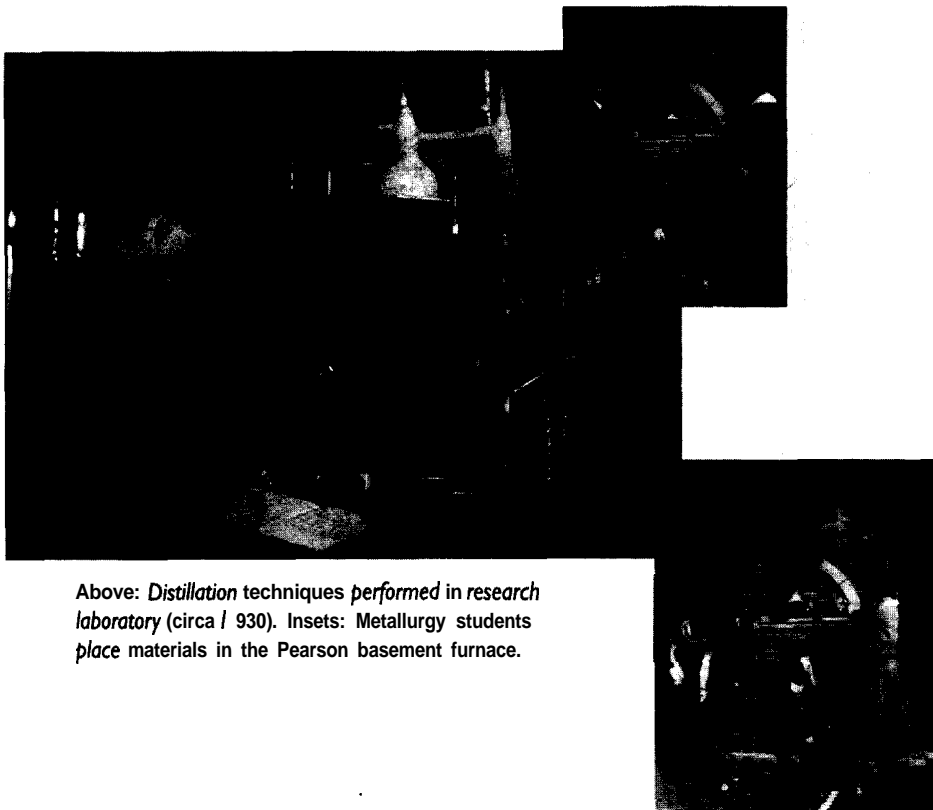


ChemNotes

SPRING 1998

A Brief History of the Chemistry Department – Part II

(excerpts from the Michael Building Rededication Address by Professor David Walt)



Above: Distillation techniques performed in research laboratory (circa 1930). Insets: Metallurgy students place materials in the Pearson basement furnace.

Construction on the new chemistry building began in the winter of 1922. The Chemistry Department provided the general design of the building, which was dedicated June 16th, 1923 at 10:30 a.m. The building was later named Pearson Hall after a distinguished alumnus and trustee, Fred Stark Pearson, who lost his life when the Lusitania sunk. We learn about Pearson from historical notes prepared by William Hersey. "One of our country's most amazing scientific geniuses during the great

period of expansion of electrical power, he electrified the world. That included setting up the electrical systems of New York City and Boston. He sparked a revolution in urban transportation. As an undergraduate, Fred Stark Pearson, Class of 1883, invented a solenoid tripping device for railroad signals.

"He was the first graduate to receive the Doctor of Science degree at Tufts. He was a scientist, business man, and a trustee benefactor of the College. He electrified some of the great cities of
continued on next page

Chair's Corner

Marc d'Alarcao

It has often been said that the strength of any organization lies in the talents of its people. By that measure, the last year has brought the Chemistry Department much to celebrate.

First, about our faculty. Last September we welcomed to our tenure track faculty Prof. Elena Rybak-Akimova, an outstanding young chemist whose broad interests span the fields of inorganic and biomedical chemistry and material science. (See the faculty profile elsewhere in this newsletter). In December, we conducted a worldwide search for a new faculty member in the field of biomedical chemistry. We are pleased to announce the hire of Dr. Krishna Kumar who is currently completing a postdoctoral fellowship at the Scripps Research Institution in the laboratory of Prof. Reza Ghadiri. Dr. Kumar, whose scholarship is in the area of design based non-covalent chemistry (especially involving peptides), will join our faculty next September. The addition of these two world-class scientists strengthens both our teaching and research in the focus areas of biomedical, materials, and environmental chemistry.

Our students have always been the heart of our program, and this has not changed. Undergraduate majors have become increasingly active in departmental activities outside of the classrooms and laboratories, largely through the efforts of the Tufts Chapter of the American Chemical Society. Under the excellent leadership of the last two ACS chapter presidents, Joe Peppe and Ruth Wiseman, and current president John Dimos, this student run organization has sponsored faculty-student dinners,

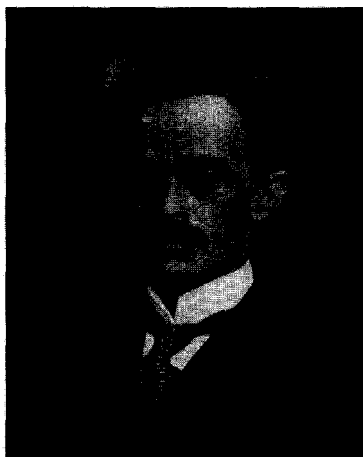
continued on page 6

A brief history, continued from page 1

the world, among them -Barcelona, Spain, Mexico City, and Sao Paulo, Brazil. He organized the hydro-electric installation on the Canadian side of Niagara Falls. At the height of his career, he died in the sinking of the British luxury passenger liner, the Lusitania, by German submarines, May 7th, 1915. This was one of the acts that led to United States entry into World War I in 1917."

Arthur Lamb, who graduated with a degree in chemistry in 1900, spoke at the Pearson Hall dedication in 1923. He was a professor at Harvard at the time, director of the chemistry laboratories at Harvard, and was also editor of *Journal of the American Chemical Society*. He said, "The old chemical laboratory, it trembles and totters as the trains on the Boston and Maine rumble by. The floors were rickety, the roof leaked, and the plumbing was in constant rebellion. The new laboratory, spacious, beautiful, well-planned and well built is actually here, thanks again, largely to Professor Durkee. Within the narrow walls of that old chemical laboratory, great discoveries were made. Hundreds of new substances, and more important, new ideas, sprang into life. We commemorate the birthplaces of men who have passed away. How much more fitting to revere the birthplaces of ideas and truths which are immortal? In the narrow laboratory, hundreds of students were given an increased understanding and appreciation of the world we live in, and acquired those habits of careful observation and logical deduction, which the studies of the exact sciences so richly afford."

During subsequent years, the department's teaching function increased steadily. In the thirties, forties, and fifties, undergraduate teaching was the main function and priority of the Chemistry Department. In the sixties and seventies, the growth of the department's graduate program occurred. This growth accelerated in the late seventies and eighties and continues today, with nearly sixty Ph.D. candidates pursuing advanced studies in chemistry. In the last few years, we have restructured the entire program, with the Chemistry Department refocusing its strengths in the traditional



Fred Stark Pearson

1861-1915

areas of Analytical, Inorganic, Organic, and Physical Chemistry, to pursue research in the fields of Materials, Environmental, and Biomedical Chemistry. This reorganization of curriculum and research emphasizes the centrality of chemistry in the sciences.

The research programs have garnered national recognition with major grants from the National Science Foundation, National Institutes of Health, Departments of Energy and Defense, and Environmental Protection Agency, as well as departmental grants and awards from Kresge, Hughes Keck, and Rockwell foundations. The research tradition at Tufts is not new - from Michael's discovery of his reaction, to Fred Greenwood's isolation of ozone intermediates through today's research in Materials, Biomedicine, and Environmental Chemistry.

With the growth in research and the graduate program, the department has never abandoned its primary mission of education. Curriculum innovation, such as Materials and Environmental Chemistry courses, as well as the Biochemistry major have kept the department vibrant. Undergraduate students participate in research as well. This participation allows them to experience first hand the elation of discovery. Prompted by these experiences, many of our majors continue their studies in chemistry at some of the

nation's finest institutions. Our students have had outstanding careers in industry, government, and academe, making contributions to science, technology, education, and public service.

One notable example in any history of chemistry at Tufts has to be Max Tishler. Dr. Max Tishler was the former head of Merck, Sharp and Dome Laboratory, and professor emeritus at Wesleyan University at the time of his death in 1989. He was a Boston native who received a B.S. in chemistry from Tufts in 1928 and earned a Master's and Ph.D. from Harvard. He was listed on approximately one hundred U.S. patents and was cited as a giant of the chemical scene these past fifty years. President Reagan presented him with the National Medal of Science in 1987. While at Merck, Dr. Tishler led research teams which developed drugs for mental depression, heart disease, arthritis, hypertension, and infectious diseases, as well as products for the control of poultry and livestock diseases. His creation of a process for the large scale manufacturing of cortisone is considered by many to have revolutionized the pharmaceutical industry. During World War II, Dr. Tishler headed up a team that developed a production process of penicillin to help wounded soldiers in Europe and Asia. Dr. Tishler was a life trustee of both Tufts and Union College and was the recipient of honorary degrees from nine institutions including Tufts.

It would be folly to make any such predictions about where contemporary work will lead. At the Pearson dedication, Professor Lamb outlined the importance of chemistry to the future. His words of seventy-three years ago ring as true today as they did then. "The great basic problems of the future are primarily chemical. More and better food, fresh supplies of energy to supplant our already vanishing oil [that was 1923] and our rapidly diminishing coal, better health and longer life. Tufts will be ready to supply her quota of these future chemists and to do her share in these labors for the welfare of the race."

PHYSICAL CHEMISTRY LABORATORY GETS A NEW OUTLOOK



Professor Mary Jane Shultz answered questions about the transformation of the physical chemistry laboratory.

Q: The physical chemistry laboratory has changed

considerably in the last several years. Can you describe those changes?

A: Certainly The first step in modernizing our laboratory was renovation of the space. Thanks to tremendous effort, particularly by Professor Walt, money was raised to renovate the west wing of the Pearson building.

Q: What was the goal of the renovation?

A: We wanted to create flexible laboratory space. The benches in the wet laboratory section are essentially tables. They can be raised, lowered, or removed to accommodate experiments. This past fall the benches were moved out and the vacuum lines that are mounted on wheeled carts were moved in. In a short time, the laboratory was transformed from a bench-top set up to one with vacuum lines.

Q: How were equipment purchases funded?

A: The National Science Foundation (NSF) has a program that funds laboratory equipment for innovative curricular change. The upper limit on that program is \$200,000 with NSF supplying half and the university contributing half. Our goal was to transform the laboratory on a \$200,000 budget.

Q: Can other colleges and universities use the same model that you are developing?

A: Yes. In fact, the reason NSF funded our proposal is that all the experiments are readily exportable.

Q: What is your model for efficient use of equipment?

A: In most teaching laboratories, all the students are doing the same experiment at the same time. We are moving toward a model with multiple experiments going on at one time. Students will rotate through experiments.

Q: Can you give an example?

A: Yes. The solution thermodynamics/ phase diagram section of the course runs for four weeks and requires four set ups for each experiment. The rotation model requires one of each set up and groups rotate through the experiments. Each group has an entire laboratory period with each piece of equipment giving them a much more intensive experience and the equipment much greater utilization.

Q: After the four week rotation, does the equipment sit idle?

A: No. Much of the equipment we have chosen will be used in multiple four-week sections. For example, the solution calorimeter is designed both for small volumes and sensitive measurement. It can be used for biologically related kinetic experiments like enzyme kinetics, prothorin binding constant determination, and protein unfolding experiments. This calorimeter will also be used in our environmental cluster for determination of total sulfur. Some of these experiments will be open-ended, discovery laboratories.

Q: What is an open ended, discovery laboratory?

A: It is an experiment where experimental details and even the question to be answered are left for the student to determine.

Q: Beside yourself, who is involved in restructuring the laboratory?

A: Three physical chemists: Professors Illinger, Kenny, Utz and Dr. Sarah Iacobucci, manager of teaching laboratories. They also were involved in writing the grants.

Q: You mentioned the instrumentation grant. Was there another?

A: Yes, we receive funds from the instrumentation program, called the Instrumentation and Laboratory Improvement (ILI) program, and also from the Curriculum and Course Development (CCD) program. The CCD program is particularly competitive with less than 20 percent of proposals being funded. We received one of the larger grants in this year's ILI and CCD competitions.

Q: Does this mean we will see continuing change in the laboratory?

A: Indeed, we have only just begun. We expect to continue for the next three years before we have completed what we proposed to do.

Seminar Series 1997-1998

The departmental seminar series, held on Tuesday afternoons at 4:30 p.m. in the newly renovated lecture room, Pearson 106, continues to provide one of the premier weekly events for chemists in the Boston area. This year, we are hosting 25 speakers, more than ever before. Many of them are leaders in their field, and some travel from as far away as the United Kingdom to give their talks. All divisions of modern chemistry are represented, with speakers from both academia and industry.

The new audio-video capabilities allow for computer-based presentations, two-projector slide shows, and video performances. The elegant, high-tech setting frames what is usually a memorable highlight for both students and faculty.

We are looking forward to welcoming you!

Clemens Richert, Seminars Committee

The list of seminars is given below.

Seminar Series, Fall 1997

September

9 Dr. Stephen Hale, M.I.T.

Isoleucyl-tRNA Synthetase: Understanding RNA Dependent Translational Editing

16 Prof. Kim Lewis, Tufts University

Cell Defense Against Unfamiliar Toxins and Organic Solvents; Molecular Mechanisms and Applications

23 Prof. Chi-Huey Wong, The Scripps Research Institute

Intervention of Carbohydrate Recognition

25 Prof. Tony Cass, Imperial College London

Protein Engineering, A Tool in the Development of Molecular Sensors

October

7 Dr. Douglas Worsnop, Aerodyne Research, Inc.

Heterogeneous Acid Solution Chemistry in the Laboratory and the Atmosphere

- 14 Dr. Joseph Hogan, Jr., ArQule, Inc.
High Throughput Screening for Drug Development
- 21 Prof. Louis Carpino, University of Massachusetts at Amherst
New Azabenzotriazole-Based *Peptide* Coupling Reagents, Recent Results and Mechanistic Considerations
- 29 Prof. Fleming Crim, University of Wisconsin Madison
Controlling Photodissociation Pathways and Watching Energy Flow in *Vibrationally* Excited Molecules

November

- 4 Dr. Oliver Mullins, Schlumberger-Doll Research
The Structures and Dynamics of Chromophores and *Fluorophores* in Asphaltenes and Crude Oils
- 18 Prof. Dudley Herschbach, Harvard University
Liberating Catalysts *from Thermodynamics*: An Easy Way to Make Benzene from Ethane

December

- 9 Prof. Greg Sia, University of Texas at Austin
Dynamics of a *Simple Surface* Reaction: The Dissociation of H₂ on Palladium

Seminar Series, Spring 1998

January

- 20 Prof. David Austin, Yale University
A *Scaffold* Approach Toward Macromolecular *Ligand* Binding
- 27 Prof. Jack Szostak, Massachusetts General Hospital
In-Vitro Directed Evolution of RNA and Proteins

February

- 3 Prof. Stacey Bent, New York University
Understanding the Chemistry of *Electronic* Materials
- 10 Prof. Michael Ward, University of Minnesota
Electrochemical *Growth* of *Epitaxial* Molecular Films
- 17 Prof. Timothy Swager, M.I.T.
The Molecular Wire Approach to Enhanced Sensitivity in Sensor Materials

- 24 Prof. Rein Kirss, Northeastern University
Electrocyclic Reactions and Thin Film Deposition Using Metal Pentadienyl Compounds

March

- 3 Prof. Roger Miller, University of North Carolina - Chapel Hill
State-to-State Vibrational Dynamics of *Polyatomic* Molecules Scattered *from* Surfaces
- 10 Prof. Anatol Zhabotinsky, Brandeis University
Chemical Oscillations, Waves and Patterns
- 18 Prof. Stephen Hanessian, University of Montreal
Designing Reagents and Reactions for Asymmetric Processes
- 24 Dr. Harry Anderson, University of Oxford
Using Non-Covalent Interactions to Control the Properties of Conjugated Organic Materials
- 31 Prof. David E. Cane, Brown University
Specificity and Versatility in Erythramycin Biosynthesis. *From* Natural to "Unnatural" Natural Products"

April

- 7 Prof. John Greedan, McMaster University, Ontario
Structural and Magnetic Studies of Battery Oxides in the Li-Mn-O System
- 14 Prof. Cynthia Friend, Harvard University
The *Surface* Chemistry of Hydrocarbon Oxidation: Experiment and Theory of Site Selective Reactions
- 21 Prof. Steven Regen, Lehigh University
Supramolecular Chemistry with a View Towards Materials Science, *Biology* and Medicine

All seminars are on Tuesdays at 4:30 p.m. in Pearson Hall, Room 106, unless otherwise noted.

Refreshments served a half hour prior to seminars in Pearson 102

Student Study Topics

- February 12 Richard Smith
March 19 Keith Albert
March 26 Michael Fleming
April 2 Donna Wilson
April 9 Jeremy Disch

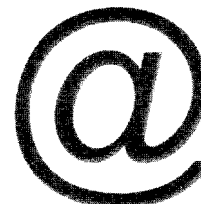
The Tufts Chemistry WEB Continues to GROW!

During the past year we have been slowly updating and adding more content to the department web site. 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 not only provide information for prospective graduate students and alumni, but 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://www.tufts.edu/departments/chemistry/>

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 email addresses but items of interest. WWW links to Alumni pages and your areas of current employment or involvement. So please write or send e-mail to 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@tufts.edu).



Faculty Profile:

Elena Rybak-Akimova



Elena Rybak-Akimova received a Master of Science degree in 1983 from the prestigious T.G.

Shevchenko University in Kiev, where she completed her thesis work, "Metal ion substitution reactions in macrocyclic and polychelate complexes." She also received a Ph.D. in inorganic chemistry in 1987 from L.V. Pisarzhevsky Institute of Physical Chemistry of Ukrainian Academy of Sciences in Kiev and there completed her dissertation "Macrocyclic iron complexes as models for hemoproteins and siderophores."

As Dr. Rybak-Akimova will attest, the education institutions in Ukraine are organized a bit differently than in the United States, in several ways. The Bachelor of Science and Master's program are both included within a span of five years, enabling the student either to finish a Bachelor of Science degree in four years or to study for an additional year and receive a Master's degree. This curriculum encompasses both course work and extensive research work. Dr. Rybak-Akimova spent time doing her research in bioinorganic chemistry studying ion complexes as models for some metal-containing enzymes and proteins. The research work which she completed while attending T.G. Shevchenko University resulted in three publications.

The Ph.D. programs are strictly research oriented, allowing for a more intensive curriculum which promotes a single focus of expertise. There are several exams to pass, with no organized preparation, with supervision

provided when needed. There was one course offered during Dr. Rybak-Akimova's time in the Ph.D. program in Kiev, "Philosophy of Marxism," a course which Dr. Rybak-Akimova is uncertain still exists as a requirement within the framework of the curriculum.

In 1993, Dr. Rybak-Akimova began her postdoctoral research at the University of Kansas as a research associate with Prof. Daryle Busch. The University of Kansas provided an environment that encouraged the combination of teaching and research, an approach she prefers. She came to Tufts for similar reasons, impressed by the research environment and attracted by Tufts' "reasonable size." Her focus at Tufts has been somewhat similar to her research in Kiev but on a more advanced level. She is currently trying to build in more functions in molecules and is working on improving the regulation of these functions. She is also planning a project exploring methods of putting different metal ions in one compound and looking at the magnetic interactions between them. A third project is to combine the other two projects and to look at the catalytic activity and the modeling possibilities with the polynuclear complexes.

Dr. Rybak-Akimova has won several awards, including the Medal and National Award of the Ukrainian Academy of Sciences for the best research among young scientists, the award for the best research project and research talk for young scientists, the award for the best student research in chemistry, and the first prize and gold medal at the Tenth International UN (UNESCO) Chemistry Olympiad in Poland in 1978. She has had multiple papers published in both national and international journals, has five submitted manuscripts and has been involved in twenty national and international conferences and workshops. Her teaching background is vast and ranges from tutoring the Ukrainian national chemistry Olympiad team to acting as research adviser at the University of Kansas and as a participant in the ACS public outreach programs.

FACULTY AND STAFF

N E W S

Larry Aulenback is the most recent addition to the staff. As shop manager, he will oversee the electronics machine, and glass shops. Larry has extensive experience in management at Tufts at the Computer Store and in Academic Computer Services.

Debbie D'Andrea, who is the newest addition to our office staff, is no stranger to the Tufts Community, as she has also worked in the Counseling Center as an office assistant. Debbie's knack for organization and the ability to look at new and better ways to facilitate office procedures are just two of the positive qualities she brings to the department. Her enthusiasm and genuine affability help to create an atmosphere which is both comfortable and professional.

Geni Magliano, who joined the department in June as staff assistant has a blend of experience well suited for the position. She graduated from the University of Massachusetts with a degree in Chemistry. Her previous work experience at Tufts enabled her to organize the purchasing functions and to make positive changes in the workflow very soon after her first day on the job.

Professor Mary Jane Shultz has signed a contract for publication of her text, *Materials Chemistry*. The text is for a one-semester introductory chemistry course which was created for teaching Chemistry 016. The expected copyright date is 2000.

The Fall 1997 Semester Awards for Outstanding Achievement were presented at the Annual Holiday Party in December. These awards are given semi-annually to a graduate student, staff member and a faculty member for extraordinary contributions to the department. The presentations were made to the following:

STAFF: Geni Magliano, Staff Assistant

FACULTY: Professor David R. Walt

GRADUATE STUDENT: Alex Kornienko

various interesting and informative field trips (for example, to the Massachusetts State Forensics Laboratory), and has participated in curriculum discussions and faculty hiring. Our graduate students, who are every year more selectively recruited, have been centrally involved in a variety of important activities beyond the research laboratory. Some of these activities include the department's Open House in March, at which graduate students presented numerous posters on their research, participation in faculty hiring, and the Tufts Graduate Student Council. In fact, the current president of this university-wide council is Ludo Juurlink, a physical chemistry graduate student working in Prof. Art Utzf laboratory.

In the last two years we have had some outstanding additions to our staff as well. Arlene Chaplin became our Department Manager in September 1996 and since then has improved virtually every function within the department. It is she whom we have primarily to thank for this newsletter! Joining our staff about the same time was Dr. Sarah Iacobucci. Dr. Iacobucci received her Ph.D. in chemistry at Tufts and after a brief teaching stint elsewhere, returned to Tufts to become director of laboratories. She is working tirelessly to assure that the undergraduate laboratory courses provide the best possible experience for our students. Recently, we have added the considerable talents of Debbie D'Andrea to our main office staff and Geni Magliano to our purchasing office. Also, we have welcomed back Larry Aulenback, Jr., as the Electronics Shop Manager.

With the addition of all of these enthusiastic new people to the wonderful core of people who have made the Chemistry Department what it is today, we are poised to become even stronger. As we look toward the future and begin to address the new challenges in research and chemical education, we can take heart that we have one of the finest teams anywhere to help define our course through these uncharted waters.

IN MEMORIAM

1939 Crosby Baker, Jr. died in November, 1996. He was a metallurgical engineer and corporate sales manager for the By Products International Division of ASARCO. His father, Crosby Fred Baker was a past chairman of the Chemistry Department at Tufts.

1954 Alfred Clancy died on January 15, 1996. He was a chemist for 35 years for the Eastman Gelatin Company in Peabody, MA. and worked most recently at the Metcalf and Eddy Company in Wakefield, MA

CLASS NOTES

1939 John Twombly retired in 1989 from the Dupont Savannah River Plant.

1940 Jack Westerfelt is a retired Navy Captain and was consulting for Sherikon, Inc in Chantilly, VA. He has passed on to his own students some of what he learned from Dr. Durkee, who was chairman while he was a student. The particular quote that stands out most was Dr. Durkee's remark to his freshman Chemistry students in 1936, "I don't care whether any of you become chemists after graduating. The discipline you learn in successfully pursuing a chemistry degree at Tufts will serve you well no matter what profession you pursue."

1945 Mrs. William Fleming (Anne Littlefield) is living in Rollinsford New Hampshire.

1953 B.S. Chem, 1957 M.D., Richard B. Brown is Associate Clinical Professor of Medicine (Neurology) at Penn State and is also Associate in the Division of Neurology at Pinnacle Health Hospitals, Harrisburg, PA.

1955 Edward G. Meloni retired from Strem Chemicals in 1997 and is relocating to North Carolina where he will work part time for Advanced Materials Corp of New Hill, N.C.

1956 Bertha G. Maneikis is managing the Simpson Infirmary at Wellesley College, Wellesley, MA.

1957 Jack R. Pitman is retired from the New England Power Company where he was an environmental compliance manager. He is also retired from the U.S. Air Force Reserve and lives on the Pacific Coast.

1958 Lawrence R. Shapiro, M.D. is Professor of Pediatrics at New York Medical College and Director of Medical Genetics at Westchester County Medical Center in Valhalla, N.Y.

1960 Jill Jacoves (Gross) is an EMT with the Rockaway Township Fire Department in New Jersey. She teaches first aid, CPR, and lifeguard training for the American Red Cross.

1961 Harry Lord is currently in R&D at Air Instruments & Measurements, Inc. working on unique sensor development including remote sensing of vehicle exhaust. He is married and has three children and four grandchildren.

1962 Daniel Appleton recently retired from Hasbro, Corp. as a Staff Process Engineer to start his own consulting firm, Ure-Foam Technologies.

1962 John Larsen is currently a professor at Lehigh University in Bethlehem, PA.

1965 Fernando Cajale has owned a shipping agency in Barranquilla, Colombia, since 1977. Prior to that he worked at the Dow Coming branch in Bogota.

1970 Elwood Trask is vice president for technology at Gates Formed-Fibre Products, Inc in Auburn, Maine.

1984 Carol DiGiusto Burd, M.D., is an internist at Harvard Pilgrim Health in Wellesley. She and her husband reside in Weston, MA. and have a daughter, Rachel.

1985 Helen Mah is technical director of a clinical laboratory at Brigham and Women's Hospital in Boston, MA. The laboratory provides testing for solid organ (kidney, pancreas, heart, lung, liver) and bone marrow transplantation.

1989 Keith So is currently doing a fellowship in Infectious Diseases at Boston Medical Center. He attended the Medical College of Pennsylvania and completed his residency at St. Elizabeth's Medical Center.

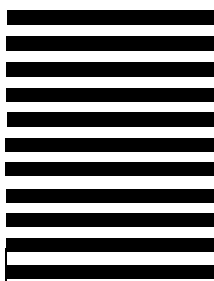
1992 Daniel Damelin is teaching Chemistry at Lincoln-Sudbury Regional High School in Sudbury, MA.



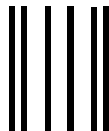
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**Doctoral Degrees
 Awarded 1997**

Pericles Calias (d'Alarcao) "Synthesis and Biological Evaluation of Water Soluble Flavonoid Analogues: Inositol 2-phosphate-quercetin Conjugates and Partial Synthesis of Phosphatidylinositol Glycans in the Study of Insulin Signal Transduction"

Brian G. Healey (Walt) "Design and Fabrication of Polymer Arrays on Optical Imaging Fibers and Their Use as Chemical Sensors"

Siqun Huang (Kenny) "Internal Rotation of the Isopropyl Group of Guaiazulene and a Method to Evaluate the Sachs Formula"

Sam Mathew (Kenny) "Fluorescence Excitation-Emission Matrix Measurement and Analysis of Ground Water Contaminants"

Stella Papasawa (Kenny) "Reducing the Risk of Global Warming from CFC Alternatives: A Scientific Basis for Policy Options"

Stephanie Tai (Illinger) "Vibrational Spectra, Infrared Radiative Properties, and Transition-State Analysis of CFC-Substitutes"

**Master's Degrees
 Awarded 1996-97**

Kristina L. Franklin Yoshiko Harada
 Justin M. Law John M. Macey
 John J. O'Connor Anna A. Panova

**Bachelor's Degrees
 Awarded 1996-97**

Gregory H. Altman Daisuke D. Nonoyama
 Joseph K. Borkowski Joseph Peppe
 Susan J. Cobern Daniel Refai
 Tiarna M. Doherty Joseph A. Reidy III
 Jason D. Halpern Emily M. White
 Rishi K. Jain Graeme Frederick
 Phillip K. Lai Woodworth
 Enio B. Lin Douglas A. Yochim
 Maki Matsubayashi Christopher M. Zappala

Alumni Reply Form

Please complete and return this form for our alumni files. Include news of your current activities or suggestions for the next newsletter.

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University _____

University _____

University _____

Residence address _____

City, state, zip _____

Firm _____

Business address _____

City, state, zip _____

This is a new address

Degree Year Adviser _____

Degree Year Adviser _____

Degree Year Adviser _____

Home phone _____

Position _____

Business phone _____

Name of spouse _____

(Unless you request otherwise, we will feel free to mention any of this in future newsletters.)

I do NOT wish to have this information in the newsletter.

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