

Future Research

This is a more sober message than usual in this column.

Electroanalytical sciences impact on the sciences of many other chemical and materials disciplines as well as contributing to the analytical chemistry of health and environmental areas. I believe that the results of electroanalytical research over the past decades have been valuable to science and society and that it is important that such research be possible in the future. It is well to remember that this research, the contributions of electroanalytical chemists in universities, industry, and national laboratories, has been made possible by the past pattern and philosophy of federal financial support of basic and applied research activities. The federal support agencies have operated under policies of research evaluation by technical peer review and of a mix of support of individual and collaborative and of basic and applied research.

This message is to call your attention to current government studies of the health of research in the U.S. One of these, a 7/92 report from the Congressional Committee on Science, Space, and Technology, was recently discussed in *Chemical and Engineering News*. Language in that report is based on the premise that the current research system is under stress and that changes should be made to attain greater federal oversight and managerial assessment of research performance. Other studies are on-going at the NSF and the NIH. I believe in the present atmosphere of seeking the keys to "competitiveness" and a more general public suspicion of science, that the agenda of these studies should be taken most seriously. They have the potential to provoke quite fundamental changes in the pattern and philosophy of federal support of science. I urge the SEAC membership to follow their progress.

Royce W. Murray

Editorial

My excuse, if needed, for the lateness of this issue is that I was waiting for the program for Plttcon '93 to arrive, since only one of the SEAC members (Anna Brajter-Toth) ever remembers to inform me of his/her symposium agenda. As usual, there were quite a few of these Individuals, including some repeat offenders. In the spirit of the season, I shall restrain myself from the usual diatribe.

After last Issue's news about the deaths of Harvey Diehl, John K. Taylor and Buck Rogers, I had hoped that we would be spared any more visits to our ranks by the Grim Reaper. But again I must sadly report the demise of two very well-known and admired scientists whose work has had a great impact on the field of electroanalytical chemistry. In August, word was received that Joe Jordan had passed away very quickly after being diagnosed as having abdominal cancer. While writing this editorial, I received word that Willi Simon, who suffered a stroke during last year's Plttcon meeting, also died unexpectedly. I have no details as to the cause, except that it may have been another stroke. This news also caught me by complete surprise since, just a month ago in Hungary, one of his dose Swiss associates indicated that he was showing marked improvement. I have asked close friends and colleagues of Professors Jordan and Simon to prepare some thoughts on these exceptional Individuals for this Issue.

As you may recall, at the SEAC Board meeting held during Plttcon '92, the subject of a new logo for the Society was revisited. As usual, the only entries to our logo contest were the ones I had mentioned, Mike Elliot's and mine. I guess everyone else is saving all of his/her creative juices for research.

Also since no response was received (surprisel!) concerning the new appearance of the newsletter, I assume that everyone is pleased, if not downright overwhelmed, by the artistry of the new format.

You will note that some of the announcements may be past their deadlines (depending on how quickly this issue of the newsletter gets printed), and I apologize to those who sent in these items. I'll try to be more timely in the future.

To end on a positive note, I call your attention to the Kudos section in which three of our brethren, Royce, Bob and Royce, have been appropriately honored for their work.

Dick Durst

Kudos

Once again, several of our illustrious members have been recognized for their scientific achievements. Royce W. Murray, SEAC President, has been elected to the American Academy of Arts and Sciences for his research on chemically modified electrodes. Bob Osteryoung will receive the Max Bredig Award in Molten Salt Chemistry from The Electrochemical Society for his electrochemical studies in fused salts. Royce Engstrom will receive the NSF-sponsored 1992 Ernest L. Buckley Award for his research on the application of microelectrodes to medical and environmental analysis. Congratulations.

Also, once again, these are awards that I came across by happenstance. Please write me if you get an award or if you know of a colleague who has received an award. I don't want to miss anyone.

**The Society For
Electroanalytical
Chemistry**

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C. N. Reilley Award Nominations Solicited

Nominations for the 1994 C.N. Reilley Award are hereby solicited. Nominations should include a letter of nomination describing the Individual's significant contributions to electroanalytical chemistry, at least two seconding letters of support, and a curriculum vitae for the Individual. All nomination materials will be retained by SEAC.

Once nominated, any Individual will be considered for the Reilley Award for three years without being renominated. The submission of any supporting information or a renomination is welcome at any time, but the decision on the 1994 Award shall be based upon the material which is available to the Award Committee on March 15, 1993. All nomination materials should be sent to:

Professor Royce C. Engstrom
SEAC-Reilley Award Committee
Department of Chemistry
University of South Dakota
Vermillion, SD 57069

PREVIOUS REILLEY AWARDEES

1984 Allen J. Bard
University of Texas

1985 Ralph N. Adams
University of Kansas

1996 Fred C. Anson
California Institute of Technology

1987 Robert A. Osteryoung
SUNY Buffalo

1988 Royce W. Murray
University of North Carolina

1989 Theodore Kuwana
University of Kansas

1990 Jean-Michel Saveant
Université de Paris VII

1991 Stanley Bruckenstein
SUNY Buffalo

1992 Stephen Feldberg
Brookhaven National Laboratory

1993 Dennis Evans
University of Delaware

SEAC Young Investigator Award Nominations Solicited

SEAC will make its first Young Investigator Awards in 1993 in recognition

New Addresses

Brian Balazs had moved from Fred Anson's lab at Caltech to:
Lawrence Livermore National Lab
Mall Code L-370
PO Box 808
Livermore, CA 94550
tel. 5 1 0-443-8303

Dear Dick,

Please change my mailing address to
Dow Chemical
PO Box 1398
Plattsburg, CA 94585
tel. 5104324403

I thought that the current newsletter looked very sharp. My compliments to you on your continuing efforts to improve the newsletter.

Sincerely,
Barbara Serr

Michael Freund's new address is:

Division of Chemistry and
Chemical Engineering
Mail Code 127-72
California **Institute** of Technology
Pasadena, CA 91125
E-mail address

internet

MFREUND@ROMEO.CALTECH.EDU

bitnet

MFREUND@CITROMEO.BITNET

Phone: (818) 358-3984

Dick,

Hill I am a relatively recent SEAC member. I joined about a year ago while I was a grad student at Boston College. I have recently graduated (yeah!) with my Ph.D. and have moved. I wanted to inform SEAC of my new address.

SEAC Logo

As I wrote in our last newsletter, "our Bylaws state that the '...Directors shall provide a corporate seal, which shall be in the form of a circle and shall have inscribed thereon the name of the Society and the words and figures, incorporated in 1984, State of Indiana.'" As Joe Maloy pointed out, the currently used logo is not in compliance with this requirement and also some members do not like the electrified beaker design.

I would like to start by suggesting a couple of ideas I proposed back in 1988: a logo based on the very recognizable cyclic voltammogram for the redox processes occurring on platinum in a depolarizer-free aqueous solution, or perhaps

My address is:
Dr. Sara Sawtelle
2885 Barbara Circle East #3
Memphis, TN 38128

I can also be reached at Memphis State University Chemistry Department and through the VAX Internet address "SSAWTELLE@MEMSTVX1.MEMSTVX1.MEMST.EDU." This address will only be valid for about 1 year; I will update the situation when I have moved. I am only filling a 1-year position here teaching quantitative analysis.

Best wishes.
Sara Sawtelle

Dear Dick:

I have graduated from Penn State and moved 80 miles east to Bucknell University. Please update the mailing list to reflect this. My new mailing address is:

Timothy G. Strein
Department of Chemistry
Bucknell University
Lewisburg, PA 17837

Thanks!
Tim

Dear Colleagues,

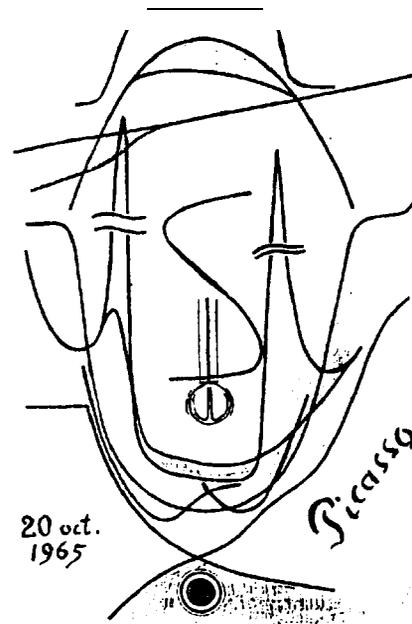
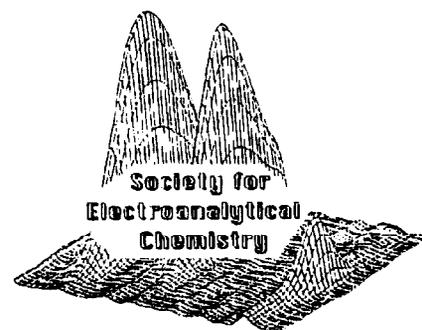
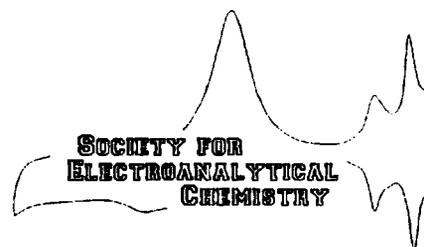
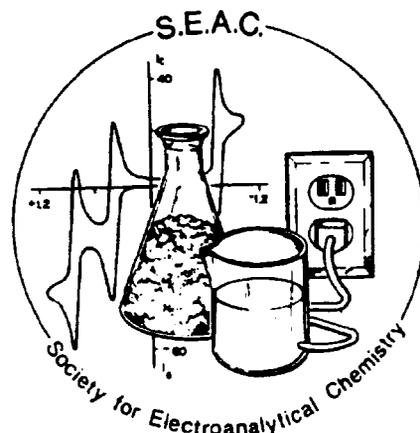
This is to inform you that since April, 1992, I have moved from Kyoto University to a new university in Fukui (about one and half hour by train from Kyoto). My new address is

Professor Mitsugi Senda
Department of Bioscience
Faculty of Biotechnology
Fukui Prefectural University
Matsuoka-cho, Fukui 910-11
JAPAN

something jazzier such as a 3-D chronovoltammogram (a la the Osteryoungs). Another design, a copy of a sketch made by Picasso for Frumkin, was sent in by Mike Elliot. Of course the designs shown will still need the requisite wording encircling the figure. These designs, along with the current logo, will be presented to the SEAC Board of Directors at the annual meeting at Pittcon '93. I'm sure you'll be sitting on pins and needles waiting to hear the result of this momentous decision; I know I will!

if you have any other ideas, send them to me before Pittcon; and I shall submit to the Board all designs received by then.

2-29-90 Dick D... -



Obituaries

I thank Garry Rechnitz for preparing, on very short notice, the tribute to **Willi** Simon. I also thank Karl Kadish for **providing** the preface he wrote on Joe Jordan **which** appeared in the special Issue of *Analytica Chimica Acta* 251, 1-2 (1991) in honor of Joe's **retirement** in 1990. (I have taken the **editorial liberty** of shortening this **article** somewhat.)

I would just **like** to add, as a personal note, that both of these **exceptional** individuals were good friends of mine and **inspiring** colleagues. I shall **especially** remember both of them for their enthusiasm and dynamism **which** very clearly came across to anyone speaking to them or **listening** to one of their lectures. They will be missed.

Professor **Wilhelm Simon**

In Memoriam

The world **scientific** community recently suffered an irreplaceable loss with the **untimely** death of **Wilhelm** Simon of the Swiss Federal Institute of Technology (ETH). **Willi** was first **stricken** while attending the 1992 Pittsburgh Conference in New Orleans, seemed to be making a gradual recovery, but succumbed in **mid-November**.

Simon's **scientific contributions** were manifold. Indeed, but he was perhaps best known for his long and **prolific** research program on the **design** and use of ionophores for analytical purposes. Some of his **studies** were of great practical importance. For example, his laboratory was among the first to develop the valinomycin-based potassium ion **electrode** having high **selectivity** over sodium ions. **Devices** based on **this principle** are **still** very **widely** used for **clinical** and analytical measurement purposes.

While Simon's group developed an impressive range of new ionophores for **both** anions and cations, he was not content merely to synthesize and characterize new ion carriers, but also contributed greatly to the understanding of the mechanistic **intricacies** involved through an elegant and **illuminating theoretical** framework.

Those who knew **Willi** personally will fondly remember his wit and charm as well as his legendary capacity for world travel. He **will** be sorely **missed!**

Garry A. Rechnitz
University of Hawaii

Professor **Joseph Jordan**

In Memoriam

Dr. Joseph Jordan was born in 1919 in **Romania** and obtained his Ph.D. degree

at the Hebrew University in Jerusalem in 1945. He was a Research Fellow with James Lingane at Harvard in 1950 and then spent three years with I.M. Kolthoff at the University of Minnesota (1951-1954) prior to joining Penn State **University** as an Assistant Professor in 1954. He was promoted to Associate Professor in 1957 and to Full Professor in 1960. He has directed the research of over 60 Ph.D. candidates and 20 postdoctoral fellows at Penn State University, and more than three dozen of these **individuals** now hold professorial ranks at various universities in the USA and overseas.

Professor Jordan has authored or coauthored more than 150 research **publications, including** a number of authoritative chapters in treatises and reference books. His interests have encompassed polarography and hydrodynamic voltammetry, kinetics of electrode reactions, mechanisms of electron transfer, thermochemical **titrations, titration** calorimetry, **thermochemistry** of immunological and enzymatic reactions, the theory of gas **chromatographic** thermal conductivity detectors, **electrochemistry** and **thermochemistry** in fused **salts**, bioelectroanalytical **modeling, enzymatic** chronoamperometry, bioanalytical sensors, the analytical **chemistry** of sulfur compounds for new coal conversion and coal-based energy technologies and the electrochemistry of photovoltaic cells for solar energy **conversion**.

On a global scale, Jordan is best known for **pioneering** important developments in two **distinct fields, viz, enthalpic** analysis and bioelectrochemistry. **He is** an **internationally** recognized authority in both of these areas and has been featured as an **invited** lecturer at numerous **meetings** and **universities** in the USA and overseas. Jordan has held visiting professorships at the University of California, Berkeley (1959), the **Swiss** Federal Institute of Technology (1961-1962), Cornell **University** (1965) the Pierre et **Marie Curie University** of Paris (1966-1969; 1975-1976) and the **University** of Jodhpur in India (1966-1967). He has also held prestigious endowed lectureships at the Swiss Federal Institute of Technology and at the Hebrew **University**, Jerusalem, Israel. He was **chairman** (1967-1971) of the **Commission** on Electrochemistry of the International **Union** of Pure and **Applied** Chemistry (**IUPAC**) and a titular member of the **Physical Chemistry Division Committee**

of **IUPAC** (1969-1973). He was also a member of **IUPAC's** Commission on Electroanalytical Chemistry from 1973 to 1967, serving as secretary, chairman, and US National Representative. He was a member of **IUPAC's** Analytical Chemistry Division **Committee** and the Committee on the **Teaching** of Chemistry.

Joseph Jordan was a member of the editorial board of the journal **Analytical Letters** and has also served on the **editorial** advisory boards of **Analytical Chemistry** and **Talanta**. He was editor-in-chief of *Treatise on Titrimetry* (Marcel **Dekker**, New York) and a co-editor with Allen J. Bard and Roger Parsons of *Standard Potentials in Aqueous Solution* (Marcel **Dekker**, New York, 1965).

Joseph Jordan was elected a Fellow of the American Association for the Advancement of Science in 1964. In 1966-1969, he was awarded a Senior **Fulbright** Professorship for lecturing in France, and he **received** a similar **Fulbright** award for lecturing in India in 1966-1967. In 1976, he received the **Benedetti-Pichler** Award from the American **Microchemical** Society.

His former students **wish** to congratulate him on his 37 years of **service** to Pennsylvania State **University** and the Science of **Analytical** Chemistry. We, his students, also wish to thank **him** for his **friendship** and guidance over nearly four decades.

Karl M. Kadish
University of Houston

**SOCIETY FOR
ELECTROANALYTICAL CHEMISTRY**

ANALYSIS OF **WORKING FUND**
BUDGET FOR **FY '92**

JULY 1, 1991-JUNE 30, 1992

Working Fund Contributions	Budgeted	Actual
Pittsburgh Conference	\$3,000.00	\$3,000.00
BAS commitment	1,100.00	1,150.00
Miscellaneous	0.00	655.00
Subtotal	4,100.00	4,805.00
Annual Dues	4,800.00	4,260.00
Interest	1,900.00	2,023.00
Total	\$10,800.00	\$11,088.00

Expenses	Budgeted	Actual
Symposium n s e	\$3,500.00	\$3,000.00
Newsletter Expense	1,200.00	1,004.00
Membership Expense		
Dues collection	500.00	280.00
Membership activities	750.00	116.00
Elections	100.00	93.00
Miscellaneous	150.00	301.00
Directory	500.00	0.00
Subtotal	2,000.00	792.00
Rellley Award Expense		
Honorarium	1,500.00	1,500.00
Award Reception	1,000.00	1,016.00
Young Investigator Award	250.00	0.00
Miscellaneous	100.00	114.00
Subtotal	2,850.00	2,630.00
Allocation of Interest to Endowments	1,200.00	1,283.00
Miscellaneous	50.00	110.00
Total	\$10,800.00	\$8,819.00

WORKING FUND BALANCE

unobligated Balance on 7/1/91 = \$5,695.00

Unobligated Balance on 6/30/92 =

(\$5,965.00 + 11,088.00 - 8,819.00 = \$7,964.00)

Meetings

PITTCON '93 Symposia*
Monday Afternoon

Inside the **Single Cell**-arranged by J.V. Sweedler, University of Illinois

Voltammetric and Capillary **Electrophoretic Microsensors**: Looking at **Single Nerve Cells** from the Inside to Outside-A.G. EWING, Pennsylvania State University

Microscale Separation Instruments for Monitoring Cell Differentiation-C.A. MONNIG, University of California at Riverside

Analysis of the **Chemical Composition** of individual Human Red Blood Cells-E.S. YEUNG, Iowa State University

Continuous Nondestructive Fluorescence Imaging of Intracellular Messenger **Concentrations** in Living **Cells**-R.Y. TSIEN, University of California at San Diego

Electrochemical and Fluorescent Measurements of Chemical Dynamics at **Single Cells**-R.M. WIGHTMAN, University of North Carolina at Chapel Hill

Promising Analytical Techniques on the **Horizon**-arranged by A.J. Bard, The

University of Texas and J.F. Coetzee, University of Pittsburgh

Dedicated to the memory of L.B. (Buck) Rogers

Ultrahigh **Resolution Surface Analysis** by Scanning Tunneling Microscopy and Scanning Electrochemical **Microscopy**-A.J. BARD, The **University** of Texas

Straightening Out Hyphenated Techniques-and Possibly Eliminating the Hyphen-D. HERCULES, University of Pittsburgh

Spectrometric Measurements on the **Horizon**-G.M. HIEFTJE, University of Indiana

Mass Spectrometry of Large Molecules F.W. McLAFFERTY, Cornell University

The Future of Capillary **Electromigration Methods**-M. NOVOTNY, University of Indiana

Wednesday Morning

New Approaches to Selectivity In **(Bio)Sensors**-arranged by S.G. Weber, **University of Pittsburgh**

Novel **Anion-Selective Membrane-Based Sensors**-M.E. MEYERHOFF, University of Michigan

Calixarene-Based Receptors for **Cations** and Their **Application** In **CHEMFET-Sensors**-D.N. REINHOUDT, **University of Twente**

Biosensors Based on **Redox Polymers** and Enzymes. Progress Towards **In vivo Determination of Acetylcholine**-A.C. MICHAEL, University of Pittsburgh, M. Gargiullo

Spatially Resolved Sensing and Combined **Sensing/Imaging** with Optical **Fibers**-D.WALT, Tufts University

Towards Sensors from Enzyme Immunoassay. Designing Reagentless Enzyme Assay Probes-S.G. WEBER, **University of Pittsburgh**

Wednesday Afternoon

Charles N. Rellley Award and Young Investigator **Award**-arranged by A. Brajter-Toth, University of Florida

Award **Presentations** by R.W. Murray
Award Address: Chemical **Reactions** Associated with Electron Transfer: **Nitroalkanes** to **Bucky Balls**-D.W. EVANS, University of Delaware

A New Twist to an Old Square Scheme: An Effective Homogeneous **Cross-Reaction**-W. GEIGER, JR., University of Vermont

Optical Second Harmonic Generation Studies of **Electrochemical Liquid-Liquid Surfaces**-R.W. CORN, University of Wisconsin at Madison

Award Address: New Approaches to Highly Selective **Potentiometric** Sensor-L.G. BACHAS, University of Kentucky

Mysteries in Potentiometric Immunoassay

written by **Heinrich Meyer and Karl Cammann**, Chair of Analytical Chemistry at the University of Munster **Wilhelm-Klemm-Str. 8, D-W-4400 Munster, Germany**

In the editorial of **SEAC Communications** 9(2), 1 (1992), **Dick Durst** called for contributions of more scientific content. Therein he mentioned a column which he started in 1988 called "unexplained phenomena." This column was not continued for lack of contributions. Now this contribution may revive it. This article contains experimental results concerning the development of a direct potentiometric immunosensor. The results are unexplained in parts. Please, send useful hints for their enlightenment to the address above.

Award Address: Measurement of Stimulated Glutamate Release with Enzyme Modified Carbon Fiber Microelectrodes-W.G. KUHR, University of California-Riverside

Measurement of Electric Fields at Electrode Surfaces-D.A. BUTTRY, University of Wyoming (SEAC Annual Meeting following symposium)

Thursday Afternoon

Electrochemical Characterization of Electronic Materials-arranged by J.G. Osteryoung, North Carolina State University

Organic Charge Transfer Salts-J. OSTERYOUNG, North Carolina State University

Phase Separation of Conducting Polymers by Electrochemical Switching-K. AOKI, Fukui University

Conducting Polymers and Inorganic Semiconductors: Novel Characterization and Fabrication of Electronic Devices-N. LEWIS, California Institute of Technology

Digital Electrochemical Processing of Compound Semiconductors-J. STICKNEY, University of Georgia

Electrochemical Opportunities for Silicon Devices-B. MILLER, AT&T Bell Laboratories

*See the official Pittcon '93 program for actual presentation times.

In addition to these symposia, there will be a number of sessions at Pittcon '93 relevant to our electrochemical interests:

Monday morning and afternoon

Electrochemistry: Advances In Methodology I & II

As is well-known to most of you, for years we have been working among other things on the area of chemical and biochemical sensors. A special kind of biosensor is the immunosensor. One of our approaches of creating such an immunosensor was the following:

The instrumental setup is an electrochemical cell consisting of an ion-selective electrode (ISE) and a commercially available reference electrode with double liquid junction. The ISE is a potassium-selective PVC-membrane electrode. Its membrane consists of dibutyl sebacate and a carboxylated PVC as basis components and valinomycin as ion-selective component. The antibody, anti-Human Serum Albumin (a-HSA), is immobilized on the surface of the PVC-membrane by

Tuesday morning

Electrochemistry: Surfaces

Tuesday afternoon

Electrochemistry: Bioelectrochemistry and Sensors

Wednesday morning

Electrochemistry: Chemically Modified Electrodes

Thursday morning

Electrochemistry: Kinetics and Mechanisms

Friday morning

Electrochemistry: Environmental and Other Analysis

1993 Winter Conference on Flow Injection Analysis

The fifth annual Winter Conference on Flow Injection Analysis (WCFIA 93) will be held in Marathon, Florida Keys, January 3-6, 1993, at the Banana Bay Resort. State-of-the-art hardware and software-driven applications will be presented. The following areas will be highlighted: process chemistry, biotechnology, instrument design, new methods, atomic spectroscopy, and electrochemistry. Vendors will exhibit their latest products. Deadline for abstracts for presentation (20 or 30 minutes) and posters, and for pre-registration, is November 15, 1992.

For information, contact:

WCFIA 93

Gary D. Christian

Department of Chemistry BG-10

University of Washington

Seattle, WA 98195

Telephone: 208-543-1835

Fax: 208-885-3478

adsorption. Both electrodes are immersed in a buffered and thermostated electrolyte solution, which is filled into the double liquid junction as well. The electromotive force (EMF) of this cell is measured with a high-ohmic voltmeter.

And how does this immunosensor work? When the antigen, Human Serum Albumin (HSA), is added to the electrolyte solution, it will bind to the antibody a-HSA on the surface of the ISE. This binding will create a shift in the potential, which can be measured with the voltmeter.

And what about the results? In our laboratories we tested five different electrolytes, e.g., potassium chloride, potassium thiocyanate, potassium perchlorate, potassium benzoate and potassium picrate. But only in potassium benzoate did the addition of HSA lead to reproducible potential shifts.

An optimization of the potassium benzoate concentration is shown in Figure 1. Therefore, the concentration of potassium benzoate (in 0.1 mol/l Tris-HCl, pH 7.4) was varied whereas the HSA-addition was the same every time:

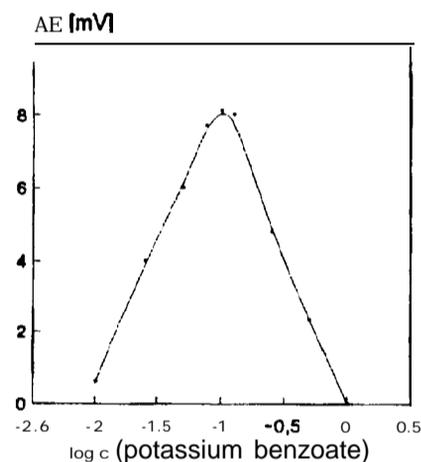


Figure 1: Optimization of the concentration of potassium benzoate.

As Figure 1 shows, a sharp maximum was obtained in 0.1 mol/l potassium benzoate solution. So all further investigations were carried out in that solution.

A calibration plot showed a detection limit of 5×10^{-8} mol/l HSA and an upper saturation at 5×10^{-6} mol/l HSA. The potential shift for these two concentration decades was about 10 mV in all. The response time was fifteen to thirty minutes depending on the corresponding change in concentration. Encouraged by this, real samples were aimed to be investigated next. And in fact HSA could be determined in a reconstituted lyophilized human serum within an error of approx. 10%.

So far, so good. But there were other results, which were not so pleasant! Figure 2 shows cross sensitivities of further proteins relative to the HSA-signal:

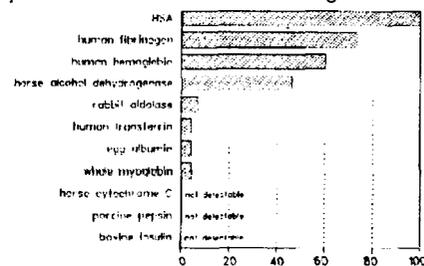


Figure 2: Cross sensitivities in % relative to the HSA-signal.

Furthermore, much to our regret, we had to realize that the addition of HSA created a signal of the same order of magnitude even when no antibody α -HSA was immobilized on the PVC-membrane of the ISE. So we had to admit to ourselves that the HSA-signal, erroneously called Immunosignal, in fact was a nonspecific signal. By this, one more wonderful dream was shattered and some more scientists were brought down to earth.

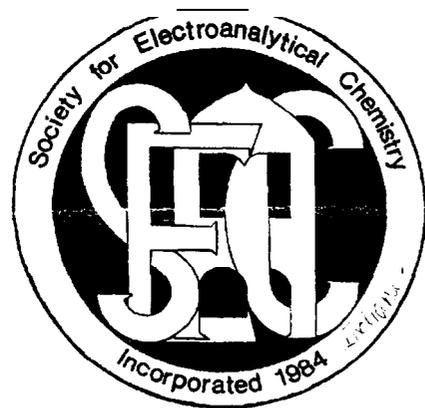
But nevertheless we ask ourselves: Why did only the electrolyte potassium benzoate create such signals? And how can we explain the sharp maximum for the optimization of the potassium benzo-

ate concentration? Furthermore: How can we explain the sequence of cross sensitivities? To that point, we can tell you: A simple dependence on the molecular weight or the electric charge according to the Isoelectric point of the proteins does not fit! And last but not least we ask ourselves: How can we explain the origin of the signals itself?

So that's it! And now we would like to invite you: Gather your brains and search for an explanation! And even if you think it is too trivial, please don't hesitate to inform us about it. Drop us a line or give us a ring and you will see us grateful for the rest of your life!

Another Logo Submission

This came in right before this issue went to press.



To Know

- To know why to do something is wisdom.
- To know how to do it is skill.
- To know when to do it is judgement.
- To strive to do it is dedication.
- To do it for the benefit of others is service.
- To want to help others is compassion.
- To do it quietly is humility.
- To get the job done is achievement.
- To get others to do all these things is LEADERSHIP.

Anon.