THE CHESAPEAKE CHEMIST

MARYLAND SECTION
AMERICAN CHEMICAL SOCIETY

VOL. XXXII JANUARY, 1976 NUMBER 1

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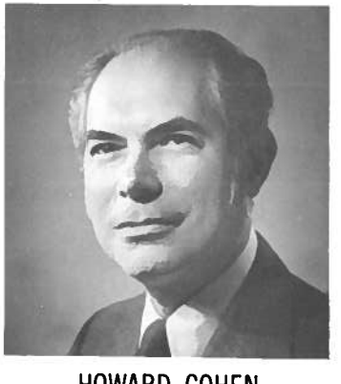

HOWARD COHEN
TREASURER

Book Review

Rosalind Franklin and DNA

by Anne Sayre (W. W. Norton & Co., Inc., N.Y., 1975, 221 pp. $8.95)

Anyone who has read *The Double Helix* by J. B. Watson will remember "Rosy" Franklin as the source of the X-ray patterns which showed DNA to be helical and of endless frustration for Watson and Maurice Wilkins. Who could forget this description: "There was never any lipstick to contrast with her straight black hair, while at the age of thirty-one her dresses showed all the imagination of English blue-stocking adolescents...Momentarily I wondered how she would look if she took off her glasses and did something novel with her hair." In actual fact, Rosalind Franklin did not wear glasses, did wear lipstick, and dressed rather smartly. More important than these distortions of her character, which served some literary function in confirming preconceived notions of the typical woman scientist, are the total misrepresentations of her contributions to the elucidation of the structure of DNA. *Rosalind Franklin and DNA* attempts to present the truth about the person and work of the late R. E. Franklin and to explain Watson's amazing distortions.

In early 1951, Rosalind Franklin accepted a fellowship from John Randall at King's College to set up an X-ray diffraction unit in his laboratory, a position equal in status to that of Maurice Wilkins. During the first year she improved the apparatus and was able to hydrate the A crystalline form of DNA to the B form (a task Wilkins had been unsuccessful at). The X-ray pattern of the B form was beautifully simple and clearly showed the B form to be helical. In November of 1951, she presented a seminar describing her results and concluding that the B form was helical, contained 2, 3, or 4 chains of nucleic acid and was coiled so that the phosphates were near the outside, with a one-turn distance of 27A. James Watson attended this seminar but apparently did not hear too well since he claims that she was "antihelical" until the Watson-Crick structure was presented. Her work was also written up as an annual report at that time. She continued her work on the A form X-ray and the density of both forms (needed to determine the number of chains per helix). During this time Watson and Crick were attempting to build models and consulting with Wilkins regarding Franklin's data which he freely released without her knowledge. In fact she died in 1958 never knowing they had used her data in deducing the structure of DNA since they never reported more than a superficial knowledge (until *The Double Helix*, published in 1968). In 1953, she generously rewrote her paper on the structure of DNA to lend support to their structure which was published in the same issue of *Nature*. Crick later estimated that in three weeks to three months she would have deduced the complete structure alone, i.e., without the help of the large numbers of people Watson and Crick consulted.

Why, then, if Watson and Crick received all the credit for deducing the structure of DNA, did Watson malign both the character and the contributions of Rosalind Franklin? His knowledge of her and her work was largely second hand, from Wilkins, and Wilkins and Franklin were never able to communicate. It is the thesis of this book that by making Rosalind Franklin into "Rosy", an uncooperative, dowdy, unfeminine scientist who could not get along with colleagues and who did not know the value of her own data, he made his theft of her results justifiable (since she would never be able to do anything with them anyway); to this end he also concocted a "race" with Linus Pauling. Such a loud protest was raised to *The Double Helix* manuscript that Watson wrote an epilogue giving her credit for the X-ray work. Francis Crick describes *The Double Helix* as a "contemptible pack of damned nonsense."

(Continued on p. ?....)

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The Chesapeake Chemist is published monthly September through May by the Maryland Section of the American Chemical Society. Address editorial comments to Howard J. Cohen, Glidden-Durkee, Div. of SCM Corp., 3901 Hawkins Point Road, Baltimore, Md. 21226. Phone 633-6400. Address advertising inquiries and copy to Kent R. Zeller, McCormick & Co., Inc., 204 Wight Ave., Hunt Valley, Md. 21031.

CATHERINE COSTELLO

Catherine Costello is a native of Boston. She received an A.B. from Emmanuel College, and an M.S. from Georgetown University. After a year of research with the FDA in Washington developing infrared techniques she returned to Georgetown to complete Ph.D. work. Interest in the application of instrumental techniques to biomedical problems brought her to her current position as a research associate in the laboratory of Prof. Klaus Bieman at MIT. She has been working with the Boston-area hospitals and research institutions for about four years on the application of mass spectrometry to the analysis of the components of body fluids for purposes of toxicology and for studies of inborn errors of metabolism.

THE APPLICATION OF MASS SPECTROMETRY TO THE PROBLEMS OF DRUG ABUSE

Although the rapid and unambiguous identification of toxic material in the body fluids of poisoning victims is a recurring problem for the clinical laboratory, the methods which have been available in this area are inadequate in as many as 20% of the cases involving comotose patients. Appropriate treatment of the patient and efficient use of the resources available require that these cases also be handled. A GC/MS computer system is currently being used to meet this need for hospitals in the Boston area. A communications network has been set up through the poison bureau so that emergency samples are directed quickly to the NIH mass spectrometry facility at MIT. There the body fluids are quickly extracted and analyzed. An online GC/MS system is used for data acquisition and reduction; the spectra obtained are immediately compared with the computerized collection of spectra of drugs, metabolites, normal body fluids, and common contaminants. Use of this system enables the identification of the unknown toxic material within 1 to 2 hours and has greatly aided physicians in choosing the optimum treatment to relieve the critical condition of both accidental poison victims and attempted suicides. All aspects of the program will be discussed as well as the prospects for provision of GC/MS analyses by commercial clinical laboratories.

CATHERINE C. FENSELAU

Catherine Clarke Fenselau is an Associate Professor in the Department of Pharmacology and Experimental Therapeutics, The Johns Hopkins University School of Medicine, Baltimore, Maryland. She received her A.B. degree from Bryn Mawr College in 1961, and earned her Ph.D. degree in 1965 in the Department of Chemistry, Stanford University, working under the direction of Professor Carl Djerassi. From 1965 to 1967 she worked in the Department of Chemistry and in the Space Sciences Laboratory, University of California, Berkeley with Professors Melvin Calvin and A. L. Burlingame. Coming to The Johns Hopkins University in 1967, she was made an Assistant Professor in 1969 and Associate Professor in 1973.

Dr. Fenselau is Editor-in-Chief of *Biomedical Mass Spectrometry* and has published 58 articles on mass spectrometry and its applications, including three reviews and an audiovisual program for teaching spectral interpretation.

Her current research activities include stable isotope labeling studies of mechanisms of chemical ionization and fragmentation, structure elucidation of nucleosides altered by physiologically active alkylating agents, and the development of solid phase techniques for synthesis of glucuronides.

(Continued on p. 6....)

JANUARY MEETING

DATE:

Wednesday, January 21, 1976

PLACE:

Eudowood Gardens Lecture Room
Eudowood Plaza, Joppa Road near
Goucher Boulevard.

SPEAKERS & TOPICS:

5:30 pm
Dr. Catherine Costello, MIT
"Application of MS to the
Problems of Drug Abuse"

8:30 pm
Dr. Catherine C. Fenselau
The Johns Hopkins University
School of Medicine
"Blood, Sweat and Urine: Applications of MS in Pharmacology"

SOCIAL HOUR:

There will be a social hour after the meeting. Refreshments will be served.

DR. CATHERINE COSTELLO

DR. CATHERINE FENSELAU

COCKTAILS AND DINNER:

Eudowood Gardens Dining Room
Cocktails 6:30-7:15

Hot buffet dinner (7:15) $5.50 per person. Retired chemists, students, and their spouses may attend the dinner at $3.50 each. Reservations are necessary for the dinner and should be made no later than January 16 with

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USE THE CONVENIENT FORM THAT APPEARS ELSEWHERE IN THIS ISSUE (or Phone: 247-0700, X 283, 261).

It is not necessary to be a member of the American Chemical Society to attend the dinner or the talks; the talks may be attended without going to the dinner. You are invited to bring your spouse and friends to both the dinner and the meeting.

CLARIFICATION

I have been informed that some of the wording in my councilor's report published in *The Chesapeake Chemist* (November) could give the impression that it was the Washington Office which was the driving force behind Amendment IX: The Manner of Election. This amendment would have required a competitive mail ballot in local elections.

In fact, this amendment was generated by, reviewed by, and finally enacted by the ACS members in the Council and *not* by the National Office staff.

I regret any misconceptions of the role of the National Office in this matter which may have arisen from my phrasing.

Carl E. Minnier

(....continued from p. 4)

BLOOD, SWEAT AND URINE: APPLICATIONS OF MASS SPECTROMETRY IN PHARMACOLOGY

Cyclophosphamide is used widely against tumors, as an immunosuppressant and, increasingly, against rheumatoid arthritis. The drug administered is not active, but it is metabolized in the liver to one or more active metabolites. However, cyclophosphamide was used clinically for more than ten years before any of the products of microsomal metabolism were identified. The application of mass spectrometry to these structure studies has made possible in recent years the elucidation of both activating and inactivating metabolic sequences and a number of new questions may now be pursued. Our current collaborative efforts are directed towards understanding the chemical basis for the physiologic activity of these metabolites, and towards determining blood levels associated with therapeutic activity and various toxicities.

The analytical applications of mass spectrometry may be broadly grouped into four categories: structure elucidation, compound verification, isotope analysis, and quantitation. Our studies of the pharmacology of cyclophosphamide will be used to illustrate these four areas. The special analytical potential of accurate mass measurements, of chemical ionization, of field desorption, of combined gas chromatography mass spectrometry, and of selected ion recording will be discussed in identifying and assaying active metabolites of cyclophosphamide and studying the mechanisms of the alkylation reactions which are thought to constitute the chemical basis for their physiologic activity.

THE KOKES LECTURE

Thursday, January 22, 1976

4:00 P.M. Room 101 Remsen Hall, Johns Hopkins University

Professor Gabor A. Somorjai

University of California, Berkeley

Professor Somorjai's work bridges the gap between surface science and hetereogeneous catalysis. His characterization of stepped surfaces on platinum crystal faces and determination of their role in catalysis is one of the most important contributions to the science of catalysis in this decade. In addition to being a creative scientist, Gabor Somorjai is also an effective teacher on both the graduate and undergraduate level. His contributions to the fundamentals of catalysis and to education reflect those of the late Professor Kokes.

The Synthesis of Metal Catalysts

Correlations of Atomic Structure, Composition and Reactivity for

Hydrocarbon Reactions on Metal Crystal Surfaces

Abstract

Surfaces of platinum, iridium and gold single crystals of varied atomic structure have been used to study the chemisorption and surface reactions of hydrogen and hydrocarbons. The surface structure has been studied by low-energy electron diffraction, the surface composition by Auger electron spectroscopy and the reaction rates and product distributions were monitored by mass spectrometry (at low pressures) or gas chromatography (high pressures). Atomic sites, where H-H, C-H and C-C bond breaking occur, have been identified along with other surface sites where complex molecular rearrangements take place. A model of hydrocarbon catalysis on platinum surfaces is suggested and the application of alloy systems to build new catalysts is reviewed.

Cocktails and Dinner, by subscription, following the lecture. For details contact J. W. Gryder, Department of Chemistry, Johns Hopkins University, Baltimore, Maryland 21218. Phone 366-3300 Ext. 254 or 502.

(....continued from p. 2)

In revealing the true nature of Rosalind Franklin and her contribution to the structure of DNA, Anne Sayre has contributed to improving professional honesty in science and dealt a blow to some of the awful myths about women scientists. --L. M. S.

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NICK NACKS

by ALAN C. NIXON

ERGS WITHOUT EFFORT?

One of the penalties of not having a Department of Science and Technology is that every committee in the Congress is getting into the business of devining how we are going to get more energy without paying the full price for it. These concerns range from the Bentson Sub-committee on Economic Growth (of the Joint Economic Committee) to Senator Muskie and Moss's Committee on the Budget. Everybody would like to get a short term "technological fix" without somehow paying our Arabian Piper -- which includes the Nigerians, the Venezuelans, the Canadians, and our own oil companies. This is exemplified by Senator Muskie who reacted to a statement that utility investment return must rise from 12% to 16% to support construction of necessary facilities, by saying that he couldn't go to his own constituents and say "You have to pay 30% of your income for energy and lower your standard of living across the board." But that's exactly what we will have to do starting, hopefully, by lowering our standard of wastefulness. At best, this would be contained within the strictures of driving smaller cars (not quite so fast) separating our garbage, recycling all the cans and bottles etc., walking more, bicycling more, and polluting less. All this doesn't sound too hard to take.

According to John O'Leary of the Mitre Corporation, the situation is going to be particularly tough in the gas industry. He said they couldn't possibly produce more than 17-trillion cubic feet of gas in '85 as compared to 22 trillion this year. He said the industry pipeline companies are "essentially desperate -- they can't build a gas plant; they can't get LNG on the line; they are pretty well stopped from making conversions of liquids into gas fuels; and we are looking at an absolutely chaotic situation in the gas market, with household curtailment as early as 1980." O'Leary related energy use, GNP, and employment with about 1 quad (10^{15} BTU) being roughly equivalent to 1 million people employed, so that in 1985, if his projected shortfall of 18 quads comes about, this would mean about the same number of millions of unemployed. Whether this is a proper correlation or not I don't know. If it is it might have the desirable effect of forcing us into a shorter work week so we could share the work with everybody.

With respect to the gas situation, I think things will not be as desperate as O'Leary was portraying them because I think we are going to be making a lot more gas from manure, from sewage, garbage, etc. than is contemplated at the present time because inevitably the price of gas is going to go up and it is going to be more profitable to tap these sources which are even now beginning to be taken advanrage of. One source which I have been trying to promote activity in is that of converting the vast amount of known oil which is underground into methane by use of anaerobic microorganisms. Two-thirds of all the oil we have ever discovered is still underground and we know where it is. It should be possible to convert a large proportion of this to methane. Similar techniques can be used with coal, oil shale, and tar sands. Commercialization should be relatively simple. This could be the answer to the gas shortage.

The Tenth Middle Atlantic Regional Meeting in Philadelphia

10th MARM

16 - 19 February, 1976

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Program Chairman ..... J. R. Williams, Temple University

Exposition Chairman ..... W. C. Pfefferle, Englehard Minerals & Chemical Corp.

Contributed papers are welcome in the following divisions:

Analytical Chemistry	R. L. Grob, Villanova University
Chemical Education	J. S. Schmuckler and F. X. Sutman, Temple University
Catalysis	To be announced
Chemical Marketing and Economics	To be announced
Chemical Documentation	H. Skolnik, Hercules, Inc.
Chemical Technicians	D. Wonchoba, DuPont
Computers in Chemistry	D. Pensak, DuPont
Fiber Chemistry	To be announced
Fluorine Chemistry	To be announced
Inorganic Chemistry	T. Brill, University of Delaware
Medicinal Chemistry	G. L. Dunn, SKF Laboratories
Organic Chemistry	G. R. Krow, Temple University
Physical Chemistry	E. R. Nixon and R. Hochstrasser, University of Pennsylvania
Polymer Chemistry	Melvin D. Hurwitz, Rohm & Haas Co.
Undergraduate Research	John R. Williams, Temple University

Deadline for Abstracts is November 1, 1975

Address:

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**Return by Friday preceding next meeting.

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