



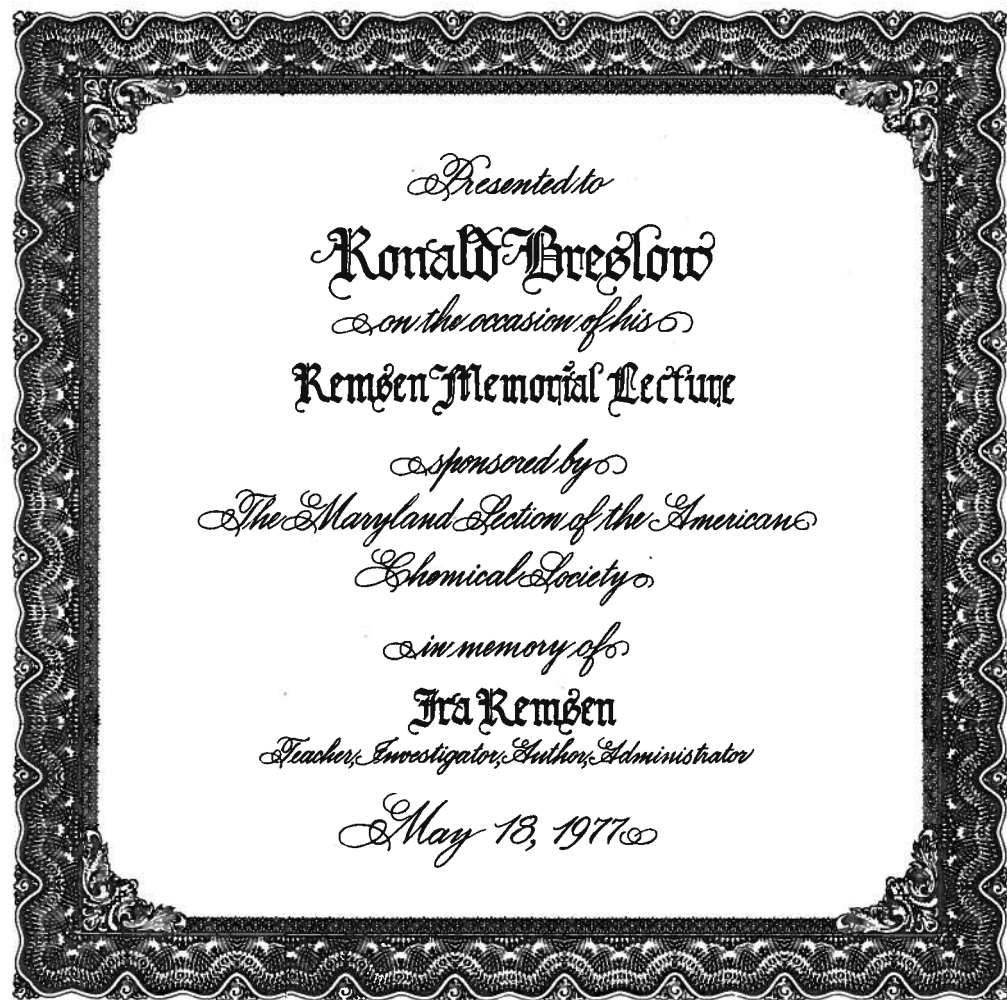
THE **CHESAPEAKE
CHEMIST**

MARYLAND SECTION
AMERICAN CHEMICAL SOCIETY

VOL. XXXIII

MAY, 1977

NUMBER 5





THE EDITOR'S FIST

THE END OF THE BEGINNING

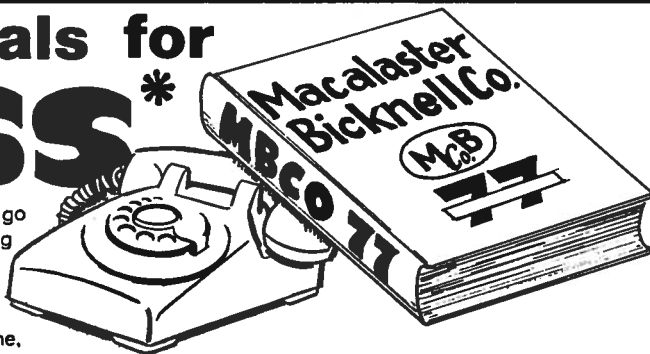
In keeping with immutable tradition ('we did it this way last year'), the Maryland Section's season covers an academic year (September through May) while the Chairman's terms and a volume of *The Chesapeake Chemist* cover a calendar year (January through December). Still, the coming summer hiatus makes the May issue a good time to stop and look back at the 10 issues that have appeared since we became Editor. Our ever-critical, penetrating gaze detects at least two places where *The Chesapeake Chemist* needs improvement. First, and more important, it needs a wider range and variety of contributors. Second, in spite of the printer's heroic efforts, its pages do not offer enough variety to the eye. We definitely need some art work, a cartoon now and again, a sketch here and there to break up the uniform gray of our pages. Volunteers, arise!

A WARM THANK YOU

Whilst 'tis true we dearly love chemistry, yet it is also true that few metatheses in a test tube can equal the near-miracle that occurs month after month as the mess on the Editor's desk is transmuted by successive stages, first at Atkins Secretarial Service, and then at Associated Printers, into an issue of this magazine. Our warmest thanks go to the people who perform these transformations, Esther Atkins and Jack Doster, respectively.

essentials for
SSS*

Hand in hand . . . they go together . . . providing the essentials for . . . **Super Scientific Service*** . . . our new **MBCO 77** catalog and the telephone.



Simply do your shopping by thumbing through the 1200 page MBCO 77 catalog. Make your selections from the 6895 cataloged items. Pick up your telephone . . . place your order . . . and we'll provide the Super Scientific Service. You'll be surprised with our fast service and prompt deliveries.

You haven't got a catalog? A copy is yours for the asking . . . merely drop us a note on your company or institutional letterhead and we will send it to you promptly.



MACALASTER BICKNELL CO. OF N. J., INC.

NORTH AND DEPOT STREETS, MILLVILLE, N. J. 08332

Toll Free Telephone 1-800-257-8405

"Consider Our Warehouse Stock Your Personal Inventory"



THE CHESAPEAKE CHEMIST

VOL. XXXIII

MAY, 1977

NUMBER 5

EDITORIAL STAFF

Eli Freedman..... Editor
2411 Diana Road
Baltimore, MD 21209
Phone: (301) 484-0632 after 7 pm

Raymond C. Petersen..Associate Editor
9329 Joey Drive
Ellicott City, MD 21043
Phone: (301) 465-8520 after 7 pm

CONTRIBUTING EDITORS

Howard J. Cohen, Glidden-Durkee Div.
of SCM

Carl E. Minnier, Essex Community
College

Linda M. Sweeting, Towson State
University

SECTION OFFICERS

Ernest L. Silversmith.....Chairman
Chemistry Department
Morgan State University
Baltimore, MD 21239

James Leslie.....Chairman-Elect
University of Maryland
636 W. Lombard Street
Baltimore, MD 21201

Robert Schneider.....Secretary
Beckman Instruments Inc.
1021 St. Michael Road
Mt. Airy, MD 21771

Howard Cohen.....Treasurer
Glidden-Durkee Div. of SCM
3901 Hawkins Point Road
Baltimore, MD 21226

COUNCILLORS

Donald E. Jones F. Timothy Parr
Carl Minnier David Roswell

IF YOU CHANGE YOUR ADDRESS...

Please DO NOT notify the Editor of the *Chesapeake Chemist*, but send your new and old addresses to: The American Chemical Society, 1155 Sixteenth Street, N.W., Washington, D.C. 20036. The Maryland Section will then be notified.

COMMITTEE CHAIRPEOPLE - 1977

Awards and National Nominations
.....Joyce J. Kaufman
The Johns Hopkins University
366-3300

Chemical Education.....Melvin Miller
Loyola College
323-1010

Program.....Ernest F. Silversmith
Morgan State University
444-3216

House.....Ronald Kassel
Edgewood Arsenal
671-2761

Member Assistance....Joseph Cogliano
W. R. Grace & Co.
531-5711

Public Relations.....Carl Minnier
Essex Community College
682-6000, X 513

Membership.....Frances Hummel
Alcolac, Inc.
355-2600

Publicity.....Dave Roswell
.....Norbert Zaczek
Loyola College
323-1010

Remsen Award.....Brown Murr
The Johns Hopkins University
366-3300

Finance.....William Stahl
377-8022

BUSINESS MANAGER

Kent Zeller
McCormick & Co., Inc.
Hunt Valley, Maryland 21031
Phone: 667-7432

ALTERNATE COUNCILLORS

Clara I. Adams Patrick Callery
Alvin Bober Thomas Simmons

The Chesapeake Chemist is published monthly September through May by the Maryland Section of the American Chemical Society. Address editorial comments to Eli Freedman, 2411 Diana Road, Baltimore, Md. 21209. Send advertising copy and inquires to Kent R. Zeller, McCormick and Co., Inc., 204 Wight Avenue, Hunt Valley, Md. 21031. The Maryland Section is not responsible for opinions expressed herein. Editorials express the opinions only of their authors. The Editor is responsible for all unsigned material.

TREASURER'S REPORT: JAN. 1 - DEC. 31, 1976

CASH ON HAND IN BANKS, JANUARY 1, 1976	
<i>The Chesapeake Chemist</i> Account	\$ 996.42
Equitable Trust	3,094.25
Loyola Federal	<u>4,757.11</u>
TOTAL	\$8,847.78

RECEIPTS	
ACS Allotment	\$ 4,553.00
ACS Commissions	22.50
Local Dues	1,844.50
Dinner Meetings	
Payment for Dinners	\$ 3,269.30
Bar Support by Firms	190.00
ACS Councilor Refund	439.63
Advertising in <i>The Chesapeake Chemist</i>	1,426.63
Interest on Savings Account	420.47
Miscellaneous	<u>10.27</u>
TOTAL	<u>\$12,176.30</u>

CASH ON HAND + RECEIPTS \$21,024.08

DISBURSEMENTS	
Administrative	
Office Supplies	\$ 539.51
Clerical Help	79.60
Officers' Expenses	279.04
Miscellaneous	<u>214.84</u>
TOTAL	\$ 1,112.99

Committees	
Education	\$ 247.15
Publicity	160.00
Membership	<u>23.40</u>
TOTAL	\$ 430.55

Meetings	
Speakers' Expenses	\$ 413.93
Dinner Costs	5,224.11
Miscellaneous	<u>360.08</u>
TOTAL	\$ 5,998.12

Councilors' Travel Expenses	\$ 585.75
<i>The Chesapeake Chemist</i>	4,256.02
Awards	<u>590.50</u>
TOTAL	<u>\$ 5,432.27</u>

TOTAL DISBURSEMENTS \$12,973.93

CASH ON HAND IN BANKS, DECEMBER 31, 1976	
Union Trust Checking Account	\$ 1,505.54
Union Trust (ESP Account)	864.06
Loyola Federal	5,013.52
<i>The Chesapeake Chemist</i> Account	<u>667.03</u>
TOTAL	<u>\$ 8,050.15</u>

CASH ON HAND + DISBURSEMENTS \$21,024.08

Silver Findings

TO OUR COCKTAIL HOUR SPONSORS: THANK YOU!

We want to take this opportunity to thank the following firms and their representatives for sponsoring the cocktail hour at our monthly dinner meetings during the past year:

Beckman Instruments, Inc.
11961 Tech Road
Silver Spring, Maryland 20904
Representative: Robert Schneider

Fisher Scientific Company
7722 Fenton Street
Silver Spring, Maryland 20910
Representative: Louis Sacchetti

Macalester Bicknell Company
North and Depot Streets
Millville, New Jersey 08332
Representatives: Robert Gerrity and Clarence E. Manaresi

We deeply appreciate the cooperation of these firms.

FOUR 50-YEAR MEMBERS HONORED

Four members of the Maryland Section, J. L. Fitzgerald Dunning, William L. Foohey, C. B. Marquand, and Samuel B. Schofield, were honored on their fiftieth year of membership in the ACS.

At the February meeting, Chairman Ernest Silversmith presented Dr. Marquand with mementoes of this anniversary, an engrossed certificate, a gold-embossed meeting pass, and a 50-year pin. The same tokens will be mailed to the others, who were unable to attend.

----- TEAR-OUT DINNER RESERVATION FORM -----

Enclosed is \$_____ (\$7.50 per person)* for dinner reservations at the Faculty Club, The Johns Hopkins University, for the following persons:

NAME	(Please print or type)	AFFILIATION
_____	_____	_____
_____	_____	_____

Please make check payable to Maryland Section, ACS, and mail together with reservation form to Dr. Ernest Silversmith, 2607 Taney Road, Baltimore, MD 21209. Or phone 444-3216 (8-4 weekdays), 358-0619 (evenings & weekends).

Return by May 13

THE 32nd REMSEN LECTURER

RONALD BRESLOW

Ronald Breslow, the thirty-second Remsen Lecturer, was born in Rahway, New Jersey on March 14, 1931. He received the A.B. *summa cum laude* in Chemistry at Harvard University in 1952, an A.M. in Biochemistry at Harvard (awarded in 1954), and a Ph.D. in Organic Chemistry at Harvard in 1955 (awarded 1956). He spent 1955-1956 at Cambridge University as a National Research Fellow with Sir Alexander Todd and, in 1956, joined the staff at Columbia University where he is now the S.L. Mitchill Professor of Chemistry.

He has held a Sloan Fellowship (1961-1963), and has been elected to the National Academy of Sciences (1966), the American Academy of Arts and Sciences (1967), the Executive Committee of the Organic Division ACS (1966), the Editorial Board of *Organic Syntheses* (1965), the Board of Editors of the *Journal of Organic Chemistry* (1968), as well as the Board of Editors of *Bioorganic Chemistry* (1971). He has received the ACS Award in Pure Chemistry (1966), the Fresenius Award of P.L.U. (1966), the Mark Van Doren Medal (1969), the Baekeland Medal (1969), and the Harrison Howe Award (1974). He was Chairman of the Organic Division of the American Chemical Society (1970) and is Chairman of the Division of Chemistry of the National Academy of Sciences (1974-1977).

Abstract of Dr. Breslow's Talk

ANTIAROMATIC IONS AND RADICALS

One of the most intriguing predictions of molecular quantum mechanics is antiaromaticity, the destabilization of certain cyclic molecules because of conjugative interaction within the rings. The basic system in which to find such a phenomenon is the conjugated cyclopropenyl anion, a cyclic 4π electron system in which conjugation is predicted to be strongly destabilizing. On the other hand, the real molecule may well have found some conformation by which this effect could be minimized or eliminated. Early evidence on substituted cyclopropenyl anions strongly indicated that they were conjugatively destabilized, but much interest attaches to the parent cyclopropenyl anion and simple alkyl derivatives. In order to look for conjugative effects in these systems, it was necessary to devise a novel way to generate these extremely unstable species and at the same time to measure an appropriate energy associated with their formation. This problem has been solved with special electrochemical techniques that permit the reversible formation of extremely unstable species in solution, and a simultaneous measurement of the associated energy changes. Using these electrochemical techniques it has been possible to determine the basicity of cyclopropenyl anion and a number of simple derivatives, and it turns out that these are the most basic hydrocarbon anions yet known. Similarly, these techniques permit the generation of simple cyclopropenyl radicals and measurements of their energy. The cyclopropenyl radical is a 3π electron system for which the prediction of destabilization from quantum mechanics is less strong, but the experimental evidence suggests that there is indeed conjugative destabilization in this system as well. The extension of these findings to other antiaromatic systems will also be described.

THE 32nd REMSEN LECTURE



DR. RONALD BRESLOW

DATE AND TIME:

Wednesday, May 18, 1977
8:30 pm

PLACE:

Remsen Hall, Room 101,
Homewood Campus of
The Johns Hopkins University

SPEAKER:

Dr. RONALD BRESLOW
Professor of Chemistry,
Columbia University

SUBJECT:

"Antiaromatic Ions and Radicals"

COCKTAILS AND DINNER:

The Johns Hopkins University
Faculty Club

Cocktails: 6:00 pm (open bar)
Dinner : 6:30 pm
Cost : \$7.50

Reservations are necessary for the dinner, and must be made with

Dr. Ernest Silversmith

Use the form on p. 5

Or phone: 444-3216 (8-4 weekdays)
358-0619 (evenings &
weekends)
before May 12, 1977

Ask for ACS RESERVATIONS

SOCIAL HOUR:

Refreshments will be served in the Garrett Room of the Milton S. Eisenhower Library (adjacent to Remsen Hall) after the lecture) ALL ARE WELCOME.

PARKING:

Free parking is available in any legal place on the campus. Do not park on roadways.

It is not necessary to be a member of the American Chemical Society to attend either the dinner or the talk. You are welcome to the lecture without going to the dinner.

NEW MEMBERS OF THE MARYLAND SECTION

Paul Timothy Bailey
USAMRIID Phys Sci Div
Ft Detrick
Frederick, MD 21701

Jesse John Barkley, Jr.
103 W. 14th Street
Frederick, MD 21701

Joseph Peter Barone
6037 Majors Lane Apt 5
Columbia, MD 21045

Andrew Lee Bates
5345-2 Harpers Farm Rd
Columbia, MD 21044

Kathy Benveniste
Univ of Maryland
Sch of Dentistry
Baltimore, MD 21201

Ramachandra K. Bhat*
Chem. Dept. UMBC
5401 Wilkens Ave
Baltimore, MD 21228

Keith Owen Bodrero
302 Steven Circle Apt 1D
Aberdeen, MD 21001

Arthur M. Brant
10319B Malcom Circle
Cockeysville, MD 21030

Alethia Mae Brown
5237 Linden Hgts Avenue
Baltimore, MD 21215

Peter A. Bushong
5705 High Tor Hill
Columbia, MD 21045

Donald N. Cambell
Bendix Corp
1400 Taylor Ave
Baltimore, MD 21204

Steven B. Chall
8883 Lincoln Street
Savage, MD 20863

Dorothy A. Cichra
JHU Chem Dept
Baltimore, MD 21218

**This person's name
appeared earlier, but was
inadvertently misspelled.*

Mark Civera
Dept of Mod Lang
UMBC
5401 Wilkens Ave
Baltimore, MD 21228

William Henry Collins
10036-F Hill Green Cir
Cockeysville, MD 21030

Gerald Raymond Conner
2481 Wintergreen Way
Gambrills, MD 21054

John M. Corliss
1211 W. Old Cold Spring
Lane
Baltimore, MD 21209

Douglas Floyd Covey
Dept of Pharmacology
725 N. Wolfe Street
Baltimore, MD 21205

Sylvia K. Daley
846 Bosley Avenue
Towson, MD 21204

Marcia Royce Dresner*
121 Otis Drive
Severn, MD 21144

Beth Ellen Drysdale
Dept Physiol Chem
JHU School of Medicine
725 N. Wolfe Street
Baltimore, MD 21205

Harold F. Eccleston
10810 Vista Road
Simpsonville, MD 21150

Bradley Park Etherton
1034 Woodson Rd Apt F
Baltimore, MD 21212

Frank Carlton Fiery
330 South Stricker St
Baltimore, MD 21223

Robert Alan Fifer
Ballistic Res Lab
Aberdeen Proving Grd
MD 21005

Dale J. Fisher
6319 Golden Hook
Columbia, MD 21043

Richard Francis Fairley
507 N. East Avenue
Baltimore, MD 21205

William Jackson Frazee
Dept of Chem
Johns Hopkins Uni
Baltimore, MD 21218

Harold C. Garber Jr.
P.O. Box 527
Brooklandville,
MD 21022

Gurdev S. Ghangas
JHU Dept of Biochem
615 N. Wolfe Street
Baltimore, MD 21205

Raymond Edward Gibson
2850 N. Charles Street
Baltimore, MD 21218

Garth Robert Griffiths
L. J. Reed Medical Hall
1620 McElderry Street
Baltimore, MD 21205

Clint Hatton, Jr.
Box 1007 Rd 8
Elkton, MD 21921

Austin Norman Heller
10B 2 President Point
Drive
Annapolis, MD 21403

William A. Henderson, Jr.
Med Lab WRAMC
Ft Meade, MD 20755

John Melville Hoffmann
Chemistry Department
U.S. Naval Academy
Annapolis, MD 21402

Michael T. Hoopes
209 Mt Vernon Avenue
Chestertown, MD 21620

Craig Alan Hoppe
4405 Laplata Ave, Apt.H
Baltimore, MD 21211

Shu Jing Caroline Hu
Johns Hopkins Univ
Chem. Dept.
Baltimore, MD 21218

Hsinkuang Huang
FCRC Proj 9
PO Box B
Frederick, MD 21701

G.M.K. Hughes
Pfizer Medical Sys
9025 Old Annapolis Rd
Columbia, MD 21045

Michael Francis Irwin
488 Martin Drive
Millersville, MD 21108

George L. Jacobs
3477 Ranger Rd
Davidsonville, MD 21035

William E. Jacobus
3902 Juniper Rd
Baltimore, MD 21218

Inam Jawed
1450 S. Rolling Rd
Baltimore, MD 21227

Howard C. Jordi
7909 S. Cartier Ct
Severn, MD 21144

Richard L. Karpel
Chemistry Dept.
UMBC
Baltimore, MD 21228

Joseph C. Kawalek, Jr.
205 S. Jefferson St. Apt 4
Frederick, MD 21701

Francis Howard Kidd, Jr.
4012 MacAlpine Court
Ellicott City, MD 21043

Phoebe Barrett Knowles
1111 Park Ave. 814
Baltimore, MD 21201

Stanley D. Koch
W. R. Grace and Co.
7379 Rte 32
Columbia, MD 21043

Sharon Sophia Krag
JHU Dept of Biochem
615 N. Wolfe Street
Baltimore, MD 21205

Robert Wilson Krebs
412 B Hidden Brook Drive
Glen Burnie, MD 21061

Stephen Krogsrud
USAOC and S
Box 875 SOC
Aberdeen Proving Grd
MD 21005

Edwin C. Kuehner
1730 Garrett Rd
Manchester, MD 21102

Linda Diana Lauer
445 Shore Acres Rd
Apt 1B
Arnold, MD 21012

John C. Leak
33 Chesapeake Ave Rte 7
Annapolis, MD 21403

Charles Pell Lewis III
976 Radcliffe Rd
Towson, MD 21204

Yuhpyng Liang
McCoy Hall Apt 416
3401 N. Charles St
Baltimore, MD 21218

Albert Lightbody
8325 F Mindale Cir
Baltimore, MD 21207

William Lijinsky
Frederick Cancer Res
Ctr, POB B
Frederick, MD 21701

G. K. Lindsay
Building 100
Microbiol. Assoc.
Walkersville, MD 21793

George L. Long
1175 Bayview Vista
Annapolis, MD 21401

James Douglas Lowry
Belverdere Road
Rd 2 Box 158
Port Deposit, MD 21904

Karen A. Magnus
Dept Biophysics
The Johns Hopkins Univ
Baltimore, MD 21218

Mark Alan Malcolm
710 S. Stokes Street
Havre De Grace, MD 21078

J. S. Mauer
Box 64A Rt 1
Worton, MD 21678

Grazina M. McClure
12237 Mt. Albert Road
Ellicott City, MD 21043

Robert William Meier
USAEHA-ECD
Aberdeen Proving Ground
MD 21010

Martin Bradley Meyers
Edgewater Apts
191 Woodvale Rd
Baltimore, MD 21221

Richard S. Miller
1749 Dana Street
Crofton, MD 21113

Richard Rockwell Mine-
singer
5665 Vantage Point Rd
Columbia, MD 21044

Ramsharan D. Mittal
Chemistry Dept.
The Johns Hopkins Univ
Baltimore, MD 21218

Henry E. Montgomery, Jr.
Chemistry Dept
US Naval Academy
Annapolis, MD 21402

Mark Lee Morris
7928 A Silverleaf Ct
Glen Burnie, MD 21061

David Warren Naegeli
c/o John Ferdock
5978 Turnabout Lane 10
Columbia, MD 21044

David Francis Nava
500 Lisa Ave
Odenton, MD 21113

Alan Scott Neese
4101 Roland Ave
Baltimore, MD 21211

Paul E. Nicholas
6686 Possum Ct
Columbia, MD 21045

...continued on next page

GEORGE W. McLAREN, Jr.

George W. McLaren, Jr. passed away on January 22, 1977. He first joined the American Chemical Society in 1942.

...continued from preceding page

Carl Johann Nielsen
Biomarkers Program
Cancer Res Center POB B
Frederick, MD 21701

David G. Van Ormer
USA Environ Hygiene
Fort Meade, MD 20755

Ching Nan Ou
Dept of Biochemistry
Johns Hopkins University
Baltimore, MD 21205

George Gilbert Outterson
65260 Hawthorne Drive
Edgewood, MD 21040

R. Padmanabhan
Dept Bio Chem
660 W. Redwood St.
Baltimore, MD 21201

Mark B. Perkal
Pharmakinetix Inc.
104 East Street
Baltimore, MD 21218

Carmen Bautista Pili
1025 Martha Ct No.3D
Annapolis, MD 21403

Alan J. Pribula
Towson State University
Dept. of Chemistry
Baltimore, MD 21204

Gerald J. Putterman
POB B
Frederick, MD 21701

Richard Leo Ranieri
W. R. Grace Co.
7379 Rte 32
Columbia, MD 21044

Bail L. Rao
1111 Park Avenue
Apt 1514
Baltimore, MD 21201

Albert I. Rapp
1401 Severn St.
Baltimore, MD 21230

Marie K. Razulis
9907 Oakglen Rd
Randallstown, MD 21133

Peter Ren
U of M School of Med.
660 W. Redwood St.
Baltimore, MD 21201

David B. Richardson
9040 Town & Country Blvd
Ellicott City, MD 21043

William Loren Riffle
6672 Hawkeye Run
Columbia, MD 21044

Nilde G. Robertson
2415 Mullinix Mill Rd
Mount Airy, MD 21771

Robert C. Rosenberg
9466 Greco Garth
Columbia, MD 21045

Charles Robert Rowe
11369 Johns Hopkins Rd
Clarksville, MD 21029

Elizabeth Snow Rowe
1515 McElderry Street
Baltimore, MD 21205

Raymond Walter Ruddon,
Jr.
Biological Markers
Frederick Cancer Res Ctr
PO Box B
Frederick, MD 21701

Bourdon Francis Scribner
123 Peppercorn Place
Edgewater, MD 21037

George M. Singer
Frederick Cancer Res
Ctr, POB B
Frederick, MD 21701

O. W. Sherwood
Rt. 1 Box 143 4
Ijamsville, MD 21754

Ramachandra Sesu Shetty
1202 Martin Court
Martin Drive
Baltimore, MD 21229

Bernard Siegel
2909 Fallstaff Rd
Apt 38
Baltimore, MD 21209

Bruce Robert Simperts
3637 Water Tank Rd
Manchester, MD 21102

Stanley S. Smith
8915 Maplebrook Rd
Randallstown, MD 21133

Shiv Kumar Soni
6711 Hawkeye Run
Columbia, MD 21044

David Thomas Sowa
2850 N. Charles St
Apt 12B
Baltimore, MD 21218

John Stewart Strehlau
5476 Cedar Ln Apt B3
Columbia, MD 21044

Harvey I. Stryker
Kentmore Park
Kennedyville, MD 21645

M. Patricia Sullivan
113 Dumbarton Rd
Baltimore, MD 21212

Robert D. Sullivan
c/o The Wilson
RD 2 Box 196 Shady Bch
North East, MD 21901

Samuel E. Susman
1316 Turret Rd
Bel Air, MD 21014

To be concluded in a future issue

THE CHESAPEAKE CHEMIST

Nominations Sought For Maryland Chemist Award

Members of the Maryland Section are invited to submit nominations for the 1976 MARYLAND CHEMIST AWARD, which will be presented at the December meeting of the Maryland Section.

The nominee must be a member of the American Chemical Society and of the Maryland Section. The meritorious achievement of the nominee shall have been accomplished within the five years previous to that in which the award is given. A previous recipient of the award is not eligible for renomination.

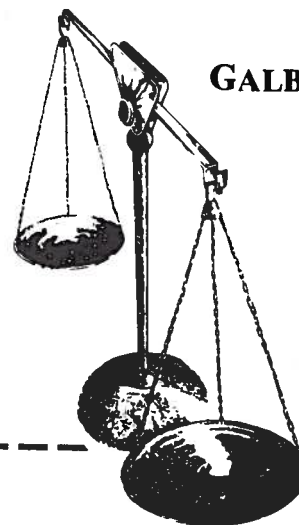
Nominations may be submitted in any format, but must include, in addition to the name and present position of the nominee, specific reasons why this Section Member should be honored.

Nominations should be sent to

Dr. Joyce J. Kaufman
Chairman, Awards Committee
Department of Chemistry
The Johns Hopkins University
Baltimore, MD 21218

Nominations must be received by August 5, 1977, in order to allow the Committee sufficient time for its deliberations.

Please Patronize Our Advertisers



GALBRAITH LABS IS WEIGH AHEAD!

Galbraith Laboratories' proven ability is "weigh" ahead of its competition. Eight chemists and twenty-five technicians carry out over 150,000 microanalyses a year, working with the latest equipment housed in 10,000 square feet of temperature-controlled space. But size has never proven to be an accurate measure for quality, that is why Galbraith Laboratories continually strives to maintain and excel in fast and accurate microanalytical work! Galbraith Labs now serves over a thousand colleges and universities, industrial firms, research foundations, hospitals and government agencies.



GALBRAITH LABORATORIES, INC.
P.O. Box 4187-2323 Sycamore Drive
Knoxville, TN. 37921-615/546-1335

For more detailed information on how Galbraith Labs is "weigh" ahead, complete and return this form:

Name _____
Company _____
Address _____
City _____ State _____ Zip _____

The Chesapeake Chemist
University of Maryland
636 W. Lombard Street
Baltimore, Maryland 21201

Dr. Yale Howard Caplan
8100 Tapscott Court
Pikesville, Md. 21203

Nonprofit Org.
U. S. Postage
PAID
Baltimore, Md.
Permit No. 2917

PLEASE DO NOT DELAY — DATED NOTICE INSIDE



ANALYTICAL SERVICE LAB
P. O. BOX 3536, WILM., DE 19807
PHONE 302 - 998-1184, 998-1185

SPECIALISTS IN MICROSTRUCTURAL ANALYSIS

10 Years Of Unexcelled Services

- * **DIFFERENTIAL SCANNING CALORIMETRY**
Thermal Transition and Thermo-Dynamic Properties
- * **SCANNING ELECTRON MICROSCOPY**
High resolution (100A) 3 dimensional microscopy
- * **TRANSMISSION ELECTRON MICROSCOPY**
High resolution (10A) microscopy of replicas and thin films
- * **OPTICAL MICROSCOPY**
Reflection, transmission, polarized, phase contrast
- * **QUANTITATIVE IMAGE ANALYSIS (STEREOLOGY)**
Particle or feature size and size distribution analysis
- * **ELECTRON PROBE X-RAY MICROANALYSIS**
Qualitative and quantitative elemental (>Be) microanalysis
- * **ELECTRON SPECTROSCOPY FOR CHEMICAL ANALYSIS**
Analysis of thin (25-50A) surface films
- * **OPTICAL EMISSION SPECTROSCOPY**
Semi quantitative and quantitative analysis of trace elements
- * **X-RAY AND ELECTRON DIFFRACTION**
Identification of crystalline compounds
- * **MICRO-HARDNESS TESTING (KNH & DPH)**

All the above services are in house capabilities

**Special Proprietary Sample Preparation Techniques
Have Been Devised To Optimize The Analytical Data**

For Further Information Contact J. F. Ficca Jr.