

SCIENCE

30 November 1973

Vol. 182, No. 4115

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



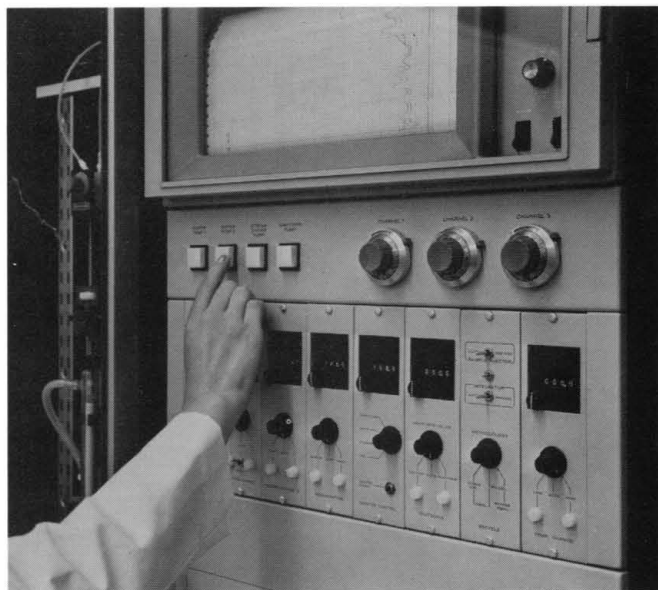
The fully automatic Model 119 is the simplest of all Amino Acid Analyzers to use

This is the sensible amino acid analyzer. It is simple in design, modestly priced, and its single-column methodology gives results which rival anything done in two columns.

The Model 119 is also versatile. It can handle a variety of methodologies, and accessories permit physiological fluid analyses and stream division. In addition, you can get your results printed directly in amino acid concentrations by using the new System AA Computing Integrator.

Simplicity in operation and maintenance. Excellent resolution and repeatability. Half the sample size required by two-column methods. 30-sample capacity for automatic over-the-weekend runs.

Find out more about these and other features that make the Model 119 the outstanding value in amino acid analyzers. Write for Data File 119-7 to Spinco Division, Beckman Instruments, Inc., 1117 California Avenue, Palo Alto, California 94304.



And the price is right: \$18,400

Beckman

INSTRUMENTS, INC.



Speaking of Science Volume 2



The second volume of this informative series of half-hour conversations between scientists and science journalists is now available. Scientists talk about their work with particular insight into a variety of topics of interest and concern. These twelve dialogues have been compiled by the AAAS and edited on to six audiotape cassettes and packaged in an attractive album.

1. The Dilemma of Prisons, Dr. John P. Conrad, Dr. Edith E. Flynn, Mr. J.D. "Sonny" Wells with William Hines
2. Science and Sociology of Weather Modification, Dr. J. Eugene Haas, Dr. Thomas F. Malone with Peter Calamai
3. New Dimensions in Human Genetics, Dr. Leon E. Rosenberg, Dr. Michael M. Kaback, with Barbara J. Culliton
4. Children and Environment: A New View, Dr. Jerome Kagan with Judy Randal and Edward Edelson
5. Energy Rationing, Dr. Earl Cook, Dr. Samuel Z. Klausner with William Hines
6. Forest Ecology and Management, Dr. Gene Likens, Dr. Arnold W. Bolle with Edward Edelson
7. Environment and Cancer, Dr. C.S. Muir, Dr. Marvin Schneiderman with Edward Edelson
8. Patterns of Discovery, Dr. Benjamin Bederson, Dr. John K. Hulm with Edward Edelson
9. The Limits of Growth: A Debate, Dr. Dennis Meadows, Dr. S. Fred Singer with David Perlman
10. Tragedy of the Commons Revisited, Dr. Garrett Hardin with Richard D. Lyons and Edward Edelson
11. Understanding Perception, Dr. Richard L. Gregory with Edward Edelson and Barbara J. Culliton
12. Exploring the Universe, Dr. Halton Arp, Dr. Herbert Friedman with Allen L. Hammond

The price of Speaking of Science Volume 2 is \$34.95 to AAAS members and \$39.95 to non members (both plus postage and handling). To order your copy of this interesting and exciting volume complete the order blank below.

Please send me _____ albums of Speaking of Science Volume 2 at \$39.95 each, \$34.95 for AAAS members. (both plus \$1.50 postage and handling).

_____ check enclosed _____ please bill me

name (please print)

address

city, state & zip

**American Association
For the Advancement
of Science**

1515 Massachusetts Avenue, N.W.
Washington, D.C. 20005
Dept. SM

30 November 1973

Volume 182, No. 4115

SCIENCE

LETTERS	Community Mental Health: <i>S. L. Auster; R. L. Procter; G. S. Sturtz</i> ; Scientists as Economists: <i>M. L. Oliphant</i>	870
EDITORIAL	Corporations and the Less Developed Countries	873
ARTICLES	The Beginnings of Metallurgy: A New Look: <i>T. A. Wertime</i>	875
	Domestication of Pulses in the Old World: <i>D. Zohary and M. Hopf</i>	887
	Departments and Disciplines: Stasis and Change: <i>R. Straus</i>	895
NEWS AND COMMENT	Energy R & D: Under Pressure, a National Policy Takes Form	898
	Astronomy in Britain: Fogged Up by Cloudy Skies and Schisms	900
	Land Use Law (II): Florida Is a Major Testing Ground	902
	The EPC: Environmental Lobby	904
RESEARCH NEWS	Glassy Metals: No Longer a Laboratory Curiosity	907
BOOK REVIEWS	The Economics of Environmental Policy, Energy, Ecology, Economy, and Economics and the Environment, <i>reviewed by K. N. Lee</i> ; Illness, Immunity, and Social Interaction, <i>S. L. Syme</i> ; Information Processing in the Visual Systems of Arthropods, <i>T. H. Goldsmith</i> ; Behaviour of Micro-Organisms, <i>E. C. Bovee</i> ; Mathematical Physiology, <i>E. O. Attinger</i> ; Steroids in Nonmammalian Vertebrates, <i>L. T. Samuels</i> ; Nuclear Magnetic Resonance in Ferro- and Antiferromagnets, <i>J. I. Budnick</i>	911
REPORTS	Excess Lead in "Rusty Rock" 66095 and Implications for an Early Lunar Differentiation: <i>P. D. Nunes and M. Tatsumoto</i>	916

BOARD OF DIRECTORS

GLENN T. SEABORG
Retiring President, Chairman

LEONARD M. RIESER
President

ROGER REVELLE
President-Elect

RICHARD H. BOLT
LEWIS M. BRANSCOMB

BARRY COMMONER
EMILIO Q. DADDARIO

CHAIRMAN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A)
Lipman Bers
F. A. Ficken

PSYCHOLOGY (J)
Carl P. Duncan
William D. Garvey

INDUSTRIAL SCIENCE (P)
Jacob E. Goldman
Jordan D. Lewis

PHYSICS (B)
Edwin M. McMillan
Rolf M. Sinclair

SOCIAL AND ECONOMIC SCIENCES (K)
Robert K. Merton
Harvey Sapolsky

EDUCATION (Q)
Gordon Swanson
Phillip R. Fordyce

CHEMISTRY (C)
Thomas E. Taylor
Leo Schubert

DENTISTRY (R)
Martin Cattoni
Sholom Pearlman

ASTRONOMY (D)
Frank D. Drake
Arlo U. Landolt

HISTORY AND PHILOSOPHY OF SCIENCE (L)
Ernest Nagel
Dudley Shapere

PHARMACEUTICAL SCIENCES (S)
William Heller
John Autian

DIVISIONS

ALASKA DIVISION
Gunter E. Weller
President
Irma Duncan
Executive Secretary

PACIFIC DIVISION
Robert C. Miller
President
Robert T. Orr
Secretary-Treasurer

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION
Gordon L. Bender
President
Max P. Dunford
Executive Secretary-Treasurer

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1973 by the American Association for the Advancement of Science. Member rates on request. Annual subscription \$30; foreign postage: Americas \$4, overseas \$6, air lift to Europe \$18. Single copies \$1 (back issues, \$2) except *Guide to Scientific Instruments* which is \$4. School year subscriptions: 9 months \$22.50; 10 months \$25. Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. Science is indexed in the Reader's Guide to Periodical Literature.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Chondrules: An Origin by Impacts between Dust Grains: <i>D. E. Lange and J. W. Larimer</i>	920
Dopamine- β -Hydroxylase: Evidence for Increased Activity in Sympathetic Neurons during Psychotic States: <i>S. Rosenblatt, W. P. Leighton, J. D. Chanley</i> . .	923
Vasopressin and Neurophysin: High Concentrations in Monkey Hypophyseal Portal Blood: <i>E. A. Zimmerman et al.</i>	925
Phosphorylation of Muscle Membranes: Identification of a Membrane-Bound Protein Kinase: <i>C. G. Andrew et al.</i>	927
Muscle Carnitine Palmityltransferase Deficiency and Myoglobinuria: <i>S. DiMauro and P. M. M. DiMauro</i>	929
Ontogeny and Peripheralization of Thymic Lymphocytes: <i>J. B. Turpen, E. P. Volpe, N. Cohen</i>	931
Oscillation of Cyclic Adenosine Monophosphate Concentration during the Myocardial Contraction Cycle: <i>G. Brooker</i>	933
Mammary Carcinoma: Enzymatic Block in Disialoganglioside Biosynthesis: <i>T. W. Keenan and D. J. Morré</i>	935
Early Social Responses in <i>Gallus</i> : A Functional Analysis: <i>H. B. Graves</i>	937
Social Rank in House Mice: Differentiation Revealed by Ultraviolet Visualization of Urinary Marking Patterns: <i>C. Desjardins, J. A. Maruniak, F. H. Bronson</i>	939
Errorless Discrimination, Autoshaping, and Conditioned Inhibition: <i>M. G. Wessells</i> . .	941
Chimpanzee Spatial Memory Organization: <i>E. W. Menzel</i>	943
<i>Technical Comments</i> : Genetic Variation in Marine Bivalvia (Mollusca): <i>N. P. Wilkins and J. Levinton</i> ; Vasectomy: Long-Term Effects: <i>N. J. Alexander and A. M. Sackler</i>	946
SAN FRANCISCO MEETING Environment and Science in Transition; Registration and Housing Forms	948

EDWARD E. DAVID, JR.
WARD H. GOODENOUGH

CARYL P. HASKINS
PHYLLIS V. PARKINS

WILLIAM T. GOLDEN
Treasurer

WILLIAM BEVAN
Executive Officer

GEOLOGY AND GEOGRAPHY (E)
Helmut Landsberg
Ramon E. Bisque

ENGINEERING (M)
Raynor L. Duncombe
C. Townner French

INFORMATION AND
COMMUNICATION (T)
Jordan Baruch
Scott Adams

BIOLOGICAL SCIENCES (G)
Dorothy Bliss
Richard J. Goss

MEDICAL SCIENCES (N)
Robert A. Good
F. Douglas Lawrason

STATISTICS (U)
Frederick Mosteller
Ezra Glaser

ANTHROPOLOGY (H)
Richard N. Adams
Anthony Leeds

AGRICULTURE (O)
Roy L. Lovvorn
Michael A. Farrell

ATMOSPHERIC AND HYDROSPHERIC
SCIENCES (W)
Max A. Kohler
Louis J. Battan

COVER

Glen Canyon Dam and Lake Powell, with Page in foreground and Kaiparowits Plateau beyond. See page 948. [Nancy Wakeman, University of California, Berkeley]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

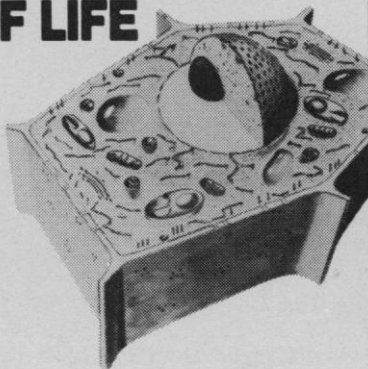
Since the genetic code is linear, why aren't we all shaped like spaghetti?

We are just beginning to understand how nature creates three-dimensional molecules on a linear framework. Biologists have found that in at least one case, evolution has devised a protein hinge to swing the parts into place. This is just one of many exciting discoveries explained in Ernest Borek's new book, *THE SCULPTURE OF LIFE*.

Borek, acclaimed for his achievements in both molecular biology and science writing, tells about: the truth behind the old wives' tale that children grow in their sleep; the hardy microbe that lives happily in nuclear reactors; the virus that beat Buckminster Fuller to an idea by several million years; the prospects for genetic engineering and human cloning....

THE SCULPTURE OF LIFE is essential reading for anyone interested in man's understanding and control of nature.

ERNEST BOREK THE SCULPTURE OF LIFE



Hardcover \$10.00, Paperback \$2.95
At bookstores or from



**COLUMBIA
UNIVERSITY PRESS**

136 South Broadway, Irvington, N.Y. 10533

LETTERS

Community Mental Health

In the article (News and Comment, 17 Aug. 1973, p. 638) describing the experiences of Georges Reding in the community mental health program in Franklin County, New York, Constance Holden seems to miss the point and, in so doing, loses the opportunity to get across a very important principle of community work. Rather than demonstrating that "Any doctor who tangles with the politics of established medicine is likely sooner or later to get his wings clipped," she simply demonstrates that, if someone speaks and acts in a manner likely to provoke others, he will be successful, and if those provoked are in a position to do something about it, they will.

In this era of the community mental health movement, Reding's approach to patient care could hardly be considered a "threat" to the establishment. Quite the contrary, many of his activities were very much in tune with the spirit of this movement. His work in orienting hospital staffs to the care of the psychiatric patient is a fine example. However, before the value of a distinct psychiatric program in a hospital was recognized, physicians hospitalized acutely ill psychiatric patients on general medical wards; this practice still continues on an informal basis in many communities that lack psychiatric services. The rationale for developing separate medical and surgical wards in a hospital is to concentrate the resources and programs most likely to be needed by each kind of patient in one place. In the case of psychiatric patients, this enables the staff to develop a therapeutic program for the patients as a group, and to make their entire day a health-directed experience, rather than simply leaving them to fritter away their time between doctors' visits.

The concepts Reding espoused in the areas of preventive care, crisis intervention, the use of "primary caretakers," and the importance of follow-up, are all strongly emphasized in community mental health programs. That these are concepts that have been slow in gaining acceptance and difficult to implement does not diminish the importance that "establishment" psychiatry attributes to the development of such services. It is unfortunate that Reding did not provide for the same kind of painstaking education of community leaders regarding what mental

health is all about, and why he was doing what he was doing, that he appeared to give the hospital staffs.

One of the most important lessons to be learned by the community psychiatrist, one unfortunately not taught in traditional residency and psychoanalytic training programs, is that, while the community will accept innovation, because its proponent places it under the medical mantle, "The doctor says so," that is simply not enough. If an innovation is to be accepted, it must be presented in the marketplace of ideas with persuasive arguments showing why it is better than competing ideas. This component of community education, so strongly emphasized in community mental health, is too often neglected by those who do not appreciate its importance.

It seems to me that the Franklin County legislators were simply saying: With all our faults, we are muddling through as best we can. Their willingness to support a mental health program at all suggests that not only did they recognize those faults but they wanted to do something to overcome them. On finding themselves stuck with someone intent on proclaiming virtue throughout the county and on using that stance as justification for dispensing with the basic respect that we all owe our fellow men and which is central to what mental health is all about, they reacted in a manner that is hardly surprising.

The positions of at least a few of those people who were so freely criticized should have been presented in Holden's report. In a situation like this, both sides of the argument deserve a hearing.

SIMON L. AUSTER

*Fairfax-Falls Church Community
Mental Health and Mental Retardation
Services Board,
4100 Chain Bridge Road,
Fairfax, Virginia 22030*

The ideas espoused by Georges Reding, while perhaps innovative for Franklin County, New York, have been used in a number of variations in many different communities. Perhaps the most innovative idea is that he would try to be successful while at the same time alienating large elements of the community. (This too has been tried many times, and it did not work then either.) In community mental health work, as in most other systems, success cannot be attained without first having some harmony with the people who

provide the funds (the county officials) and with other important dispensers of similar services (local physicians, and so forth). Antagonizing these elements, regardless of the correctness or brilliance of the ideas, almost always leads to failure. Successful people in community mental health, the Peace Corps, and VISTA (as well as in many other systems, such as universities) have had to learn these skills, or find other tasks which do not demand such patience, tact, and diplomacy, or find other situations in which they may be more insulated from their deficiencies in these areas. Even if the idea is right, the proper timing and necessary community support must be there or the idea must wait. (One can also learn that despite one's expertise sometimes the idea itself is *not* right and one's own judgment needs to be modified by others. It is a good, humbling, enriching experience.)

ROBERT L. PROCTER
Division of Mental Health and
Retardation Services,
State Office Building,
Topeka, Kansas 66612

Constance Holden's allegation that the resistance to change is stronger in small rural communities is unsupported. Her report suggests that the medical community of Franklin County rejected Reding's ideas; the fact may be that they rejected Reding's personality and approach—not his ideas.

I have been deeply involved in setting up life-style clinics for the poor in four northern counties including Franklin County. Our services include well-child care, preventive dentistry, family planning through Planned Parenthood, nutritional advice, and transportation to and from the clinic. All services are provided without charge to the patient. Evaluation of preschool children is carried out by nurse-pediatricians. These clinics represent a radical change in health care delivery.

We have opened one clinic in Franklin County and plan very shortly to open another in Hogsburg, New York, a village on the St. Regis Indian Reservation. Contrary to Holden's statement concerning resistance to change, we have found the physicians of Franklin County extremely cooperative. Our efforts have been spearheaded by Barbara Maguire, coauthor with Reding of the report of his experiment published in the *New England Journal of Medicine* (1).

I admire Reding's work very much.

I believe he has made a major contribution. Certainly his work deserves careful scrutiny by others in the psychiatric field. Nonetheless, it seems quite clear that Holden's conclusions are not at all supported by facts. It appears that Reding was not rejected by the establishment, but rather his rejection may have been an autoimmune phenomenon initiated by his treatment of other physicians.

GEORGE S. STURTZ
North Country Children's Clinic, Inc.,
Doctors Park, 199 Pratt Street,
Watertown, New York

References

1. G. R. Reding and B. Maguire, *N. Engl. J. Med.* **289**, 185 (1973).

Scientists as Economists

The controversy which has developed about Forrester's world model (Letters, 22 June, p. 1236) interests and surprises me. One would gather from some critics, in *Science* and elsewhere, that Forrester and his colleagues had performed a positive disservice to mankind, and to the free world in particular, by publishing their results. In my view, any attempt to make a national or a world model which will enable us to assess, however imperfectly, the possible future, is of immense value.

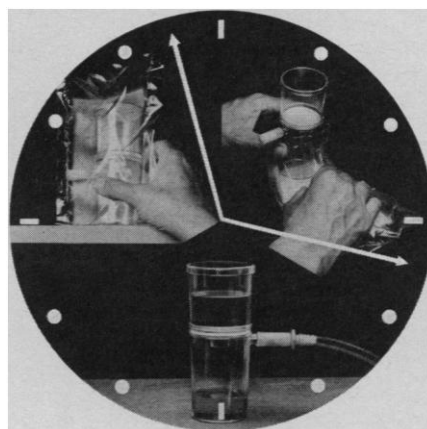
Keynes showed the governments of the world how to avoid the full consequences of deep economic depression. No one has yet shown how the vicious effects of the present inflation, which is playing havoc with the economies of all the democratic world, may be reversed or softened. And it is this rapid decrease in the value of money which has brought penury to science, as well as insuperable problems to governments. For most of us, the real standards of living are falling. No effort to understand why is wasted.

I suggest that if more scientists interested themselves in these complex economic questions, instead of leaving them to accountants and financiers, a growing ability to develop measures which would stabilize economies would inevitably develop. Techniques which led to the present worldwide economic mess are not necessarily those which will lead to a solution.

M. L. OLIPHANT
Government House,
Adelaide, South Australia

NALGENE® FILTER UNITS

...THE TIME SAVERS



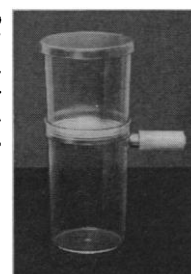
If it takes time, it costs money. Nalgene Filter Units save precious time. When you peel off the protective bag, they're *instantly* ready for use. These uncomplicated filter units replace inconvenient glass, metal, and plastic filtration equipment requiring time and manpower to clean, assemble, fuss with membranes, wrap and sterilize.

The Nalgene Filter Unit comes complete with everything you need—filter cup, protective cover, support plate, 115-ml capacity suction flask with vented and cotton-plugged sidearm, and membrane filter. It's pre-sterilized and individually packaged in a sealed, plastic bag—ready for immediate use without elaborate preparations.

This single-use, low-cost, reliable unit filters rapidly. Filtrate can be poured off very easily. And it's disposable—can be incinerated after use to destroy pathogens.

Available with a plain 0.20 micron membrane (Cat. No. 120-0020), or an 0.45 micron grid membrane (Cat. No. 245-0045). Buy them by the case and keep a supply on your shelf ready *when you are*.

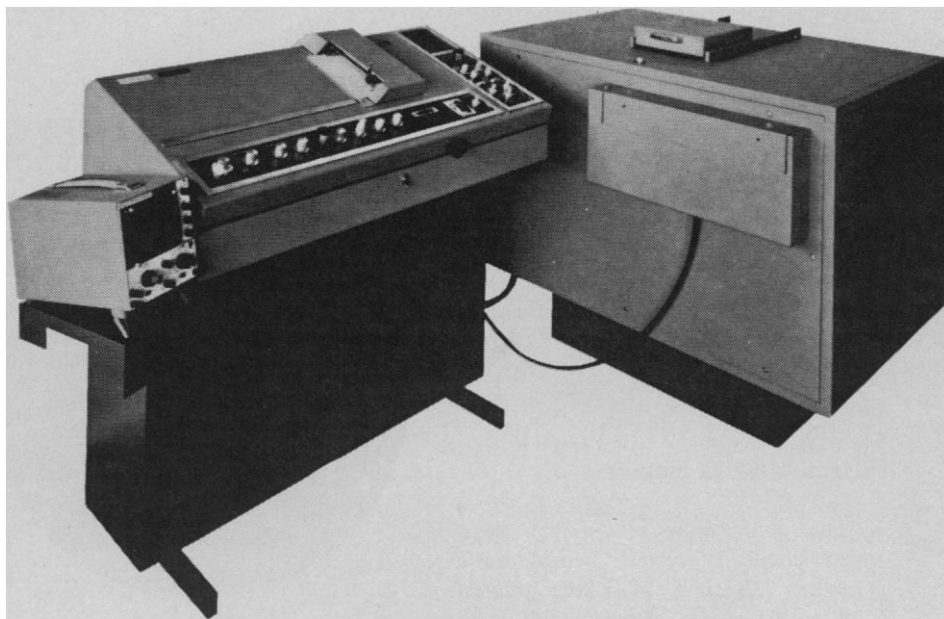
Order from your Lab Supply Dealer. For full details write Dept. 4211E Nalgene Labware Division, P. O. Box 365, Rochester, N.Y. 14602.



Nalgene® Labware . . .

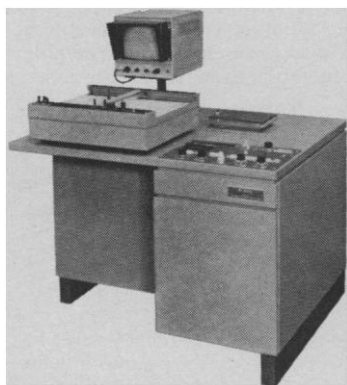
the safe unbreakables—preferred by professionals.

A 100-watt bulb consumes as much power as the magnet in our NMR Spectrometers.



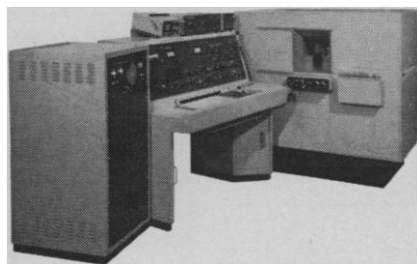
The Model R32 NMR Spectrometer is the first high-field instrument designed with the chemist in mind. This 90 MHz Spectrometer for ^1H , ^{19}F and ^{31}P studies combines rugged construction, high stability and ease of operation. A Triple Resonance Accessory provides automatic field frequency lock and makes double resonance experiments such as spin tickling and IN-DOR part of the day's routine.

Variable temperature operation down to -100°C is achieved without the use of liquid nitrogen.



Model R24A. 60 MHz ^1H NMR Spectrometer. Digital sweep X-Y recording system. Best buy in low-cost field.

Model R22. 90 MHz multi-nuclear NMR Spectrometer. Features CW as well as FT capabilities.



Since Perkin-Elmer's entire line of NMR Spectrometers employs *permanent* magnets, the only power required for the magnet is for thermostating and supplying the Golay coils*.

They need no troublesome cooling water and no noisy water refrigerator.

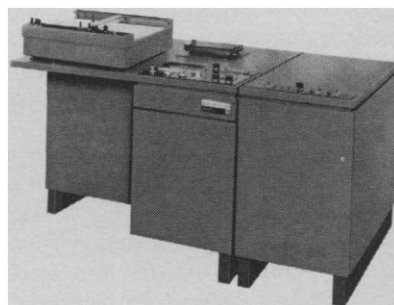
In fact, the savings in operating costs alone could pay for the cost of the instrument in as little as 7 years.

But economical operation is only one of the many benefits you get with our *permanent* magnet Spectrometers. Others are: unmatched resolution stability; amazing ease of set-up; and high throughput.

If you are planning to add to your current NMR capabilities or just getting into NMR, it will pay you to get more information on the entire Perkin-Elmer line of *permanent* magnet NMR Spectrometers.

Instrument Division, Perkin-Elmer Corporation, Main Avenue, Norwalk, Conn. 06856.

*Perkin-Elmer patent numbers 3,515,979 and 3,622,869.



Model R26. New ^{13}C FT NMR Spectrometer. 10 mm sample tube. Built-in pulse unit. Greatest bargain in ^{13}C NMR.

Model R12. Versatile 60 MHz NMR Spectrometer. Can be equipped to solve the most demanding NMR problems.



PERKIN-ELMER

Committed to helping your samples tell you more.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

1973

H. S. GUTOWSKY	GARDNER LINDZEY
ARTHUR D. HASLER	RAYMOND H. THOMPSON
RUDOLF KOMPFFNER	EDWARD O. WILSON
DANIEL E. KOSHLAND, JR.	

1974

ALFRED BROWN	FRANK W. PUTNAM
JAMES F. CROW	MAXINE SINGER
SEYMOUR S. KETY	GORDON WOLMAN
FRANK PRESS	

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

WILLIAM BEVAN

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News and Comment: JOHN WALSH, LUTHER J. CARTER, DEBORAH SHAPLEY, ROBERT GILLETTE, NICHOLAS WADE, CONSTANCE HOLDEN, BARBARA J. CULLITON, SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, WILLIAM D. METZ, THOMAS H. MAUGH II, JEAN L. MARX, ARTHUR L. ROBINSON

Book Reviews: SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN SELTZ-PETRASH

Cover Editor: GRAYCE FINGER

Editorial Assistants: MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, ELEANORE BUTZ, MARY DORFMAN, JUDITH GIVELBER, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, GINA BARI KOLATA, MARGARET LLOYD, JEAN ROCKWOOD, PATRICIA ROWE, LEAH RYAN, JOHN SCHAUER, LOIS SCHMITT, MICHAEL SCHWARTZ, RICHARD SEMIKLOSE, YA LI SWIGART

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: GWENDOLYN HUDDLE;
Subscription Records and Member Records: ANN RAGLAND

Advertising Staff

Director

EARL J. SCHERAGO

Production Manager

MARGARET STERLING

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: John P. Cahill, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4440. Cable: *Advancesci*, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 28 September 1973. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

Corporations and the Less Developed Countries

The issue of overriding importance to most of the peoples of this world is the large gap between the standards of living of advanced countries and less developed countries (LDC's). In principle, through application of science and technology, standards in the LDC's could be raised substantially. In practice, change is slow in most countries. The problem is one of implementation. To create a successful enterprise, it is necessary to bring together technical know-how, skilled labor, managerial and marketing skills, and capital. Most of the LDC's are deficient in one or more of these ingredients.

The LDC's have therefore found it expedient to turn to the great multinational corporations. These have at their disposal the necessary skills and resources to create jobs and products. But relations between the LDC's and the corporations have been characterized by tensions arising from differing needs and objectives. The principal goal of the corporations is profit. The goals of the LDC's are many and changing. A decade ago, import substitution was emphasized—that is, assembling locally items such as automobiles that previously had been imported. Lately, many of the LDC's have developed the ambition to export manufactured goods in order to obtain much-needed foreign exchange. Often this desire is thwarted by licensing arrangements and patent positions. Another goal of the LDC's is jobs for their citizens. In the past, the corporations brought in high-cost, labor-saving machinery appropriate to conditions in the United States but not to those of the LDC's. The LDC's want the corporations to support local research and development; the corporations have not conducted much research and development in the LDC's.

The LDC's need the skills and capital that can be supplied by the multinational corporations but are determined to obtain them on terms that will better serve the host countries. For their part, the corporations are aware of a changing climate. They have found it expedient to respond at home to a host of social pressures, and many are preparing to be more responsive to the needs of the LDC's. A recent report* issued by the National Academy of Sciences depicts these changing attitudes. Some of the corporations have already put into practice more enlightened procedures. Recently, in Bogota, I was told of IBM activities in assembling electric typewriters in Colombia. The plant there was designed to be labor intensive. Only hand tools are used. Accordingly, the initial capital outlay was small. The tasks of the workers are rotated so that they can learn to perform all the operations of the assembly while avoiding boredom. An electric typewriter has many hundreds of parts and some of these must be imported. Nevertheless, the value-added in Colombia amounts to more than half the final cost of the machine. The assembly plant is now filling most of the South American demand for IBM electric typewriters.

It seems likely that the foregoing example will be multiplied in the future as corporations respond to wishes of the host countries. However, the LDC's want to be more than assemblers. They would like to be completely in command of their own destinies. They would like to obtain know-how cheaply from the companies. But the companies are not likely to transfer for a nominal sum know-how that cost hundreds of millions of dollars to acquire. If the LDC's wish to achieve full independence from technological dominance, they must be prepared for a long-time effort and the building of their own corps of competent scientists and engineers.—PHILIP H. ABELSON

* *U.S. International Firms and R, D & E in Developing Countries*, report of an ad hoc panel of the Board on Science and Technology for International Development (National Academy of Sciences, Washington, D.C., 1973).

VERLAG CHEMIE

Cornelius Keller

The Chemistry of the Transuranium Elements

Kernchemie in Einzeldarstellungen
Volume 3

Edited by Karl Heinrich Lieser.

1971. 675 pages, 29 pictures and 190 tables.
Linen DM 188,— ISBN 3 - 527 - 25389 - 0

This book provides an up-to-date account of the chemistry of the transuranium elements. Particular attention is also given to physical and nuclear-physical data. None of the other elements show such close correlations between chemistry and physics as the transuranium elements.

The work is divided into two parts. The first part deals with transuranium elements within the larger group of actinides and stresses analogous and different behaviors, e.g., as compared to the lanthanides. Ten chapters describe the preparation, stability, and application of the isotopes and elements, the electronic configuration (which has only recently been established unequivocally), valences and coordination chemistry, metallurgy, organometallic and analytic chemistry, as well as separation procedures and behavior in solution and in the solid state. The first part is rather an accurate description and a representation of common and contrasting features of the actinides than a compilation of details. It therefore contains an up-to-date review of all actinide elements including thorium, protactinium and uranium.

The second part describes the preparation and properties of the individual transuranium elements neptunium ($Z = 93$) to hahnium ($Z = 105$) and contains predictions about the chemistry of the superheavy elements. All these chapters follow a common scheme: discovery, preparation and production of the isotopes, metallurgy, solid state chemistry, organometallic chemistry, chemistry in aqueous solutions, separation procedures, and analytical chemistry. Numerical values of the literature have been critically selected. Numerous tables, figures and diagrams are supplementing the text.

This monograph shows that our knowledge of some of the transuranium elements is greater as compared with that of many non-radioactive, classical elements; remaining gaps and problems are clearly indicated. This book is of interest to nuclear chemists and physicists as well as to inorganic chemists who will certainly appreciate it as a survey of an important and relatively new branch of inorganic chemistry.

VERLAG CHEMIE GMBH
6940 WEINHEIM/BERGSTR.
POSTFACH 129/149
GERMANY

Aquasol for:

Convenient Preparation of
Buffered Samples for LSC

Simple and direct counting of LSC samples containing buffer systems such as EDTA, sodium phosphate, sodium citrate, HEPES, tris, sodium borate, sodium cacodylate, TMT, sodium acetate, and Krebs-Ringer bicarbonate have been done with the use of Aquasol.[®]

Aquasol NEF-934: \$46/4 liters \$166/4x4 liters



New England Nuclear

575 Albany Street, Boston, Mass. 02118
Customer service 617-482-9595

NEN Canada Ltd., Dorval, Quebec, NEN Chemicals GmbH, Dreieichenhain, Germany.

Frigicator[®]

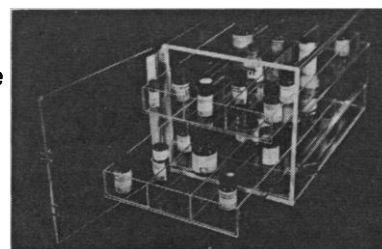
keeps 'em cool, dry, and organized

A more convenient way to store labile biologicals and chemicals that must be cool and dry.

Frigicator replaces the old vacuum desiccator which takes up space and is awkward to use.

Optional lock for controlled drug storage. It's air tight, light weight, and space saving with trays for easy cataloging.

Fits handily in refrigerator or freezer. Frigicator, (9" x 9" x 16"), is constructed of 1/4" transparent acrylic and contains 1/4 pound desiccant. Shipped F.O.B. Omaha for \$67.00 ...\$75.00 with locking latch.



Order: **Frigicator[®]**



STRECK LABORATORIES INC.

P.O. BOX 6036, OMAHA, NEBRASKA 68106