



THE

# CHESAPEAKE CHEMIST

MARYLAND SECTION  
AMERICAN CHEMICAL SOCIETY

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NUMBER 1-2



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# THE CHESAPEAKE CHEMIST

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**NUMBER 1-2**

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## DIRECTORY OF CHEMISTRY OUTREACH PROGRAMS

A directory of public outreach programs and publications offered by the nation's chemistry community is now available free of charge from the American Chemical Society (ACS). The programs listed include such activities as science competitions, teacher workshops, and speakers' bureaus.

The 53-page booklet should be especially useful to science educators and organizations desiring increased contact with the chemistry community, as well as to everyone interested in science generally, according to ACS's Kenneth Chapman. It also could benefit organizations with outreach programs already in place by indicating what is being done elsewhere, he notes.

The directory was produced by the ACS education division with the cooperation of the Council of Chemical Research, Chemical Manufacturers Association, and Pharmaceutical Manufacturers Association. It describes public outreach activities by ACS local sections, chemistry departments of research universities, and chemistry-oriented companies. Sources of the information are listed, including names and phone numbers of contacts.

Former ACS president Paul G. Gassman in his introduction to the directory notes that "science rich" chemistry organizations (e.g., corporations, universities, government agencies, and professional organizations) contribute broadly to science and technology activities. But in spite of all this effort, "millions of students still receive seriously inadequate education in science and technology," he says.

"Also, only a small fraction of the general public has regular opportunities to learn about or to be updated about important aspects of science and technology that affect the economy, the environment, and life itself," he adds. "We believe this report will be useful to all concerned -- that the 'science rich' will be stimulated to expand their outreach and that the 'science poor' will be aided in their search for programs and resources that may be used locally with little or no modification.

The scope of the directory is reflected in its table of contents, which describes 21 ongoing programs under the heading "student-oriented programs" -- from "career exploration" to "tutoring and homework hot lines." The "scholarships" section lists 104 sponsors.

Next is "teacher-oriented programs," which includes "summer employment for teachers," "teaching as a second career," and "research internships for high school faculty."

The third heading, "institutional support," includes "instructional materials development," "media events and materials," and "migrants, grants, and other financial support."

Copies of the directory may be obtained by phoning 1-800-227-5558, option 86. From the Washington, DC area, call (202) 452-2107.

When did YOU last attend  
a Maryland Section meeting?

## ERNS DATABASE

The Environmental Protection Agency's ERNS database (Emergency Response Notification System) is now available through the Chemical Information System (The CIS).

The database includes more than 195,000 records of spills/releases of oil or hazardous substances reported to federal authorities from 1987 to the present. Each record contains information on the substance spilled/released; the time, date, and location of the incident; the company or agency believed in some way responsible for the spill; and initial remedial action undertaken in response to the incident. A variety of other data are also present in the records, and all significant data are searchable.

The database included records related to incidents as late as 20 September 1992 at its initial appearance on the CIS. It is expected to be updated quarterly.

Information on ERNS or The CIS is available from CIS, Inc., 7215 York Road, Baltimore, MD 21212, USA, 410-321-8440.

## GOUCHER PROFESSOR RECEIVES SCIENCE AWARD

Judith Levin, assistant professor of chemistry at Goucher College, has received a \$30,500 Cottrell College Science Award through the Research Corporation of Tucson, Arizona. The grant will help support Dr. Levin's research in genetics.

A resident of Owings Mills, Dr. Levin received her A.B. in biochemical sciences from Harvard University and Ph.D. from the University of California, Berkeley. Prior to joining the Goucher faculty this year, Dr. Levin was an associate research scientist at the Institute for Biophysical Research on Macromolecular Assemblies at The Johns Hopkins University.

Research Corporation is a foundation for the advancement of science. The Cottrell College Science Program supports basic research in chemistry, physics, and astronomy at public and private universities.

## JUDGES

The High School Program of the Maryland Section needs judges to help with two events in Spring 1993. On March 20, 1993, a team of six people is needed to judge exhibits for the Baltimore Science Fair at Towson State University, starting at 10:00 am. Later, in May, two judges are needed to assist with experiments with the CHEMATHON at University of Maryland at College Park, starting at 8:30 am on a Saturday.

If you are interested in serving as a judge for either of the events, please contact Mike Zapf at (410) 771-7471 (w) or (410) 879-1793 (h).

## CHANGES OF ADDRESS

It is not necessary to notify *The Chesapeake Chemist* of address changes. We get our mailing labels each month from the ACS, so if you inform the ACS of your address change, we will automatically receive the correct label.

# FEBRUARY MEETING

PAUL J. FAGAN

Paul J. Fagan received his B.S. degree in chemistry from Rutgers University in 1976. He obtained a master and Ph.D. degrees in inorganic chemistry from Northwestern University in 1980 where he did research on organoactinides with Prof. Tobin J. Marks. He went on to do postdoctoral work with Prof. Charles P. Casey at the University of Wisconsin, Madison. Since 1982 he has been in the Central Research and Development Department of the E.I. duPont de Nemours and Co. His professional interests are in the general fields of inorganic and organometallic chemistry including homogeneous catalysis, rational synthesis of molecular solids, polysilane chemistry, and most recently the chemistry of buckminsterfullerene ( $C_{60}$ ).

## METAL COMPLEXES OF BUCKMINSTERFULLERENE

Fullerenes ( $C_{60}$ ,  $C_{70}$ ,  $C_{84}$ , etc.) have attracted considerable attention in a wide variety of disciplines, and the metal chemistry of fullerenes has played an important role in the development of these fields. Our particular interest is the attachment of metals on the exterior of fullerene surfaces. We have explored both the fundamental organic and metal chemistry of buckminsterfullerene ( $C_{60}$ ). Reactions of  $C_{60}$  with ruthenium, nickel, palladium, and platinum reagents reveal the chemical nature of  $C_{60}$ . This has allowed the preparation of a number of structurally well-characterized fullerene derivatives containing metals. We have isolated and characterized compounds of the formula  $(Et_3P)_2M(\eta^2-C_{60})$  and  $[(Et_3P)_2M]6C_{60}$  ( $M = Ni, Pd, Pt$ ) which have been characterized by x-ray diffraction. The physical properties of these materials have been determined in detail including electrochemical studies which are quite revealing. Some of the principles which arise from the metal chemistry seem to be applicable to other chemistries of  $C_{60}$ . Currently, we are developing other  $C_{60}$ -based ligands for metals.

## CAS DOCUMENTATION

Three new manuals, *Registry File: Dictionary Searching, Building and Searching Structures on STN*, and *New and Revised Chemical Abstracts Indexing Terms-1992*, are now available from *Chemical Abstracts Service*.

*Registry File: Dictionary Searching* is a detailed description of the content and search characteristics of the dictionary fields in the CAS REGISTRY file. The information in the manual is divided into general fields, nomenclature-derived fields, molecular-formula-derived fields, and ring data fields. Search and display examples are included. The cost of the manual is \$10.

*Building and Searching Structures on STN* contains information on all aspects of structure searching in STN structure-searchable files, including the REGISTRY and BEILSTEIN files. The manual concentrates on the STRUCTURE command and its subcommands. Each chapter is accompanied by a set of practice problems designed to be used with STN learning files such as BEILSTEIN. The cost of the manual is \$50.

*New and Revised Chemical Abstracts Indexing Terms-1992* details the changes in *Chemical Abstracts* index terms for the 13th Collective Index period (1992-1997). Both new and revised index terms are included. The manual is available free of charge.

Copies of the manuals can be obtained by contacting CAS Customer Service at 614-447-3731 or 800-753-4CAS (in North America).

## DATE & PLACE:

Wednesday, February 17, 1992  
Morgan State University  
Baltimore  
McKeldin Center  
4th Level Ballroom

Dinner reservations should be made by mailing checks, payable to Maryland Section of ACS, to

Dr. Stephen M. Gregory  
College of Notre Dame  
4701 North Charles Street  
Baltimore, MD 21210

## SCHEDULE:

6:00 Social Hour by February 10. Late reservations may be made by calling

7:00 Dinner

(410) 532-5714

8:00 Paul J. Fagan  
Central R & D  
DuPont Experimental Station  
Wilmington, Delaware

by February 12. Answering machine is available at this number.

"Metal Complexes of  
Buckminsterfullerene"

Dinner price is \$16.00 per person, but spouses and retired chemists may attend for \$14.00; students may attend for \$8.00.

It is not necessary to be a member of the American Chemical Society to attend. You may attend the lecture without attending the dinner.

## DIRECTIONS:

Morgan State is at Cold Spring Lane and Hillen Road, in the Northwood section of northeast Baltimore City. If you are traveling East on Cold Spring Lane, cross Hillen Road and turn left into the first parking lot you come to ("H Lot"). The McKeldin Center is just East of H Lot; the Parham Ball Room is on the fourth level.

If you use the beltway (Route 695), get off at Exit 30 and head South on Perring Parkway. Go about 3 miles to Cold Spring Lane, turn left and proceed to H Lot as described above.

If you are coming from South of Baltimore, take Route 295 (Russell Street) into downtown Baltimore. Turn right on Pratt Street, go about a half mile and turn left on Calvert Street. Go about 3 miles and turn right at 33rd Street. Drive about 1 mile, past Memorial Stadium and The Alameda, to Hillen Road. Turn left, go 1 mile and you will come to Cold Spring Lane. Turn right and park in H Lot.

## 27th MARM

The 27th Middle Atlantic Regional meeting of the ACS will be held June 2-4, 1993, hosted by the New York Section and Hofstra University, Hempstead, NY.

March 10

## MARYLAND SECTION FUTURE MEETINGS

W. R. Grace & Co.  
Research Laboratory  
Dr. Ernest Eliel

April 14

Western Maryland College  
Student Awards  
Poster Session

General Chairperson is Rodney B. Finzel (516-463-5534); Program Chairperson is Sut Ahuja (914-368-6346); Exhibits Chairperson is Evelyn Sarnoff (718-459-3097).

May 12

The Johns Hopkins Univ.  
Remsen Award

W. R. GRACE & CO. AWARD  
ADDRESS BY EMILIO Q. DADDARIO  
OCTOBER 21, 1992

In this time of national debate the spin doctors of our political candidates, especially those running at the highest levels, gyrate enormous energy around the issue that we have come to call the character thing. While it would be nice to know for certain that everyone we elect to office is as pure as driven snow, scientists who are in the business of searching out new knowledge would probably advise them to look elsewhere. C. P. Snow would put wisdom in a higher category. In a keynote talk to hearings before my committee on the topic of "Government, Science, and Public Policy" he said, "...we are living in a world which is only too real: the problems are desperately, and probably vitally, important; we can't duck them; we have to have partial answers, if that's the best we can do. We are not very wise, so we had better be as clear and as straightforward as we can manage... I don't want to overstate the case. Being scientifically informed is no substitute for wisdom. I would rather have choices made by wise men who are not scientifically educated than by unwise men who are."

Daniel Bell, Professor of Sociology at Harvard, and Moderator of hearings on "The Management of Information and Knowledge," raised a somewhat similar question in his opening remarks. He asked, "How do you apply wisdom to the management of information and knowledge?" A simple enough question until applied to Bell's thesis that the United States was the first post industrial society which "without the organization of information...can no longer know where we are going to go," and cited an old Talmudic aphorism, "If you don't know where you are going, any road will take you there."

Just recently, the Nobel Laureate, Herbert Simon of Carnegie-Mellon, has come out with a new book, *Models of My Life*. I read it as two books. One autobiographical, the other a history of what we now call cognitive and artificial intelligence. Having studied Bertrand Russell and Alfred North Whitehead's *Principia Mathematica*, Simon apparently felt an obligation to keep in touch with Russell about the progress of his work. In a letter to Russell he explained that he was "interested in simulating human problem solving and not simply demonstrating how computers could solve hard problems...you may also be interested in the evidence of our paper that the learned man and the wise man are not always the same person. Of course, that has been known for a long time but it is nice to have such definitive evidence to bring against the pedant."

Cognition as defined by Webster is "the process of knowing: any mental operation by which we become aware of objects of thought or perception; knowledge or the capacity for it." I have a story that fits that definition. A few months ago, when my grandson was not quite five, his mother brought him to St. Patrick's Cathedral in New York City, where they live on the 21st floor of a large apartment building. He was struck by the grandeur and the massiveness of that wonderful church and began to point and exclaim. His mother, thinking him a bit noisy, whispered, "You must be quiet." "Why?" he asked. "Because this is God's house," she replied. "This is where he lives." He looked up, and asked, "On what floor?"

Bertrand Russell acknowledged Simon's achievement, "I am also delighted by your exact demonstration of the old saw that wisdom is not the same as erudition." He then threw in that he was delighted by Simon's example of the superiority of the machine to him and Whitehead. That seemed a somewhat magnanimous tongue-in-cheek remark, and yet a reminder, I expect, that machines are tools for man and not vice versa.

May I reach back in this dialogue and bring in Thomas Jefferson? When I was in high school I bought a nine volume set of *The Works of Thomas Jefferson* in a second-hand bookstore. I have them still and never find him short of advice. Remember that Jefferson is speaking against the backdrop of an agrarian society. In 1812, on receipt of Thomas Cooper's introductory lecture to a course of chemistry for the University of Virginia, Jefferson replied, "You know the just esteem which attached itself to Dr. Franklin's science, because he always directed it to something useful in private life. The chemists have not been attentive enough to this. I have wished to see their science applied to domestic objects, to malting for instance, to fermentation and distillation generally, to making bread, butter, cheese, soap, to the incubation of eggs, etc. And I am happy to observe some of these titles in the syllabus of your lecture. I hope you will make the chemistry of these subjects intelligible to our good housewives."

Ten years later Jefferson was less pragmatic. In a letter to George Hopkins he wrote, "The new chemistry indeed has given us a new principle of the generation of rain, proving water to be a composition of different gases, and has aided our theory of meteoric light. I am myself an empiric in natural philosophy, suffering my faith to go no further than my facts. I am pleased, however, to see the efforts of hypothetical speculation, because by the collision of different hypotheses, truth may be elicited and science advanced in the end."

Daniel Bell, 150 years later, carried that thought to a further dimension. To him, chemistry was the first modern industry "insofar as one has to know the theoretical properties of the macromolecules which are manipulated in order to know what one is making. That is a unique relationship that is amplified by the atomic bomb." To Bell that created "a change of relationship of science to technology" in that "institutions primarily concerned with the codification of theoretical knowledge, became primary to society, because theory now, in effect, guides the way we practice...we have a reduction of empiricism and a growth of theory, not only in the relation of science to technology, but also in the relation of economics to public policy."

The shift from Jefferson's emphasis and empiric dependence on experience and observation to Bell's growth of theory takes nothing away from either of them. They each understood both sides of the equation and what was needed for the time in which they lived. Yet Jefferson remains, to me, the prototype of the wise man. How was he wise enough to see that the efforts of hypothetical speculation would lead to truth and advance science? I lay it to the experience he built over a lifetime of public service and to the common sense he showed in seeking out information from every available source. His "Works" are filled with thousands of letters, sent and received, seeking out advice and solutions on every conceivable subject, and his journals reflect his conversations and observations as he travelled here and abroad. I can imagine whom he would have communicated with in my time as to the usefulness of science and its intelligibility to the citizenry.

I begin with George Kistiakowsky, late Professor of Chemistry at Harvard, Science Advisor to President Eisenhower, and first Chairman of the National Academy's Committee on Science and Public Policy. In 1970 hearings on "National Science Policy" he said, "Thoughtful individuals are questioning, not the occurrence of technological progress but the socially undesirable forms it has taken. Their criticism...is very valid and perhaps can be put into a nutshell by noting that there has been too little concern with the welfare of the individual and too much has been done at his expense. Our citizens' resentment, as they experience inadequate health care, the sorry state of our environment, the decay of our cities...are quite justified. The remedy is in the selective strengthening and reorientation towards a better response to social needs."

The theme that science is not compartmentalized, but a necessary underpinning of the social structure of our democracy, is an interesting one. Although there are arguments about the totality of scientific budgets and the way science and technology is organized, no responsible person I've run into would deny that the advance of basic and applied science is essential to our national interest and of vital concern to the Federal Government.

Why is that so? As good an answer as any comes from Lee DuBridge, Science Advisor to President Nixon and President Emeritus of Cal Tech. At 1966 Hearings on "Government, Science, and Public Policy" he gave these reasons: "Our national defense, our prestige among nations, the health and comfort of our people, the viability of our economy...are all dependent on the application of scientific discovery to practical problems."

Where would the discoverers come from? DuBridge pointed to the obvious: our graduate schools and universities. But then he forged educational links. They in turn depended on undergraduate colleges for students, who in turn looked to secondary schools, and they to elementary schools. "Thus," he said, "our entire educational system is at once involved in our apparently simple goal of advancing science." Education, in that light, is the broad base center for training at all levels and the ultimate determiner as to how the United States will be judged as a center of performance, world-wide.

Roger Revelle, who died last year, saw the world through a population and ocean prism. He was equally at home as the Director of Scripps Oceanographic Institute and, later, as Director of the Harvard Center of Population Studies. In a paper entitled "Science and Social Change," he wrote, "Many of the changes brought about by the natural sciences present disturbing problems that these sciences themselves cannot solve...Thus the most far reaching of all social changes so inexorably demanded by the new science is a change of the methods, objectives, scope, and importance of education." His move from Scripps to Harvard matched words to action, and until his death, two years ago, taught that "social changes brought about by science and technology have created problems that must be attacked by the social scientists -- economists, psychologists, sociologists, political scientists, and city planners -- working with natural scientists and engineers.

Where would these people come from and how would we create synergism between them? Shortly after Philip Handler became President of the National Academy of Sciences, I asked him what he missed the most about leaving Duke University where he had been a Professor of Biochemistry. "My students," was his answer. He considered them a resource and the development of their talent as essential. "Educational improvement," he said, "has been deferred for many years and the American position worldwide, its leadership position, is in jeopardy. This loss is not equivalent to defeat in the Olympics because it bodes ill for our national security and for the vigor of our economy. Young people who come from every walk of life through our diverse school system... must be bastions of our democracy," and he suggested a program that would offer "stipend and tuition support to all students in good standing, engaged in advanced education beyond the baccalaureate, regardless of field, be it in the natural or social sciences, the humanities, medicine, law, engineering, etc...in exchange for two, three, or even five years of national service...in all the nooks and crannies of public service -- on Indian reservations, in ghetto clinics, county courthouses, rural schoolhouses conservation corps, research laboratories, etc."

Are all of these people necessary? Is this world we live in at risk? Let's hear from Charles Lindberg in 1970 when he was living with tribal aborigines in the Philippine Mountains of Mindanao. Invited to participate in hearings on science policy he sent his thoughts in a handwritten note: "I think the survival...of our western civilization is likely to depend on how intelligently we apply its science and technology to our human environment. If we

can cope with the problems our unprecedented knowledge has created, we can do so only by properly using the tools of that knowledge. No previous civilization has had either our knowledge or our tools...We should establish our policy on the obvious fact that no system of government, warfare, education, or religion can be satisfying or successful unless it eventually improves the quality of man."

As science has advanced in accordance with Jefferson's hypothesis, the choices as to its uses become more difficult than even he could have contemplated. Hunter Dupree, Professor of Science History at Brown University, put it this way. "Because knowledge cannot be traded or hoarded like other goods it has to be administered by rules of its own. Yet it is this very ability to move around and apply itself to situations never dreamed of by its creators that makes knowledge of a highly organized and systematic type the most potent force in the world today. Symbolized by the atomic bomb, it has a reputation for evil...by modern medicine a reputation for good. But the inability to hoard knowledge for either good or evil prevents these moral judgments from being more than emotional hunches...science can be as good or evil as the ends to which it is put."

Despite that dilemma there is no turning back from the path we are on. It will always be somewhat slippery but never non-negotiable as long as we recognize that the pool of knowledge is unquenchable and provide for our best people to participate in its investigation. We are certainly wise enough to recognize that is the only way to stay ahead of the game. And it is Tennyson who tells us that "Knowledge comes but wisdom lingers."

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## Happy New Year

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### AMERICAN CHEMICAL SOCIETY DIVISION OF POLYMER CHEMISTRY, INC. 1993 WORKSHOPS

February 28 - March 3, 1993: SOLID STATE NMR SPECTROSCOPY OF POLYMERS

Organized by: Alan D. English  
Du Pont  
P.O. Box 80356  
Wilmington, DE 19880-0356  
Phone: 302-695-4851  
Fax: 302-695-8207

Alan A. Jones  
Department of Chemistry  
Clark University  
Worcester, MA 01610-1477  
Phone: 508-793-7113  
Fax: 508-793-8861

Location: Keystone Resort, Keystone, Colorado

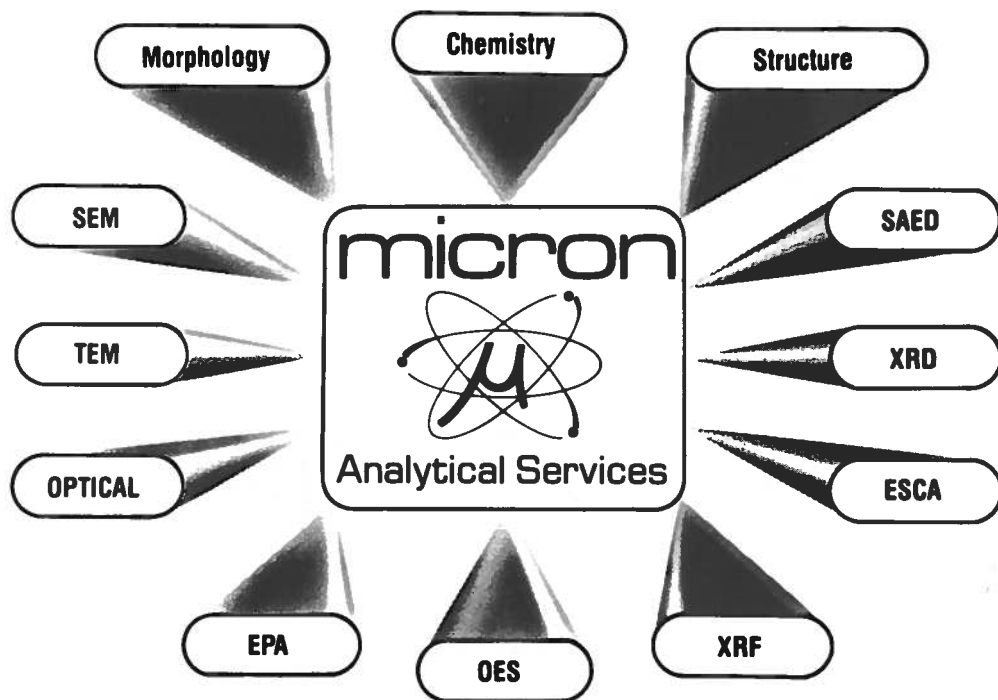
Sponsored by: The ACS Division of Polymer Chemistry, Inc.

TOPICS TO BE COVERED AT THE WORKSHOP INCLUDE: THE USE OF NMR METHODS TO CHARACTERIZE POLYMER STRUCTURE AND DYNAMICS, MOLECULAR MODELLING AND THEORY, MOLECULAR DIFFUSION, CONCENTRATED SOLUTION BEHAVIOR, AND NMR METHODOLOGY. POSTER PRESENTATIONS WILL BE AN INTEGRAL PART OF THE MEETING AND ARE SOLICITED.

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