

ChemNotes

SPRING 1996

Chair's Corner

Last May, the department had the pleasure of hosting the first Chemistry Group meeting. The group is comprised of five alumni:

Dr. Jane Frommer (Tufts B.S. 1976)
Research Scientist, IBM Almaden

Dr. William Koster (Tufts Ph.D. 1972)
Vice President, Bristol Myers Squibb, Pharmaceutical Research Institute

Dr. Alex MacLachlan (Tufts B.S. 1954)
Deputy Undersecretary for Technology Partnerships, U.S. Dept. of Energy and Former Senior Vice President for Research and Development at DuPont

Dr. Edward Marram (Tufts Ph.D. 1965)
President and Chairman, GEO-CENTERS, Inc.

Prof. Don Wiley (Tufts B.S. 1966)
Professor and Chairman, Dept. of Molecular and Cell Biology, Harvard University.

The morning session involved an overview of the department in terms of faculty, program (research, curriculum), and facilities followed by a group discussion. Lunch was held in the Pearson main lecture room where the department's graduate students engaged the group with some marvelous posters of their research. More group discussions were followed by an executive session leading to recommendations.

Recommendations included specific actions that the department should take in the areas of faculty hiring strategies, funding opportunities, and fundraising. In addition, the group provided valuable advice regarding research and curriculum directions the department was taking. The discussions were insightful

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Michael Research Building Rededication

After about a year of complete renovation, the Michael Research Building is on the verge of reopening. The refurbished structure is beautifully designed with six brand new, large research laboratories including the W. M. Keck Foundation Materials Research Laboratory, a new loading dock, chemical storage facilities, instrument facilities, and all new infrastructure.

To celebrate the Michael Building reopening and to share this momentous event with friends and colleagues who

made the renovation possible, we are planning a gala rededication ceremony. The event has been planned to coincide with Alumni Weekend (May 16 -19, 1996). We cordially invite each of you to join us in an all-class reunion of Chemistry Alumni. A few of the events scheduled follow. For more information on Chemistry events, please contact Ms. Janice Silva at (617) 627-2634.

For information on university-wide events, please call Alumni Relations at (617) 627-3526.

Rededication Opening Ceremonies

Thursday May 16

8:00 p.m. Tufts Night at the Boston Pops

Friday May 17

10:30 - 11:00 a.m. Michael Rededication Ceremony

11:30 a.m. - 12:00 noon Tours of the Chemistry Department

11:30 a.m. - 1:00 p.m. Lunch

1:00 - 4:30 p.m. Michael Rededication Symposium

Welcome and Historical Overview

Prof. David R. Walt, *Chairman, Dept. of Chemistry, Tufts University*

"Batteries - An Evolving Technology"

K. M. Abraham, *Vice President, E. I. C. Laboratories*

"Functional Cavities in Proteins"

Steven G. Boxer, *Professor of Chemistry, Stanford University*

"The U.S. Research Enterprise: How Can We Ensure its Future?"

Alexander MacLachlan, *Deputy Undersecretary for Technology Partnerships, U.S. Department of Energy*

4:30 - 5:00 p.m. Tours of the Chemistry Department

4:30 - 5:30 p.m. Cocktail Reception

5:30 p.m. - Brown & Blue Lobsterbake

Saturday May 18

9:00 a.m. - 11:45 p.m. Various university activities including tours, concerts, class meetings, and much more

Sunday May 19

9:30 a.m. - 140th Commencement

Chemistry Department Acquires State-of-the-Art MALDI-TOF Mass Spectrometer

In recent years, a new mass spectrometric technique has been established that combines a very mild ionization process with high sensitivity, tolerance for heterogeneous samples, versatility, and ease of use. This technique, termed matrix-assisted laser desorption ionization time of flight detection (MALDI-TOF) spectrometry, allows the characterization of large polymers, proteins, oligosaccharides, and oligonucleotides. Typically, samples in the pico to femtomole range are sufficient for the generation of mass spectra. Since no classical technique allows a spectrometric analysis of the above-mentioned biomolecules, a decision was taken to purchase a MALDI-TOF instrument for the department, to strengthen its instrumentation for research in biomedical chemistry, one of the developing foci of research. After a very critical and competitive evaluation of the field, a Bruker BIFLEX spectrometer was ordered.



The new MALDI-TOF mass spectrometer

This mass spectrometer, like most MALDI-TOF instruments, uses a pulsed UV laser beam to desorb analytes that have been cocrystallized with an absorbing matrix. Ions formed under these conditions are accelerated in a strong electrostatic field and molecular masses are determined from the flight

time, which is measured using a detector at the end of a drift tube. Ions of close to 300,000 Daltons mass have been detected at Tufts.

While operating with a medium length 1.2 m drift tube in linear mode, the BIFLEX is also equipped with ion optics and a 1.6 m reflectron detector, which allows the sequencing of peptides by post source decay. In reflectron mode, a resolution of up to 2500 can be achieved due to the 1 GHz digitizer. A further improvement of resolution will come from an upgrade to delayed extraction capabilities, which are expected to be installed towards the end of the year.

The instrument is presently located in laboratory P 208 of the Pearson building. A presentation and demonstration of the instruments capabilities was held on September 22, a few weeks after installation. The proud operators of the instrument wish to thank all supporters of the department. We are looking forward to many years of productive research with this spectrometer.

Clemens Richert and David Sarracino

DOCTORAL DEGREES AWARDED (1995-1996)

Karen S. Bronk (Walt)
"Imaging Based Sensor Arrays"

Yuriy V. Gankin (Robbat)
"A New Compound-Specific Rapid Detection Mass Spectrometer"

Sarah Iacobucci (d'Alarcao)
"Synthesis of Inositol Glycans for Insulin Signal Transduction Studies and the study of the Mechanism of Cyclopropane Fatty Acid Synthetase of E. Coli"

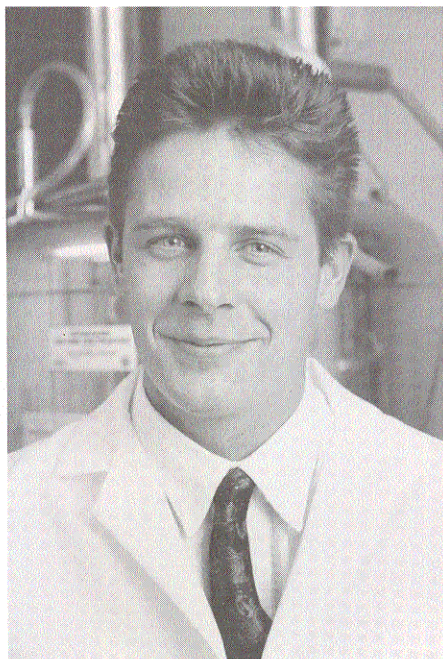
Leo T. Kenny (Haas) "Preparation and Characterization of Lithium Cobalt Oxide by Chemical Vapor Deposition for Application in Thin Film Battery and Electrochromic Devices"

Ioanna Petrounia (Brush)
"Transient Inactivation of Almond Mandelonitrile Lyase by 3-Methyleneoxindole: A Photooxidation Product of the Natural Plant Hormone Indole-3-Acetic Acid"

Bizuneh Workie (Kounaves)
"Electrodeposition of Copper Metal Alloys and Oxides from the Copper-Nickel Heteropolymetallic Complexes, $(\mu_4-O)N,N$ -diethylnicotinamide $_4Cu_{4-x}(Ni(H_2O))_xCl_6$ ($x = 0 - 4$). Surface and Electrochemical Characterization."

FACULTY PROFILE

Clemens G. Richert, Assistant Professor



At the beginning of the fall semester 1995, Clemens Richert joined the Department of Chemistry at Tufts as an assistant professor for organic chemistry. His research interests lie in the area of biomedical chemistry. He will be teaching both organic chemistry and biochemistry courses.

Clemens Richert studied undergraduate chemistry at the University of Münster, Germany where he received a B.Sc. in 1987. He then moved to the University of Cologne where he received an M.S. in Organic Chemistry in 1990. Research for his diploma thesis was performed in the group of Prof. Emanuel Vogel where he developed a synthetic method for the preparation of side chain functionalized porphyrin analogs. Besides studying chemistry, Clemens Richert took biology classes in

Cologne and these studies were continued at the Medical School of the L.M. University Munich where he enrolled for the Human Biology graduate program in 1990. His research in Munich was focused on elucidating the mechanisms that lead to the tumor accumulation of certain porphyrins and porphyrinoids. Such dye molecules can be activated by light to destroy cancer cells. Compounds synthesized in Cologne were shown to localize in tumors more selectively than the semisynthetic porphyrin mixture currently clinically employed for photodynamic therapy of tumors. He received a Ph.D. in Human Biology *summa cum laude* in 1993.

At the end of his experimental work in Munich, Clemens Richert moved to the Swiss Federal Institute of Technology Zurich where he joined the group of Prof. Steven Benner in the Laboratory for Organic Chemistry as a Kekulé-Fellow of the Federation of the German Chemical Industry. In the Benner group, he became involved in the synthesis and *in vitro* characterization of backbone-modified oligonucleotides. These molecules provide a new system for expanding the understanding of nucleic acid structure and might be useful for applications involving DNA and RNA recognition. Work at the ETH led to the synthesis of the first oligomeric non-ionic RNA analogs. Clemens Richert received a Ph.D. in chemistry from the ETH in 1994. From November 1994 until August 1995 he worked as a postdoctoral researcher in Zurich, developing a synthesis for chimera of sulfone-linked RNA and natural oligonucleotides.

The underlying theme of Dr. Richert's research is to use the intrinsic reactivity and molecular recognition properties of known natural biomolecules to construct molecules that fulfill a new, desired biological function. His current interest is the design and synthesis of virus-like carriers of genetic material. During evolution, viruses acquired proteins to serve as coats against nuclease degradation and as tools to achieve membrane penetration. Mimicking their strategy of efficient *in vivo* transfection of cells is the central challenge that must be met to establish

techniques of molecular medicine as therapeutic tools. One of these techniques is gene therapy, which aims at the expression of genes in the cells of individuals with genetic diseases. A complementary technique is antisense therapy, which aims to *inhibit* the expression of unwanted genetic information, e.g. viruses. Dr. Richert's research is performed with short oligomers and focuses on non-sequence specific interactions. His work involves the identification of peptides that protect DNA against nucleases, the synthesis of DNA-peptide conjugates, and the study of intramolecular peptide-DNA complexes. Key techniques employed in this research are solid phase syntheses, matrix-assisted laser desorption time of flight detection mass spectrometry (MALDI-TOF MS), and one and two dimensional NMR spectroscopy.

A second field of interest is the combinatorial synthesis of porphyrin libraries and the *in vitro* selection of active compounds. This research includes the development of new protecting group strategies for classical porphyrin cyclization reactions and spectroscopically-monitored selection experiments.

Clemens Richert also is actively involved in chemical education. This fall semester, he is teaching a graduate level course on biochemistry. In his teaching he is strongly committed to the development of analogy-based presentation strategies that facilitate an understanding of chemistry by the novice. Since he has biomedical interests and received a dual education, he is planning to strengthen the ties between the Department of Chemistry and Tufts' Medical School.

and constructive. There were some things the group felt needed fine-tuning and other things the department needed to pay some attention to. Many of the suggestions have been implemented since the meeting. Another meeting will be held this year.

I was particularly struck by the group's genuine concern for the department. There was a sense of shared responsibility for the continued development and improvement of the Chemistry Department. The individuals on the Advisory Group are representative of the entire alumni base. It was extremely gratifying to see first-hand the commitment that most of you must have for the department and the university.

On that note, as described in other columns in this newsletter, I want to urge all of you to visit the department for the Michael Building Rededication on May 17. The day promises to be a memorable one. It is an excellent opportunity to get reacquainted with long lost labmates, classmates, teaching assistants, faculty, and friends. I hope to see all of you there.



THE HISTORY OF TUFTS CHEMISTRY

As we all know, Tufts Chemistry has a rich historical tradition with such notable scientists as Arthur Michael and Max Tishler (to name just two) among its family. As a part of the Michael rededication celebration we would like to prepare a brief historical overview of Tufts Chemistry, but we need your help. If you have any information or photographs of historical interest, please contact David Walt at (617) 627-3470. We would like to make the presentation of our departmental heritage as complete and interesting as possible. Thanks!

Faculty and Staff News

Sarah Iacobucci has become our new Director of Laboratory Services. Sarah is no stranger to Tufts, having earned a Ph.D. in organic chemistry here under the supervision of Prof. Marc d'Alarcao. Since then she has been instructor at Worcester Polytechnic Institute and adjunct assistant professor at Assumption College. She assumed her duties as director on a part-time basis in January 1996 while she completes her commitments to the other institutions, and begins at Tufts on a full-time basis this May.

In December, 1995 **Jim Bodah** became our new Electronics Shop supervisor. Jim brings 21 years of experience in electrical engineering to the department including several years during which he served in the U.S. Navy. Most recently, Jim was engaged in providing field support to the electrical utility industry.

David R. Walt, chairman of the Chemistry Department, was recently named Robinson Professor of Chemistry.

We are grateful to the following individuals and organizations for their contributions to the campaign for Chemistry. Thank you.

Patrons

Air Products & Chemicals, Inc.
ArQule
E.I. DuPont & Nemurs Co.
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Alan J. Hirshberg
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John A. Krol
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Nancy (Schein) Stoldt
Peter V. Tishler
Frederick E. Welch
Virginia (Schulman) Weston
Carol J. (Fruehan) Willey
Austin H. Young
John P. Young

Seminars

The 1995-1996 Chemistry Department Seminar Program is off to an exciting start with a full lineup of weekly seminars in addition to a special seminar event this spring. By year's end, over twenty-five distinguished scientists from academic, industrial, and government laboratories in the U.S. and Europe will have visited the department and described their work to Tufts faculty and students. A generous gift by a Tufts Alum has permitted the seminar committee to assemble a particularly strong and varied program this year. A partial listing of seminars presented this fall includes Dr. Blake Peterson, (Harvard University) "A Synthetic Receptor Approach to Rational Drug Design Targeting Cholesterol with Water-Soluble Cyclophanes"; Professor Patrick Treado, (University of Pittsburgh) "High Definition Raman and Fluorescence Chemical Imaging of Materials"; Professor Jacqueline Krim, (Northeastern University) "The Atomic-Scale Origins of Friction"; Professor Emanuel Vogel, (University of Cologne) "Porphyrins and their Structural Variants Molecules of Interdisciplinary Interest"; Professor Gil Nathanson, (University of Wisconsin-Madison) "Energy Transfer, Bonding, and Proton Exchange in Gas-Liquid Collisions"; Professor Paul Weiss, (Penn State) "Atomic Scale Views of Interactions, Dynamics, and Chemistry," and Dr. Guido Herrmann, (ETH, Zürich) "Enzymatic Synthesis of Oligosaccharides and Glycopeptides."

THIS SPRING'S SEMINAR SCHEDULE APPEARS BELOW:

Spring 1996 Tufts University Chemistry Seminar Series

January 23

Professor Jonathan Kenny
Tufts University
• *In Situ Monitoring of Soil and Groundwater Using Lasers and Fiber Optics*

January 30

Dr. Lyle Isaacs, ETH Zurich -
Harvard University
• *Selective Mono and Multiple Functionalization of Buckminsterfullerenes*

February 6

Dr. Hagan Bayley
The Worcester Foundation for
Biomedical Research
• *Triggers and switches in a pore-forming protein genetic engineering and targeted chemical modification of staphylococcal a-hemolysin*

February 13

Professor Larry McLaughlin
Boston College
• *Probing the Catalytic Activity of the Hammerhead RNA using Analogue Complexes*

February 20

Professor Brian Bent
Columbia University
• *Atoms and Radicals in Gas-Surface Reactions*

February 27

Dr. Isao Noda
Procter and Gamble Company
• *Two-Dimensional Infrared (2D-IR) Spectroscopy*

March 11, 12

Monday, 5:30 p.m.

Tuesday, 4:30 p.m.

Dean's Lecture Series

Professor Arthur Ellis
University of Wisconsin - Madison
• *You Do Teach Atoms, Don't You? A Case Study in Breaking Science Curriculum Gridlock.*
• *Chemical Sensors Based on Semiconductor Photoluminescence*

March 26

Mr. Howard Weetal, NIST
• *Optical and Electronic Characterization of Bacteriorhodopsin as a possible material for information storage and retrieval*

April 2

Professor Charles Zercher
University of New Hampshire
• *Diastereoselective Synthesis of Polycyclopropanes*

April 9

Professor Tom Beebe
University of Utah
• *STM and 'Molecule Corrals' for understanding organic monolayer self-assembly*

April 16

Professor Daniel Kahne
Princeton University
• *Carbohydrates as DNA Binders Structure, Function, and Design*

April 22

Monday, 3:30 p.m.
Professor Joseph Wang
New Mexico State University
• *Field Monitoring of Trace Metals - Bringing the Laboratory to the Field*

May 20

Monday, 3:30 p.m.
Professor Gary Posner
The Johns Hopkins University
• *Designer Drugs for Healthier Living*

Seminars are held in Pearson Hall, Room 104 at 4:30 p.m. unless otherwise noted.

Refreshments served in Pearson 102 one-half hour prior to the seminar.

In addition to our weekly seminar series, the department will also host two special seminar events this spring. In March, we have the honor of hosting Professor Arthur Ellis of the University of Wisconsin-Madison as the Deans' Seminar Series speaker. Professor Ellis will visit Tufts for several days to meet with faculty and students and to present two seminars the Dean's Seminar, which will detail his innovations in science education and curriculum reform, and a second seminar describing his own research in inorganic materials chemistry. In May, the department will host a symposium in conjunction with the rededication of the newly renovated Michael Building. Details of the Michael Rededication Symposium appear elsewhere in this issue of the newsletter.

For the most current information on the department's seminar series, contact the Chemistry Department office ((617) 627-3441) and ask to be placed on the seminar schedule mailing list, or visit the Tufts Chemistry Web Page (<http://www.tufts.edu/departments/chemistry/index.html>). Departmental seminars are generally held in Pearson 104 at 4:30 p.m. on Tuesdays during the academic year, and the public is always welcome.

CLASS NOTES

1926 Whitman G. Rouillard (B.S. 1926, Tufts) is retired and lives in Salt Lake City, UT.

1940 Jack Westervelt (B.S. 1940, Tufts) retired from the United States Navy in 1972 after 31 years of service. Since then he has worked for a succession of civilian companies on Navy-related programs until his retirement in 1994. He currently resides in Virginia and remains a part-time consultant.

George E. Marsh (B.S. 1940, Tufts) has recently retired from the Cabot Corporation of Boston where he was vice president.

1942 Edwin A. Schlotzhauer, Jr. (B.S. 1942, Tufts) has retired from Asarco, Inc., Federal Metals Corporation and currently resides in New Jersey. He and his wife Signe are enjoying golf, tennis, and travel.

1957 Edward A. Zink, Jr. (B.S. 1957, Tufts) is a Senior Account Manager at Huntsman Chemical Corp. in Marshfield, MA. He has worked with chemical companies for his entire career beginning two days after graduation with DuPont and including sixteen years with Shell Chemical. He retired from the Air Force Reserve in October 1995.

1961 Harry C. Lord (B.S. 1961, Tufts; Ph.D. 1967 UCSD) is the president of Air Instruments and Measurements, Inc. where he is involved in the development and application of environmental analyzers. He resides in California where he enjoys raising orchids and tropical fruit trees.

1967 John B. Fenn, Jr. (B.S. 1967, Tufts; Ph.D. 1972, Purdue) is the president of LeyGold Technologies in Enfield, CT. This company is the U.S. daughter company of LeyGold Ag of Germany and manufactures vacuum coating equipment.

1972 Doris I. Lewis (B.S. 1965, Duke; Ph.D. 1972, Tufts) is a professor of Chemistry at Suffolk University in Boston. She has served as chairperson of that department since July, 1995. Professor Lewis is also a councilor of the Northeastern Section of the American Chemical Society.

1974 Kathleen Mayzel (B.S. 1974, Tufts; M.D. 1978, Mt. Sinai Medical School) is a surgeon specializing in breast surgery. Since 1992, she has been the director of the Faulkner Breast Centre in Boston, a group practice of women clinicians who treat women who have or are at risk of developing breast cancer. Dr. Mayzel is also an assistant clinical professor of Surgery at Tufts Medical School.

1977 Neil L. Redline (B.S. 1977, Tufts; Ph.D. Washington State University) has recently completed his graduate study under the supervision of Professor Maurice Windsor studying the effects of high pressure on the function of photosynthetic reaction centers.

1978 Neil Baron (B.S. 1978, M.S. 1980, Tufts) is a marketing manager for Sybase in Burlington, MA. He is currently responsible for marketing Sybase's Professional Services offerings.

1981 Alfonzo D. Jordan (B.S. 1981, Tufts; M.S. 1985, Howard; Ph.D. 1993, Villanova) is currently employed at The R. W. Johnson Pharmaceutical Research Institute as a scientist in the Drug Discovery Division. He is involved in research of CNS agents targeted at anxiety, sleep disorders, and Alzheimer's disease. Dr. Jordan lives in Pennsylvania.

1982 Duane E. Sands (B.S. 1982, Tufts; M.D. 1986, Johns Hopkins) is a cardiac surgeon at the Cardiothoracic and Vascular Institute of the Bahamas where he performed the first open heart procedure ever in the Bahamas. Dr. Sands is currently working at both a large public hospital and a small private hospital.

1983 Scott B. Snapper (B.S. 1983, Tufts; M.D., Ph.D., Albert Einstein College of Medicine) is a Clinical and Research Fellow in gastroenterology and immunology at Massachusetts General Hospital. Dr. Snapper is studying immunodeficiencies and T-cell biology. His brother, Marc, is an assistant professor of Chemistry at Boston College.

1986 Mohammad R. Mostafavi (B.S. 1986, Tufts; M.D.) is currently a resident in urology at UCSD Medical Center. He and his wife Marjan have two children, Mojdeh and Payam.

1991 Daniel Damelin (B.S. 1991, M.A.T. 1992, Tufts) is currently teaching chemistry at Lincoln-Sudbury Regional High School.

1992 Ryan Zucker (B.S. 1992, Tufts) is currently studying medicine at New York University School of Medicine.

1994 Suzanne Fox (B.S. 1994, Tufts) is currently a graduate student at the University of Wisconsin, Madison. She is currently a research assistant in the School of Pharmacy there.

ALUMNI NEWS

John A. Krol named CEO of DuPont

DuPont's board of directors named John A. Krol, 58, as chief executive officer beginning December 1, 1995. Krol, who holds a B.S. (1958) and M.S. (1959) in chemistry from Tufts, joined DuPont in 1963 where he has held manufacturing, marketing, and managerial positions, principally in the fibers area. He has been DuPont's vice chairman since 1992. Krol succeeds as chief executive officer Edgar S. Woolard, Jr., who is retiring.

Don Wiley wins Lasker Award

Biochemist Don Wiley, Professor at Harvard University, has won the 1995 Albert Lasker award for basic medical research, presented on September 25, 1995. Wiley, who holds a B.S. (1966) in chemistry from Tufts and a Ph.D. (1971) from Harvard, shared the award with four other eminent researchers Emil Unanue (Washington University School of Medicine), Peter Doherty (St. Jude's Children's Research Hospital), Rolf Zinkernagel (University of Zurich), and Jack Strominger (Harvard University) for their work on T-cell recognition and response.

Herbert S. Eleuterio wins Lavoisier Medal

Organic chemist Herbert S. Eleuterio was one of five DuPont scientists awarded the Lavoisier Medal for Technical Achievement last April. The medal is DuPont's highest scientific honor. Eleuterio, who received a B.S. (1949) in chemistry from Tufts and a Ph.D. from Michigan State University was honored for his work in polymer chemistry. Eleuterio retired from DuPont in 1992 and is currently a visiting professor at the National University of Singapore.