivan Korendovych along with Tuft undergraduate student Millicent Smith gave captivating presentations at the Art Forgery exhibit. Members of Tufts ACS student affiliates chapter, Rebecca Clark, Marie Fojas, Rachelle Jyringi, Amit Kothari, Jodie Moreau, and Lisa Schupmann gave thought-provoking presentations at several exhibits throughout the museum. Michelle DeBaKey was the videographer and recorded Professor Shkhashiri's dynamic demonstrations in a live webcast. Photographer, Arlene Chaplin, who also manages the Tufts Chemistry Department, captured the excitement and enthusiasm of the union between chemistry and art. Pictures and the video of Shkhashiri's presentation are at the website: http://ase.tufts.edu/chemistry/iacobucci/si_ncw.html.

Chair's Corner

Continued from page 1

Visualization has become an important theme in curriculum development. Professor Kumar has introduced molecular visualization into the organic and biochemistry courses. Helping students visualize molecular structures, reactions and interactions on the atomic/molecular level is a logical extension of his research efforts which are aimed at understanding interactions in determining peptide structure. Professor Kumar's work was the subject of a colorful highlight article in a recent issue of *Chemical and Engineering News* (May 14, 2001, pg. 41). Check it out!

We all know that chemistry plays a central role in many aspects of our lives—from our environment to our foods to our medicines. However, as an academic endeavor, we don't often

get close enough to the front lines to see a tangible result of our work. This year Professor Walt's work on sensor development made it to the front lines in a most dramatic fashion. For several years now, you have been able to read about his work with the artificial nose project in major publications or see him on the BBC. Professor Walt, his post-doctoral assistants and graduate students licensed part of the technology that they developed bringing both fame and fortune to the department. The results will undoubtedly be felt and seen by the entire department for years to come.

The department played a major role in the Boston area celebration of National Chemistry Week this year with the effort headed by Dr. Sarah Iacobucci. The theme of this year's National Chemistry Week was *Celebrating Chemistry and Art* with emphasis

on the role of chemistry in the advancement of art and in art preservation. Sarah organized major events at the Science Museum and at the Forsyth Institute. The highlight of the Science Museum event was entertainment by Prof. Basam Shkhashiri (he is always entertaining) giving a presentation titled, "*Picasso, DaVinci, Shkhashiri! Artistry and Chemistry*," Shkhashiri always gets a great reaction! You can view his presentation on the Science Museum's web site that can be accessed through Tufts Chemistry's web site, Sarah's page: http://ase.tufts.edu/chemistry/iacobucci/si_ncw.html, go to the Science Museum logo and on the Museum web site go down to Sunday, Nov. 4 and click on the video. While you are on Sarah's web site, check out the many interesting demos that she, Prof. Chris Jaworek, and Michelle DeBaKey have put together.

The faculty continues to score significant hits with external funding of research and educational initiatives. While the national funding rate for research is approximately 30%, our departmental faculty saw 43% of their federal research grants funded and an impressive 63% of the nonfederal grants. The record in educational initiatives is near perfect. If you are in the Medford/Boston area, please stop by and see what a difference these funds have made to our students and the department. Our major challenge in the coming year is to add equally productive faculty and to continue the process of raising funds for completion of the renovation of Pearson. Much of the focus for that effort is on the instructional facilities and we will be looking to our friends to assist—thank you in advance. *Mary Shultz, Chair*

Pearson gets a facelift

The construction of the Pearson building was completed in 1923. During the past seventy-eight years, exposure to the elements of New England weather caused deterioration to the exterior envelope (roof and four exterior sides of the building) of the building. The roof, equipment penetrations, and parapet flashings were deteriorated beyond their useful life. The precast concrete cornices around the perimeter of the building and the lintels over the windows exhibited extensive surface degradation and required immediate attention. In the summer of 2000, make-safe repairs to the most deteriorated elements were performed until a more extensive restoration could be done in the summer of 2001.

The completed project includes replacement of the high and low roofs, all watertight flashings around the equipment and the entire parapet. On the facades, the band course at the top was resurfaced. Sections of the text course and all of the lettering as well as many cracked concrete lintels and deteriorated precast elements were replaced new and installed so as to blend in with the original elements. This included the front medallion over the main entrance and the rear chemistry medallion on the low roof parapet on the south side. Both were restored to their original integrity. The building also received extensive patching, waterproofing, caulking at the windows, masonry repointing of the brick and exterior lighting upgrades. The result reflects the original design of the exterior and preserves the historical beauty of the structure.



Arlene Chaplin, Department Manager, puts a finishing touch on the new medallion over the front entrance of Pearson.

The Tufts Chemistry WEB site!

<http://chem.tufts.edu>

OUR SITE PROVIDES INFORMATION SUCH AS COURSE LISTINGS, current course material, degree requirements, faculty/staff/student info, the graduate program, special events, links to other chemistry resources, an on-line historical archive, back issues of ChemNotes, and more detailed information about the exciting and ongoing research being carried out by our faculty. The hope is that this resource will provide information for prospective graduate students and alumni and will eventually contain links to many valuable chemistry resources within the department and throughout the world. Check us out and see what is currently going on in the department. You can access our site at: <http://chem.tufts.edu>.

We are still collecting information for several new areas including "Alumni Page" where we would like to list as many of you as possible. We would like to include not only names and e-mail addresses but items of interest and WWW links to Alumni pages and your areas of current employment or involvement. So please write or e-mail us if you would like to be included. Let us know where you are and what you are doing!

The web site was created and is maintained by Professor Samuel Kounaves (skounave<at>tufts.edu).

Funding Initiatives

Graduate Student Fellowships

The chemistry department has an excellent record in graduate education and training with graduates assuming leadership positions in academia, government and industry. A healthy and strong fellowship program will enable us to continue attracting the most talented students. Since graduate training bridges the education and research enterprises and our graduate students are actively involved in undergraduate instruction, attracting top graduate students is a very high priority.

Undergraduate Research Fellowships

Fully 77% of the incoming class at Tufts University expects to write an undergraduate thesis. In chemistry, this means engaging in research. Stipends for summer research and supplies will enable us to meet the needs of these students.

Chair Initiatives Many grants, particularly for undergraduate equipment, require matching funds. As we seek to update and upgrade our undergraduate laboratories, these funds are needed to leverage further support. In addition, well-timed support can often make the difference between an educational initiative that remains 'on the drawing board' and one that has a positive impact on our students.

Renovation Funds The main focus presently is on the instructional facilities: the undergraduate organic laboratory, a new inorganic laboratory and a biochemistry/advanced synthesis laboratory. While the former two have long been part of a basic undergraduate chemistry experience, the latter is a growth area. Biochemistry and biotechnology are sure to grow in importance in the near future and our students will benefit immeasurably from upgraded facilities.

Seminar Series

SPRING 2002

JANUARY 22

Prof. John P. Toscano,
Johns Hopkins University
Rational Design of Novel Photo-chemical Precursors to Nitric Oxide

FEBRUARY 12

Prof. Andrei Tokmakoff,
Massachusetts Institute of Technology
Molecular Structure and Dynamics in Solution Observed Through Two-Dimensional Infrared Spectroscopy

FEBRUARY 19

Prof. Seichi Matsuda,
Rice University
Tinkering with Terpene Biosynthesis

FEBRUARY 21

Hosted by the Undergraduate Chapter of the ACS at Tufts
Dr. Mukund Chorghade,
Geltex Pharmaceuticals, Inc.
Progress of a Drug from Conception to Commercialization

FEBRUARY 26

Prof. John T. Groves,
Princeton University
The Chemistry and Biology of Eroxynitrite: Reactive, Invasive and Enigmatic

MARCH 5

Prof. John A. Gerlt,
University of Illinois, Urbana-Champaign
Does Sequence or Structure Determine Enzyme Function? Different Reactions Catalyzed by the "Same" Active Site

MARCH 12

Prof. Eric Bakker,
Auburn University & École Normale Supérieure, Paris
From Extremely Selective Ion Sensors to Smart Microspheres

MARCH 26

Prof. Milan Mrksich,
University of Chicago
A Surface Chemistry Approach to Studying Cell Adhesion

APRIL 5

Prof. Dr. Geert-Jan Kroes,
University of Leiden
Vibrational Effects on Dissociative Chemisorption of Hydrogen on Cu(100) and Pt(111)

APRIL 9

Prof. Lawrence Scott,
Boston College
Strategies for the Rational Synthesis of Fullerenes and Their Open Geodesic Siblings

APRIL 16

Consensus Pharmaceuticals Lecture
Prof. Julius Rebek, Jr.,
The Scripps Research Institute & The Skaggs Institute for Chemical Biology
Molecular Assembly and Encapsulation

APRIL 23

Prof. Kenneth Karlin,
Johns Hopkins University
Synthetic Modeling of Copper and Heme-Copper Protein Dioxygen Chemistry



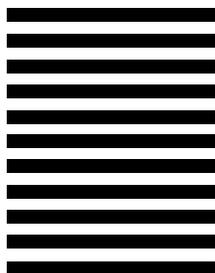
Visitors are welcome

All seminars are held in the Pearson Chemistry Building, 62 Talbot Avenue in Medford, Room P-106 at 4:30 p.m. unless otherwise noted. Refreshments served in Pearson 102 thirty minutes prior to the seminar. For more information please contact Janice Silva at (617) 627-2634 or janice.silva@tufts.edu.

NewsLetter
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Tufts University
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SENIOR EDITOR:

Arlene Chaplin

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University _____

University _____

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