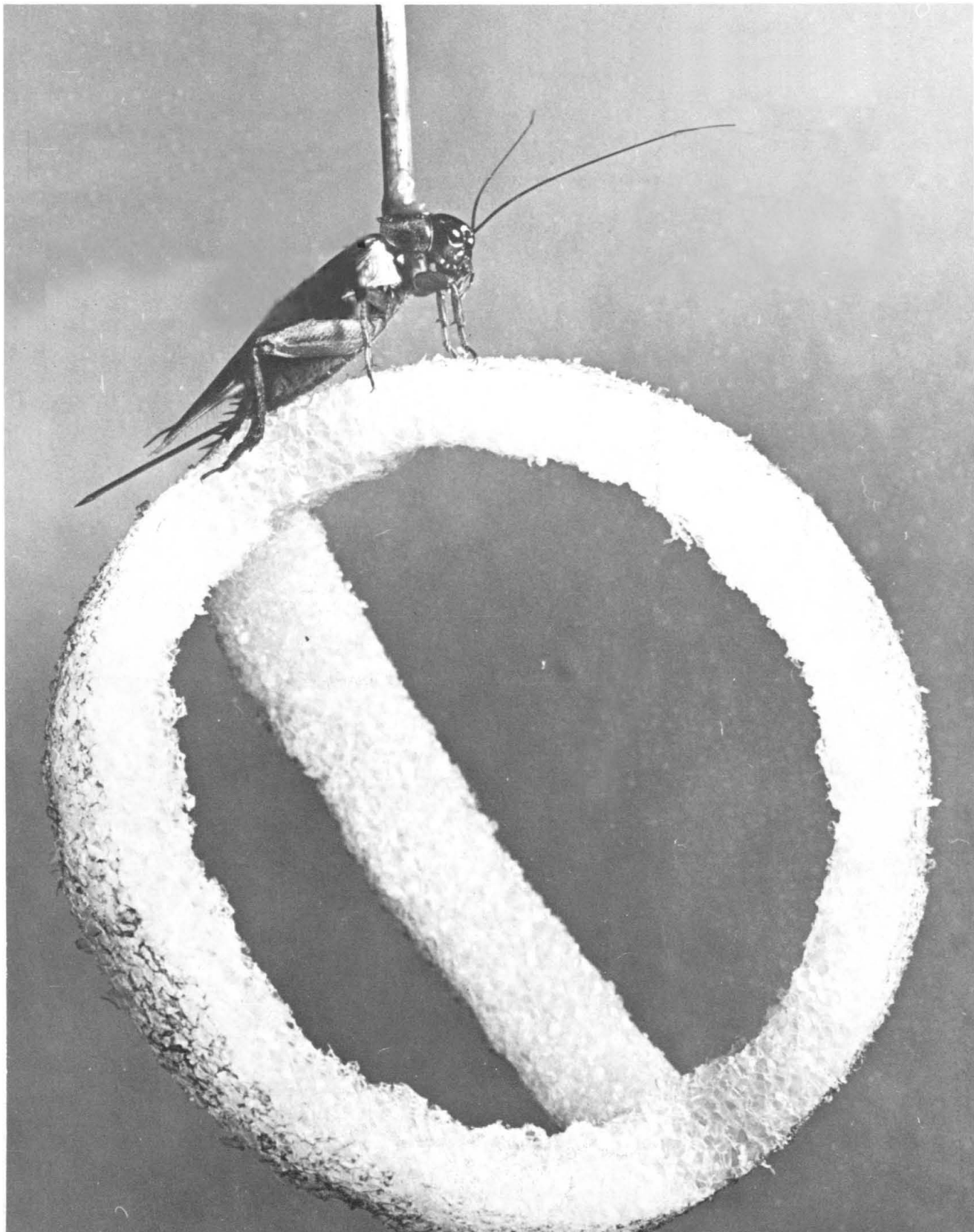


# SCIENCE

6 April 1973

Vol. 180, No. 4081

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



# LOW-COST ULTRAMICROTOMY

Low-cost ultramicrotomy for electron microscopy depends on being able to choose the right instrument for each particular task.

LKB offer a COMPLETE range of ultramicrotomy instruments for you to choose from.

The economical LKB-Huxley ultramicrotome allows you to cut good quality sections for electron microscopy at

low cost. Its simple and easily-learned controls make it ideal for training as well as research.

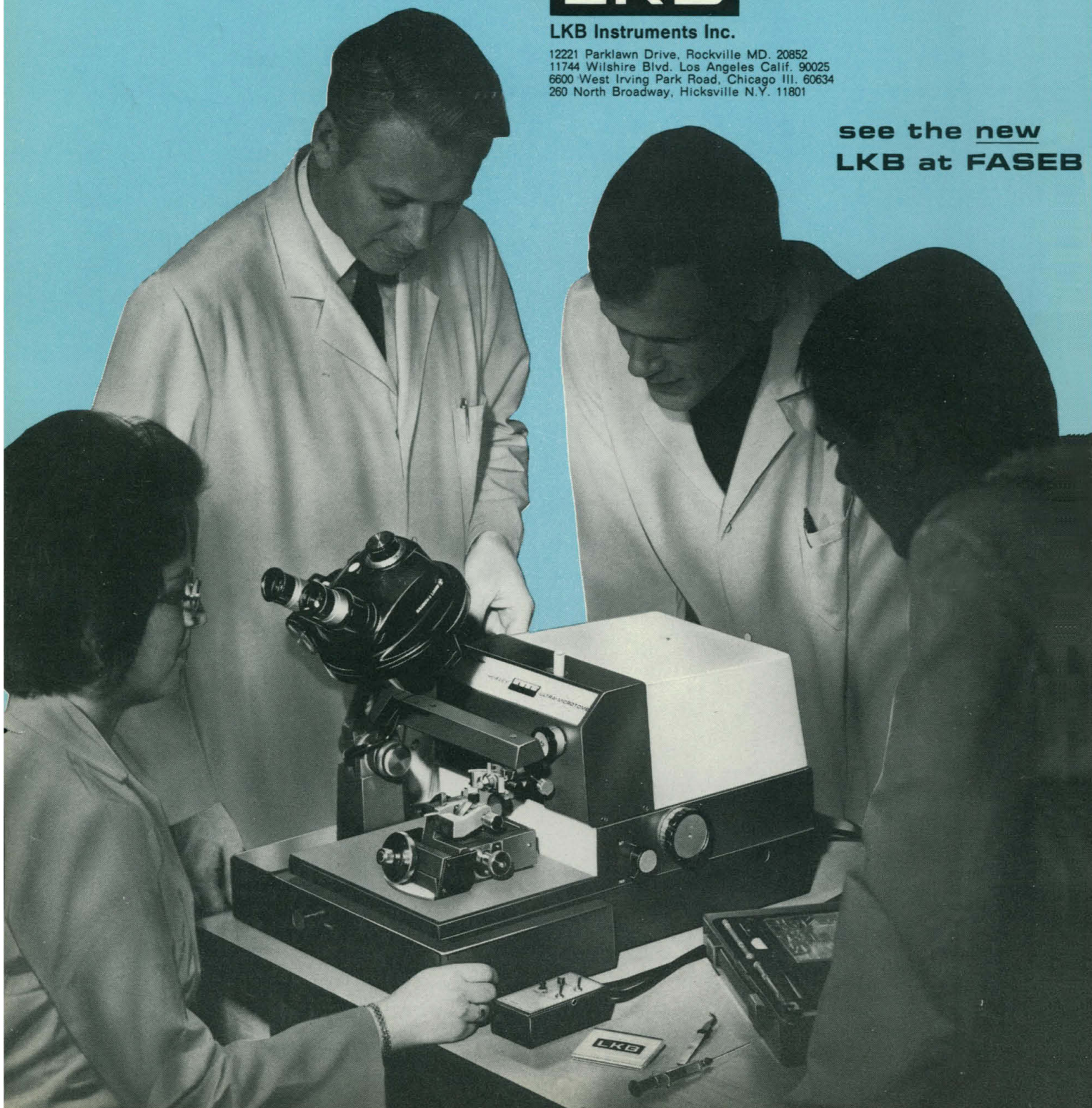
For ultrathin sectioning of your more difficult specimens, the Universal Ultratome III gives you a wider range of variable parameters than any other ultramicrotome on the market today.

## LKB

**LKB Instruments Inc.**

12221 Parklawn Drive, Rockville MD. 20852  
11744 Wilshire Blvd. Los Angeles Calif. 90025  
6600 West Irving Park Road, Chicago Ill. 60634  
260 North Broadway, Hicksville N.Y. 11801

**see the new  
LKB at FASEB**



# It's nice to know America leads the world in medical research.

## Just don't get sick.



Pick up almost any recent issue of **SCIENTIFIC AMERICAN**, and chances are you'll discover some impressive new advances in the life sciences. The discovery of a powerful family of hormone-like agents called prostaglandins, the mapping of human chromosomes, Nobel prize-winning insights into the causes of cancer . . . or a score of other fascinating achievements.

Our medical and paramedical technologies are leaping forward. Each year, each month, each day there are fewer limits on our abilities to diagnose and cure disease, alleviate suffering and prolong life.

Unfortunately, a tragic gap separates what we can do from what we *are* doing. As other articles in **SCIENTIFIC AMERICAN** have shown, our health care system, responsible for delivering the blessings of medical technology to the people, is shamefully disorganized, outdated and expensive—resulting in needless pain, physical damage and death.

Three years ago the situation was critical. This year it is intolerable. Next year it will be worse.

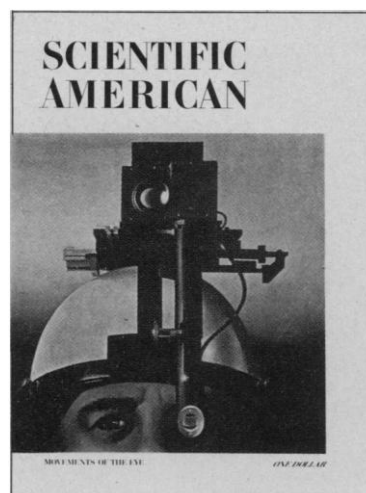
The need to do something about it is

now recognized in the White House, the Congress and the medical community itself.

In September, an entire issue of **SCIENTIFIC AMERICAN** will be devoted to the growing health care crisis. Many of the articles may surprise you, perhaps even shock you. Like all **SCIENTIFIC AMERICAN** articles, they will bring you facts you won't find anywhere else . . . explain in advance problems that may make headlines months or even years from now . . . and do it all with unparalleled accuracy and objectivity. As usual, all the articles will be written by leading authorities who are directly involved in the issues they are discussing.

Modern health care, of course, is just one of the vital current issues **SCIENTIFIC AMERICAN** covers on a continuing basis. Pick any major subject area from race relations to national defense, from computer technology to the population explosion, and you're likely to find a whole string of articles running back 20 years or more—each a clear, meticulously documented, often prophetic analysis.

For the best, most up-to-date thinking on any important subject, it makes sense to subscribe to **SCIENTIFIC AMERICAN**.



**Scientific American  
makes sense today out of  
issues that will make  
headlines tomorrow.**

By subscription, \$10 for 12 months.  
Use the attached card, or call toll-free  
800-243-6000 (in Conn., 1-800-882-6500).

6 April 1973

Volume 180, No. 4081

# SCIENCE

<b>LETTERS</b>	Flora of North America: <i>A. W. Galston</i> ; Insulin Synthesis: <i>S. A. Lakoff</i> ; Arms Control: <i>J. Lederberg</i> and <i>S. D. Drell</i> ; One Man's Family: <i>R. H. Shannon</i> ; Frog Health: <i>D. S. Papermaster</i> and <i>E. Gralla</i> ; Latin American Development: <i>L. Tosi</i> ; <i>P. G. Keeney</i> . . . . .	9
<b>EDITORIAL</b>	Blow-Hot. Blow-Cold Educational Policies . . . . .	13
<b>ARTICLES</b>	A Distilling System for Purer Water: <i>K. Hickman, I. White, E. Stark</i> . . . . . Enzymatic Interconversion of Active and Inactive Forms of Enzymes: <i>H. L. Segal</i> . . . . . On the Enzymology of Amino Acid Transport: <i>A. Meister</i> . . . . .	15 25 33
<b>NEWS AND COMMENT</b>	Soviet-American Science Accord: Could Dissent Deter Detente? . . . . . Herbicides: Agent Orange Pulled from Vietnam May Go to the South Americans . . . . . Immunology. Two Immune Systems Capture Attention . . . . .	40 43 45
<b>RESEARCH NEWS</b>	ERTS: Surveying Earth's Resources from Space . . . . .	49
<b>BOOK REVIEWS</b>	Impact of Insulin on Metabolic Pathways, <i>reviewed by A. Rubenstein</i> ; Glucagon, <i>P. W. Felts</i> ; Behaviour of Wolves, Dogs and Related Canids, <i>L. K. Corbett</i> ; Aquaculture, <i>J. D. Costlow</i> ; Biology of Halophytes, <i>B. Osmond</i> . . . . .	52
<b>REPORTS</b>	Helium Flux from the Earth's Mantle as Estimated from Hawaiian Fumarolic Degassing: <i>J. J. Naughton et al.</i> . . . . . Ductile Superconducting Copper-Base Alloys: <i>C. C. Tsuei</i> . . . . .	55 57

## 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

## CHAIRMEN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A)  
Lipman Bers  
F. A. Ficken

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

CHEMISTRY (C)  
Thomas E. Taylor  
Leo Schubert

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

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

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

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

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

EDUCATION (Q)  
Gordon Swanson  
Phillip R. Fordyce

DENTISTRY (R)  
Martin Cattoni  
Sholom Pearlman

PHARMACEUTICAL SCIENCES (S)  
William Heller  
John Autian

## DIVISIONS

### ALASKA DIVISION

Gunter E. Weller  
President  
Irma Duncan  
Executive Secretary

### PACIFIC DIVISION

John D. Isaacs  
President  
Robert T. Orr  
Secretary-Treasurer

### SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

J. Linton Gardner  
President  
Marlowe G. Anderson  
Executive Secretary

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. Annual subscription \$20; foreign postage: Americas \$3; overseas \$5; air freight to Europe, North Africa, Near East \$16; single copies \$1 (back issues, \$2) except *Guide to Scientific Instruments* which is \$4. School year subscription: 9 months, \$15; 10 months, \$16.75. Member rates on request. New rates effective 1 May 1973: Annual subscription \$30; foreign postage: Americas \$4, overseas \$6, air lift to Europe \$18. Provide 4 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

Nile Delta: The Defunct Pelusiac Branch Identified: <i>A. Sneh and T. Weissbrod</i> . . . .	59
Rare-Earth Manganites: Catalysts with Low Ammonia Yield in the Reduction of Nitrogen Oxides: <i>R. J. H. Voorhoeve, J. P. Remeika, D. W. Johnson, Jr.</i> . . . .	62
Crystallographic Orientation of Clinoenstatite Produced by Deformation of Orthoenstatite: <i>R. S. Coe and W. F. Müller</i> . . . . .	64
Teleconnections in the Equatorial Pacific Ocean: <i>K. Wyrski</i> . . . . .	66
Lunar Cinder Cones: <i>T. R. McGetchin and J. W. Head</i> . . . . .	68
Mechanisms of Trace Metal Transport in Rivers: <i>R. J. Gibbs</i> . . . . .	71
Kilauea Volcano, Hawaii: A Search for the Volcanomagnetic Effect: <i>P. M. Davis et al.</i> . . . . .	73
Genetic Variation in a Gradient of Environmental Variability: Marine Bivalvia (Mollusca): <i>J. Levinton</i> . . . . .	75
Two Morphologically Distinct Blood-Brain Barriers Preventing Entry of Cytochrome c into Cerebrospinal Fluid: <i>T. H. Milhorat, D. A. Davis, B. J. Lloyd, Jr.</i> . . . .	76
Immunologic Manipulation of Metastases due to Herpesvirus Transformed Cells: <i>R. Duff, E. Döller, F. Rapp</i> . . . . .	79
Translocation Trisomic Mice: Production by Female but Not Male Translocation Carriers: <i>E. M. Eicher</i> . . . . .	81
Genetic Control of Song Specificity in Crickets: <i>R. R. Hoy and R. C. Paul</i> . . . . .	82
$\Delta^9$ -Tetrahydrocannabinol: Effects on Mammalian Nonmyelinated Nerve Fibers: <i>R. Byck and J. M. Ritchie</i> . . . . .	84
<b>ASSOCIATION AFFAIRS</b> Nutrition and New Food Technology: <i>R. Rojas and O. Paredes-López; Effects of Malnutrition on Human Development: S. Zubirán; Drug Addiction: U. Estrada; Natural Products: T. E. Taylor</i> . . . . .	86

WARD H. GOODENOUGH  
CARYL P. HASKINS

DANIEL P. MOYNIHAN  
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. Towner 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

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

ANTHROPOLOGY (H)  
Richard N. Adams  
Anthony Leeds

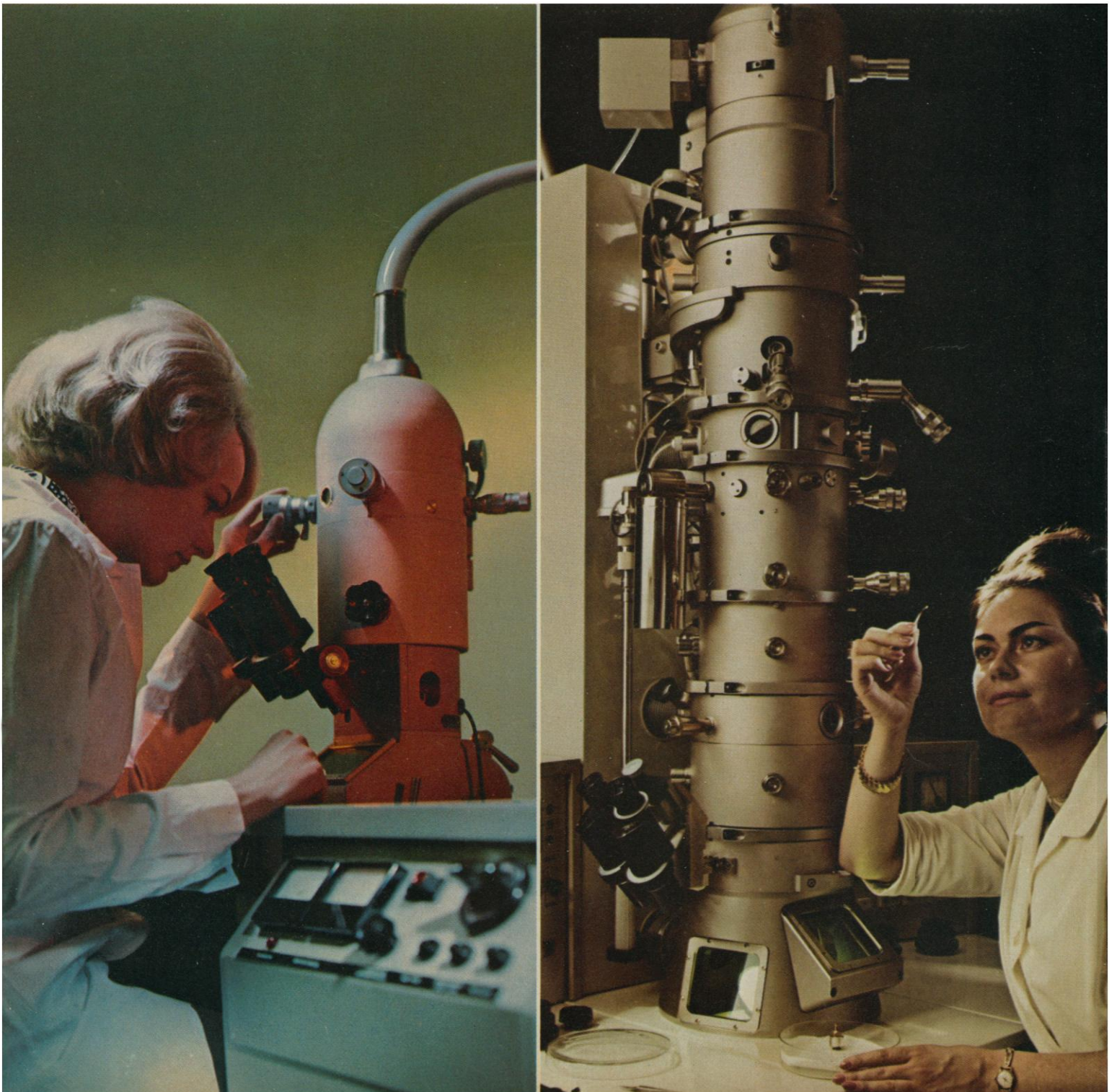
AGRICULTURE (O)  
Roy L. Lovvorn  
Michael A. Farrell

## COVER

Female crickets are drawn to males of the same species by the male's calling song. By placing a tethered female upon a Y-maze and placing loudspeakers on her right and left, her responsiveness to various songs can be directly measured (actual size of cricket, 1 inch in length). See page 82. [C. Walcott, Biology Department, State University of New York, Stony Brook]

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.

**These Siemens microscopes  
don't look the same but they're  
made the same way.**



# SIEMENS

**Featuring superior quality and precision, our high-performance microscopes keep you ahead in scientific research.**

If you're searching for superior precision-made electron microscopes backed up by an experienced service organization, you should be discussing your needs with Siemens.

Take our Elmiskop 101 B microscope, for example. This instrument is giving scientists reliable service, day after day, year after year. Resolutions of 3.5 Å are easily attained in the axial operating mode. And many microscopists have often achieved lattice resolution of 2 Å.

The electro-magnetic system of the Elmiskop 101 B provides for quick centering of the electron beam and ease of switch-over to high resolution dark field microscopy. The temperature of the objective lens is automatically controlled to keep stage drift to an absolute minimum.

A unique anti-contamination device allows for observations of the specimen over extended periods. A short focal length objective lens ensures highest possible resolution. With the exposure meter, incorporating a controlled shutter, readings can be taken from a large image or small sections of 1 sq. cm.

A wide variety of cartridges are

provided to suit any condition experienced in scientific research. Even when using double-tilt cartridges, the resolution is maintained.

The Elmiskop 101 B allows for magnification of up to 700,000 x. The standard version is readily available in the range from 40 to 100 kV acceleration voltage, 120 kV upon request.

The compact Elmiskop 51 is an ideal instrument for routine analyses, control of preparation techniques, and the selection of specimens. It can be easily installed. Just as important, microscopists have found it very easy to operate the instrument because of its clean functional design.

With the Elmiskop 51, magnifications in four steps from 1250:1 to 12,500:1 are possible. Up to 15 specimens can be inserted simultaneously into this microscope—allowing for quick and easy analyses. The Elmiskop 51 is widely used for diagnostics in hospitals. Also for quality control operations in industry.

Backing up both the Elmiskop 101 B and the Elmiskop 51 is efficient after-sales Siemens service. Our factory-trained maintenance personnel are your guarantee of continuous and trouble-free operation.

Our specialists look forward to discussing your needs with you. Write or call Siemens Corporation, 186 Wood Avenue South, Iselin, New Jersey 08830. (201) 494-1000.

Pictured at left is the compact Elmiskop 51. Right is the high-resolution Elmiskop 101 B electron microscope.

# Phosphorus-32 Deoxy Nucleotides

Shipment from stock    Ultra pure

**Deoxyadenosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-012** 1-10Ci/mmole  
\$85/100 $\mu\text{Ci}$  \$185/500 $\mu\text{Ci}$  \$325/1mCi

**Deoxycytidine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-013** 1-10Ci/mmole  
\$85/100 $\mu\text{Ci}$  \$185/500 $\mu\text{Ci}$  \$325/1mCi

**Deoxyguanosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-014** 1-10Ci/mmole  
\$85/100 $\mu\text{Ci}$  \$185/500 $\mu\text{Ci}$  \$325/1mCi

**Thymidine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-005** 1-10Ci/mmole  
\$85/100 $\mu\text{Ci}$  \$185/500 $\mu\text{Ci}$  \$325/1mCi

Available with ultra-high specific activity.  
Call or write for details.

## Also available

**Adenosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-003** 1-10Ci/mmole  
\$100/100 $\mu\text{Ci}$  \$190/500 $\mu\text{Ci}$  \$250/1mCi  
**NEG-003X** 20-100Ci/mmole  
Prices and delivery on request.

**Adenosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\gamma$ - $^{32}\text{P}$ ]**

**NEG-002** 2-10Ci/mmole  
\$75/100 $\mu\text{Ci}$  \$100/500 $\mu\text{Ci}$  \$150/1mCi  
**NEG-002X** >10Ci/mmole  
\$75/100 $\mu\text{Ci}$  \$100/500 $\mu\text{Ci}$  \$150/1mCi

**Cytidine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-008** 1-10Ci/mmole  
\$105/100 $\mu\text{Ci}$  \$200/500 $\mu\text{Ci}$  \$350/1mCi  
**NEG-008X** 20-100Ci/mmole  
Prices and delivery on request.

**Guanosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\gamma$ - $^{32}\text{P}$ ]**

**NEG-004** 2-10Ci/mmole  
\$85/100 $\mu\text{Ci}$  \$150/500 $\mu\text{Ci}$  \$225/1mCi

**Guanosine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-006** 1-10Ci/mmole  
\$105/100 $\mu\text{Ci}$  \$200/500 $\mu\text{Ci}$  \$350/1mCi  
**NEG-006X** 20-100Ci/mmole  
Prices and delivery on request.

**Uridine 5'-triphosphate, tetra  
(triethylammonium) salt [ $\alpha$ - $^{32}\text{P}$ ]**

**NEG-007** 1-10Ci/mmole  
\$105/100 $\mu\text{Ci}$  \$200/500 $\mu\text{Ci}$  \$350/1mCi  
**NEG-007X** 20-100Ci/mmole  
Prices and delivery on request.

*All compounds in aqueous solution  
in combi-vial, shipped in dry ice.*

**NEN** New England Nuclear

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

Canada: NEN Canada Ltd., Dorval, Quebec, Tel: (514) 636-4971  
Europe: NEN Chemicals GmbH, D6072 Dreieichenhain, Siemensstrasse 1, Germany. Tel: Langen (06103) 8353

**SEE THE TRACKING DYE**

**SAVANT'S HIGH VOLTAGE ELECTROPHORESIS SYSTEM**

LUCITE TANK

SEQUENCING  
FINGERPRINTING  
MAPPING  
SCREENING  
PEPTIDES  
RNA & DNA PRODUCTS  
NUCLEOTIDES  
AMINO ACIDS  
HORMONE CHAINS  
CATECHOL AMINES  
SUGAR MIXTURES

POWER SUPPLY

**The popular HVE system with the "SEE-THRU" TANK**  
**ADDITIONAL IMPORTANT ADVANTAGES OF THE SAVANT HVE SYSTEM**

- The tank may be placed in a hood or cage while the power supply is safely operated outside.
- Long 46" running path.
- A choice of "3 POWER SUPPLIES" — 3,000 volts, 5,000 volts or 8,000 volts.
- Economical — since it offers the researcher **VERSATILITY, RELIABILITY and RESOLUTION.**
- Complete interchangeability with Flat Plates.

Savant HVE Systems are "PROVEN" in over one thousand laboratories around the world. Request catalog #73. **SAFETY INSTALLATION** — For sound ideas on this subject, please call on us.

**Savant Instruments, Inc.**  
221 Park Avenue Hicksville, N.Y. 11801  
(516) 935-8774

tainment (whatever happened to rouge and powder!).

The evening's entertainment was provided by a guitar rock band that used electricity instead of fingers, and by painting signs protesting the thermal pollution from the proposed new power facility on the north edge of the lake. (The thermal pollution from such a facility would be about the equivalent of that which my daughters and their friends contribute to the lake getting ready for a night out with their bathing, hair-washing, and clothes-washing.)

With more girls at home there should be an offset in power use. A few more things could be washed in one cycle. However, there is often a last-minute, second cycle of consumption by one of the others of some forgotten unmentionables. I can shower in 3 minutes with a few gallons of water. One of my daughters needs at least 20 minutes and at least 70 gallons of water for a bath or shower or whatever she does up there. I see little hope of retarding the growth of the residential power demand until scientists can apply highly skilled analysis to the female and the particular, unanalyzable, unscientific, uncontrolled phenomena of their power consumption. (I never hear them running the power lawn mower.)

Philosophically and financially I hope the authors are right that the "crisis" has been overestimated, but I hold out no hope whatsoever.

R. H. SHANNON

59 Valecrest Drive,  
Islington, Ontario, Canada

### Frog Health

*Science* has appropriately alerted its readers to the poor health of frogs available for research (see T. H. Maugh, *Research News*, 27 Oct. 1972, p. 387) and noted that septicemia and malnutrition are the predominant causes of death. Gibbs *et al.* (1) demonstrated how simple treatment with tetracycline and food was sufficient to eliminate these causes of death. Following their suggestion, we have treated frogs received from large mid-western and eastern suppliers by injections of tetracycline [5 percent, weight to volume, in water; 0.5 milliliter per frog (weight, 100 to 150 grams)] via soft polyethylene tubing (PE 90) into the stomach once or twice per day. Ninety percent survival is the routine

result. In addition, if investigators refused to pay for frogs received dead, suppliers might investigate simple modes of treatment in the housing ponds to avoid the loss of captured stock.

DAVID S. PAPERMASTER

Department of Pathology,  
Yale University Medical School,  
New Haven, Connecticut 06510

EDWARD GRALLA

Section of Laboratory Animal Sciences  
and Department of Pharmacology,  
Yale University Medical School

### References

1. E. L. Gibbs, T. J. Gibbs, P. C. Van Dyke, *Lab. Anim. Care* 16, 142 (1966).

### Latin American Development

In the last year, several *Science* editorials have dealt with Latin American development. Two of them by Philip Abelson (9 June 1972, p. 1077; and 6 Oct. 1972, p. 13) merit some comment.

As a Latin American, I cannot help noting the widespread misunderstanding of American engineers and scientists about the social, political, economic, and scientific problems of Latin American countries. I do not blame them, but rather find they have great difficulty understanding what underdevelopment really means. As Abelson correctly observes, "If the poorer countries are to develop, they must do so largely by their own efforts." Although in many of these countries the state has played a strategic role in promoting the development of the industrialized sector, internal structural conditions have oriented the production of goods to satisfy the consumption of the middle and upper classes. Moreover, as a new form of economic domination—the multinational corporation—is spreading throughout the world, the planning, decision-making, and financial, scientific, and technological knowledge are located in the industrialized countries (1). The result is a new form of the well-known "center-periphery" model (2), in which manufacturing activities are concentrated in industrial (center) countries, while the peripheral ones specialize in those products needed by the former for their economic expansion.

Abelson suggests that "The Latin American countries might try to utilize the bounteous resources of scientists and engineers in developed countries,"

although he also notes that there are 50,000 Latin American scientists and engineers not effectively employed in industry. What he probably ignores is that Latin American professionals "have no opportunities to use their knowledge in the established industries and even less chance to exercise their ability to invent, create and use their research qualifications to improve techniques and manufactured products. . . . The designs, the projects and the plans for manufacture of industrial goods in local subsidiaries arrive already fashioned from headquarters" (3).

In his editorial of 9 June 1972, Abelson refers to Brazil as an example of rapid economic change in recent years. Brazil is, in fact, an excellent example of a model of growth for the sake of some multinational corporations and for the benefit of a small minority (5 percent) of the population (4). Abelson does not refer to countries like Chile, Peru, and Cuba, which are trying, in spite of all sorts of difficulties, to change the economic and social structure of their societies in order to distribute the benefits of development to the majority.

In most Latin American countries, any attempt to tackle the problem of underdevelopment constitutes a threat to the state of economic dependence under which those countries are being allowed to grow; this sort of "economic growth" is a mischievous fraud. Most Latin American scholars are not even free to discuss in their own countries the problems related to the impact of science and technology on an underdeveloped society, as the universities which are the place to do so are forbidden to them (5).

LUCIA TOSI

Département de Recherches Physiques,  
Université Paris VI,  
75005 Paris, France

#### References

1. O. Sunkel, *Hum. Relat.* 24, 1 (1970).
2. R. Prebisch, *Bol. Econ. Amér. Lat.* 6, 1 (1961).
3. J. L. Lopes, as quoted by O. Sunkel, *Cad. Brasil.* 52, 32 (1969).
4. C. Furtado, *Análise do "Modelo" Brasileiro* (Editôra Civilização Brasileira, Rio de Janeiro, 1972).
5. J. L. Lopes, *Sci. World* 3, 8 (1972).

The efforts of Brazil's Executive Commission for the Economic Recuperation of the Cacao Region (CEPLAC) fit the "legitimate aspirations" mentioned in Abelson's editorial of 6 October 1972. Funded through a 10 percent tax on exported cocoa, CEPLAC is charged with the development of agriculture and the improvement

of living standards in Bahia, where cocoa grows.

Logically, first priority goes to increasing the tonnage and quality of the cocoa crop for export through a traditional agricultural research and extension approach, but CEPLAC does not stop there. To get the crop to market, bridges and roads are built where needed, and dock facilities are nearing completion at the port city of Ilheus. CEPLAC is using cocoa money in a program of agricultural diversification aimed at changing the prevailing monoculture. Through CEPLAC, schools have been built and staffed, medicine bought, and rural towns have sewage systems and potable water for the first time. In June 1972, a new research laboratory was dedicated. Located within the CEPLAC compound near Itabuna, this facility ranks as one of the most complete and potentially productive centers devoted to tropical agricultural research.

Abelson comments about the small number of scientists and engineers in Latin America. He suggests that the "bounteous resources" of technical talent in developed countries fill the breach, but that this would require, among other things, "a willingness [by Latin Americans] to provide conditions that would permit effective tackling of problems." Such conditions prevail at CEPLAC, especially in the case of biological sciences. The forests and fields abound with exciting and intellectually stimulating challenges; and, with the new laboratory nearby, discoveries of great practical importance are now possible.

The Brazilians will eventually make it on their own. But CEPLAC is the type of indigenous organization mentioned in Abelson's editorial, where an infusion of scientific talent from abroad, in this case on a small scale, could accelerate the development process. CEPLAC is no ragtag outfit. It has forceful and effective leadership and the resources to get the job done.

As a postscript to all overburdened scientists who would like to get away from it all: at Itabuna the mail service is impossible, so there are no letters to answer; telephones work only about as far as you can shout; and the beach—well, it can be all yours, with nothing but sand and more sand, surf, and palm trees as far as the eye can perceive.

P. G. KEENEY

Division of Food Science and Industry,  
Pennsylvania State University,  
University Park 16802

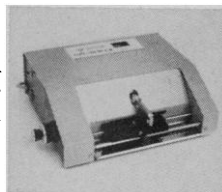
## The Brinkmann Gel Column

### Slicing It Pretty Thin

It's a safe bet you won't find one in every household. Or in every laboratory. But if you're moving in the sort of specialized area of electrophoretic analysis of RNA, for example, and you have to serve up slices of polyacrylamide gels, a lot of laboratory types think the MICKLE GEL SLICER is the best thing since delicatessens.

It figures.

How else can you cut a frozen gel column up to 10 cm long and 1 cm thick into flaw-



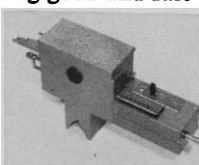
less slices of less than 1.0 mm, in increments of 0.1 mm, and leave the rest of the column undisturbed?

Cutting force and blade angle are adjustable for hard-frozen dilute gels, or softer, concentrated cylinders. Slices are easily collected for processing and scintillation counting.

Twenty cuts per minute. Foot switch leaves hands free. Electromagnetic counter keeps score on slices. Write for complete details.

### How To Look Good, Fast.

Costs being what they are today, the guy (or gal) who can save a few dollars gets the hero medal. Here's a way to look good while you're looking good and fast (while you're rapidly scanning



polyacrylamide gel columns optically, that is).

Be the first to recommend purchase of the

### VICON LINEAR GEL SCANNER

—the attachment that fits right into your Zeiss PMQ II Spec. cell compartment without modification (and avoids costly instrument duplication).

It scans at 6 mm/min—even faster (25 mm/min) for coarser separations—in either direction. Resolution? Slit aperture is 100  $\mu$  thin to catch those narrow bands. Columns to 10  $\times$  100 mm can be handled. Wavelength is variable from 200 to 750 m $\mu$ . And there are a host of options available to meet your specific needs. Want to scan fast? Want to look good? Get the details. Write:

Dept. B.G.C.  
Brinkmann Instruments, Inc.  
Cantigue Road,  
Westbury, N.Y. 11590  
(516/334-7500)

Brinkmann Instruments  
(Canada), Ltd.  
50 Galaxy Boulevard,  
Rexdale (Toronto), Ontario

# We want to be useful ...and even interesting

## A cure for gobbledygook?



Condition 1



Condition 2



Condition 3



Condition 4



The pen or pencil you habitually carry is on your mind only if missing from your pocket and needed. A Kodak pocket Instamatic® camera is no more burdensome. When needed, it captures a record of what has been seen in much more detail, much easier, much faster, much more credibly than the average pen. (Takes magicubes when doing inventories, for example.) Where accurate observing is a professional duty, half a day's pay thus invested might yield handsome returns in more observation and less verbalization per working year. Higher priced model focuses by rangefinder to 3 feet, covers 50,000:1 in light by CdS exposure sensor. See photo dealer.

Years of training and experience in photography are *not* required to take pictures like these. Yet they express clearly what the citizenry means by "clean," "moderately clean," "moderately littered," "heavily littered."

In fact, this particular set of pictures is actually used in the streets of the nation's capital as a guide to keep track of trends in cleanliness with numbers that say more than the rubbish tonnage picked up or the dollars spent doing so.\*

More and more agencies on various levels of government are acquiring quantities of inexpensive Kodak Instamatic® cameras to place in hands that would otherwise be generating mighty torrents of little-understood words in the discharge of important responsibilities.

This does a favor for all. Gobbledygook is as hard to write as it is to read.

\*Details are explained in "How Clean Is Our City?" available from Publications Office, The Urban Institute, 2100 M Street, N.W., Washington, D.C. 20037 for \$1.95. It doesn't tell what camera made the pictures and we haven't asked.



When words fail

# 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
AUTHUR D. HASLER	RAYMOND H. THOMPSON
RUDOLF KOMPNER	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

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, MARSHALL KATHAN, MARGARET LLOYD, DANIEL RABOVSKY, JEAN ROCKWOOD, PATRICIA ROWE, LEAH RYAN, JOHN SCHAUER, LOIS SCHMITT, MICHAEL SCHWARTZ, YA LI SWIGART

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: LEONARD WRAY; Subscriptions: BETTE SEEMUND; Addressing: THOMAS BAZAN

## Advertising Staff

### Director

EARL J. SCHERAGO

### Production Manager

PATTY WELLS

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burkland, 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*, 29 September 1972. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

# Blow-Hot, Blow-Cold Educational Policies

The phasing-out of the training grants and fellowship program at the National Institutes of Health will sharply curtail the government's direct support of predoctoral and postdoctoral education in the sciences. Some training will continue in connection with research grants, but the number of students supported will be a minor fraction of those who had received stipends earlier. The dismantling of the government's fellowship program liquidates some excesses but, on balance, is a destructive move, and it comes at a time when the need for some kinds of scientists and engineers is actually growing.

After Sputnik was launched, this nation engaged in a frantic effort to expand its scientific capabilities. For a number of years government funds available for research in the physical and biomedical sciences increased rapidly. At the same time, the Apollo program was implemented. These developments created a shortage of scientists and engineers. The government responded by initiating and expanding support of many kinds of fellowships and training programs. To meet the opportunities of the times, universities expanded their faculties, thus increasing opportunities for employment. Industry found it difficult to attract qualified personnel. Demand for scientists seemed insatiable. Help-wanted ads in the *New York Times* and other publications reached record numbers. An index of employment opportunities, based on such evidence, peaked in 1966 at 190 percent of 1961 levels. When government support ceased to grow, demand for scientists began to drop. Universities no longer needed to expand their faculties, industry began an era of retrenchment. The Apollo program entered its final phases. Suddenly there were unemployed scientists and engineers, and the index of employment opportunities dropped below 40 in 1971. During the peak years, it was common for top-quality graduates and Ph.D.'s to receive dozens of job offers. In 1971, the best students often had only two or three opportunities, and some graduates had no jobs for months.

The most dramatic unemployment problem was in the aerospace industry. When activities were cut back, severe local unemployment resulted. A picture of an engineer driving a taxi created a profound and lingering impression.

Those in government who wished to dismantle the fellowship programs had a useful excuse. Why train scientists when there were scientists unemployed? To a substantial extent, the unemployment argument is no longer valid. The index of employment opportunities has climbed above 100. In some regions there already are shortages of engineers.

Influenced by current antitechnology talk and by reports of unemployment, first-year college students have been shunning engineering. Beginning enrollment is down more than 30 percent from 2 years ago. Students often leave engineering courses; they rarely enter them after the freshman year. Thus, a severe shortage of young engineers may now be projected 4 years hence. This is likely to come at a time when this nation will be engaged in frantic "crash" programs to solve the energy crisis—an effort that will involve a tremendous construction program and large numbers of engineers.

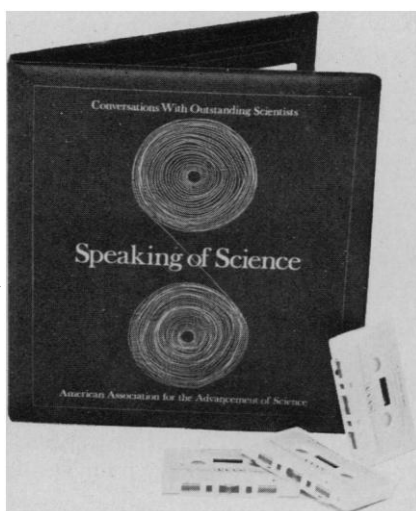
In the years ahead, this nation will encounter many unexpected problems requiring the skills of scientists and engineers. We may well come to regret bitterly the fact that we have been unable to do better than follow destructive blow-hot, blow-cold educational policies. We should adopt the more realistic assumption that this nation must have good science, good medicine, and good engineering, and we should make it possible for the top students, regardless of financial ability, to participate.

—PHILIP H. ABELSON

# “The eternal mystery of the world is its comprehensibility.”

– Einstein

## Speaking of Science



To help you understand the world through science, the AAAS—the largest general scientific organization in the United States—has created a series of audiotapes.

Designed for listening in the home and the classroom, the 12 half-hour conversations feature 30 of America's leading scientists discussing today's problems.

These conversations, narrated by Edward Edelson, science writer for the *New York Daily News*, and Mitchell Krauss of WNET-TV in New York, will be of interest to the scientist wanting to keep up-to-date in other fields. To the student. To libraries. To the general listener.

The audiotape cassettes, for playback on standard cassette machines, are packaged in an attractive vinyl binder.

1. DISCOVERING MARS  
*Dr. Carl Sagan*
2. EVOLUTION AND THE DESCENT OF MAN  
*Dr. Theodosius Dobzhansky, Dr. Ernst Mayr, Dr. Elwyn Simons*
3. ADVANCES IN THE BEHAVIORAL SCIENCES  
*Dr. Eric Lenneberg, Dr. Ward H. Goodenough, Dr. Lionel Tiger*
4. WHAT IS NEEDED FOR PEACE?  
*Dr. Chadwick F. Alger, Dr. Richard A. Falk, Dr. George W. Rathjens*
5. HEALTH CARE AND DELIVERY  
*Dr. Walter J. Lear, Dr. Paul Friedman, Dr. H. Jack Geiger*

6. ADVANCES IN THE PHYSICAL AND LIFE SCIENCES  
*Dr. Mark Kac, Dr. Charles Price, Dr. Charles P. Leblond*
7. ADVANCES IN THE OCEAN SCIENCES  
*Mr. E. W. Seabrook Hull, Dr. John L. McHugh*
8. PUBLIC UNDERSTANDING OF SCIENCE  
*Dr. Margaret Mead, Mr. Peter Hackes, Dr. Paul B. Sears*
9. TECHNOLOGY TODAY  
*Dr. J. E. Goldman, Dr. J. Herbert Holloman*
10. THE FINITE EARTH  
*Dr. Athelstan Spilhaus, Dr. Arthur Kantrowitz, Mr. Daniel J. Fennell, Mr. Herman Kahn*
11. ADVANCES IN ASTRONOMY  
*Dr. Herbert Gursky*
12. NOISE AND MUSIC  
*Mr. F. Richard Moore, Mr. Paul B. Ostergaard*

List price: \$39.95  
(\$34.95 for AAAS members).

Please send money order or check payable to AAAS—No cash. Send to Dept. I

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## American Association for the Advancement of Science

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

# ANNOUNCEMENT

## DECEMBER MEETINGS

IN

## HOUSTON, TEXAS

27 - 30 DECEMBER 1973

American Microscopical Society

American Society of Zoologists

Animal Behavior Society

Society for the Study of Evolution

Society of Protozoologists

The 1973 annual meetings of the above societies will be held at the Rice Hotel in Houston, Texas. Contributed paper sessions and several symposia are being planned. Society members may present papers, but all interested biologists are invited to register and attend.

### MAJOR SYMPOSIUM

**Toward a National System of Ecological Preserves—The Genetic, Systematic, and Ecological Basis of Natural Area Preservation**

Conference room rates at the Rice Hotel: \$11.50 single, \$7.50 double, \$6.50 triple, and \$5.50 quadruple occupancy.

Air transportation: Round-trip group flights at reduced rates are being planned from major cities to Houston.

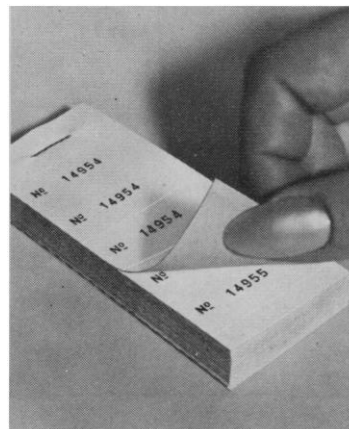
For further details contact the Program Officer of the appropriate society or the Meeting Manager:

Dr. Rezneat M. Darnell  
Department of Oceanography  
Texas A&M University  
College Station, Texas 77843

Your Lab is  
More Efficient with

### TIME CONSECUTIVE NUMBERING SYSTEMS

Use to Number:  
Test Tubes . . .  
Requisition Forms . . .  
Containers . . .  
Control Lots . . .



There are many ways a Time Consecutive Numbering System can save you time through increased efficiency. Inexpensive and easy-to-use, Time Consecutive Number Labels are self-sticking—adhere to any surface in temperatures ranging from  $-70^{\circ}\text{F}$ . to  $+250^{\circ}\text{F}$ . Numbers can be repeated from 1 to 10 times on a choice of seven different color stocks. Available in handy pre-cut tablet or clinically safe BACTERIOSTATIC roll form.

Adaptable to any numbering system you develop, these labels are supplied with a standard "No." prefix or any of 5 other prefixes. Think of the efficient, economical systems you can develop using Time Consecutive Numbers.

Write today for free samples, and more information on Time Consecutive Numbers and other TIME Products for the Laboratory. We will also send the name of your nearest dealer.

**NOTE: NEW ADDRESS.** We have recently moved into new facilities; enlarged and automated to serve you better.



PROFESSIONAL TAPE COMPANY, INC.  
DEPARTMENT 12  
144 TOWER DR., BURR RIDGE (HINSDALE), ILL. 60521

# Sale!

## O-18 Enriched Water

with  
Deuterium  
Normalized to 0.02 atom % D.

Sale ends April 30, 1973

Atom % O-18	Grams	Price
10	25	\$450
20	5	205
30	2	160
40	1	120
50	1	160
60	1	210
70	1	275
80	1	290
90	0.5	200
95	0.5	220

Delivery from stock. Ask for other quantities.  
Phone (415) 234-4130

**BIO-RAD** Laboratories

32nd & Griffin Ave., Richmond, CA 94804