

THE NUCLEUS

December 1995

Of the Northeastern Section of the American Chemical Society

Vol. LXXIV, No. 4

Monthly Meeting

*Symposium on
Immunomodulators*

Chemist Becoming

*Condensation of the talk
by Esther Hopkins at the
October meeting*

Sweet Little Sixteen

*Text of the remarks by A.C. Hill
remembering his father,
Henry A. Hill*

Book Review

*The Periodic Kingdom
by P.W. Atkins*



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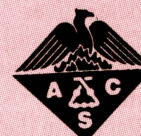
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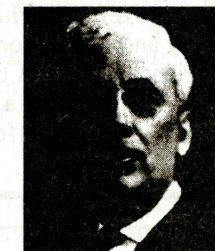
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Deadlines: February 1996 issue: December 16, 1995

THE NUCLEUS

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ACS News

Science and Mathematics Education and Female Students: What Works

From an article in the October 9 issue of *ACS Washington Alert* by Min-Son T. Dang, ACS Staff

A two-page brief by the ACS was sent to federal legislators in the ACS ALERT. The brief quotes the 1992 National Assessment of Educational Progress (NAEP) Report on the performance of boys and girls in mathematics and the sciences. The report found that math abilities were pretty much the same for boys and girls in grades four and eight. However, by grade 12, more boys could perform at the advanced math level (3% of the boys compared to 1% of the girls). In science, girls' and boys' performance was the same only in grade four. A slight gap in achievement occurred in grade eight, and widened for 17-year olds: About 6% of female students performed at or above the NAEP's highest cognitive level, compared to slightly more than 13% of the male students.

Other studies connect a student's confidence level in his/her science/math ability and his/her continuance in math or science classes. A drop in confidence often precedes a decline in achievement and thus affects educational and career choices.

Call for Papers

Undergraduate Research Poster Session at the
211th ACS National Meeting
New Orleans, Louisiana
March 24-28, 1996

Undergraduate students are invited to submit abstracts for the presentation of papers at the Undergraduate Research Poster Session, which will be part of the extensive programming for undergraduates at this national meeting. Send one copy of a 150-word abstract on the standard ACS form to:

John Higuchi
Student Affiliates Program
American Chemical Society
1155 Sixteenth Street, N.W.
Washington, DC 20036

**Deadline for receipt of abstracts:
December 1, 1995**

Female students also pursue science and math majors at the post-secondary level. However retaining women in these fields is a continuing challenge.

According to a 1993 National Science Foundation document, *Indicators of Science & Mathematics Education 1992*, women hold more than half of all degrees (associate's, bachelor's and master's) awarded in 1989-90 for all academic areas, and more than one-third of all doctoral degrees. In science and engineering during this period, women were best represented at the

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associate's level and least at the doctoral level: women earned 59% of associate's degrees, 43% of bachelor's degrees 34% of master's degrees and 28% of doctoral degrees in science and engineering.

The ACS document urges remedies for these discrepancies with the aim of making the United States more competitive in the international market place.

Specific remedies proposed involve improvements in the curricula and infrastructure and improvements in the preparation of teachers and enhancement of current teachers:

Curricula and Infrastructure

- To seek input from women and parents in formulating education policies, especially at the K-12 level.
- To teach science and mathematics by using real-life examples and story lines relevant to female students' lives.
- Develop and support curricula that include female images and role models.
- Facilitate the availability of laboratory equipment in urban and rural schools and community colleges.

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Monthly Meeting

The 775th Meeting of the Northeastern Section of the American Chemical Society, held jointly with the Medicinal Chemistry Group.

Symposium - Immunomodulators: Recent Advances in the Drug Development of Autoimmune Disease and Immunosuppression

Thursday, December 7, 1995

Boston College, Chestnut Hill, MA, Shea Room, Conte Forum

- 3:00** Coffee and Refreshments
3:30 Dr. Timothy Ocain, Procept, Inc. - *A Novel Series of Small Molecular Weight Immunosuppressive Molecules*
4:30 Dr. Amos B. Smith, III, University of Pennsylvania - *Immunomodulators as Synthetic Targets: FK506, Rapamycin, Demethoxyrapamycin and Discodermolide*
5:30 Social Hour,
6:30 Dinner
8:00 Evening meeting, V. Wilcox, presiding.
Dr. Jon Clardy, Cornell University - *Using Small Molecules to Govern the Association of Large Molecules: Potential Application to Autoimmune Disease and Immunosuppression*

Refreshments will be served after the program.

Dinner reservations should be made no later than noon, November 30. Please call or fax Marilou Cashman at (800) 872-2054. Reservations not cancelled at least 24 hours in advance must be paid. Members, \$25.00; Non-members, \$28.00; Retirees, \$15.00; Students, \$8.00. THE PUBLIC IS INVITED. Anyone who needs special services or transportation, please call Marilou Cashman a few days in advance so that suitable arrangements can be made. **Free Parking** in the garage next to the forum, enter from Beacon St.

Next meeting: January 12, 1996 at Wellesley College, Prof. Geoffrey Davies, Northeastern University: "New Insights into Humic Substances." Social hour and dinner: 5:30, Davis Hall, evening meeting: 8:00 (Science Center).

Biographies

Dr. Timothy Ocain

Timothy Ocain received a Ph.D. from the University of Wisconsin in 1986. Following a postdoctoral appointment at the University of Minnesota, Dr. Ocain joined Wyeth-Ayerst Research, initially focusing on the development of new hypertensive drugs. He then led the rapamycin analog effort, addressing medicinal chemistry and biochemical aspects of rapamycin-related compounds. In 1993, Dr. Ocain joined Procept, Inc. in Cambridge, Mass. as Principal Investigator guiding efforts

toward the development of new immunosuppressive drugs.

Dr. Amos B. Smith III

Amos B. Smith III received a Ph.D. from Rockefeller University in 1972 where he worked with Prof. William C. Agosta. After a year as a Postdoctoral Associate with Agosta, he joined the Department of Chemistry at the University of Pennsylvania where he is now the Rhodes-Thompson Professor of Chemistry and Chairman of the Department. He has received numerous honors and awards. Currently he is on the editorial board of the *Journals of Organic Chemistry, Organic Reactions, Organic Synthesis, and Fullerene*

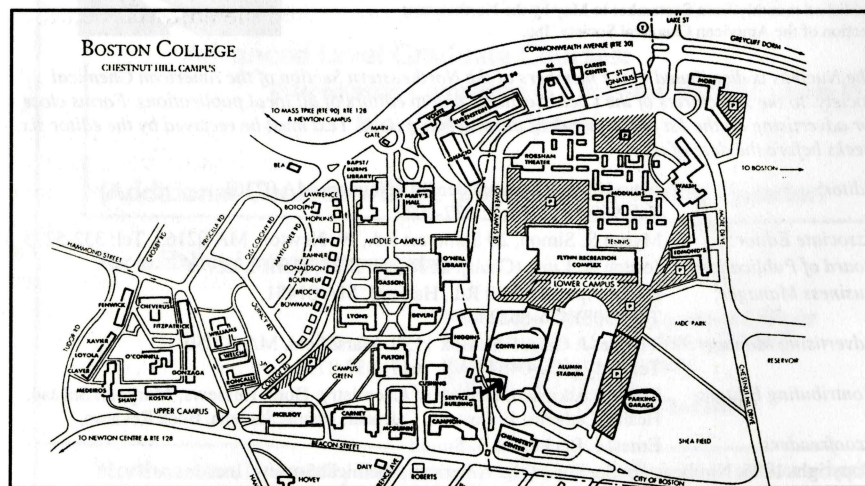
Science and Technology. In 1996 he will serve as Chairman of the Organic Chemistry Division of the ACS.

Dr. Smith is currently conducting research on Stereocontrolled construction of architecturally complex natural and unnatural products having significant bioregulatory properties. This is the central thrust of the synthetic program. Current targets include antitumor, pesticidal, immunosuppressant and fungicidal agents. This program has led to over 60 total syntheses of natural products, including methylenomycin A, talaromycins A and B, the indole diterpenes paspaline, paspalinine, and paspalicine, as well as FK506, rapamycin, and demethoxyrapamycin. He has ongoing research projects which include the fields of photochemistry for the synthesis of highly strained rings, structural elucidation of natural products, non-peptide peptidomimetics, and catalytic antibodies, as well as some work in material sciences with fullerenes.

Dr. Jon Clardy

Jon Clardy received a Ph.D. from Harvard University in 1969. He joined the Department of Chemistry at Iowa State University the same year. In 1978 he moved to Cornell University where he is currently the Horace White Professor of Chemistry. He has received many honors and distinctions. Currently Dr. Clardy is a member of the Bio-Organic and Natural Products Study Section of NIH, the United States National Committee on Crystallography, and the editorial board of *Chemistry and Biology*.

Dr. Clardy's research emphasizes molecular structure, especially the structures of biologically important molecules. Throughout his career he has worked on natural products from unusual sources. Recently, he has focused on natural products complexed with their macromolecular receptors and is best known for his studies involving novel inhibitors of serine proteases, the structure-based design of chorismate mutase inhibitors, and the structural chemistry of complexes of immunosuppressive agents. ♦



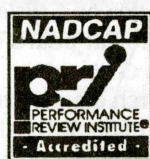
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Abstracts

Timothy Ocain *A Novel Series of Small Molecular Weight Immunosuppressive Molecules*

New strategies for controlling immune responses in transplantation and autoimmune disease are currently of great interest in the pharmaceutical industry. We have discovered a chemically distinct series of molecules which are potent inhibitors of T cell proliferation. A synthetic analoging program has produced small molecular weight compounds (<500 daltons) that are active *in vitro* at the nanomolar level. The mechanism of inhibition demonstrated by these new compounds is clearly distinct from that of cyclosporin. In addition, *in vivo* immunosuppressive activity has been demonstrated in several models of graft rejection and autoimmune disease.

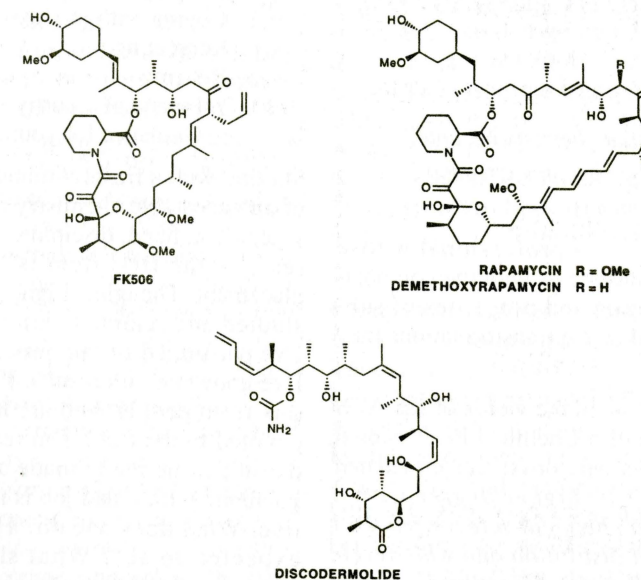
Amos B. Smith, III *Immunomodulators as Synthetic Targets: FK506, Rapamycin, Demethoxyrapamycin and Discodermolide*

The total syntheses of rapamycin, demethoxyrapamycin and discodermolide, potent, naturally occurring immunomodulators will be presented. Highlights of the syntheses include Stille and Negishi cross-coupling reactions for stereocontrolled installation of olefins, and dithiane anion additions to suitable electrophiles to construct protected aldol linkages. Lessons learned during our FK506 synthetic venture will also be presented.

Jon Clardy *Using Small Molecules to Govern the Association of Large Molecules: Potential Applications to Autoimmune Disease and Immunosuppression*

The association of large molecules enforced by small molecules is a central theme in molecular biology. The FKBP family of proteins — the name derives from their ability to bind the immunosuppressive natural product FK506 — illustrates both natural and contrived macromolecular associations

will deal with the structural aspects of how these ligands bind and control the association of FKBP with itself and other proteins. ◇



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Chemists Becoming

Condensed from the address at the October 12 Section Meeting

by Esther A.H. Hopkins

What is it that chemists become?
When do they become chemists?
What is a chemist, anyway?

A chemist — a professional whose subject matter deals with the composition, structure and properties of substances and of the transformations they undergo.

A chemist — in the words of the ACS Definition of a Chemical Professional "...a person who possesses an earned bachelor's or higher degree with a major in a chemical science from an accredited institution and who develops, applies, or communicates the principles of the chemical profession and exercises independent judgment and the discretion in conceiving, planning, coordinating, or executing chemical projects or who has experience in so doing."

A chemist — one eligible for membership in the American Chemical Society.

Our Society is concerned with chemistry itself and with its teaching. Chemical Education is a central focus. But what is a head stuffed full of facts and theories, attached to muscles and bones that have been trained to manipulate test-tubes, chromatography columns, computer keys? Certainly not a chemist.

Assuming that one has the knowledge, it also takes assimilation of the facts, maturity, personal ethics, and a job to be a chemist.

The topic tonight: steps for becoming a chemist and how the American Chemical Society helps its members become and remain "chemists".

These steps are:

1. Finding a job, that first job or a subsequent one, including career counseling, resumé writing, networking, formal job search and interview skills.
2. Keeping that job
3. Coping with job loss
4. Recreating
5. Retiring
Financial security
Guidance for young ones

Starting with a freshly-minted graduate of an acceptable chemistry curriculum — degree in hand, discipline inculcated, ready — the first item is the initial placement. Thoughts might go, "I have studied and retained certain matters, I've performed certain procedures and I've gotten certain results. I've learned this from people who are honest and devoted to the field. I'm ready. A job doesn't come ready-made and how to go about getting that job is not instinctive. What does one do? How is one expected to act? What should one remember? What professional terms surround this job? What working environment should I expect and contribute to? What are my obligations in terms of professional development? And just as important as beginnings, how should I end my relationship with a given employer? How do I move on? What do my senior colleagues tell me about these things?"

Councilors and consultants have written them down in the Professional Employment Guidelines (PEG) distilled from the experience of thousands of chemists on both sides of the hiring desk. The Guidelines are divided into two categories, for the chemical professional and for the employer. PEG is written for the non-academic environment. The companion academic guidelines are also available. PEG gets updated and rewritten every five years. The latest edition is dated 1993. Comments are already being collected for the 1998 edition.

1. Finding a first job today is much like finding any subsequent one except that one hasn't had the direct experience.

Yesterday's graduate often had the option of choosing which offer to take. Today's graduate needs to dig a bit deeper to elicit one offer. Yesterday's chemist often grew in that first job and retired from it. Today's graduate will probably have several jobs or several careers before retirement. Both the new graduate and the chemist looking for a subsequent job needs skills in resumé writing, in interviewing and in accepting guidance, counseling, mentoring from colleagues in a position to help, as well as good chemistry.

The Professional Services Department of the ACS is prepared to be of assistance to first time job seekers and to those who have done it before. The department offers career counseling, resumé writing, role-playing interview skills and provides Employment Clearing Houses at all the National meetings and the Regional meetings.

What is Career Counseling? Volunteer members have been trained in career issues, in talking with people about their careers; what they want to do; what their training is; what their goals are; what they are willing to do, to risk, to sacrifice to reach those goals; what they have already learned or tried. The training includes discussion with professionals relative to how this background fits into these goals. Consultants are warned not to attempt to be mental health counselors or psychological counselors. After training and the appointment by the Executive Director, the counselor is assigned cases brought by members who are seeking assistance in career moves.

"How do I handle a return to the work force when I've been out raising my children? Would there be value in my taking a lateral transfer that would enable me to go to Law school nights? What do I do if my superior grabs all the credit for my work? Should I, as a B.S. chemist, take a job as a 'technician' with the hope that experience there will enable me to be a 'professional' later?"

Career counselors help counselees be aware of a rational way of organizing for a job search; 1. Setting up a work space; 2. Getting to work, for

job-seeking is a hard job and should be done with discipline; 3. Refining those job search skills; 4. Networking; 5. Writing a good resumé that will be read and acted on, writing a resumé that will get you an interview; 6. Knowing what to say in an interview and how to say it; 7. Presenting themselves and their abilities in the best light.

A large number of Career Counselors are needed at National Meetings to review resúmes, but the regular work of the Career Counselor is done by phone or mail from their homes or offices. Career Counseling began from the former Council Committee on Professional Relations, (CPR). There was a subcommittee that worked with chemists who had lost their jobs, and it seemed as if it were late for helping some of them. The Society emphasis should be more on prevention than on reparations and repairs. There should have been more information available to chemists when they were first looking at that particular job. They, perhaps, should have examined more closely what that job would entail for them and whether they really wanted to do that. They should have considered their own long term goals and looked to see if that was really what they wanted.

2. Keeping a job for a professional means more than simply showing up, doing your thing and collecting your paycheck. It means an ongoing commitment to professional development including continuing education. Being a part of a non-static discipline means always having more to learn in order to keep up. It also means meeting the expectation of adherence to the highest ethical standards, such as one of the objectives in the federal charter of the ACS "...the improvement of the qualifications and usefulness of chemists through high standards of professional ethics, education and attainments."

There was, in the late 80's a trend toward writing codes of conduct. One part of this arose in reaction to people seeing scientists as amoral and bent on "succeeding", whatever that meant, by any means possible. The federal gov-

ernment wrote draft regulations for the area. Meetings were set up between representatives of various scientific organizations to explore codes, guidelines, and ethical statements. The ACS committees involved felt that it would be very difficult to write restrictions on all that a professional did — that people would not accept them completely. There are some quite moral people who would not, on principle, sign a pledge even if they personally agreed with every statement in it. ACS did have from generations back a "Chemists Creed". CPR appointed a subcommittee to look at the entire issue including that Creed and to rework it, if they felt it prudent — to make a statement about A Chemist's Code of Conduct. The result of that effort was approved by the governing bodies of the ACS in 1994. Some typical statements from the code are:

"Chemists have a professional responsibility to serve the public interest and welfare and to further knowledge of science.

Chemists should seek to advance chemical science, understand the limitations of their knowledge and respect the truth.

Chemists should remain current with developments in their field, should promote and protect the legitimate interests of their employers, should treat subordinates with respect for their professionalism and concern for their well-being.

Chemists should regard the tutelage of a student as a trust conferred by society for the promotion of the student's learning and professional development.

Chemists should treat associates with respect, and give credit for their contributions.

Chemists should serve clients faithfully and incorruptibly.

Chemists should understand and anticipate the environmental consequences of their work."

3. But we don't always keep that job. Down-sizing, right-sizing, world-wide competition intervene. Sometimes chemists get into the wrong job and they and the organization are better off

Member News

Cynthia Friend of Harvard University, together with Alice P. Gast of Stanford University, were honored by being asked to deliver the 1995 Langmuir Lectures of the ACS Division of Colloid and Surface Chemistry at the Chicago National ACS meeting in August. Prof. Friend's lecture was titled: "Radical Reactions on Surfaces: Oxidation to Materials Growth". (*C&E News*, Sept. 18, 1995, p. 42).

Charles M. Lieber of Harvard University has been honored by the New York & New Jersey Sections by being selected as the 1995 Baekeland Awardee. A Symposium was held in his honor on October 30, 1995 at the AT&T Bell Laboratories in Murray Hill, NJ. Prof. Lieber was honored for his pioneering work in solid-state chemistry and the creation of new sensitive microscopies for probing organic and biological materials. His award address was: "Chemical Force Spectroscopy: Probing Intermolecular Interactions and Imaging Functional Groups."

From *The Indicator*, 76(8), 4 (October, 1995) ◇

if there is a parting of the ways. Acceptance of this fact is hard. Sometimes we recognize the issue only at the time we lose the job. How do we cope with job loss? The Society realized that not everyone was coping in a constructive manner. While no homicides were reported to the Committee in the wake of job loss, there were reported suicides and many people went into deep depressions. The Society, the Committee, felt that we could not undertake suicide prevention or mental health counseling. There were some meetings with mental health professionals and discussions of referrals to organizations that do suicide prevention. What the Society could do would be to publish a

continued on page 16

Sweet Little Sixteen

Remarks delivered by
Anthony Cromwell Hill on the occasion of the 16th Henry A. Hill Award, 12 October 1995

It is both a pleasure and an honor to be your guest at the presentation of the 16th annual Henry A. Hill Award. On behalf of my mother, Dr. Adelaide M. Cromwell, who regrets that she cannot be here, my family, and my father's friends in and out of chemistry, I thank the Northeastern Section for commemorating my father and congratulate Dr. Michael E. Strem on joining the distinguished roster of the recipients of this award.

When I was invited to speak tonight, I was tempted to bring my guitar, sing Chuck Berry's "Sweet Little Sixteen", and tell everyone to put on their dancing shoes. I think my father would have liked that and that it might have been the most appropriate tribute I could have paid to him, his devotion to the Northeastern Section, and the spirit the award in his name seeks to honor.

Henry Aaron Hill was the Chuck Berry, the Charlie Parker and the Count Basie of the Northeastern section all rolled into one, with a little Harry S. Truman thrown in here and Tom Pendergast thrown in there, and a healthy dash of Mark Twain. Like all of these men, my father was a product of that mixture of river and prairie, small town and city, North and South, East and West that was in the first half of this century that receptacle of American influences known as Missouri. He was born in St. Joseph's in 1915, 70 years after that town had been the origin of the Pony Express and a generation after that community, at its peak, had been home to more millionaires than Chicago. History had already passed St. Joe long before my father was born, but it had left enough footprints to inspire him to dream of great things.

His father was the headwaiter and bell captain in the biggest hotel in

town, the Hotel Robidieux (I just love that name, so redolent of the river culture that connected St. Joe with New Orleans). In his free time, my paternal grandfather edited the local black newspaper, chaired the chapter of the NAACP, and turned out the black vote for the Pendergast machine. From the cradle, my father was brought up with a taste for what some of my neighbors on the gown side of Cambridge might call public policy and those on the town might call public service. My father would carry both of these influences to his involvement in the ACS. He wanted the society to be a strong voice for the profession of chemistry no less than he wanted it to be a forceful advocate for the position of chemists whether they were employed in the academy or in industry.

In retrospect, the irony of my father's prominent involvement in the ACS is that chemistry was not his first love. In a different time or place, I'm sure my father would have gone into politics or law, but in Missouri at that time, these were not viable options for a Negro, even one so bright that when he took IQ tests in high school his scores were so high that officials at his Jim Crow school insisted that he take the tests again. True to his later embrace of the scientific ethos of reproducible results, my father not only matched his original tests scores, he exceeded them.

As a college student at Johnson C. Smith University in Charlotte and a Rosenwald Scholar at the University of Chicago, science in general and chemistry in particular would capture a part of his imagination for two reasons. On one hand, he was fascinated by the power of science as a force in human affairs, the grand drum major in that pageant then so confidently called progress. On the other, he was impressed by what seemed the potential color-blindness of the scientific method and its promise of a special realm in an otherwise blatantly racist world where it did not matter who you were but what you could prove.

I wish I could tell you that my father's hope in that promise were readily fulfilled; I wish I could say that

when he knocked on the door and revealed his brilliance and his industry the gates of opportunity were gladly thrown open and he was welcomed as a co-worker in the kingdom of knowledge, a gallant young knight in the crusade of progress. But that's not what happened. Through a process more torturous than most of us can imagine or that I have time to explain tonight, my father managed to get into MIT and, to the astonishment of many, graduate first in his doctoral class in biochemistry in 1943. Even so, he applied unsuccessfully to 55 companies, large and small, before anyone offered him a job approaching his qualifications.

That someone was Frank Atwood, a fellow MIT alumnus who hired my father partly on the recommendation of their common professor, James Flack Norris. These men, both of whom were members of the Northeastern Section, were part of a nucleus of scientists who helped sustain my father's belief in what science could be and what this country and our world could become if men and women of science who were also of sense stepped to the fore.

My father's contribution to the ACS came, it seems to me, in three areas above all. First, in campaigning for the creation of the James Flack Norris award among other efforts to honor and help teachers in the field, he took a stand on behalf of all of those at various levels in the education system who contribute through their teaching and research to the profession. Second, as a member of various state and federal commissions, he sought to assure that the voice of the scientist was heard in the councils of policy-making. Third, he endeavored to make certain that the ACS would function not only as a professional society but as a society for professionals – a proto-union – that in the trying times of the Seventies would support chemists in a rapidly changing and uncertain market.

The key to my father's success in addressing these three issues may have been his experience riding around the black neighborhoods of St. Joe in the back of his father's car. It was there that he learned that not only in Tip O'Neill's famous aphorism that *all*

politics is local but perhaps more importantly that all politics is personal, that, above all, it is the personal ties that hold effective organizations together. This is particularly true of professional societies where shared affections and at times shared afflictions create enduring human bonds. The bonds my father established with the diverse membership of the Northeastern Section were among the most meaningful of his life. To him, the members of the section were not just colleagues but comrades, not just fellows but friends, as dear to him as the members of his family.

It was my pleasure to see – up close and personal – this aspect of my father's life – to attend some functions of the Northeastern Section, to stay with him at the Chemists Club in New York, and to travel with him to Society functions here and abroad. Of all of those exposures, two stand out in my mind as ideographs. One was from I recall a meeting of international chemical societies in Mexico City in I believe 1976 shortly after my father's election as president of the ACS. Resplendent in a tuxedo with a frilly blue shirt consistent with worst fashion excesses of that pseudo Beau Brummell era, my father danced the night away, taking a turn with almost every lady in attendance.

The other memory comes from the Northeastern Section meeting of the following spring, which was held at ADL. My father was welcomed as the quintessential local boy made good by an enthusiastic audience seated at long tables arranged perpendicular to the podium. From the rostrum, my father looked around the room, one seat at a time and identified its occupant by name and described their relationship – noting when they had first met and what the individual's interests were. It was a tour de force not merely of memory but of affection, of love.

And that, to my mind, is what the Henry A. Hill Award is about. It is the way that the Northeastern Section honors that individual who has done the most to foster that deep and abiding affection for chemistry as a profession and for its practitioners as people –

people of great and useful knowledge, certainly, people of high standards and high purpose, but people also brought and bound together by a sublime devotion to one another that sings as high, sweet and clear as – if I may borrow one last time from Chuck Berry – the strains of "Johnny B. Goode."

Rock on, Dr. Strem, and let this splendid aggregation, the Northeastern Section, roll with you. ◇

ACS News

continued from page 4

- Maintain support for programs aimed at attracting and retaining female students in the mathematics and science fields in order to ensure a lasting impact.

Teacher Preparation and Enhancement

- Raise parental and teacher expectation of female academic performance in science and mathematics, especially in the early grades.
- Train faculty members and administrators to be sensitive to the backgrounds and experiences of female students, and to be aware of subtle discrimination in the classroom.
- Sustain professional; enhancement programs for K-12 teachers to better equip these professionals to teach science and mathematics.
- Raise public awareness of the importance and relevance of science to daily living.
- Use hands-on experiments, open-ended inquiry, cooperative learning techniques and other teaching methods that complement and enhance female students' learning styles, teach science in the early grades and preferably throughout their education.
- Make a priority of addressing gender equity in education programs at all school levels, including counseling and vocational education programs.
- Use testing and assessment as guides for continual progression rather than endpoints for exclusion.

Nominations

Philip L. Levins Memorial Prize

Nominations for the Philip L. Levins Memorial Prize for outstanding performance by a graduate student on the way to a career in chemical science should be sent to the Executive Secretary, NESACS, 23 Cottage St., Natick, MA 01760 by March 1, 1996. The graduate student's research should be in the area of organic analytical chemistry and may include other areas of organic analytical chemistry such as environmental analysis, biochemical analysis, or polymer analysis. Nominations may be made by a faculty member, or the student may submit an application. A biographical sketch, transcripts of graduate and undergraduate grades, a description of present research activity and three references must be included. The nomination should be specific concerning the contribution the student has made to the research and publications (if any) with multiple authors.

The award will be presented at the May 1996 Section Meeting.

- Foster and increase contact and collaboration among faculty at pre-college institutions, community colleges, four-year colleges, and those at graduate institutions for sharing ideas and improving math and science instruction.
- Encourage working scientists, particularly women and those from underrepresented groups, to participate in school programs.

ACS intends the policy brief to help policymakers and practitioners formulate and implement programs that would nurture female students' interest and participation in the sciences.

[But at this juncture, with a congress eager to shift responsibilities to the states, would such briefs be more likely to achieve their aim by being sent to state and local officials? (ed.)] ◇

Book Review

The Periodic Kingdom by P.W. Atkins¹ Reviewed by Dennis J. Sardella, Department of Chemistry, Boston College

A great detective story is built on confusion and deception; it is a long convoluted sentence with an exclamation point at the end. Persistent investigation leads to an accumulation of seemingly unconnected clues whose very multiplicity intrigues even as it deepens the confusion. But then comes a moment of clarity when the critical fact is uncovered, the organizing principle that allows all the pieces of the puzzle to cascade into place. In an instant of elation, the relationships are revealed, and the mystery is no longer a mystery.

Science has often been compared to detective work — the accumulation of facts whose relationships to one another is frequently unclear, and the conviction of the existence of an underlying unifying principle whose discovery leads to the kind of brilliant intellectual synthesis that delights by its capacity to illuminate and amazes by its power to transform. Science is not so much the simple accretion of facts as the discovery of relations between those facts, and of relations between relations. Like the solution of a whodunit, the revelation of that organization culminates in an intellectual exclamation point.

In chemistry, the first towering achievement of that sort was the development of the periodic table by Mendeleev and its eventual explanation by the quantum theory of atomic structure. In the early to mid-nineteenth century, the chemical world must have been an exceedingly confused and confusing place, like a landscape enticingly littered with fragments of a structure waiting to be reassembled. Early workers provided some preliminary sorting, grouping the fragments into piles, but it was finally

Mendeleev's genius that discerned the relationships, which sent researchers on a directed and informed search for the missing ones.

Unfortunately, the contemporary textbook retelling of the story often reads more like an episode from "Columbo" than one from Sherlock Holmes. The solution (the quantum theory of atomic structure) is lovingly described in great detail at the beginning. The periodic table and the data it systematizes appear almost as an afterthought, a mere illustrative example. The revisionist version of the story, as opposed to the admittedly less compact chronological one, robs the story of its power. At its worst, it can create the impression that chemistry is akin to Euclidean geometry, with a set of theoretical axioms from which the experimental data can be deduced. It obscures the fact that chemistry, like life, is an experimental science. To fully appreciate the light, one must first have experienced the darkness, something impossible for the first-time reader of the story to do from the revisionist approach.

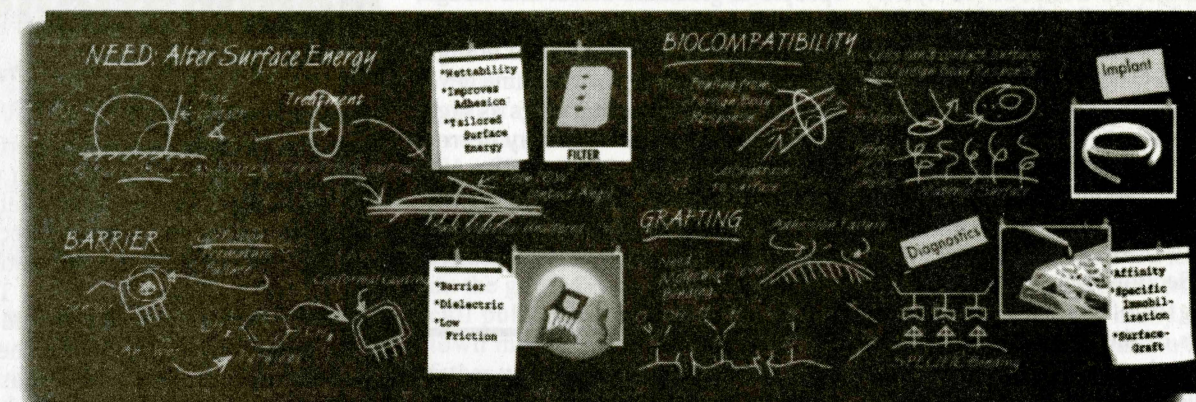
P.W. Atkins, in *The Periodic Kingdom*, one of a series of books called *The Science Masters*, aimed at the general reader, gets the story right. Since people are always fascinated by stories of geographic discovery, Atkins treats the periodic table as if it were a continent. He describes the variation in properties as its topographical features, in terms that combine the geographic and the nearly poetic ("There are the glittering, lustrous regions made up of metals and lying together in what we call the Western Desert. This desert is broadly uniform, but there is a subtlety of shades, indicating a variety of characteristics." "To the east the landscape varies markedly.... Here lie the softer regions of the kingdom and a lake can be seen...not the limpid gray or blue of earthly lakes, but a striking deep red, verging on brown. This region is known as bromine and it is one of only two lakes in this peculiar land. The other lake is on the eastern edge of the Western Desert, and is quite different in appearance, with a harshly metallic,

silvery sheen. This is mercury, a silver lake amidst the stone.") He eschews a strictly chronological structure, moving from Geography (general structure and periodic trends in physical properties), through History (discovery and naming of the elements, cosmochemistry and elemental origins, then the "cartographers"), to Government and Institutions (atomic structure, valence and reactivity, origins of periodic trends). There is a great deal of information in the book and the structure allows the reader adequate time to be intrigued and bemused before the final explanation is supplied. Atkins' prose is enjoyable and his explanation accessible to nonspecialists.

One place where Atkins stumbles somewhat is in his chapter on the periodic table. He correctly describes Döbereiner's triads as groups of three related elements in which the atomic weight of one is approximately the arithmetic mean of the other two. Unfortunately he cites as his first example the Fe, Co, Ni triad (atomic weights 55.9, 58.9 and 58.7, respectively), which does not even come close to fitting this definition. This undercuts the force of the remaining two examples (Cl, Br, I and Ca, Sr, Ba) and left me wondering how and why he chose to use it. On perusing several monographs on the history of chemistry, I was unable to find any mention of a Fe, Co, Ni triad, and remain puzzled by its inclusion.

In a couple of places Atkins makes specific references with which some Americans may be unfamiliar. Summarizing the now-irrelevant controversy over which Groups should be designated as A- or B-groups, he writes, "However, there were Cavaliers and Roundheads as well as Big- and Little-endians afoot, and whereas Cavaliers used this nomenclature, Roundheads reversed A and B" (p.92). Later he describes Rutherford's amazement at the results of bombarding gold foil with alpha particles, "[h]aving expected blobs of jelly to pass through blobs of jelly, like blancmanges hurled at a wall of blancmanges..." (p. 104). However, since their meaning can be

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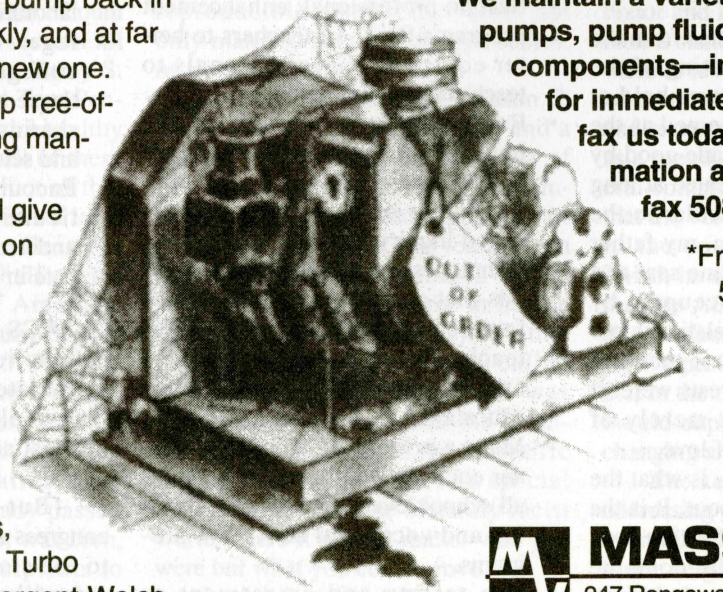


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Book Review

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inferred from the context, neither is serious.

There is one particularly egregious typographical error. In speaking of isotopes, Atkins says, "Carbon, for instance, almost always has six neutrons in addition to its six protons, but isotopes with seven and eight protons [emphasis by ed.] are also known" (p. 106). This is unlikely to seriously perturb a scientist, who will dismiss it as a result of the peculiar blindness associated with proofreading one's own prose. However, the general, non-scientific, reader at whom the book is primarily directed, may come away genuinely confused or misinformed.

All in all, though, I found the book an enjoyable read. It might make a great Christmas present for that young person you're trying to interest in chemistry (or perhaps for that significant other who wonders what you actually do for a living!) ◇

The Mica Mine and Chantrelles

Gordon Conference Reminiscences

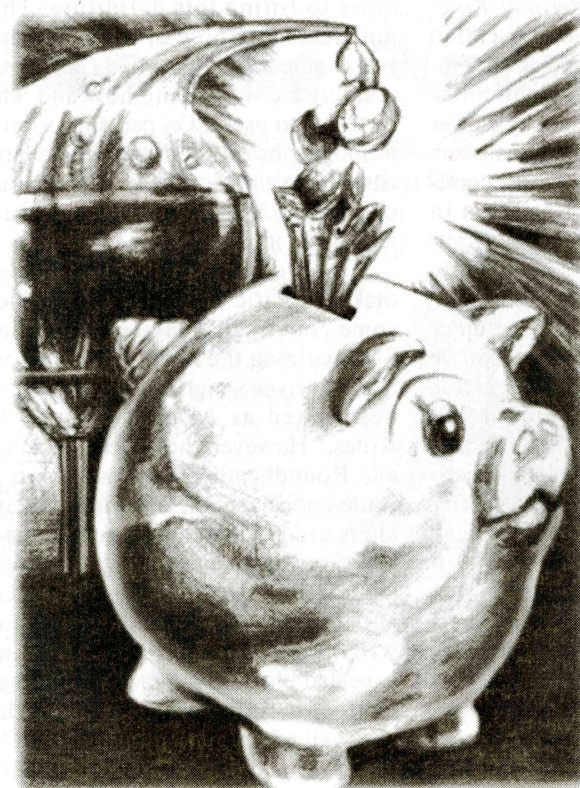
by Arno Heyn

If you had been at any of the Gordon Conferences in New Hampton in the sixties or seventies, I am sure you remember the indomitable Mr. Madan. He was a science teacher at New Hampton School, and was responsible for the local arrangements at the conferences. In the summer months each conference ran from Monday to Friday, with arrivals on Sunday afternoon. The somewhat spartan dormitory facilities of the boys' school were where the 100 or so conference attendees stayed, while the technical meetings took place in a large basement class-room in the forenoon and early evening. The

afternoons were left free for sports, swimming, golf or socializing.

The Analytical Chemistry conference took place in early August each year, and I was a regular attendee for a dozen years or so in the fifties and sixties. Mr. Madan ran things with an iron hand. The daily menu was the same each week, with Thursday night always a buffet lobster dinner on the lawn, if weather permitted.

Being an active hiker, I used to gather small groups of attendees for occasional afternoon outings to Mt. Cardigan or other easy hikes within a short driving distance. One day Mr. Madan suggested: "Why don't you explore around for the mica mine - there used to be one during the war at Danbury near the junction of routes 4 and 104." He pointed out on my topo-



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Historical Notes

by Edward R. Atkinson,
Amherst, Mass.

Continuation of the biographies of recently deceased chemists and chemical engineers which was begun in the November issue.

Charles R. Bartels, 77, a retired chemical engineer, died on January 9, 1995. He was a native of Yonkers, NY and attended Seton Hall in Orange, N.J., then obtained the S.B. and M.S. degrees from M.I.T. in 1938. During World War II he served as a captain in the Chemical Warfare Service at Pine Bluffs Arsenal, Arkansas. For 16 years he was employed by E.R. Squibb & Sons during which time he was involved in the production of pharmaceuticals including penicillin, streptomycin and vitamin B12. For his patents and publications in these subjects he was elected to the Squibb Institute for Medical Research. For the subsequent 20 years he was employed by the Gulf Oil Co. in New Jersey as an environmental engineer concerned chiefly with ground water pollution. In retirement he came to Lexington and pursued a lifelong interest in archaeology. He was active in the cataloguing of Native American artifacts in Harvard's Peabody Museum and also served as chairman of the Robbins Museum reconstruction project in Middleboro, Mass. He was a vice president and trustee of the Massachusetts Archaeological Society.

Another year, when a small group of us were climbing Mt. Cardigan from the State Park on the west side, I happened to notice a few chantrelle mushrooms (*cantharellus cibarius*) a few feet from the trail. Having gathered and enjoyed them many a time in Germany, and also here, I put them in a sandwich bag and took them back. In the evening, after the meeting, when everybody was in the snack bar chatting, playing cards, and socializing, I stepped up to the bar, manned by the Chemistry Teacher, and asked him to cook me a hamburger and fry my mushrooms on the griddle in butter as a side-order. I made a point to speak loudly enough so others could hear the request. As I carried the plate with the hamburger and mushrooms across the snack bar to my table, I was followed by anxious eyes and several people

Joseph Horace Faull, Jr., 89, died on July 9, 1994. A native of Toronto, he attended Phillips Andover Academy and then received the B.S. (1927), the M.S. (1929), and the Ph.D. (1931) degrees from Harvard. Joe (as he was known to his chemist friends) then spent a year in Germany as a John Harvard Travelling Fellow. He described the state of German universities in the early years of the Nazi regime in a talk

before the Northeastern Section (the *NUCLEUS*, May 1935; reprints available). When World War II broke out Joe was directing research at the General Latex and Chemical Co. in Cambridge. The company, along with General Tire and Rubber Co. was selected by the Rubber Reserve Co. to operate a large GR-S synthetic rubber plant in Baytown, Texas. Joe served as Technical Superintendent of the plant until 1946 when he left to become head of the scientific section of the Boston office of the Office of Naval Research. At that time Joe was convinced that security of the United States would depend on a vigorous continuation of government-sponsored research. The O.N.R. was one of only two or three agencies supporting such research prior to the establishment of the National Science Foundation. Joe continued his affiliation with O.N.R. and also served as consultant to General Latex and General Tire until his retirement.

Joe's boss at O.N.R. was Arnet Lawrence (Larry) Powell. He and Joe participated in many activities of the Northeastern Section. Joe lived in Cambridge and took great delight in the educational and cultural activities of the Boston area. My wife and I met him on many occasions, usually accompanied by his sister. His first love, of course, was Harvard. It was fitting when an illustrated essay on Harvard was published in the New York Times Magazine for July 20, 1986, a full page colored picture of the faculty club dining room revealed Joe (not identified by name) at lunch with a young lady. For years Joe's relatives thought that the lady was a cousin visiting from Baltimore. I had written to Joe kidding him about his dining out with a "young chick". He replied that the lady in question was a remarkable scholar whom he had met years before when she had come to Harvard as a refugee from Iran. She was fluent in eight languages and was celebrating her obtaining the Ph.D. and plans for publication of her thesis.

Joe was a member of organizations as diverse as the Harvard Club,

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Historical Notes

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the ACS, the Appalachian Mountain Club, the Woods Hole Oceanographic Institute, and Omicron of Alpha Chi Sigma.

A memorial service for Joe was held on August 9, 1994 in the Bigelow Chapel at Mount Auburn Cemetery.

Eiji Fujimori, 71, died on May 2, 1994. He was a native of Kamisawa, Japan and studied at the University of Tokyo where he received the B.Eng. degree in applied chemistry (1945) and the D.Sci. in chemistry (1956) after ten years as a graduate research fellow. During the 1955-59 period he was a visiting research fellow in the laboratories of Robert Livingston (Minnesota), Melvin Calvin (California), and Albert Szent-Gyorgyi (Woods Hole Marine Biology Laboratory). After a year lecturing on biophysics and biochemistry at Tokyo he became section chief in charge of photobiology and photochemistry at the U.S. Air Force Cambridge Laboratories in Bedford. In 1974 he became a senior scientist at the Boston Medical Research Institute. He was a charter member of the American Society for Photobiology and a member of the advisory board of the journal *Photochemistry and Photobiology*. Before retirement in 1989 he had published over 70 papers in his field.

Carroll B. Gustafson, 94, a retired professor of chemistry at the Mass. College of Pharmacy, died on March 3, 1995. He was a native of Millville, Mass. and grew up in Arlington. He received the B.S. in chemistry from Tufts College in 1921 and the M.S. from Boston University in 1941. At M.C.P. he taught freshman chemistry and supervised laboratory courses. He retired in 1970.

Raymond W. James, 85, died on November 28, 1994. He graduated from high school in Gardiner, Maine and then received the B.S. in chemical engineering from Northeastern University in 1932. His professional associations included chief chemist at Beamis Associates, Watertown (1932-37),

group leader at Arthur D. Little, Inc. (1937-1960), director of manufacturing at Photek, Inc. in Kingston, R.I. (1960-63), technical director at Arkwright Interlaken, Fiskeville, R.I. (1963-66), and director of research for the Fitchburg Paper Company (1966-71). He was the author of 40 U.S. and foreign patents. In retirement, Ray was active in community and professional affairs in Lexington. He was an ACS member for 56 years, a member of AIChE, was chairman of the board of selectmen (1955-58) and in 1945 served as president of the Northeastern University alumni association. I recall with pleasure my association with Ray during the later years of his employment at A.D. Little.

William J. Knox, 91, the grandson of a former slave and a native of New Bedford, died on July 9, 1995. He was a 1925 chemistry graduate of Harvard where he had been denied residency in the dormitories because of his race. He taught for several years in the Deep South, then returned north to obtain the Ph.D. in physical chemistry at M.I.T. (1935). At that time, job opportunities in industry were almost non-existent, so he accepted a faculty appointment at Talladega College in Alabama. Suffering the indignities associated with life in Alabama, he left teaching and joined the research staff of the Manhattan Project at Columbia University. Following the war he directed research in coatings and film at the Eastman Kodak Company in Rochester, N.Y. until retirement in 1970. Throughout his professional life he was very active fighting racial discrimination.

(To be continued) ◇

Chemists Becoming

continued from page 9

booklet, which, if people saw it at the right time, could help them recognize their issues and seek the sort of help that would be beneficial to them. The booklet that resulted is titled "*Coping with Job Loss*". It is a very difficult booklet to get into the proper hands. People who feel secure (rightly or wrongly) in their jobs won't accept it.

After a job has been lost, it is late for some of the recommendations. Some of the topics covered are:

Under *Put Your Job Loss in Perspective*:

- Keep your head
- Blow off steam
- On the Home Front
- Yours is to reason Why
- Take care of business –
The Termination package
- Survival Tactics

Reach Out for Help

Organize for your Job Search:

- Set up a work space
- Refine your job search skills
- Target your job search
- Network your way to a new job
- Make ACS a positive connection
- Make a new beginning

It works. Perhaps some of you who don't have a current perception that your job is less than completely secure might read it.

4. One part of becoming a professional is not related to the Office of Professional Services. It's the part that says that concentrated effort needs to be relieved — that all work and no play makes Jack, or Jill, a dull person. One needs time to recreate the interest, to shine up the sword. The ACS has connections with a travel agency that plans trips to the National Parks, to Hawaii, Canada, to Alaska, to allow one to feel the tenseness go, to see the faces on the mountain, to taste fresh ripe sugar cane, to watch crystal clear water flow over rocks and waterfalls and wash out worry, cleanse the soul, allow new inspirations in.

5. And when one has grown and learned and developed and taught others there comes a time to sit back and contemplate what being a chemist has meant. To look at one's life work and know that it was good. To see that one no longer has to meet schedules. Arriving there requires long term planning, as careful as planning for any long-term research effort.

- What to do?
- Where to live?
- How to live?
- How to pay for it all with no cost-of-living adjusted earned income?

continued on page 17

Emission Spectrograph

Morton International is offering a Jarrell-Ash emission spectrograph and associated Baird-Atomic microphotometer free of charge to a university or other not-for-profit organization. The 3.4 meter Ebert arc/spark optical emission spectrograph measures 16x5x3 feet and requires an exhaust duct for the arc/spark stand. The model RC-3 microphotometer measures 5x4x4 feet. Darkroom access for photographic plate development is necessary. The instrument, along with numerous supplies, is available on a where-is, as-is basis at Morton's Northshore location. For further information, contact L.J. Guilbault at (508) 689-1517. ◇

Chemists Becoming

continued from page 16

The Member Services Department has developed workshops and brochures that help in establishing retirement plans so that the retirement can be paid for, and in developing life-long hobbies so that there are some answers to "what to do." It has established insurance and IRA plans for protection or for savings. Various local sections have organized consultancies or other groupings that allow chemists who are seniors to keep their hand in, if that is what they want, to keep their minds in, if the hands are weary, to help young chemists to begin. Some groups arrange speakers' bureaus or guide science fairs. One new focus for the Society is to actively do something about the addition of minority participants into the profession. Some senior members of the Society are organizing to help assure the future availability of persons who will be part of 21st Century demographics.

*Chemists becoming
Chemists being
How our coming together
in our professional Society
helps us all BE.* ◇

Calendar

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December 12 cont.

Prof. Philip Anfinrud (Harvard Univ.)
"Biology from Femtoseconds to
Microseconds: A Time-Resolved IR
Study of Myoglobin"
Mass. Inst. of Technology
Rm. 2-105, at 4:00 pm

December 13

Prof. Phillippe M. Guyot-Sionnest (Univ. of Chicago)
"Time-Resolved Studies of Adsorbates'
Vibrational Dynamics"
Harvard University
12 Oxford St., Rm. Mb-23, at 4:00 pm

December 18

Prof. Thomas Meade (California Inst. of Technology)
Title TBA
Harvard University
12 Oxford St., Rm. Mb-23, at 4:15 pm

Notices for the Nucleus Calendar should be sent to:

Prof. Cathy Costello
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Boston Univ. Med. Ctr., R-806
Boston, MA 02118-2394
Tel: (617) 638-6490
Fax: (617) 638-6491, 638-6761 ◇

Mica Mine

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asked me: "Are you really going to eat these mushrooms. Couldn't they be poisonous?" I answered, "Oh, I'm pretty sure they're OK", purposely not making it sound too convincing. Next morning at breakfast time, as I came into the dining room, quite a few eyes were looking for signs of my having had a bad night after eating these 'questionable' mushrooms.

Americans, by and large, are quite agarophobic, i.e. they fear mushrooms. In France, Germany, and eastern European countries children get to know mushrooms at an early age and mushrooms, whether store-bought or gathered, are a frequent addition to the menu. ◇

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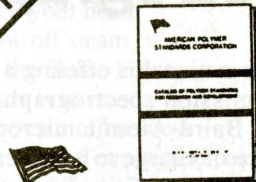
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November 21

Prof. Gil Nathanson (Univ. of Wisconsin-Madison)
“Energy, Transfer, Bonding and Proton Exchange in Gas Liquid Collisions”
Tufts University
Rm. 104, Pearson Bldg., at 4:30 pm

Prof. Ken Houk (Dept. of Chemistry and Biochemistry, UCLA)
Bayer Lecture: “Theoretical Studies of Stabilities, Dynamics and Reactions of Container Molecules”
University of New Hampshire
Iddles L103, at 11:10 am

November 24

Prof. Mike Fasco (SUNY-Albany and Wadsworth Laboratory)
“Applications of Competitive PCR”
Tufts University
Rm. 104, Pearson Bldg., at 4:30 pm

November 27

Dr. Paul Anastas (USEPA)
Title TBA
Brandeis University
Rm. 122, Gerstenzang, at 4:00 pm

Dr. Daniel A. Green (Central Science and Engineering, Du Pont Co., Wilmington, DE)
“From Molecules to Millions of Pounds per Year, the Application of Industrial Crystallization Research”
Tufts University
Rm. 136, STC Bldg., at 2:30 pm

November 28

Prof. David M. Ronis (Dept. of Chemistry, McGill Univ.)
“Conformation Equilibrium and Spatial Correlations in Hairy-Colloid Suspensions”
Harvard University
12 Oxford St., Mallinkrodt Mb-23, at 5:00 pm

Prof. Paul Weiss (Pennsylvania State Univ.)
“Atomic Scale Views of Interactions, Dynamics and Chemistry”
Tufts University
Rm. 104, Pearson Bldg., at 4:30 pm

November 29

Prof. Brian Bent (Columbia Univ.)
“Atoms and Radicals in Gas-Surface Reactions”
Harvard University
12 Oxford St., Rm. Mb-23, at 4:00 pm

Dr. Susan B. Hastie (Dept. of Chemistry, SUNY Binghamton)
“The Mechanism of Colchicine Binding to Tubulin – New Insights into an Old Drug”
UMass Dartmouth
Sci. & Eng. Bldg., Rm. 305, at 4:00 pm

November 30

Prof. Peter J. Rossky (Univ. of Texas, Austin)
“Excited State Dynamics and Nonradiative Relaxation in Solution”
Boston College
Rm. 127, Merkert Chemistry Ctr., at 4:00 pm

December 4

Prof. Chaitan Khosta (Stanford Univ.)
1996 Wilson Lecture: Title TBA
Harvard University
Science Center C, 1 Oxford St., at 4:00 pm

December 6

Dr. Karen Erickson (Dept. of Chemistry, Clark Univ.)
“Anticancer/Anti-AIDS Compounds from Marine Organisms”
UMass Dartmouth
Sci. & Eng. Bldg., Rm. 305, at 4:00 pm

December 7

Prof. Louis S. Hegedus (Colorado State Univ.)
“Chromium Carbene Complex Photochemistry in Organic Synthesis”
Boston College
Room 127, Merkert Chemistry Ctr., at 4:00 pm

Dr. Paul Corkum (National Research Council, Canada)
“Molecules in strong Laser Fields”
Harvard University
12 Oxford St., Mallinkrodt Mb-23, at 5:00 pm

Dr. Alan Packard (Children’s Hospital Medical Center, Boston)
“Chemical Aspects of Radionuclide Generator”
University of New Hampshire
Iddles L103, at 11:00 am

December 11

Prof. Philip Anfinrud (Harvard Univ.)
“Biology from Femtoseconds to Microseconds: A Time-Resolved IR Study of Myoglobin”
Harvard University
12 Oxford St., Mallinkrodt Mb-23, at 4:15 pm

December 12

Prof. Guido Hermann (ETH, Zurich)
“Enzymatic Synthesis of Oligosaccharides and Glycopeptides”
Tufts University
Rm. 104, Pearson Bldg., at 4:30 pm

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