

# SCIENCE

29 August 1975

Volume 189, No. 4204

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





# Protein electrofocusing in 1.5 hours

## with a thin-layer PREPARED polyacrylamide gel

Now, for the first time, a thin-layer prepared polyacrylamide gel, the Ampholine® PAGplate, is available for electrofocusing of proteins, hormones and enzymes. Samples as low as 10 µl, and in the microgram range, can be run and complete electrofocusing takes only 1.5 hours.

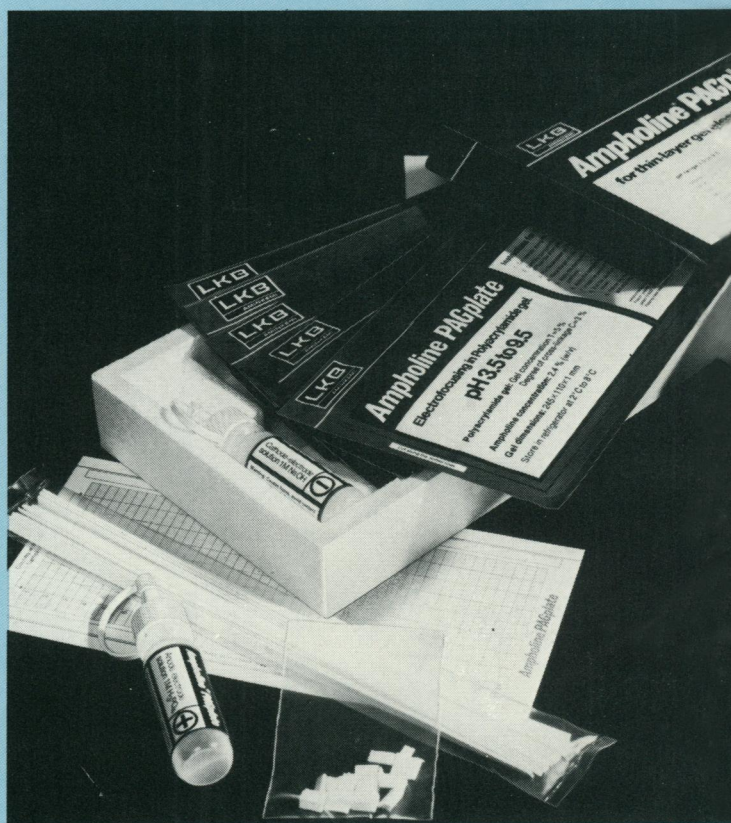
The Ampholine® PAGplate is an easy to use polyacrylamide gel plate (245 × 110 × 1 mm) containing Ampholine® carrier ampholytes in the pH range 3.5 to 9.5. The Ampholine is used to create the pH gradient in electrofocusing and the protein samples are then focused at their isoelectric points.

### No tedious preparation

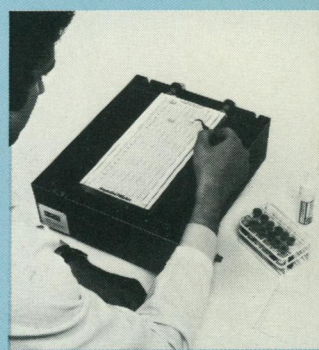
When you use an Ampholine PAGplate you avoid the tedious preparation and exposure to toxic chemicals involved in do-it-yourself gel plates. No pipettes or complicated sample applicators either. Everything you need for electrofocusing in polyacrylamide gel comes in the complete Ampholine PAGplate kit.

To get the best results, use an Ampholine PAGplate with the LKB 2117-010 Multiphor, complete for electrofocusing in polyacrylamide gel, and the new LKB 2103 Power Supply which gives you constant power, constant current or constant voltage.

For more information on the Ampholine PAGplate and other fine products from LKB for biochemical separations, contact your LKB representative or fill in the coupon below.



*The Ampholine® PAGplate can be used complete for 24 samples, or cut in half for 12 samples and in thirds for 8 or 16 samples. The remaining parts can then be stored in the original package in a refrigerator until your next experiment.*



*Applying your sample is simple and precise with the sample application pieces. Dip, soak for a few seconds in your sample solution, and then place on the gel surface.*

**YES please!**

Mail to: LKB Instruments Inc.  
12221 Parklawn Drive  
Rockville, MD 20852

- ☐ LKB 1804 Ampholine® PAGplate
- ☐ LKB 2117 Multiphor Electrofocusing Equipment
- ☐ LKB 2103 Power Supply

Name \_\_\_\_\_ Title \_\_\_\_\_

Institution \_\_\_\_\_

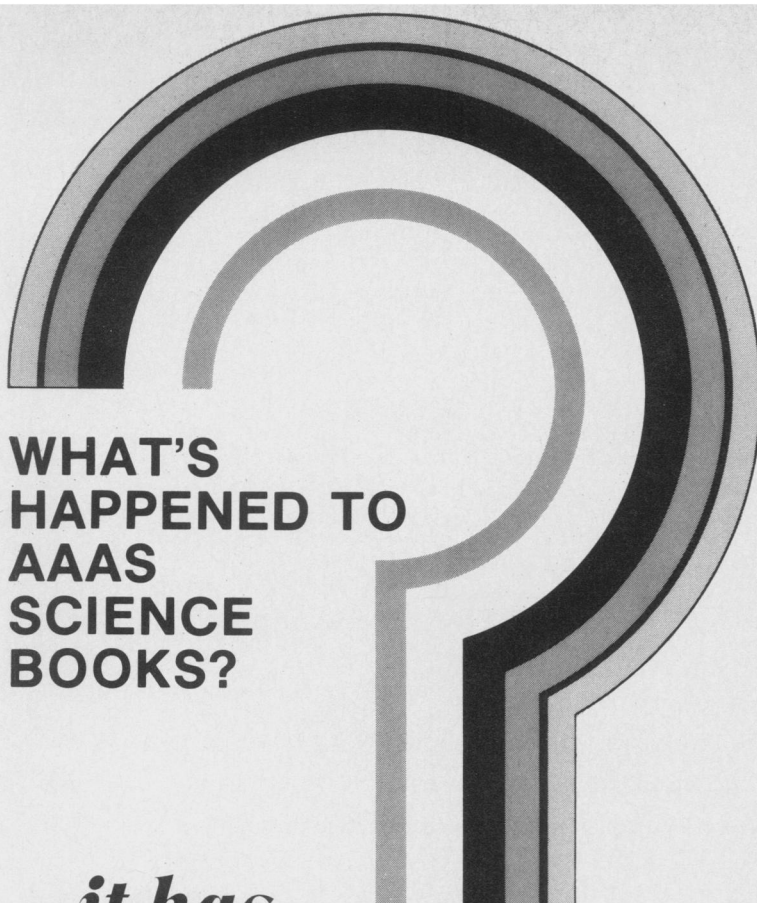
Address \_\_\_\_\_

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

**LKB**

**LKB Instruments Inc.**  
12221 Parklawn Drive, Rockville MD. 20852  
11744 Wilshire Blvd. Los Angeles CA 90025  
6600 West Irving Park Road, Chicago Ill. 60634  
260 North Broadway, Hicksville N.Y. 11801  
3700 Chapel Hill Blvd., Durham N.C. 27707





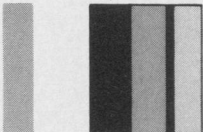
**WHAT'S  
HAPPENED TO  
AAAS  
SCIENCE  
BOOKS?**

*...it has*

*become AAAS Science Books & Films*

Are you among the thousands who have been depending upon *AAAS Science Books* as your quick, reliable source for the evaluation of the latest science books? If not, join them. But get even more information now with this new, expanded publication offered by AAAS. In addition to book reviews, you can read reviews of the new science education *films* produced each year by commercial firms, universities, and government agencies in the new *AAAS Science Books & Films*.

In its quarterly issues, SB&F will review approximately 1,000 new science books and approximately 200 films per year — an average of close to 300 items per issue. Using this single selection tool, you will find good science information sources for readers and viewers at all levels — from kindergarten through college.



Think about this. SB&F not only saves you valuable time. It can save actual cash, if you are now choosing science materials without adequate guidance. It can easily save you more than the subscription costs each year (\$15.00 for members, \$16.00 nonmembers). Why not subscribe today?

**ORDER FORM**

**AAAS Science Books & Films** sounds valuable to me.

Please enter my one-year subscription for SB&F now.

☐ \$15.00 for AAAS members.

☐ (\$26.00 / 2 yr.)

☐ \$16.00 for nonmembers.

☐ (\$28.00 / 2 yr.)

☐ Check enclosed. (Make payable to A.A.A.S.)

☐ Please bill me.

Name & Title \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

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

**American Association for the Advancement of Science**

Attn: Keith Rath, Dept. KW-3

1515 Massachusetts Avenue, N.W.

Washington, D.C. 20005

29 August 1975

Volume 189, No. 4204

# SCIENCE

<b>LETTERS</b>	Intermediate Technology: <i>P. N. Gillingham</i> ; Computers: Active or Passive?: <i>M. Klerer</i> ; <i>A. Etzioni</i> ; Conserving Nonhuman Primates: <i>M. W. Terry</i> ; Moral Responsibility: <i>R. E. Frisch</i> . . . . .	678
<b>EDITORIAL</b>	One-Armed Scientists?: <i>E. E. David, Jr.</i> . . . . .	679
<b>ARTICLES</b>	The 1973 Flood and Man's Constriction of the Mississippi River: <i>C. B. Belt, Jr.</i> . . . .	681
	Honey Bee Recruitment: The Dance-Language Controversy: <i>J. L. Gould</i> . . . . .	685
	The American Birth Rate: Evidences of a Coming Rise: <i>J. Sklar</i> and <i>B. Berkov</i> . . . .	693
<b>NEWS AND COMMENT</b>	New Jersey Higher Education: Accountability Versus Autonomy . . . . .	700
	What's Wrong with This Picture? . . . . .	703
	An Obscure Front-Runner for Interior . . . . .	704
	Science in Vietnam: The Postwar North Seeks American Assistance . . . . .	705
<b>RESEARCH NEWS</b>	Opiate Receptors: Implications and Applications. . . . .	708
	It's Not Mars, But It's Still a Big Drop . . . . .	709

## BOARD OF DIRECTORS

ROGER REVELLE  
Retiring President, Chairman

MARGARET MEAD  
President

WILLIAM D. MC ELROY  
President-Elect

RICHARD H. BOLT  
KENNETH B. CLARK

EMILIO Q. DADDARIO  
EDWARD E. DAVID, JR.

## CHAIRMEN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A)  
Victor L. Klee  
Truman A. Botts

PHYSICS (B)  
Victor F. Weisskopf  
Rolf M. Sinclair

CHEMISTRY (C)  
William E. Hanford  
Leo Schubert

ASTRONOMY (D)  
Carl Sagan  
Arlo U. Landolt

PSYCHOLOGY (J)  
Richard C. Atkinson  
Edwin P. Hollander

SOCIAL AND ECONOMIC SCIENCES (K)  
Seymour M. Lipset  
Daniel Rich

HISTORY AND PHILOSOPHY OF SCIENCE (L)  
Roger C. Buck  
George Basalla

ENGINEERING (M)  
Edward Wenk, Jr.  
Paul H. Robbins

EDUCATION (Q)  
F. James Rutherford  
Phillip R. Fordyce

DENTISTRY (R)  
Clifton O. Dummett  
Sholom Pearlman

PHARMACEUTICAL SCIENCES (S)  
James T. Doluisio  
Raymond Jang

INFORMATION, COMPUTING, AND COMMUNICATION (T)  
Martin Greenberger  
Joseph Becker

## DIVISIONS

### ALASKA DIVISION

William E. Davis  
Chairman, Executive Committee

Irma Duncan  
Executive Secretary

### PACIFIC DIVISION

George A. Zentmyer  
President

Robert T. Orr  
Secretary-Treasurer

### SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Michelle Baker  
President

Max P. Dunford  
Executive Officer

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. and additional entry. Copyright © 1975 by the American Association for the Advancement of Science. Member rates on request. Annual subscription \$50; foreign postage: Americas \$7, overseas \$8, air lift to Europe \$30. Single copies \$2 (back issues \$3) except Food Issue (9 May 1975) is \$3 and *Guide to Scientific Instruments* is \$6. School year subscription: 9 months \$37.50; 10 months \$41.75. 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

<b>BOOK REVIEWS</b>	The Compton Effect and Scientific Papers of Arthur Holly Compton, reviewed by J. L. Heilbron; Antivivisection and Medical Science in Victorian Society, W. Provine; Primate Aggression, Territoriality, and Xenophobia, G. Hausfater; The Biology of Hystricomorph Rodents, J. P. Rood; Higher Excited States of Polyatomic Molecules, D. M. Hanson; Membrane Transport in Plants, R. M. Spanswick . . . . .	711
<b>REPORTS</b>	Thermochemical Decomposition of Water Based on Reactions of Chromium and Barium Compounds: C. E. Bamberger et al. . . . .	715
	The Terrestrial Magnetosphere: A Half-Wave Rectifier of the Interplanetary Electric Field: R. K. Burton, R. L. McPherron, C. T. Russell . . . . .	717
	Lepidopteran Leaf Mine from the Early Eocene Wind River Formation of Northwestern Wyoming: L. J. Hickey and R. W. Hodges . . . . .	718
	Jupiter: Its Infrared Spectrum from 16 to 40 Micrometers: J. R. Houck et al. . . . .	720
	Cyclic Octatomic Sulfur: A Possible Infrared and Visible Chromophore in the Clouds of Jupiter: B. N. Khare and C. Sagan . . . . .	722
	Sun-Tracking Solar Furnaces in High Arctic Flowers: Significance for Pollination and Insects: P. G. Kevan . . . . .	723
	Predicting Response to Endocrine Therapy in Human Breast Cancer: A Hypothesis: K. B. Horwitz et al. . . . .	726
	Acetaldehyde Oxidation by Hepatic Mitochondria: Decrease After Chronic Ethanol Consumption: Y. Hasumura, R. Teschke, C. S. Lieber . . . . .	727
	Phosphorus-31 as a Nuclear Probe for Malignant Tumors: K. S. Zaner and R. Damadian . . . . .	729
	Tail Pinch Induces Eating in Sated Rats Which Appears to Depend on Nigrostriatal Dopamine: S. M. Antelman and H. Szechtman . . . . .	731

RUTH M. DAVIS WARD H. GOODENOUGH	FREDERICK MOSTELLER CHAUNCEY STARR	WILLIAM T. GOLDEN Treasurer	WILLIAM D. CAREY Executive Officer
GEOLOGY AND GEOGRAPHY (E) William E. Benson Ramon E. Bisque	BIOLOGICAL SCIENCES (G) Hans Laufer Jane C. Kaltenbach	ANTHROPOLOGY (H) Ruth L. Bunzel Philleo Nash	
MEDICAL SCIENCES (N) Robert Austrian Richard J. Johns	AGRICULTURE (O) Paul E. Waggoner J. Lawrence Apple	INDUSTRIAL SCIENCE (P) Jordan D. Lewis Robert L. Stern	
STATISTICS (U) Carl A. Bennett Ezra Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Charles E. Anderson Stanley A. Changnon, Jr.	GENERAL (X) Atheistan F. Spilhaus Joseph F. Coates	

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. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

## COVER

(Above) Houses in the floodplain of the Meramec River, a tributary of the Mississippi River, were flooded by backwater from the Mississippi on 5 April 1973. On 29 April, the Mississippi completely overpowered the Meramec and caused it to run backward. (Below) Aerial view of Saint Louis, Missouri (looking north from East Saint Louis, Illinois), on 28 April at 11 a.m. shows the constriction of the river caused by man-made levees. The levees are indicated on the east side by roads. See page 681. [Charles B. Belt, Jr., Saint Louis University]

# 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

1975

H. S. GUTOWSKY	DONALD LINDSLEY
N. BRUCE HANNAY	RUTH PATRICK
DONALD KENNEDY	RAYMOND H. THOMPSON
DANIEL E. KOSHLAND, JR.	

1976

ALFRED E. BROWN	FRANK PRESS
JAMES F. CROW	FRANK W. PUTNAM
HANS LANDSBERG	MAXINE SINGER
EDWARD NEY	ARTHUR M. SQUIRES

## Editorial Staff

### Editor

PHILIP H. ABELSON

### Publisher

WILLIAM D. CAREY

### Business Manager

HANS NUSSBAUM

*Managing Editor:* ROBERT V. ORMES

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

*Assistant to the Editors:* PATRICIA ROWE

*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, GINA BARI KOLATA, FANNIE GROOM

*Book Reviews:* KATHERINE LIVINGSTON, LYNN MANFIELD, JANET KEGG

*Cover Editor:* GRAYCE FINGER

*Editorial Assistants:* JOHN BAKER, ISABELLA BOULDIN, MARGARET BURESCH, ELEANORE BUTZ, MARY DORFMAN, SYLVIA EBERHART, JUDITH GIVELBER, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, MARGARET LLOYD, JEAN ROCKWOOD, LEAH RYAN, LOIS SCHMITT, RICHARD SEMIKLOSE, YA LI SWIGART, ELEANOR WARNER

*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. 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: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 11 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581)

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: 467-4443. Cable: *Advancesci*. Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 28 June 1974. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## One-Armed Scientists?

A few months ago, Senator Muskie called for "one-armed" scientists. The occasion was a Senate hearing on the health effects of pollutants. Testimony from the National Academy of Sciences and other sources was not as definitive as the Senator desired. Witnesses insisted upon saying, "On one hand, the evidence is so, but on the other hand. . . ." Thus, the call for one-armed scientists.

This incident illustrates a fundamental dilemma of the scientist or engineer in communicating with his patron, the lay person. Laymen conceive of scientific fact as an absolute—shades of gray and uncertainty are not acceptable. Scientific investigations are to produce unequivocal answers, according to the popular notion. On the other hand, scientists know that there are very few absolutes that will stand up for long. Those few that do are enshrined as "laws of nature."

Should we phrase our communications to hide our doubts and the gaps in our knowledge? Should we be assertive in the interest of bringing science to greater influence on affairs? Should we take account of the human trait that impressions, however incorrect, are seldom changed by fact but only by other impressions? That would be a risky and unwise strategy in my view.

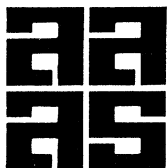
The modest influence of science in affairs today rests largely on its reputation for objectivity. To the degree that we abandon that virtue, we lose influence and are considered merely another self-serving, politically biased, ax-grinding constituency. We hear already the sinister thoughts from politicians that a reputable scientist can be found to support any side of any controversy, that scientists have used their disciplines to reinforce their political convictions, and that scientists are interested primarily in feathering their own nests.

However, there is some question as to how serious the politicians and the educated public really are about unequivocal views from scientists and engineers. Most of them know at least secondhand that absolute knowledge is rare. I suspect that much of their one-armed desire is animated by their reluctance to decide between evils or between virtues. A significant "scientific" tilt relieves them of responsibility for unpopular and difficult decisions. There are obvious reasons why we as scientists should not abet this tendency by lending our credibility to any side without stating all the caveats that go with a responsible scientific report to our own community.

It is indeed difficult to qualify properly theoretical results and their speculative implications, tentative conclusions from limited data, and social impacts without creating more uncertainty than previously existed and thereby weakening the basis for action. Yet that is the responsible path. We should be encouraging greater respect for the mystique of the scientific process and its role in uncovering reality. We should be emphasizing the complexity of important matters, their unknowability, and yet their promise for the future.

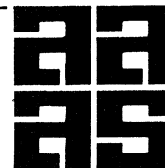
In the 1950's and early 1960's, we went through an age of simplification. That was a time of confidence and, as it turned out, overconfidence. Hopefully we are emerging into a new age of realism with the recognition of complexity. In this connection I was privileged to hear the farewell speech of Daniel Moynihan to the President's Cabinet in 1970. He said, "A century ago the Swiss historian Jacob Burckhardt foresaw that ours would be the age of 'the great simplifiers,' and that the essence of tyranny was the denial of complexity. He was right. This is the single great temptation of the time. It is the great corruptor, and must be resisted with purpose and with energy."

"What we need are great complexifiers, men who will not only seek to understand what it is they are about, but who will also dare to share that understanding with those for whom they act."—EDWARD E. DAVID, JR., *Gould, Inc.*, 8550 West Bryn Mawr Avenue, Chicago, Illinois 60631



**AUDIO  
TAPES**

# Interested in science and the quality of life?



**AUDIO  
TAPES**

... Then be sure to check this list of carefully selected audiotapes from the 1975 AAAS Annual Meeting. Whether or not you attended the meeting, you will find these recordings an excellent addition to your listening library, presenting timely discussions in such critical areas as environment and ecology ... land use, food production, and human population ... energy and transportation ... urban policy and planning ... health policy and research ... understanding human behavior ... Check the list of available cassettes for topics that may be of special interest to you.

## SCIENCE

### ... and human imagination

189-75 **Information Technology and Individual Privacy** (I).

201-75 **New Ideas Toward Metric Conversion for the Public** (II only).

### ... and human environment

190-75 **The Future of Cars: Energy, Environment, and Economics** (I-IV).

195-75 **Food, Population, and the Environment** (I-III).

196-75 **Energy and Societal Development** (I).

197-75 **Electrical Responses of Plants to External Stimuli** (I).

200-75 **The Food-Energy Relationship** (I).

202-75 **Are There Thresholds in the Effects of Pollutants on Health?** (I).

### ... and human health

191-75 **Aging and Quality of Life** (I).

192-75 **Application and Misapplication of Findings in Parapsychology** (I).

198-75 **Genetics and Humanity** (I-II).

204-75 **Perceptual Systems: Images, Hallucinations, and Dreams** (I).

### ... and the metropolis

193-75 **Urban Medical Problems** (I).

194-75 **Primary Health Care in the Urban Community** (I).

199-75 **The City and the Sea** (I).

[The hyphenated numbers preceding the symposium titles identify each title by tape number (preceding the dash) and by year of taping (after the dash). Roman numerals following the titles designate the number of sessions in each symposium.]

Prices: Single session symposium, \$19.95  
Multi-sessions, \$19.95 for first session;  
\$16.95 for each additional session of the  
same symposium.

Approximate length of a single session is 3 hours.

Please send me the following cassette tapes:

Tape No. \_\_\_\_\_ Session No. \_\_\_\_\_  
Tape No. \_\_\_\_\_ Session No. \_\_\_\_\_  
Tape No. \_\_\_\_\_ Session No. \_\_\_\_\_  
Tape No. \_\_\_\_\_ Session No. \_\_\_\_\_

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

- ☐ Please bill me  
(subject to \$1.50 handling charge)
- ☐ Check or money order enclosed  
(payable to AAAS — no cash)

- ☐ Please send me a complete  
listing of AAAS audiotapes.

Allow 3 to 4 weeks for delivery.



Department ATP-75  
**American Association for the Advancement of Science**  
1515 Massachusetts Avenue, N.W.  
Washington, D.C. 20005