THE GOESSMANN GAZETTE

A publication of the Chemistry Department, University of Massachusetts at Amherst *Summer, 1992*

Present Research Group of Louis A. Carpino

LOUIS A. CARPINO RECEIVES HIRSCHMANN AWARD IN PEPTIDE CHEMISTRY

Louis A. Carpino, Professor of Organic Chemistry, has been awarded the 1992 Ralph F. Hirschmann American Chemical Society Award in Peptide Chemistry, which is sponsored by Merck, Sharp & Dohme Research Laboratories. As one colleague quoted in *Chemical and Engineering News* of October 7, 1991, states, "It is difficult even to conceive of the idea that one chemist should have introduced so many of the intermediates that have made modern peptide synthesis possible and has now added another one. However, Louis Carpino has done it."

Carpino has been on the faculty since 1954 and is currently being honored for two key discoveries in the development of protecting groups for peptide synthesis. Today the majority of chemists doing peptide synthesis use either the *tert*-butyloxycarbonyl (BOC) or 9-fluorenylmethoxycarbonyl (FMOC) group, both designed by Carpino, as alpha protectants for the assembly of peptides and small proteins.

The work which led to the Hirschmann Award is a good example of two consecutive serendipitous discoveries in the field of amino group protection. When Professor Carpino came to UMass in 1954, one of his research goals was to synthesize the first examples of a class of compounds, monosubstituted diimides (RN=NH), considered too unstable to be isolated under normal conditions. It was thought that it might be possible to generate a stable diimide salt, for example by treatment of known esters such as R-N=NCOOBn with HBr, a typical deblocking agent for the carbobenzoxy group (COOBn, CBZ). Professor Carpino had in mind doing IR studies, possibly at low temperatures, to verify the postulated intermediates. Indeed this project allowed the University via Research Corporation and NSF support to obtain its first IR spectrometer, the old Perkin-Elmer 21. NMR studies would have been equally useful, but at that time NMR was not even "just around the corner." It was several years before the first commercial NMR spectrometer, the Varian A-60, like the PE-21 now only a museum piece, became available.

Unfortunately (or fortunately, in view of the eventual results), the azo linkage in R-N=NCOOBn acted to oxidize the deblocking agent HBr, thus dashing hopes for removing the CBZ group and retaining the azo linkage. Professor Carpino therefore sought a protecting group which would be cleaved by a weaker acid which happened also to be non-reducing. The carbo-*t*-butoxy group (COOCMe$_3$, BOC) fit the bill in combination with trifluoroacetic acid (TFA). Following Carpino's initial work

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The Curriculum in Biological Chemistry Continues to Grow

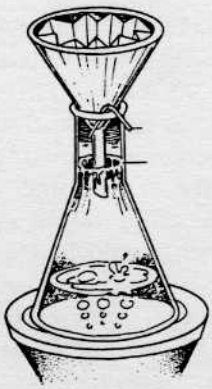
Just like a healthy, young, living organism is wont to do, the Biological Curriculum in the Department of Chemistry is growing. With the addition of Lynmarie Thompson (see New Faculty section) the Biological Chemistry Faculty have grown in number to include, along with Professor Thompson, Professors John Brandts, Michael Maroney, Craig Martin, and Robert Weis. This group fills an important niche in the University community by teaching and researching the chemical basis of the exquisitely complex molecules and chemical reactions that are found throughout the biological world. These laboratories cross the traditional boundaries within chemistry to include tools and approaches of physical, inorganic, and organic chemistry. In addition, all of these professors are members of the Graduate Program in Molecular and Cellular Biology, providing opportunities for intellectual exchange between several Departments.

The Biological Chemistry Faculty has had an impact on a number of courses—they have introduced an emphasis on biological molecules into Elementary Physical Chemistry and Chemistry of Macromolecules, and have plans to introduce a biophysical section of Physical Chemistry Laboratory. A number of courses have been offered since the inception of the curriculum in 1989 that are available to advanced undergraduates and graduate students alike, including Biophysical Chemistry, Protein Structure, Nucleic Acid Chemistry, Biological Magnetic Resonance Spectroscopy, and Metal Ions in Biology.

These new directions in courses and research represent an important opportunity to train students for the growing fields of pharmaceutical and environmental chemistry, and biotechnology.

Correction

Kenneth Gonsalves, Frederick Hedberg, and **Kenneth Wynne** were incorrectly listed in the Summer, 1990 issue of the *GOESSMANN GAZETTE* as having received their Ph.D.s under the direction of Professor C. Peter Lillya. **Professor Marvin Rausch** was the director of Kenneth Gonsalves, Frederick Hedberg's director was the late **Professor Robert Williams,** and the research director of Kenneth Wynne was **Professor John George.**



Governor William Weld officiated at the groundbreaking ceremonies for the new **Silvio O. Conte Polymer Research Center** last summer (1991). This building will be directly north of the Graduate Research Center and will provide more than 100 laboratories, with research space for 20 faculty and 150 graduate students. The Center should be ready for occupancy by 1994.

FACULTY NEWS

Professor Ronald D. Archer has been the facilitator for the "New England Team" of ChemSource, an NSF sponsored program to provide detailed curricular materials (objectives, labs, history, humor, references, etc.) for beginning teachers. The New England Team has produced three of the thirty-five SourceBook modules: Halogens, Solutions, and Photochemistry—all of which will be available in hard copy, PC & Mac diskettes, and CD-ROM forms by the Summer of 1992.

Professor David Curran returned in September from a sabbatical leave which was spent partly in Amherst and partly at the Naval Research Laboratories in Washington, DC. The latter was particularly enjoyable since it provided a chance to do research in electrochemistry.

Professor Roberta O. Day was the recipient of the **Connecticut Valley Section Award**. She received a plaque and monetary award at the September 19, 1990 meeting held at Mount Holyoke College. Her award address was titled, "Looking at Molecules: Single Crystal X-ray Diffraction Analysis."

Professor Paul M. Lahti has been invited to speak at a special "Instrumentation Symposium on Molecular Based Magnetism" in Shuzenji, Japan, to be held in October, 1992. He was also invited to participate in a NATO Advanced Research workshop on Magnetic Materials in Lucca, Italy during the Fall of 1990 and to a NSF workshop on Reactive Intermediates at Santa Barbara, California, in the Spring of 1991.

Professor Robert W. Lenz, who is a Faculty Affiliate in the Chemistry Department, received the **ACS Award in Polymer Chemistry**, sponsored by the Mobil Chemical Company.

Professor C. Peter Lillya chaired the New England Regional ACS meeting at UMass in June, 1991. There were 430 attendees and 229 papers and posters. **Professor Lillya** took a sabbatical leave in Spring, 1992 at the Organic Chemistry Institute, University of Mainz, Germany.

Professor Michael J. Maroney was a guest of the Hungarian National Academy of Science on a US-Hungarian exchange program for two weeks in September, 1991. He was based at the Biological Research Institute in Széged and visited various institutions in Pécs and Budapest. In the Summer of 1992 he gave an invited lecture entitled, "Insights Regarding the Structure and Function of Ni Sites in Hydrogenase" at the Third International Conference on the Molecular Biology of Hydrogenase in Troia, Portugal. **Professor Maroney**, with **Dr. Beatrice Botch** as co-investigator, received a grant from the Camille and Henry Dreyfus Foundation which contributed to the acquisition of the CAChe Molecular Modeling System for the Chemistry Department Resource Center.

Professor Marvin Rausch was recently elected as Permanent International Secretary for the **International Conferences on Organometallic Chemistry**. The next conference is scheduled for August, 1992 and will be held in Warsaw, Poland.

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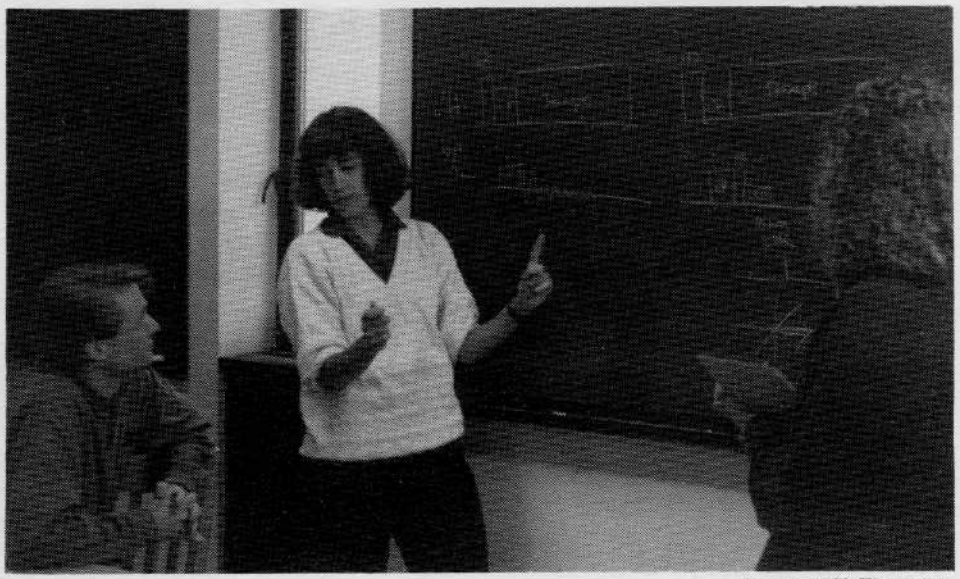

Lynmarie K. Thompson

NEW FACULTY

Dr. Lynmarie K. Thompson joined the Department in January, 1991, as an Assistant Professor. Her research interests are in the area of Biophysical Chemistry and focus specifically on understanding the mechanism of action of membrane proteins involved in signal transduction and bioenergetics. Currently her approach to studying these topics combines the techniques of magnetic resonance spectroscopy with biochemistry and genetic engineering. Professor Thompson received her undergraduate degree from the California Institute of Technology in 1983, her Ph.D. from Yale University in 1989, and was a postdoctoral fellow at Massachusetts Institute of Technology from 1989 to 1990.

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