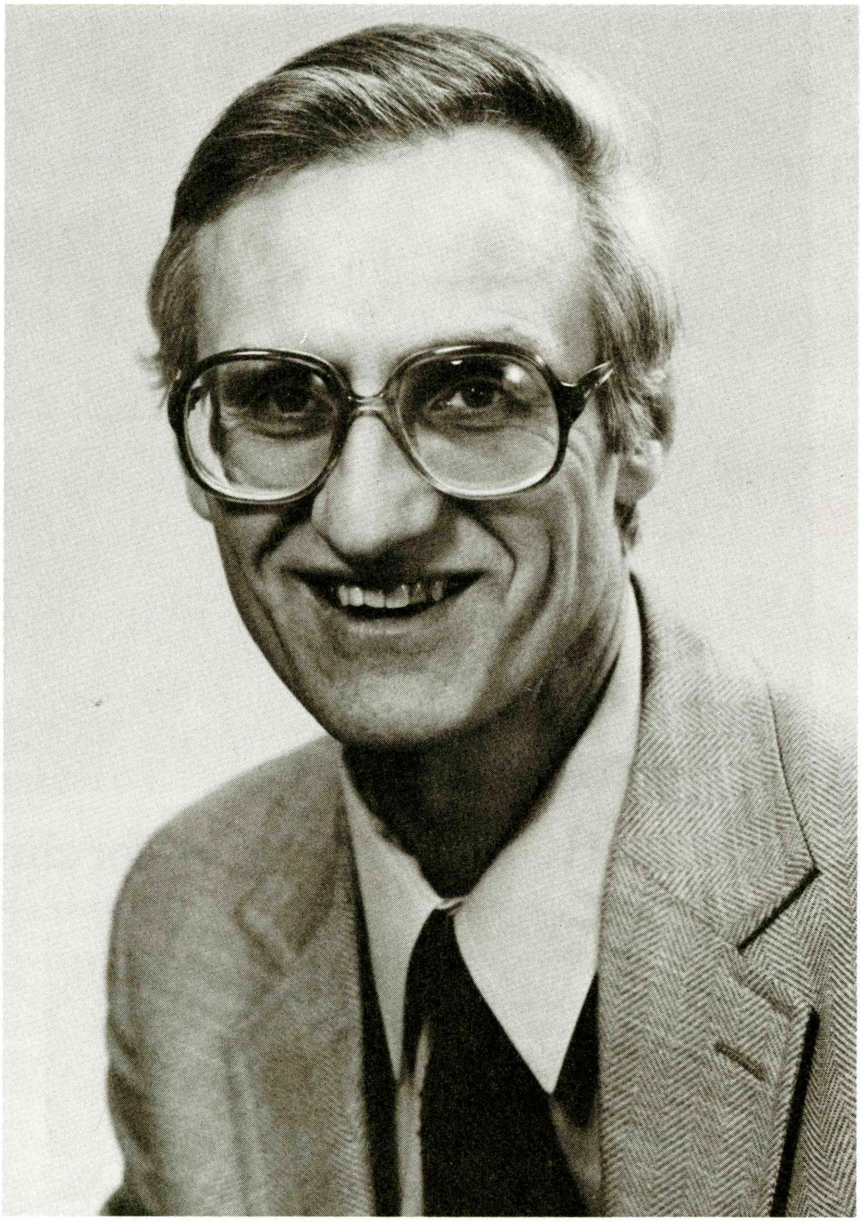
THE NUCLEUS

February 1989 *Of the Northeastern Section of the American Chemical Society* *Vol. LXVII, No. 5*

Monthly Meeting:

Prof. Bill Giessen to Speak on Superconductivity



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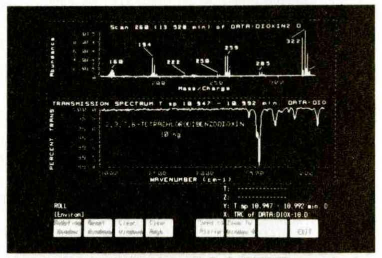

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Contents

Cover: *Professor Bill C. Giessen, Northeastern University*

March Issue Deadline: *January 20, 1989*
Please note the Editor's new address and phone number below.

THE NUCLEUS

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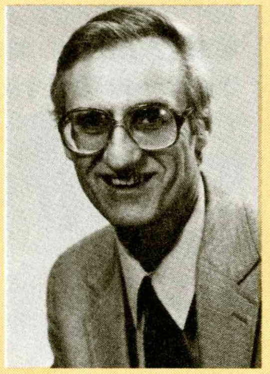
February Meeting

The 714th Meeting of the Northeastern Section of the American Chemical Society



Thursday, February 9, 1989

Simmons College, Main College Building
300 The Fenway, Boston Massachusetts

5:30 p.m. Social Hour, The Fens Room

6:00 p.m. Dinner, The Fens Room

7:30 p.m. LECTURE, Room C103
"The Chemistry of Ceramic High-T_C Superconductors"
Bill C. Giessen, Northeastern University

Refreshments will be served after the program.

Dinner reservations must be made no later than February 3, 1989. Please call Mrs. Piper at (800) 872-2054 or (508) 456-8227. Reservations not cancelled at least 24 hours in advance must be paid. Members: $16; Non-members: $20; Students and Retired Chemists: $5; THE PUBLIC IS INVITED.

Abstract

The Chemistry of Ceramic High-T_C Superconductors

by Bill C. Giessen, Department of Chemistry and
Barnett Institute of Chemical Analysis and Materials Sciences
Northeastern University, Boston, MA 02115

The science and technology of the new ceramic high-T_C superconductors (HTSC's) poses tasks and challenges to chemists. Scientific challenges include successful syntheses of new HTSC compounds, advances in the fundamental understanding of the mechanism of superconduction in oxides, especially layered cuprates, and, ultimately, the ability to predict new HTSC's. Technological challenges include the improved preparation of HTSC's by chemical methods, e.g., from inorganic precursors or by the sol-gel method.

There are now about a dozen known cuprate high-T_C superconductors with T_C between 40 and 125 K, and the outlines of a usable theoretical framework exist; materials with technologically useful properties (especially, an acceptable critical current density, j_C) are now being produced.

This talk will review these developments and outline the state of the art and the prospects of HTSC's. ◇

Biography

Bill C. Giessen

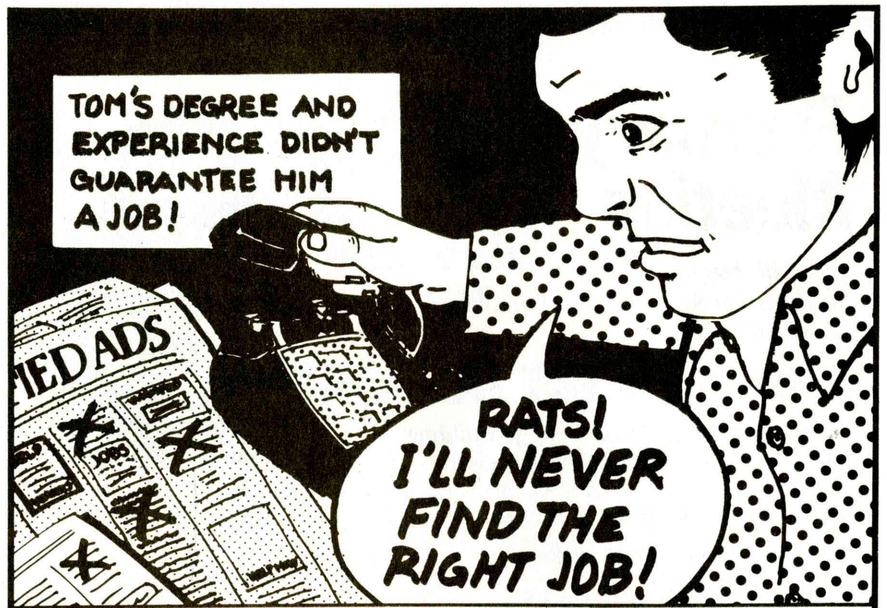
Bill Cormann Giessen is a Professor in the Departments of Chemistry and Mechanical Engineering at Northeastern University in Boston. He is also Associate Director of NU's Barnett Institute of Chemical Analysis and Materials Science, where he heads the Materials Science Division. A native of Pittsburgh, PA, he grew up in Germany and holds a doctorate from the University of Göttingen; after a period as a Research Associate at MIT he moved across the Charles River to his present affiliation with Northeastern.

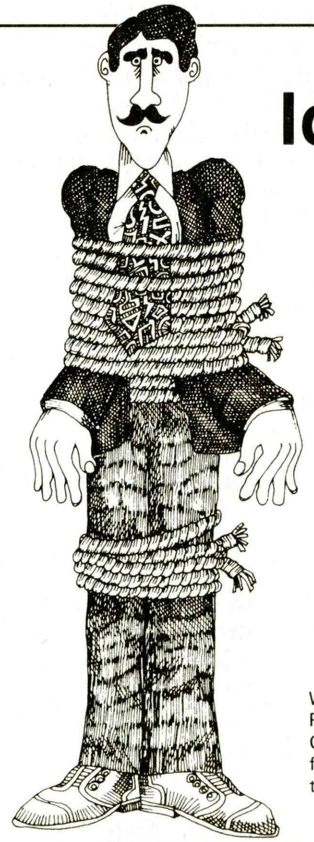
Applying a chemistry-oriented approach to materials science research, Prof. Giessen is author/coauthor of 180 publications and 10 patents in the areas of alloy chemistry, including high temperature phase diagrams, complex polytype phases, metastable alloy phases produced by rapid solidification and metallic glasses. He has also edited or co-edited seven books in his fields of expertise.

In the seventies, he and his colleagues at the Barnett Institute also did research on forensic chemistry and forensic materials science. Building on this interest, he founded and remains as Chairman of the Board of Cambridge Analytical Associates, Inc. (CAA) which grew to become one of the leading US firms active in environmental chemical services.

Currently, he and his interdisciplinary associates at Northeastern are studying ceramic high-T_C superconductors, and they were the first US team to prepare the much-sought 4-layer cuprate compound which turned out to have the second-highest T_C on record [122 K , P. Haldar et al., Science *241,* 1198 (1988)].

Dr. Giessen has been Secretary of the Committee on Alloy Phases of The Metallurgical Society (TMS) and a Councillor and National Secretary of the Materials Research Society. In 1988 he received the Hume-Rothery Award of TMS for contributions to the science of alloys. ◇





1988 James Flack Norris Summer Scholar Reports

II—DNA Replication in the Presence of Mutagenic Sites

by Joseph A. Iocono
Faculty Advisor:
Dr. Larry W. McLaughlin
Department of Chemistry
Boston College

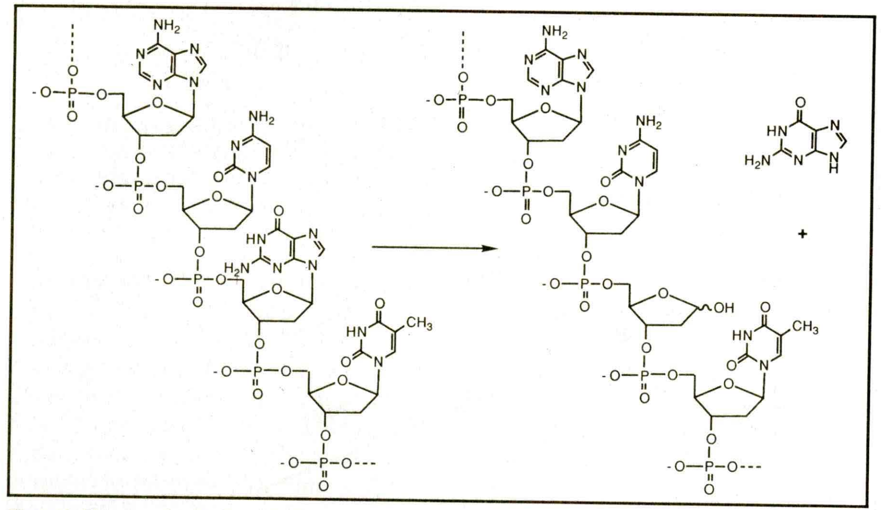


Figure 1. Cleavage of an N-glycosidic bond to form an apurinic/apyrimidinic (AP) site.

Introduction Damaged macromolecules that result from external chemical agents or naturally occurring biological processes can compromise normal cellular growth and long term viability. When such events occur within the chromosome the results can be catastrophic because replication or repair errors that occur at these sites can affect subsequent generations. Our interest revolves around a lesion known as the apurinic/apyrimidinic (AP) site. Abasic or AP sites are formed when the N-glycosidic bond of a purine or pyrimidine base bound to the deoxyribose sugar is hydrolyzed without cleavage of the DNA sugar-phosphate backbone. The polymeric nucleic acid molecule remains intact but one (or more) nucleobase residues has been lost. Abasic sites can result after reaction of a nucleobase with certain chemical reagents and are also commonly formed during normal DNA repair processes. For example, the glycosidic bond is labilized and can be readily hydrolyzed after chemical alkylation at the N7 position of guanine [1]. It is also hydrolyzed during DNA repair by enzymes known as DNA glycosylases [2]. The presence of an AP site, whether the result of base modification, or incomplete repair processes, is a potential mutagenic site since important sequence information has been deleted (Fig. 1). For example, AP sites in DNA have been reported to be mutagenic during transcription. [1,3]


The 1988 J.F. Norris Summer Scholars and their advisors. Standing (left to right): Dr. John Burke, Stonehill College; Dr. Allen L. Ganser, Emmanuel College; Dr. Michael Hearn, Wellesley College, Chair of the NESACS Education Committee; Sr. Dorothy Higgins, Chair of the J.F. Norris Summer Scholar Committee; Dr. Larry McLaughlin, Boston College; Dr. David M. Lemal, Dartmouth College. Seated (left to right): Diane Luchente, Emmanuel College; Joseph Iocono, Boston College; Bryan Roberts, Dartmouth College.

Most studies of abasic sites in DNA have involved the use of AP site analogues [4-7] in which a tetrahydrofuran or similar derivative was used in place of the cyclic hemiacetal present in an AP site. This approach has been employed because of the difficulty in synthesizing an oligodeoxynucleotide or DNA fragment containing this specific lesion. The abasic site is relatively reactive and results in cleavage of the DNA backbone by β-elimination reactions through the enol form of the hemiacetal. [8] In the presence of amines, such as piperidine, Schiff's base formation accelerates the β-elimination reaction and cleavage of the polymer. [9] Because of this reactivity, it has not been possible to incorporate an AP site into an oligodeoxynucleotide

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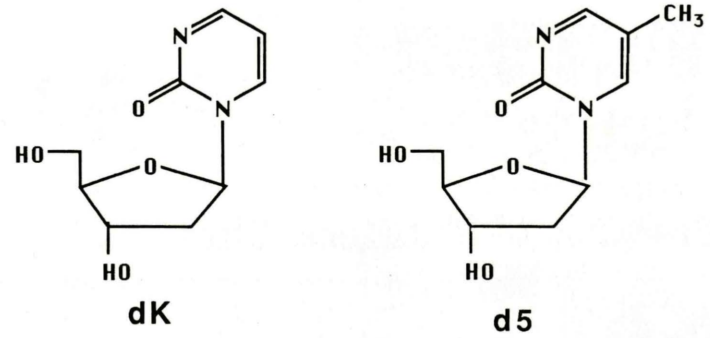

Figure 2. Structures of d5 and dK.

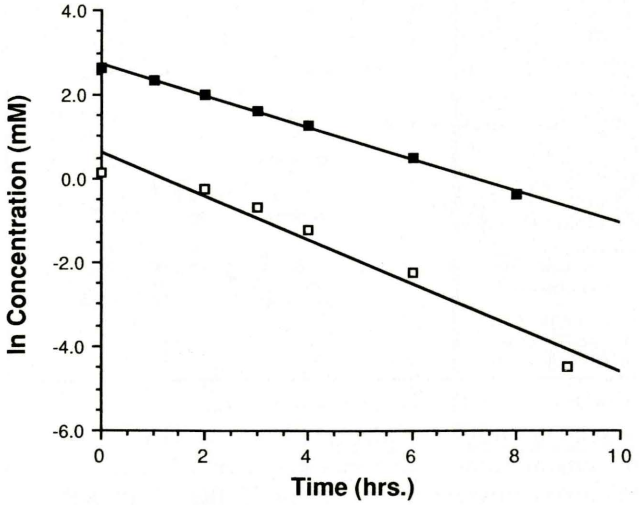

Figure 3. Kinetic plots of the hydrolysis of dK (□) and d5 (■) at pH 3.0 and ambient temperatures. The derived rate constants for the hydrolysis of dK and d5 were 0.52 hr^{-1} and 0.38 hr^{-1} respectively.

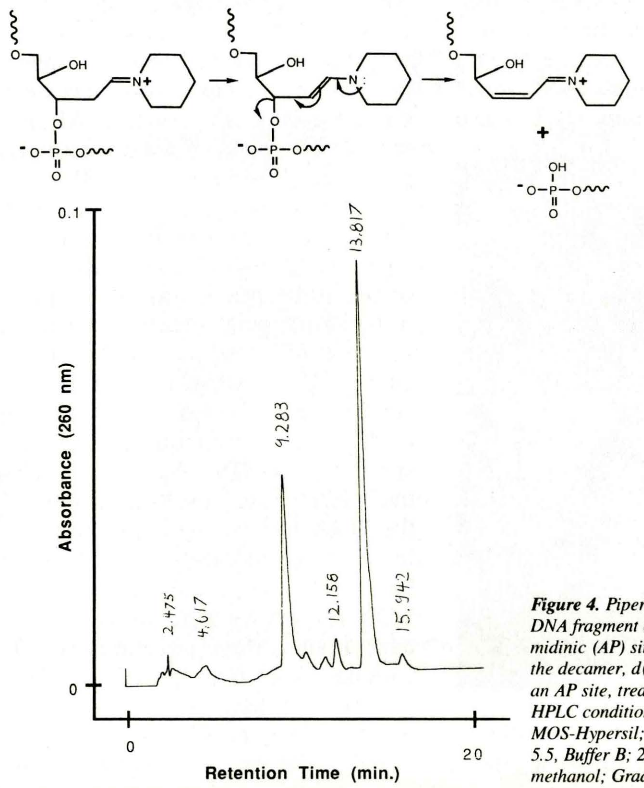

Figure 4. Piperidine catalyzed cleavage of a DNA fragment containing an apurinic/apyrimidinic (AP) site (above). HPLC analysis of the decamer, d(CTGAATT__AG), containing an AP site, treated with piperidine (below). HPLC conditions: 4.6 × 250 mm column of MOS-Hypersil; Buffer A: 20 mM KH_2PO_4, pH 5.5, Buffer B; 20 mM KH_2PO_4, pH 5.5, 70% methanol; Gradient: 0–100% B in 60 minutes.

continued from previous page

using standard chemical synthesis procedures. The studies to date rely upon using uracil DNA glycosylase to remove an incorporated uracil base from a chemically synthesized oligodeoxynucleotide [10,11].

Dr. McLaughlin's research group has been involved in a program of studying the structural and biochemical implications of placing modified bases into DNA at specific sites. It has been observed that it was difficult to prepare oligodeoxynucleotides containing the two 2-pyrimidinone nucleoside residues d5 and dK (Fig. 2) and obtain pure products [12]. In addition to the pyrimidinone containing oligodeoxynucleotide, a second fragment was obtained which was very similar to the desired product but lacked the 2-pyrimidinone residue. It appeared that this second product, which was the same length as the desired fragment, might have lost the pyrimidinone base during the chemical synthesis procedures and contain an abasic site. This suggested that the 2-pyrimidinone nucleoside residues might provide a route to the chemical synthesis of DNA fragments containing the desired AP site. My project has involved the study of the stability of 2-pyrimidinone nucleosides, and examination of the feasibility of using the hydrolysis of such residues to form abasic sites and finally the implications of this site on DNA replication by DNA polymerase.

Results The stability of the pyrimidinone nucleosides were examined by incubating them at ambient temperature in buffers of varying pHs and monitoring the results by HPLC (with U.V. detection at 310 nm). At pHs 3 and 4, both 2-pyrimidinone nucleosides, d5 and dK, underwent facile hydrolysis to generate the corresponding nucleobases which was confirmed by comparison with the appropriate independently prepared standards. Under basic conditions, including treatment with concentrated ammonia, the nucleosides appeared very stable. The acid catalyzed hydrolysis exhibited pseudo-first order kinetics and rate constants were derived from the plots of figure 3.

The two pyrimidinone oligodeoxynucleotides d(CTGAATT5AG) and d(CTCAATTKAG) were then synthesized and treated in a similar manner at pH 3 and ambient temperature. HPLC analysis indicated that each DNA fragment was converted to a product which eluted with an earlier retention time. This suggested that hydrolysis of the pyrimidinone nucleoside residue had occurred producing an AP site. In order to confirm its presence, the product was treated with piperidine. (Strand-Scission reaction) which accelerates cleavage of the DNA carbohydrate-phosphate backbone at apurinic sites [9] (Fig. 4). Subsequent analysis indicated that cleavage had occurred and two oligodeoxynucleotides were present (Fig. 4). A control reaction with the d5 (or dK) containing fragment did not produce the hydrolysis products.

The hydrolytic reaction of the oligodeoxynucleotides appeared slower than that observed with the free nucleosides. This was confirmed with the determination of the corresponding rate constants for the hydrolysis of the decamers. (Fig. 5)

The stability of the double stranded DNA fragments containing AP sites has been examined by measuring thermally induced helix to coil transitions [13]. The stability of the duplex structures were, as expected, related to the number of hydrogen bonding interactions present in the duplex form of the self-complementary oligodeoxynucleotides (Table 1). Substitution of dK for dC in two positions of the duplex dodecamer [d(CGCGAATTKGCG)]$_2$ decreased the helix stability by 19.4°C. The dodecamer continuing two abasic sites [d(CGCGAATT__GCG)]$_2$ was further destabilized by an additional 22°C (a 41.4°C decrease in Tm from the native dC containing fragment, [d(CGCGAATTCGCG)]$_2$).

Table 1

OLIGODEOXYNUCLEOTIDE	Tm
[d(CGCGAATTCGCG)]$_2$	61.7
[d(CGCGAATTKGCG)]$_2$	42.3
[d(CGCGAATT__GCG)]$_2$	20.3

Discussion Mild aqueous hydrolysis (pH 3.0) of 2′-deoxy-2-pyrimidinone nucleosides results in facile cleavage of the N-glycosidic bond at rates much faster than observed for the four common 2′-deoxynucleosides. This rate is reduced somewhat when the nucleoside residue is incorporated into a DNA fragment but still provides a simple procedure for the generation of AP sites at specific well-characterized regions in nucleic acids. In addition to the loss of sequence information, the generated abasic site dramatically decreases the stability of the double stranded DNA. Although the observed decrease in stability in the present case might be enhanced by the use of relatively short DNA fragments, the results suggest that the presence of an AP site in longer DNA polymers may induce significant local helix destabilization.

The final aspect of this project, which will be completed as a Boston College Scholar of the College Project, involves the preparation of DNA templates containing AP sites and an examination of the events which occur during DNA polymerase catalyzed replication of such templates. In the work accomplished to date, DNA fragments containing AP sites can be resolved from the dK (or d5) containing fragments by HPLC techniques. HPLC offers a simple and rapid technique for purifying the desired modified DNA fragments. Polyacrylamide gel electrophoresis will be employed to monitor how effectively the DNA polymerase can "read through" the abasic site, and DNA sequencing techniques will be used to determine the base or base composition which appears opposite the AP site after replication.

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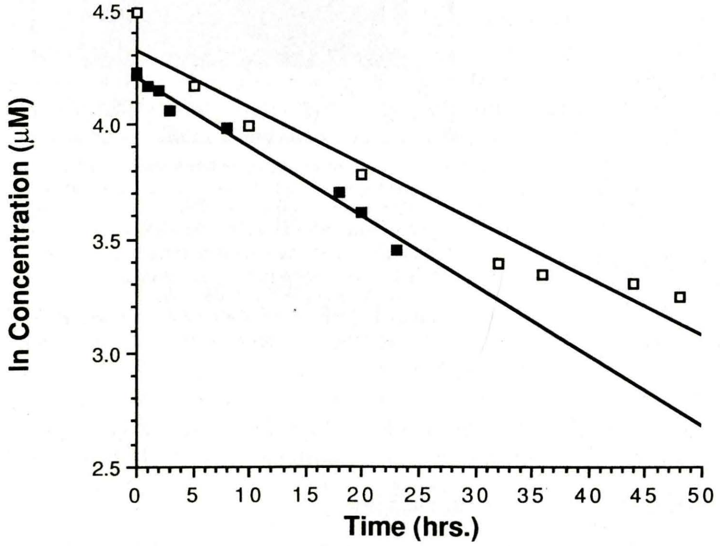


Figure 5. Kinetic plots of the hydrolysis of d(CTGAATTKAG) (□) and d(CTGAATT5AG) (■) at pH 3.0 and ambient temperatures. The derived rate constants for the hydrolysis of d(CTGAATTKAG) and d(CTGAATT5AG) were 0.025 hr^{-1} and 0.031 hr^{-1} respectively.

References

1. Loeb, L. and Preston, B (1986) *Annual Review of Genetics 20:* 201-30.

2. Lindahl, T. (1979) in *Progress in Nucleic Acid Research and Molecular Biology Volume 22,* 135-192.

3. Loeb, L. (1985) *Cell* 40, 483-484.

4. Takeshita, M., Chang, C.-N., Johnson, F., Will, S. and Grollman, A.P. (1987) *J. Biol. Chem. 262,* 10171-10179.

5. Kalnik, M.W., Chang, C.-N., Grollman, A.P., and Patel, D.J. (1988) *Biochemistry 27,* 924-931.

6. Cuniase, P., Sowers, L.C., Eritja, R., Kaplan, B., Goodman, M.F., Cognet, J.A.H., Lebret, M., Guschlbauer, W., and Fazakerley, G.V. (1987) *Nucleic Acids Research 15,* 8003-8020.

7. Eritja, R., Walker, P., Randall, S., Goodman, M. and Kaplan, B. (1987) *Nucleosides and Nucleotides 6(4),* 803-814.

8. Lindahl, T. (1982) *Annual Review of Biochemistry 51,* 61-87.

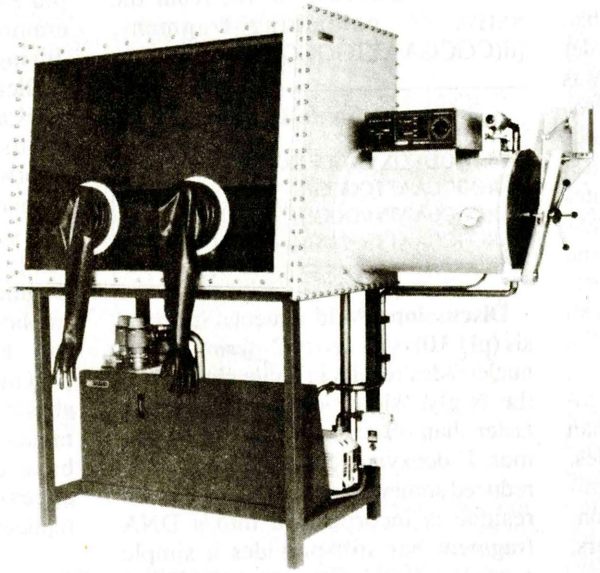
9. Maxim, A. and Gilbert, W. (1980) *Methods in Enzymology 65,* 499-580.

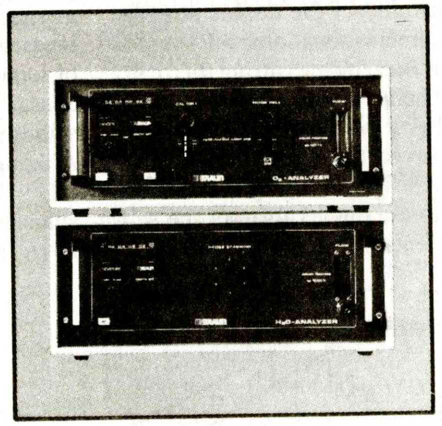
10. Manoharan, M., Ransom, S., Mazumder, A., Gerlt, J., Wilde, J., Withka, J., and Bolton, P. (1988) *J. Am. Chem. Soc. 110,* 1620-1622.

11. Stuart, G.R., and Chambers, R.W. (1987) *Nucleic Acids Research 15,* 7451-7462.

12. Gildea, B. (1988) M.Sc. "The Synthesis and Properties of 2-Pyrimidinone Containing Oligodeoxyribonucleotides" (Boston College).

13. Albergo, D., Marky, L., Breslauer, K. and Turner, D. (1981) *Biochemistry 20,* 1409-1412.





The US Army Materials Technology Laboratory and the ACS

by Dr. George R. Thomas,
Chief Scientist, U.S. Army MTL

The US Army Materials Technology Laboratory located as it is on the site of the old Watertown Arsenal has roots that go back to 1812. As an Arsenal for the next century and a half it specialized in making things out of iron and steel, materials of choice for guns, cannon, bullets, and cannon balls, artillery rounds, etc. During this period it maintained expertise in the field of metallurgy, and made many important contributions to the state of the art. Indeed such local expertise prompted the Army to set up the Ordnance Materials Research Office (OMRO) on the site. During the 1950s research into metals was regarded as being much too narrow a focus and a materials research nucleus was spawned on the Arsenal property under the auspices of OMRO. With the phasing out of the Ordnance Corps, the name of this office of expertise was changed to the Army Materials Research Agency (AMRA). Then, with the closing of the Arsenal, the AMRA gathered in the remaining research capability of the Arsenal and was renamed The Army Materials Research Center. Simultaneously a grand strategy developed to transfer all the Army materials research capability into one organization. While the strategy was never fully implemented, a polymer capability was imported from the US Army Natick Laboratories to round out the existing research in metals, ceramics and mechanics already resident at Watertown. This organization became known as the Army Materials and Mechanics Research Center (AMMRC). More recently it has been renamed the Army Materials Technology Laboratory (MTL) in recognition of the fact that the Army wanted to capture and harness technology from all sources as well as develop it in-house. And that brings us up pretty much to date:

Membership in professional societies has been a tradition, a part of the culture, of the organizations preceding MTL. Prior to the advent of the polymer group, "Watertown" participated in the American Chemical Society mainly in response to the needs of its metallurgists for analytical services. Accordingly, participation in the activities of the ACS, although important to the Arsenal, was small. The metallurgists had their own societies. In development of the ceramics capability, the ceramists who were hired brought with them their loyalties to such societies as the American Ceramics Society. Gradually we've seen the development of SAMPE and the conversion of the American Society for Metals (ASM) to the ASM, International, an international *materials* society. These and many others, including the ASTM, compete for the professional loyalties of the scientists and engineers at MTL.

The ACS, long the mecca for those engaged in polymers and subsets thereof—rubber, adhesives, plastics, additives fibers, fiber reinforced plastics, etc.—was a natural home for the chemists brought in from Natick Laboratories and continues to be for the much larger "organic materials group" which ensued.

Looking at the latest available membership list of the ACS (1985) one finds 26 ACS members working at MTL. Four have retired. Of the remining 22, eleven work in the Polymer Research Branch, three in the Composite Development Branch (both spinoffs from the original Natick contingent), four in the Materials Science Branch, one each in the Metals Research Branch and the Engineering Standardization Branch. In addition, the Chief Librarian and the Chief Scientist claim the American Chemical Society as "their Society."

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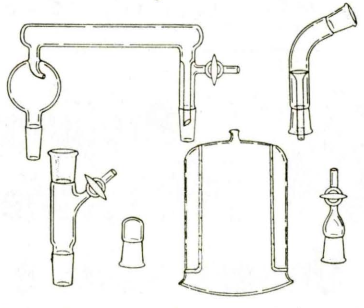

US Army MTL

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Clearly the ACS is not without supporters at MTL despite the fact the roster of personnel indicates that there are another twenty four materials engineers, chemical engineers and chemists who are eligible and could benefit by embracing the ACS as "their Society."

What do these chemists' chemists (i.e., ACS members) do? Like all scientists and engineers at MTL they work at the "cutting edge" of their chosen technology, generally with advanced state of the art equipment. Typically they hold leadership roles. One leads the basic work on synthesis and characterization of organic materials while another develops the processing technology. Currently ACS members work in the areas of superconductivity; molecular structure by X-ray diffraction; diffusion of small molecules through polymeric materials; synthesis of new and novel polymers such as the polyphosphazenes and the polyphenylquinoxalines; robotics and aritificial intelligence for the characterization of polymeric materials from liquid to solid and from manufacture to discard; interactions between lasers and composite materials which have major spinoff potential in other areas such as diamond-like coatings; new applications for Auger/ESCA, scanning Auger, and electron microscopy; ion implantation; elastomers for heavy duty use such as found in tank track pads; adhesion and adhesive bonding. Working jointly with other Army agencies they have made important and major contributions to the development of the fiber reinforced plastic (FRP) helicopter, the FRP tank, the FRP helmet, and the light weight howitzer. These are a few illustrative examples of what chemists do at MTL.

With the quest of the Army for lighter and lighter materials with which to build its equipment—which will require further development of fiber reinforced plastics and future development of molecularly reinforced plastics—*and* with latest developments of polymeric materials as conductors, electrodes, components of batteries, magnets, etc., there remains much to be done and the future looks bright for MTL chemists.

Clearly there are exciting things going on at MTL and it is by no accident that many of these exciting things are being done by chemists' chemists; ie, members of the ACS. Indeed there is such a high degree of correlation between leadership and excellence in research and membership in the American Chemical Society that one might be tempted to conclude that "you can't have one without the other." For the moment it's at least a good working hypothesis.

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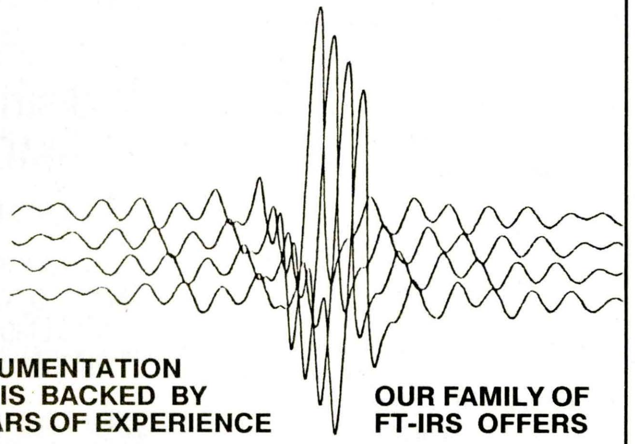
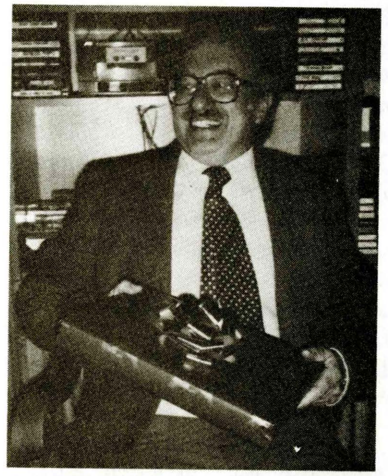
Preliminary Notice
1989 James Flack Norris Undergraduate Summer Research Scholarships

Potential applicants, research directors, nominators and recommenders are advised that detailed guidelines and application forms should be reaching the respective departmental offices by mid-February.

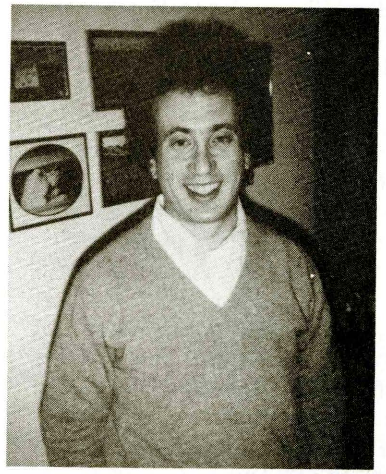


1988 Board of Publications Report

Mrs. Jean Vnenchak and Dr. Cathy Costello, members of the Board of Publications.



Dr. William E. Adams who stepped down after seven years as advertising and business manager.



Dr. Mark Druy, circulation manager, who has been very busy producing the 1988/89 NESACS membership directory.

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Associate Editor:	Myron Simon

The Board of Publications met monthly; it had a busy and productive year, highlighted by the following activities/events.

1. 1988 saw a number of personnel changes and additions to the working staff of the Board. Bill Adams left as Ad and Business Manager. A dinner acknowledging Bill's service was given by the Board in December.

   Vince Gale joined the staff as Ad Manager and has done an excellent job in bringing in ads both for the Nucleus and for the Directory.

   Russ McCann completed his first full year as Business Manager. He inherited, in addition to the Nucleus workload, the job of costing and tracking the Directory expenses.

   Myke Simon joined the Nucleus staff in November as an Associate Editor. His primary focus is to bring more articles of substance to the publication.

2. A Directory of NESACS members was completed at the end of 1988 and will be in the hands of the membership in January 1989. The project ran slightly over the approved budget, although much effort was expended in keeping all costs to a minimum. Both Mark Druy and Russ McCann are to be commended for their efforts in this regard. Due to Vince Gale's efforts, ad income for the Directory exceeded projections and this, too, helped reduce the total overall publication cost.

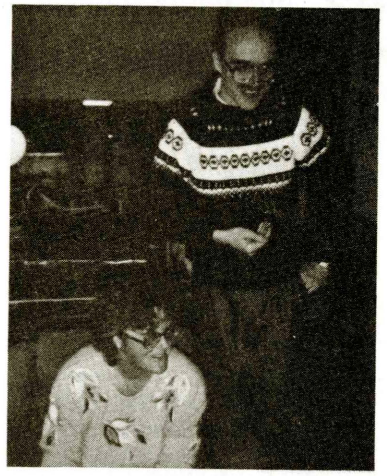
3. Printing charges for the Nucleus were increased twice this year, due to increases in paper costs from the mills servicing the printer. Russ McCann obtained quotes throughout the year from numerous other printers, but none were found to be more economical than our present printer.

4. Ad rates were increased significantly this past year under the guidance of Vince Gale. As a result, ad revenues have increased over projections for 1988, and we are budgeting close to a 30% ad revenue increase for 1989.

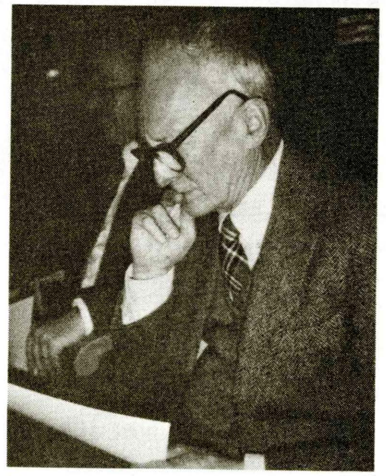
Respectfully Submitted,

Harry W. Orf, Ph.D.
Chairman, Board of Publications

Vince Gale, the new advertising manager, and Russ McCann, the new business manager.



Dr. Harry Orf (standing) and Dr. Adrienne Day at Dr. Orf's house at the December meeting of the Board.



Dr. Arno Heyn, past chairman of the Board of Publications, studying the 1989 Nucleus budget.

NERM Call for Papers

The Eastern New York Section of the A.C.S. invites contributions for the 19th Northeastern Regional meeting to be held at the State University of New York at Albany June 18–21, 1989. The following symposia (with chairmen) are scheduled: Advances in Mass Spectrometry (W. Ligon); Asymmetric Synthesis (J. Welch); Atmospheric Chemistry and Processes; Biochemistry (B. Wallace); Environmental & Hazardous Wastes (E. Skelly); Food Polymers (P. Given); Forensic Chemistry (H. Garber); Innovative Activities in Chemistry Laboratory Teaching (R. Strong); Inorganic Complexes of Hindered Thiols (J. Zubieta, S. Koch); Organic Synthesis (F. Hauser, A. Schultz); Organometallic Chemistry (P. Toscano); Photochemistry & Its Applications (J. Crivello); Panel Discussion on Laboratory Wastes (G. Glaros); Polymers in the Curriculum (G. Wnek); and Steroid Receptor Antagonists and Biosynthesis Inhibitors (M. Bell).

Papers beyond those of the invited guest speakers may be submitted for these symposia as well as for the general technical paper sessions, which include analytical, chemical education, environmental, inorganic, medicinal, organic, physical, spectroscopic, and polymer chemistry. Poster sessions will also be accepted. Contributions from undergraduate research projects are encouraged. The NERM High School Teacher Award will be given at a luncheon. The Buck Whitney Award and Address occurs on Tuesday.

Those wishing to present papers in any of these areas must submit one standard camera ready ACS Abstract form and two copies by February 28, 1989 to Program Co-Chairman Dr. Michael MacLaury, General Electric Corporate R & D, 1 River Road; Bldg. K-1 Room 5A68, Schenectady, N.Y. 12301, phone (518) 387-6628. Please indicate if a paper is to be associated with a symposium! For other information, contact William B. Martin, Jr., Chemistry Dept., Union College, Schenectady, N.Y. 12308, phone (518) 370-6336.

OSHA, NIOSH, EPA and SARA III

Symposium—March 8, 1989

A special symposium titled "OSHA, NIOSH, EPA and SARA III in the Analytical Laboratory" will be held on Wednesday, March 8, 1989 at the Pittsburgh Conference. Dr. Richard S. Danchik, Aluminum Company of America has arranged this half-day symposium with four invited speakers, followed by a Roundtable Discussion and a contributed session held in the afternoon titled "Industrial Hygiene Chemistry." Mr. John A. Pendergrass, Assistant Secretary of Labor, Occupational Safety and Health (OSHA) will present the keynote address concerning "A Personal Evaluation of OSHA." He will present an overview of OSHA and its impact on analytical laboratories, especially highlighting the new PEL proposals and the challenges this will present to industrial hygienists and industrial hygiene chemists. Concerning the new PEL proposals, Mr. Pendergrass was recently quoted in Chemical and Engineering News—"In a single stroke, we are updating and expanding one of the most important ways of protecting workers from the harmful effects of toxic substances. Getting federal exposure levels up to date is the most important purpose of our porposal. It presents a 20-year leap forward in levels of protection."

Dr. Laurence Reed, Associate Director of Policy Development, National Institute for Occupational Safety and Health will address "The NIOSH Recommended Exposure Limit (REL) Process" and the various issues surrounding NIOSH recommendations for establishing levels of occupational health standards.

For more information contact
Publicity and Public Relations/
Pittsburgh Conference, Suite 322,
12 Federal Drive, Pittsburgh PA 15235,
(412) 795-7110.

Grant Sources at ACS

Electronic Bulletin Board for Members

Are you looking for federal funding to explore a research idea? Do you need to know who funds research in your area of interest? The American Chemical Society (ACS) can help. The Department of Government Relations and Science Policy maintains an electronic bulletin board guide to grants and contracts in the chemical sciences and engineering, for access by ACS members.

The bulletin board is called ChemREFS which stands for Chemical Research and Education Funding Sources. All you need to access Chem REFS is a computer, modem, and telephone—and best of all, access is free. You only pay for long distance charges you may incur.

Once online, you'll find over 250 files describing chemical research and education programs at a variety of federal agencies, each with its own directory. Among those represented are: Department of Agriculture, Environmental Protection Agency, National Institutes of Health, and National Science Foundation.

Area-specific and targeted programs, such as instrumentation funding, young investigator programs, and women and minority programs, are described in their own directories.

Two special features of ChemREFS are News and New Programs. The News category carries bi-weekly coverage of science policy issues, the federal budget, and changes in grant and contract procedures or guidelines. The New Programs area highlights the newest federal programs and selected RFP's with short submission deadlines.

All files can be downloaded to the user's system. Users can contact the ACS System Operator by electronic mail or by telephone. ACS members interested in obtaining a user manual should contact Ms. Trudy J. Rodgers, Office of Science Policy Analysis, Government Relations and Science Policy, 1155 Sixteenth Street, N.W., Washington, D.C. 20036, (202) 452-2127.

ACS-STS Minigrants

Curriculum Development for High School Teachers

A new program offering high school teachers up to $1,000 in materials development funds has just been announced by the American Chemical Society. The ACS-STS Minigrants will fund projects focusing on the relations among science, technology, and society (STS) issues.

Teachers may use the grant funds either to produce their own, original lessons and resources that might be used over two to four days, or they may design a curriculum module using existing materials to comprise a four- to nine-week unit. Hands-on activities and an emphasis on problem solving, decision-making, and critical thinking skills are particularly encouraged.

The goals of the ACS-STS Minigrants are to help students understand science in its societal context, to assist teachers in developing and implementing innovative curriculum, and to form a cadre of experienced teachers and a selection of programs to serve as models for continued evolution of science programs.

The project director must be a high school teacher who is a member or national affiliate of the American Chemical Society. Other participants may include other teachers, college and university professors, or members of local industry. The availability of matching funds is also an important consideration. The application deadline for projects scheduled to begin in the fall of 1989 is March 31, 1989.

For details and an application packet call or write David Licata, Manager
Office of Precollege Science
American Chemical Society
1155 Sixteenth St., NW
Washington, DC 20036, (202) 872-4590

1989 Dues Bill

If you have not received your 1989 dues bill or have questions about your bill, please call 800-333-9511.

To charge your payment by phone, call toll-free 800-227-5558, or in the Washington, D.C. area call 202-872-8070.

If you have questions concerning your membership, please call Audra Rafter, Manager, Office of Member Services at 202-872-4414.

Calendar

For additional information, call:
Brandeis University – (617) 736-2500
Harvard University (chemistry) – (617) 495-4070
Southeastern Massachusetts University – (617) 999-8246/8232

Wednesday, Feb. 1

Dr. Robert Michel
(University of Connecticut)
"Laser Excited Atomic Fluorescence Spectrometry"
Southeastern Massachusetts University
Science & Engineering Building
(Group II) room 305 at 4:00 pm

Monday, Feb. 6

Professor Stephen G. Sligar
(University of Illinois)
"Title to be Announced"
Brandeis University
Gerstenzang 122 at 4:00 pm

Wednesday, Feb. 8

Dr. J. Michael Edwards (University of Connecticut School of Pharmacy)
"Green Medicine: Drugs from Higher Plants"
Southeastern Massachusetts University
Science & Engineering Building
(Group II) room 305 at 4:00 pm

Thursday, Feb. 9

Professor Walter G. Klemperer
(University of Illinois, Urbana)
JOINT HARVARD/MIT INORGANIC SEMINAR
"A Molecular Building-Block Approach to the Synthesis of Ceramic Materials"
Harvard University
Mallinckrodt MB-23 at 5:00 pm

Monday, Feb. 13

Professor Frederick E. Ziegler
(Yale University)
"Synthetic Studies on the Trichothecenes"
Brandeis University
Gerstenzang 122 at 4:00 pm

Monday, Feb. 20

Professor Bonnie A. Wallace
(Rennselaer Polytechnic Institute)
"The Structure of the Gramicidin Ion Pore"
Brandeis University
Gerstenzang 122 at 4 pm

Monday, Feb. 27

Professor Koji Nakanishi
(Columbia University)
"What Triggers Vision?"
Brandeis University
Gerstenzang 122 at 4:00 pm

CONFERENCE ANNOUNCEMENT

A one day conference for high school and university chemistry teachers on Perceptions of Chemistry will be held Saturday, March 4, 1989, at Worcester Polytechnic Institute, Worcester, Massachusetts. This conference is sponsored jointly by the Department of Chemistry, Worcester Polytechnic Institute and the New England Association of Chemistry Teachers. The featured speakers will be Henry Bent of North Carolina State University, John Burmeister of the University of Delaware, Miles Pickering of Princeton University and Frank Westheimer of Harvard University. This conference will be devoted to concepts related to improving the perception of chemistry held by the general public and, particularly by students. The registration fee is $12.00. Write to Department of Chemistry, Worcester Polytechnic Institute, Worcester, MA 01609 for registration or information or call 508-831-5371

Notices for the NUCLEUS Calendar should be sent to:
Cynthia B. McGowan
Department of Chemistry
Wellesley College
Wellesley, MA 02181
Phone: (617) 235-0320 ext 3112

(Note: Material should be sent so that it arrives before the first of the month prior to the month for which the event is scheduled.)

THE
NUCLEUS
Northeastern Section of the American Chemical Society
19 Mill Road
Harvard, MA 01451