

# SCIENCE

23 October 1970

Vol. 170, No. 3956

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



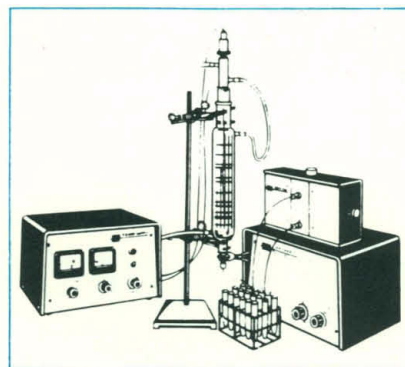


Ampholine Electrofocusing equipment,  
including Power Supply,  
Uvicord ultraviolet Monitor and Recorder,  
ready for protein separation.

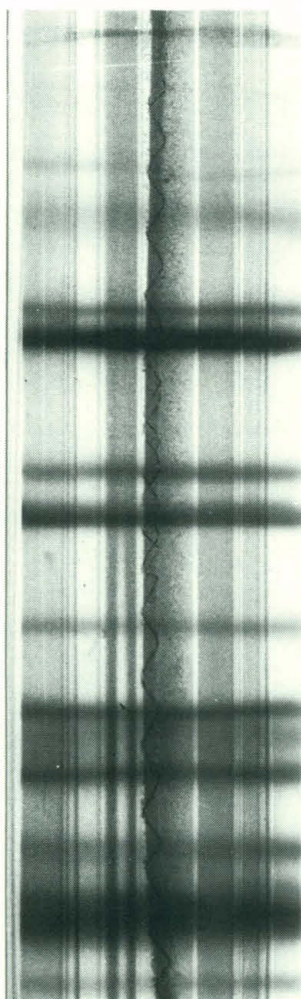


IN THE SERVICE OF SCIENCE

LKB INSTRUMENTS INC. 12221 PARKLAWN DRIVE, ROCKVILLE MD. 20852  
11744 WILSHIRE BLVD. LOS ANGELES CALIF. 90025



# PROTEIN | Separation Purification Characterization



A separation  
of chicken haemoglobin.

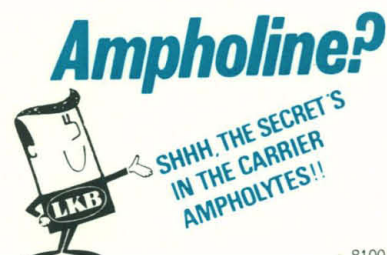
Research establishments, hospitals,  
and industry throughout the world  
have used LKB Ampholine Electro-  
focusing to successfully separate the  
following kinds of protein.

Endotoxins from bacteria  
(lipopolysaccharides)  
Capsular polysaccharide from H. Influenza  
Urine gonadotrophins of pregnancy  
(human)  
Pituitary hormones  
Amonuim Sulfate preparations of human  
serum  
Blood coagulation proteins, namely FXII  
Whole serum  
Gamma globulin  
Steroid binding  $\gamma$ -globulin  
Transcortin cortisol binding  $\mu_1$  globulin  
 $\gamma$ -globulin, transferrins  
Cytochrome c from beef heart  
Biliverdin-protein in eel serum  
Rat fetal protein from albumin  
Immunoglobulins  
Bovine serum  
Albumin  
Ovalbumin  
Intact platelet mebranes  
E. coli nucleases  
Enzymes catalyzing sulphydryl  
—disulfide interchanges  
Enzymes-cellulases (some proteases)  
Butyrylcholinesterases from human brain  
Pancreatic enzymes  
Bromelain + acid phosphatase from  
ananas comosus  
Arylsulphatases of aspergillus oryzae  
Mitochondrial transaminases  
D-aspartic oxidase  
Glycosidases from fungal or bacterial  
source  
Lactoperoxidase  
Invertase from yeast  
Ribosomal  
Catalase  
Acid phosphotases

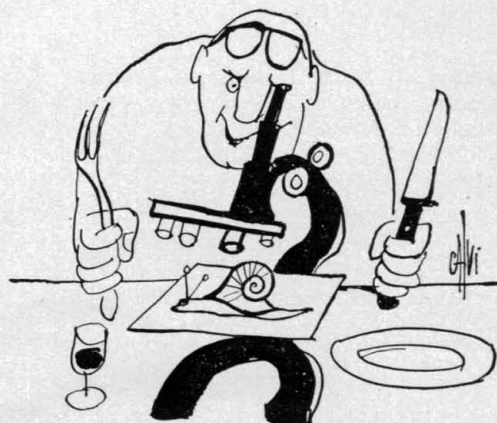
DNA polymerase  
Enzymes of carbohydrate metabolism  
Neurospora crassa invertase  
Alkaline phosphatase in eel inthestinal  
mucosa  
For myltetrahydrofolate syntetase from  
clostridium thermoaceticum  
Haemoglobin  
Isoenzymes of alcohol dehydrogenase  
Soluble grape proteins  
Influenza virus and adenovirus  
Herpes simplex virus proteins  
Renin (bovine, human)  
Insulin  
Glycopeptides of fibrinogen and platelets  
Chondroitin sulfate glycoproteins  
Myoglobin  
Ferritin  
Chemically modified myoglobin  
Interferon samples from chicken eggs  
High and low molecular weight  
glycosidases. Detergent-soluble  
glycosyltransferases (membrane bound)  
Extracellular enzymes and toxins from  
staphylococcus aureus e.g. hyaluronate  
lyase

Have YOU a research problem that  
can be solved by LKB

Sales and service in USA: New York,  
Boston, Washington, Chicago, St. Louis,  
Atlanta, Houston, Los Angeles; in Europe:  
Stockholm, The Hague, Copenhagen,  
Rome, Vienna, London; and throughout  
the world.



# Tiens, une revue scientifique française.



En 6 mois, « La Recherche » est devenue la première revue scientifique de langue française en Europe.

Et nous avons tout fait pour cela.

Nous nous sommes délibérément orientés vers l'innovation scientifique et technologique.

Nous avons diversifié nos sommaires pour aborder tous les aspects de la recherche fondamentale ou appliquée.

Et nous avons choisi, pour chaque discipline, de dégager l'essentiel d'une actualité souvent surabondante : vous ne pouvez pas lire les deux millions d'articles originaux qui paraissent chaque année dans le monde.

Aujourd'hui, « La Recherche » a pris place parmi les grands de l'information scientifique internationale.

Maintenant, nous pouvons venir chez vous.

Après tout, nous parlons le même langage.

Même si nous écrivons en français.

Que trouverez-vous dans « La Recherche » ?

Un entretien avec l'actualité.

Chaque mois, les hommes engagés dans le processus d'innovation scientifique et technique exposent leurs travaux, leurs projets ou leurs idées.

Les fronts de recherche.

Des articles de synthèse vous informent sur tous les secteurs où une mutation s'amorce.

Le dossier du mois.

Sur un grand sujet, un ou plusieurs spécialistes français ou étrangers font le point des découvertes successives, de leurs conséquences théoriques, de leurs applications et de leurs retombées économiques.

Le magazine.

Des articles brefs de nos correspondants rendent compte des découvertes et hypothèses dont on commence à parler.

Les nouvelles de France et de l'Etranger.

Une revue mensuelle des travaux, des résultats dont on ne parle pas encore.

C'est tout cela « La Recherche ».

Avec, en plus, des rubriques régulières : congrès importants, bibliographies internationales, tribunes libres, etc.



Je désire profiter d'un abonnement d'un an (11 numéros) à « La Recherche », au prix spécial de lancement de \$ 16.00.

M .....

Profession .....

Fonction ou spécialité .....

Rue .....

Ville ..... Pays .....

Adressez ce bon, accompagné de votre règlement, à :

Etats-Unis & Canada : Periodica, 7045 avenue du Parc, Montréal 303 - Québec, Canada.

Autres pays : « La Recherche », 4 Place de l'Odéon 75-Paris 6<sup>e</sup>, France.

Offre valable jusqu'au 1<sup>er</sup> Décembre 1970 et réservée aux lecteurs non encore abonnés à « La Recherche ».

■ HAVAS CONSEIL



23 October 1970

Vol. 170, No. 3956

# SCIENCE

<b>LETTERS</b>	Democracy: Haven for Dissent: <i>M. B. Visscher; S. P. Hunt; R. S. Alexander; F. S. Harris, Jr;</i> Oceanic Quest: <i>W. S. Wooster;</i> Medical Editors' Dilemma: <i>F. Silber;</i> No Wrangle: <i>M. Nelson</i> .....	386
<b>EDITORIAL</b>	Fact-Crazy, Theory-Shy?: <i>A. Etzioni</i> .....	391
<b>ARTICLES</b>	Ekistics, the Science of Human Settlements: <i>C. A. Doxiadis</i> .....	393
	Cell Communication, Calcium Ion, and Cyclic Adenosine Monophosphate: <i>H. Rasmussen</i> .....	404
	Psychological and Social Barriers to Women in Science: <i>M. S. White</i> .....	413
<b>NEWS AND COMMENT</b>	Nixon's Science Adviser: Genesis, Progress of a Surprise Appointment .....	417
	AAAS Won't Absorb Science Service .....	418
	Cyclamates: House Report Charges Administrative Alchemy at HEW .....	419
	Tenure Controversy: Rejected San Jose Engineer Is Wed to a Red .....	420
	Nobel Prize: Three Share 1970 Award for Medical Research: <i>S. Udenfriend; A. R. Martin</i> .....	422
<b>RESEARCH TOPICS</b>	Ion Implantation: <i>G. L. Wick</i> .....	425
<b>BOOK REVIEWS</b>	<i>Population, Resources, Environment</i> , reviewed by <i>A. J. Coale</i> ; other reviews by <i>W. R. Wedel, R. E. Schofield, L. Sokoloff, D. C. Malins, D. J. Dessart, M. V. Morkovin, R. Smoluchowski, R. S. Mitchell</i> ; Books Received .....	428
<b>REPORTS</b>	Heating of Basalts with a Carbon Dioxide Laser: <i>M. Blander et al.</i> .....	435
	Where Was the Moon Formed?: <i>S. F. Singer and L. W. Bandermann</i> .....	438

<b>BOARD OF DIRECTORS</b>	H. BENTLEY GLASS Retiring President, Chairman	ATHELSTAN SPILHAUS President	MINA REES President-Elect	DAVID BLACKWELL RICHARD H. BOLT	LEWIS M. BRANSCOMB BARRY COMMONER
<b>VICE PRESIDENTS AND SECTION SECRETARIES</b>	MATHEMATICS (A) R. P. Boas F. A. Ficken	PHYSICS (B) R. G. Sachs Albert M. Stone	CHEMISTRY (C) Herman S. Bloch Leo Schubert	ASTRONOMY (D) Helmut A. Abt Arlo U. Landolt	
	ANTHROPOLOGY (H) Margaret Mead Anthony Leeds	PSYCHOLOGY (I) Frank W. Finger William D. Garvey	SOCIAL AND ECONOMIC SCIENCES (K) Robert M. Solow Harvey Sapolsky	HISTORY AND PHILOSOPHY OF SCIENCE (L) George Wald Raymond J. Seeger	
	PHARMACEUTICAL SCIENCES (Np) Don E. Francke Joseph A. Oddis	AGRICULTURE (O) Matthias Stelly Michael A. Farrell	INDUSTRIAL SCIENCE (P) Sherwood L. Fawcett Burton V. Dean	EDUCATION (Q) Frederic B. Dutton Phillip R. Fordyce	
<b>DIVISIONS</b>	<b>ALASKA DIVISION</b> T. Neil Davis President Irma Duncan Executive Secretary	<b>PACIFIC DIVISION</b> George E. Lindsay President Robert C. Miller Secretary	<b>SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION</b> Loren D. Potter President Marlowe G. Anderson Executive Secretary		

SCIENCE is published weekly on Friday and on the fourth Wednesday in September 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 © 1970 by the American Association for the Advancement of Science. Annual subscription \$12; foreign postage: Americas \$3; overseas \$5; single copies, 50¢ (back issues, \$1) except *Guide to Scientific Instruments* which is \$3. School year subscription: 9 months, \$9; 10 months, \$10. 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

Blood Velocity Measurements in Intact Subjects: <i>O. C. Morse</i> and <i>J. R. Singer</i> . . . . .	440
Bimodal Sedimenting Zones Due to Ligand-Mediated Interactions: <i>J. R. Cann</i> and <i>W. B. Goad</i> . . . . .	441
Macrophage Membranes Viewed through a Scanning Electron Microscope: <i>A. H. Warfel</i> and <i>S. S. Elberg</i> . . . . .	446
Specific Inhibition of Nuclear RNA Polymerase II by $\alpha$ -Amanitin: <i>T. J. Lindell</i> et al. . .	447
Echo-Ranging Neurons in the Inferior Colliculus of Bats: <i>N. Suga</i> . . . . .	449
Coagulation Inhibitor Elicited by Thrombin: <i>E. Marciniak</i> . . . . .	452
Histamine Production by Transplantable Argyrophilic Gastric Carcinoid of <i>Praomys (Mastomys) natalensis</i> : <i>S. Hosoda</i> et al. . . . .	454
Phenylthioacetate: A Useful Substrate for the Histochemical and Colorimetric Detec- tion of Cholinesterase: <i>G. M. Booth</i> and <i>R. L. Metcalf</i> . . . . .	455
Trisomy-3,4 and Triploidy (3A-ZZZW) in Chick Embryos: Autosomal and Sex Chro- mosomal Nondisjunction in Meiosis: <i>S. E. Bloom</i> . . . . .	457
Rapid Axonal Transport of Sulfated Mucopolysaccharide Proteins: <i>J. S. Elam</i> et al. . . .	458
Plasticizers from Plastic Devices: Extraction, Metabolism, and Accumulation by Bio- logical Systems: <i>R. J. Jaeger</i> and <i>R. J. Rubin</i> . . . . .	460
Radioresistance of Cooperative Function of Carrier-Specific Lymphocytes in Antihapten Antibody Responses: <i>D. H. Katz</i> et al. . . . .	462
Electrical Coupling: Low Resistance Junctions between Mitotic and Interphase Fibroblasts in Tissue Culture: <i>P. O'Laque</i> et al. . . . .	464
Shear Degradation of Fibrinogen in the Circulation: <i>S. E. Charm</i> and <i>B. L. Wong</i> . . . .	466
Gibbon Fibrinopeptides: Identification of a Glycine-Serine Allelism at Position B-3: <i>G. A. Mross</i> , <i>R. F. Doolittle</i> , <i>B. F. Roberts</i> . . . . .	468
<b>ASSOCIATION AFFAIRS</b> International Biological Program: <i>J. McKee</i> ; Tours . . . . .	471

GERALD HOLTON  
PHYLLIS V. PARKINS

LEONARD M. RIESER  
KENNETH V. THIMANN

WILLIAM T. GOLDEN  
Treasurer

WILLIAM BEVAN  
Executive Officer

GEOLOGY AND GEOGRAPHY (E)  
Richard H. Mahard  
William E. Benson

ENGINEERING (M)  
Newman A. Hall  
Raynor L. Duncombe

INFORMATION AND  
COMMUNICATION (T)  
R. M. Hayes  
Scott Adams

ZOOLOGICAL SCIENCES (F)  
David Bishop  
Richard J. Goss

MEDICAL SCIENCES (N)  
Leon O. Jacobson  
F. Douglas Lawrason

STATISTICS (U)  
Douglas Chapman  
Ezra Glaser

BOTANICAL SCIENCES (G)  
William A. Jensen  
Arthur W. Cooper

DENTISTRY (Nd)  
Robert C. Likins  
Richard S. Manly

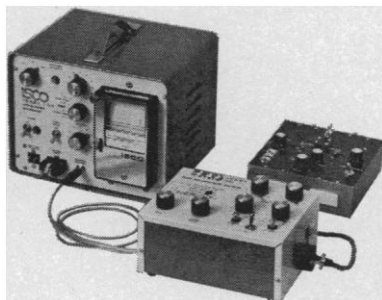
ATMOSPHERIC AND HYDROSPHERIC  
SCIENCES (W)  
Robert M. White  
Louis J. Battan

## COVER

Center of Paris, showing the wide diagonal avenues that, in the 19th century, were superimposed on the existing pattern of streets, to speed transportation. Such planned cities of traditional type, the result of long human experience, tend to acquire monumental characteristics. One inch on the scale represents 0.57 kilometer. See page 393. [C. A. Doxiadis]

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.

## With an ISCO two channel O.D. recorder



### you can:

- Monitor one column at both 254 and 280 m $\mu$ .
- Or two columns at either wavelength.
- Or one column at two optical path lengths.
- Or ratio record one column to compensate for elution gradients.

A new accessory for ISCO quantitative dual-beam flow monitors provides these applications. The Model 580 Channel Alternator will fit all current ISCO dual-beam flow monitors and can be adapted to earlier models with slight modification.

All ISCO UV flow monitors have an output calibrated in linear absorbance (O. D.). They have the narrowest bandwidth available and one model will operate a fraction collector in such a way that separate UV absorbing peaks are deposited in separate tubes. They are available in single and dual-beam versions operating at two discrete UV wavelengths and continuously throughout the visible spectrum. And they cost no more than most instruments having none of these features.

Send for brochure UA3717 for further details.



**INSTRUMENTATION  
SPECIALTIES CO., INC.**  
4700 SUPERIOR LINCOLN, NEBRASKA 68504  
PHONE (402) 434-0231 CABLE ISCOLAB LINCOLN

## LETTERS

### Democracy: Haven for Dissent

Two recent letters (4 Sept.) criticize scientists who venture to express opinions for public notice in relation to public policy matters. A third makes the same point by quoting the 267-year-old stricture by the Royal Society of London against "meddling with Divinity, Metaphysics, Moralls, Politics, Grammar, Rhetorick, or Logic." All three letters have a hollow sound in the context of present realities of the society in which we live, but the one by Arkush should not simply be ignored. He says, in relation to Nobel laureates expressing publicly their views about the impropriety of the U.S. participation in the southeast Asian war, "They apparently assume that political competence is common to all men."

Apparently Arkush chooses to ignore the fact that the assumption he decries is the central principle of democracy. Anyone who subscribes to universal suffrage implicitly makes that assumption. Democracy surely has its flaws, but nearly everyone in this country thinks it to be the best political system that has yet been devised. One of the reasons that democracy has worked as well as it has is undoubtedly because many scholars, in science as well as in other disciplines, have exercised their prerogatives as citizens to contribute to political debate. To make it work in our scientific and technological age, scientific experts must let the less well-informed public know their views. One suspects that what really bothers Arkush is that the views of the 44 Nobel laureates differ from his own, and that the general public may, as it should, be more impressed by their views expressed in concert than by his own.

MAURICE B. VISSCHER  
*Department of Physiology, University  
of Minnesota, Minneapolis 55414*

To men like Russell and Arkush (Letters, 4 Sept.) who idealize "experts" and expertise and suggest that the citizens of our country remain docile and compliant to the hypnotic credo "the President knows best," I commend the following recollections by former Nazi Albert Speer in his remarkable new book *Inside the Third Reich*:

The ordinary party member was taught that grand policy was much too complex for him to judge it. Consequently . . . one was never called upon to take personal responsibility. The whole structure

of the system was aimed at preventing conflicts of conscience from even arising. . . . Worse still was the restriction of responsibility to one's own field. That was explicitly demanded . . . people were immured in closed-off, isolated areas of life. The longer Hitler's system lasted, the more people's minds moved within such isolated chambers. . . . We had derived our principles from . . . the authoritarian though not totalitarian state of Imperial Germany (1, p. 33). . . .

With such arguments we soothed our consciences. I myself and many others snatched avidly at excuses; the things that would have offended us two years before we now accepted (1, p. 53).

To those who tell us we should not criticize the President I also commend a recent discerning critique of American society by T. Roszak (2), and especially the chapter "The myth of objective consciousness," an analysis of the "scientific world view."

SAMUEL P. HUNT

129 Whitney Avenue,  
New Haven, Connecticut 06511

### References

1. A. Speer, *Inside the Third Reich* (Macmillan, New York, 1970).
2. T. Roszak, *The Making of a Counter Culture* (Doubleday, Garden City, N.Y., 1969).

Russell and Arkush seem to be guilty of the not uncommon fallacy of confusing the role of technical expertise in the formulation of public policy. Technical expertise establishes the boundary conditions within which decisions in regards to policy should be formulated, but does not dictate the policy decision. Indeed, if technical considerations truly dictate the decision, it is a decision of necessity and not of "policy." . . . If the President were committed to withdrawal of all U.S. forces from Vietnam as rapidly as was technically feasible, he has expert advisers who could inform him how rapidly the necessary transport facilities could be mobilized to accomplish the task. Any scientist who criticized such a timetable would be clearly obligated to demonstrate greater technical expertise than the representatives from the Pentagon. In the present situation, however, the policy decision has not been formulated on the basis of technical feasibility. The Nixon doctrine of U.S. aid to achieve self-determination and its corollary of Vietnamization is clearly not the dictate of technical expertise; it is a philosophy of world politics and the role that this nation should play. Every responsible citizen has the obligation to examine that philosophy and, if he chooses, to express his disagreement without being subjected to the erroneous criticism

that he is invading an area where he lacks the expertise for wise technical decisions.

ROBERT S. ALEXANDER  
20 Forest Road, Delmar, New York

As a lifelong professor, research scientist, and active participant in local and national scientific organizations I am as much interested in the history, advancement, and utilization of science as the signers of widely publicized letters. For a long time I have resented certain prominent scientists taking on themselves the right to speak for all of science and scientists, by implication, and worse, to deal authoritatively with subjects outside their special scientific competence. In courts of law (where I have often served as an expert witness in scientific and technical problems) the court is very careful to limit any expert's testimony to areas of demonstrated competence both in general and with respect to the particular case in issue. Any court would throw out as "incompetent" the testimony of famous scientists or would-be experts in "non-scientific" areas outside their competency.

FRANKLIN S. HARRIS, JR.  
15514 Tuba Street,  
Mission Hills, California 91340

### Oceanic Quest

Stommel, in his provocative article on future prospects for physical oceanography (26 June, p. 1531), asks "are present plans for expanded oceanographic research designed to solve basic scientific problems?" The answer is clearly no; they are designed to increase support for oceanographic work as a prerequisite to more effective use of the ocean and its resources. If successful, these plans should help scientists to solve basic scientific problems.

It is difficult to quarrel with Stommel's view that we must find out how the machinery of the ocean works before attempting to predict or control it (although many geophysical predictions contain large elements of empiricism). But having been involved in preparation of "An Oceanic Quest" and the "Ponza" Report (as was Stommel), I must disagree with his interpretation of the nature and implications of some of their recommendations.

Stommel tests these and other reports by asking whether their recommendations on basic scientific investigations

in physical oceanography are adequate. Although physical oceanographers (including Stommel) participated in the studies, the principal emphasis was on cooperative and interdisciplinary programs, so it is not surprising that the purely physical aspects were not so fully developed as they might have been in more specialized groups. It should also be noted that neither study pretended to be comprehensive. On the contrary, they stressed that only *examples* of possible programs were presented.

Stommel suggests that proposals for the International Decade of Ocean Exploration (IDOE) and for the UN long-term and expanded program (LEPOR) were (or should have been) concerned exclusively with basic marine science. In fact, both programs are concerned only with certain aspects of marine science as they relate to ocean use. The reports stressed that achievement of the applied goal of enhanced ocean utilization depended on extensive scientific research and that the details of this research should be elaborated by the scientists concerned. Their intent was to establish a framework within which new support for oceanography could be applied.

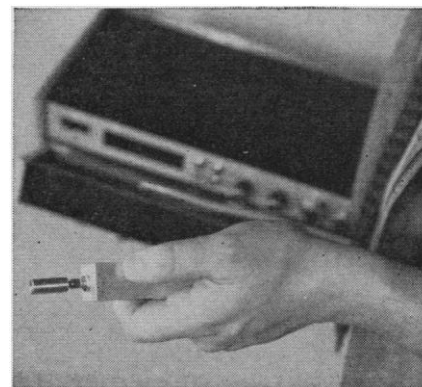
Stommel is particularly hard on the Integrated Global Ocean Station System being developed by the Intergovernmental Oceanographic Commission. This program was initiated by the need to justify allocation of radio frequencies for transmission of oceanographic data and by the desire to develop an ocean counterpart to the World Weather Watch. The IGOSS was not conceived exclusively to reveal the dynamics of ocean circulation, although the dynamics of ocean circulation must be better understood before such a system can be designed. Rather it is intended to make possible eventual ocean forecasts to increase the safety and efficiency of various kinds of marine activities.

There are enough problems in the development of IGOSS without blaming it for others' sins. Nowhere in the official description of IGOSS is there reference to increasing the number of weather ship stations by 19, or beginning to set out 310 automatic data buoys in 1971. Such proposals may have been advanced in IGOSS or World Weather Watch discussions, but there is no evidence that IOC is committed to fostering them. Nor has there been any serious attempt to establish a routine global system involving hundreds of buoys, as implied by Stommel.

## Background radiation complicating your experiment?

### GE's new NUCLE EYE Monitor nuclear counting system may solve your problem.

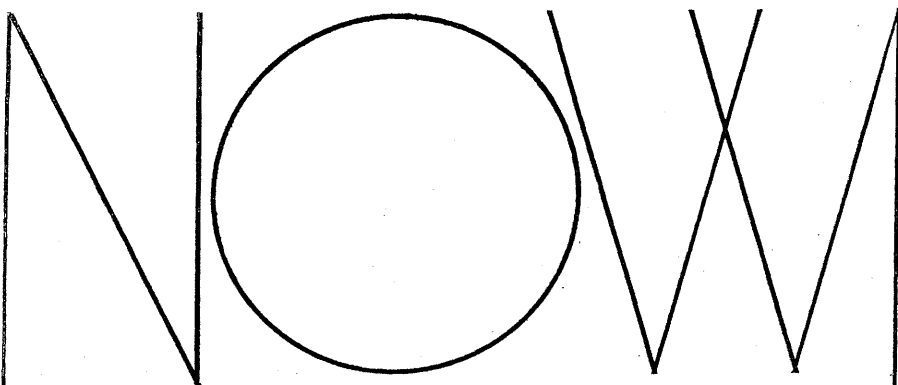
Unique high-speed solid-state circuitry lets the ultra-sensitive General Electric NUCLE EYE Monitor detect events almost as fast as they occur. And its point probe detection head makes a mighty small target for cosmic particles. Result? Background count is virtually eliminated. No cooling . . . no lead bricks. 162-58



Completely portable, the NUCLE EYE Monitor lets you get closer to your work. From \$2995.

For more information, contact  
Space Technology Products,  
P.O. Box 8439, Philadelphia, Pa.  
19101. Phone: (215) 962-8300

GENERAL  ELECTRIC



**AT YOUR BOOKSTORE**

**CHEMISTRY OF THE ALKALOIDS**

*Edited By S. W. Pelletier*

Twenty-two international authorities bring together in this single volume the wealth of current information now available on the chemistry of these important plant derivatives. Encompassing the historical, pharmacological, botanical and chemical aspects of the subject, the book describes typical reactions and methods of synthesis for each alkaloid group. These classifications are determined essentially by identifying ring structures and are defined as follows:

- Group I Alkaloids containing phenylethylamine, isoquinoline or related structures
- Group II Alkaloids containing an indole or a quinoline system
- Group III Alkaloids containing pyrrolidine, piperidine, pyridine rings and related structures
- Group IV Terpenoid and steroidal alkaloids

In addition, you will find a full chapter on biosynthesis and an enlightening examination of plant systematics. **800 pages, 6 x 9, \$24.95**

**SYNTHETIC PEPTIDES**

*By George R. Pettit*

This invaluable guide gives you a summary of synthetic peptides, giving information as to what peptides have been prepared, physical constants, and primary references. Based on an exhaustive survey of all literature published on the subject between 1960 and early 1970, the book contains primary references to over 800 papers. Approximately eight thousand experiments are summarized in tables to provide a ready review of information useful in peptide synthesis and purification, and theoretical problems concerned with optical rotation. **Approximately 592 pages, 6 x 9, \$19.95**

**PRINCIPLES AND TECHNIQUES OF ELECTRON MICROSCOPY:**

**Biological Applications. Volume I**

*By M. A. Hayat*

With the help of this book you can gain a sound, working knowledge of the essential biochemical concepts underlying modern preparatory procedures for electron microscopy.

Supporting the premise that a true understanding of these procedures can best be reached by first learning the basic chemical fundamentals, the book fully details the chemistry of the interaction of reagents with cellular substances. This background enables you to interpret more accurately the electron micrograph of any specimen which has been subjected to fixation, dehydration, embedding, sectioning, staining, and electron bombardment. It also opens new insights into potential research areas in the field. **412 pages, 6 x 9, \$19.50**



**VAN NOSTRAND REINHOLD COMPANY**

450 West 33rd Street, New York, N. Y. 10001

I can't believe that Stommel is opposed to large-scale and long-term planning. If such planning is done poorly, it is necessary both to protest and to help in doing it better. Stommel has protested and, along with many other scientists, is actively contributing to better planning. I hope that his article will not persuade these scientists that national and international efforts to enhance support for oceanography are both misguided and futile and thus cause them to withdraw their essential contribution. There is also a danger that Stommel's views will be used as a weapon against these planning efforts and the organizations engaged in them. At least internationally, these organizations are fragile, and it would be a tragedy if they were further weakened by this well-intentioned but often misleading attack.

WARREN S. WOOSTER

*Scripps Institution of Oceanography,  
Post Office Box 109,  
La Jolla, California 92037*

**Medical Editors' Dilemma**

The editor of *The New England Journal of Medicine*, writing in *Science* ("Medical literature: The campus without tumult," 28 Aug., p. 831), raises anew, and in the same disturbing fashion, an issue he examined in an editorial in his own journal in September 1969: a presumed "conflict" between the priorities of publishing scientific papers in full in scientific journals and the increasingly effective and rapid reporting of scientific news to scientists by professional journalistic methods.

The nub of Ingelfinger's complaint is that full journalistic reporting of medical news in the medical press may produce a situation in which later publication of some of this material in medical journals "merely serves archival, bibliographic, and narrow technical purposes." To avert this threat, he proposes measures which boil down to plain censorship or, on the most tolerant interpretation, a self-sacrificial restriction of news coverage by the medical press.

*Medical Tribune*, in an editorial commenting upon Ingelfinger's published proposals a year ago, said: "The [*New England*] *Journal's* proposed policy seems to have been conceived in a moment of irritation. Already, according to *Medical Tribune* staff members, it is resulting in some restriction of legiti-



mate news at medical meetings by creating a feeling of fear among some investigators that their full papers may not receive formal publication if they cooperate with medical news reporters. The *Journal's* proposals are unworthy of the principles of medical communication that the *Journal* itself, we are sure, espouses with us."

It seems odd—nay, anachronistic—in a time when professional and public support is desperately sought for science by investigators, teachers, editors, and students to avert budgetary disaster—to find restriction of news being advocated in the ranks of the defenders. Since Ingelfinger concedes in his *Science* article that his own journal must wait 2 to 6 months to publish what papers it does select, it should be emphasized that medical journalism has done yeoman service in shortening the time it takes to convey news highlights (virtually never the "complete conceptual and documental form" feared by Ingelfinger) from a scientific meeting, laboratory, or school to the practitioner in the field.

I am sure there will be others—professional science writers and editors in particular—who wish to examine Ingelfinger's premises and conclusions with great care. If there is a problem, it does not lie in his imagined competition but rather in the need for regular and comprehensive study of the critical requirements of communicating scientific information to the professions and the public.

FREDERICK SILBER

Medical Tribune,  
110 East 59 Street, New York 10022

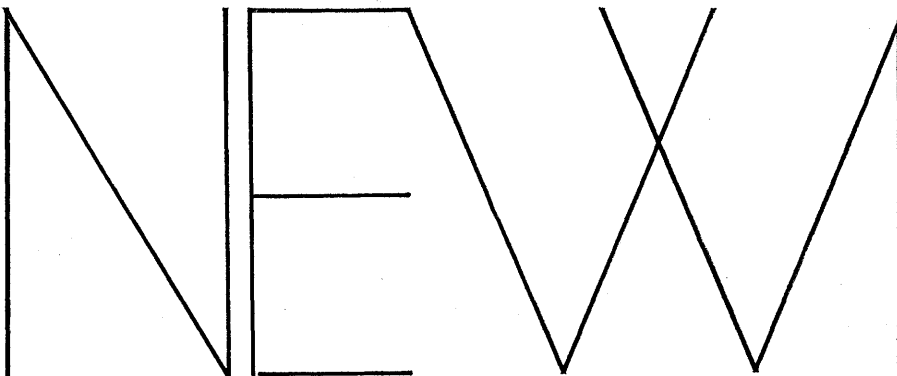
## No Wrangle

May I set the record straight with reference to an allegation [attributed to E. G. Sherburne, Jr., director of Science Service] in Boffey's article (18 Sept., p. 1182)? Marcia Nelson was not "fired . . . at least partly because her job had largely been taken over by a computerized subscription service." I was, in fact, not fired at all, but resigned, partly for the reason stated, and partly because of a completely amicable agreement between Sherburne and me to disagree about some aspects of my job. No wrangle was involved in this action.

MARCIA NELSON

1305 Providence Terrace,  
McLean, Virginia

23 OCTOBER 1970



FROM VAN NOSTRAND REINHOLD

## MEMBRANES OF MITOCHONDRIA AND CHLOROPLASTS

*Edited by Efraim Racker*

ACS Monograph No. 165

This major work brings together in a single volume the latest findings in the area of membrane-linked catalytic processes.

It deals with mitochondria and chloroplasts—the intercellular organelles responsible for the generation of bioenergy in plant and animal cells. Since the function of these organelles is intimately associated with their constituent membranes, special emphasis is placed on the properties, and the mutual interactions of the individual membrane components.

Each section is written by one or more experts and covers such important topics as the formation, composition, stability and physical properties of the bilayer . . . the structure of liposomes . . . model membranes . . . the chemical and chemiosmotic hypotheses . . . the structural role of catalytic membrane components . . . methods for the separation of the outer and inner mitochondrial membranes . . . intramitochondrial distribution of enzymes . . . relationship of ion transport to mitochondrial energy transfer . . . mitochondrial DNA and RNA . . . and more. **322 pages, 6 x 9, \$17.50**

## COLORIMETRIC METHODS OF ANALYSIS including Photometric Methods Volume IVAA

*By Foster Dee Snell and Cornelia T. Snell*

This volume brings you the most current details in the colorimetric and photometric analyses of urea and related compounds, compounds with inorganic radicals and elements, sterols, hormones and alkaloids.

Updating and corresponding with Chapters 7 through 11 of Volume IV in the Series, the book treats each detail and determination of the organic and inorganic substances from basic theory to final calculations and interpretations of the results.

As in previous volumes, the book has been arranged for fast, easy reference . . . an invaluable reference on the latest analytical methods for professionals in organic chemical and pharmaceutical research.

**623 pages, 6 x 9, \$22.50**

## REGULAR AND RELATED SOLUTIONS The Solubility of Gases, Liquids and Solids

*By Joel H. Hildebrand, John M. Prausnitz and Robert L. Scott*

A major revision and sequel to Hildebrand and Scott's classic reference, this book greatly expands their coverage of solubility within a thermodynamic framework using the microscopic or inter-molecular potential foundation approach of solubility. Scores of solutions of gases, liquids, and solids are arranged in the light of this important theory.

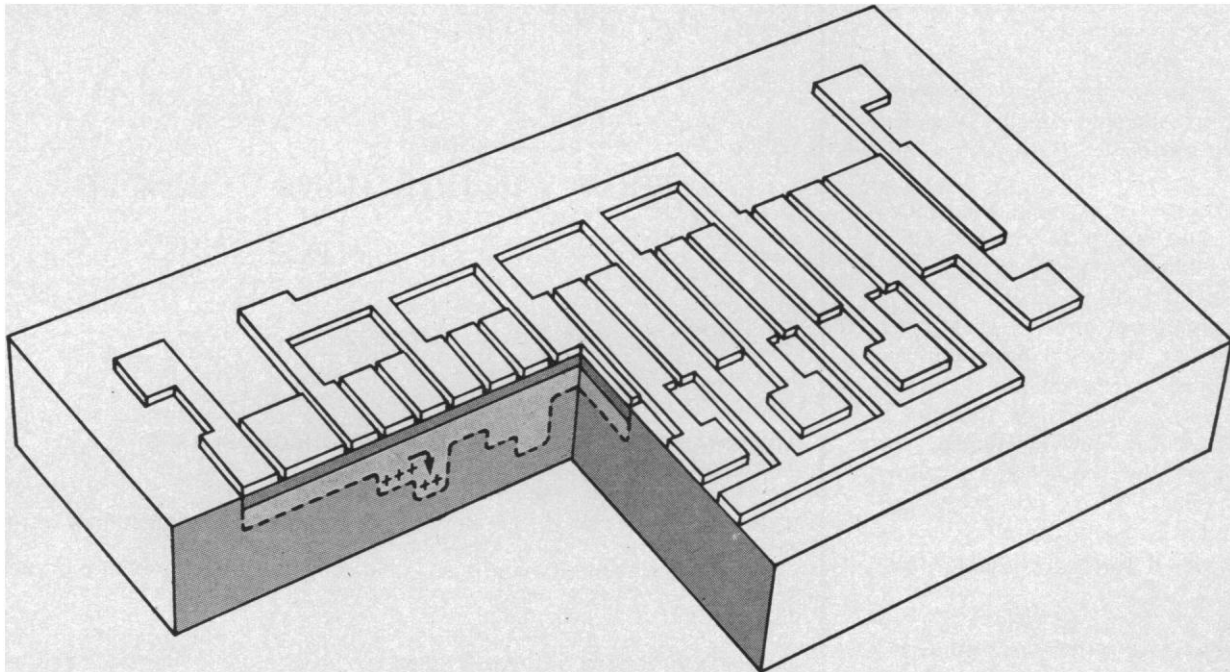
Presenting a wealth of new experimental evidence, the book represents the lifetime contribution of three of the foremost authorities in the field.

**228 pages, 6 x 9, \$10.95**



**VAN NOSTRAND REINHOLD COMPANY**

450 West 33rd Street, New York, N. Y. 10001



**Functional device without junctions**

A junctionless semiconductor device that performs complete circuit functions has been invented by Bell Labs scientists Willard Boyle and George Smith. It may replace complex integrated circuits for information storage and other processing.

The new device consists of a layer of semiconductor (silicon) covered by a layer of insulation (silicon dioxide), with a row of closely spaced metal plates on top of the insulation. It operates much like an array of capacitors passing a stored charge—representing a binary information bit—from one capacitor to the next.

If all plates are held at a small negative voltage, the charge (holes) will remain stationary . . . stored in so-called “potential wells” below

the plates. If, now, a stronger negative pulse is applied to a plate adjacent to one under which charge is stored, the charge will “spill over” into the deeper potential well thus produced (figure). So, charges can be shifted, plate by plate, along the surface of the semiconductor.

One use is as a shift register. Holes may be created at one end, moved along the semiconductor surface, and detected (read out) at the other end. Charge can be detected through the capacitance change it causes when present under a plate. The basic shift register may be used as part of a recirculating memory or as a delay line.

The new device can also convert images to electrical signals. By projection through a narrow slit, one horizontal strip of the image is

focused on the semiconductor. Beneath each plate, this produces charge proportional to brightness. The shifted-out charge stream is an analog of that strip. Successive strips compose a complete image.

The first device was made of silicon. But since junctions are not needed, devices can be made from many semiconductors.

The device is so new that we haven’t explored all possible applications. But its simplicity promises high reliability. And the comparatively few steps required to make it will keep costs low. We expect it to have considerable impact on telephony and on other high-volume information systems.

From the Research and Development Unit of the Bell System:



**Bell Labs**

## 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

1970

GUSTAF O. ARRHENIUS	RICHARD C. LEWONTIN
FRED R. EGGAN	ALFRED O. C. NIER
HARRY F. HARLOW	FRANK W. PUTNAM
MILTON HARRIS	

1971

THOMAS EISNER	NEAL MILLER
AMITAI ETZIONI	BRUCE MURRAY
EMIL HAURY	JOHN R. PIERCE
DANIEL KOSHLAND, JR.	

### 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 Editor: DANIEL S. GREENBERG

Foreign Editor: JOHN WALSH

News and Comment: LUTHER J. CARTER, PHILIP M. BOFFEY, CONSTANCE HOLDEN, ROBERT BAZELL, SCHERRAINE MACK

Book Reviews: SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN BARKDOLL

Cover Editor: GRAYCE FINGER

Editorial Assistants: JOANNE BELK, ISABELLA BOULDIN, ELEANORE BUTZ, NANCY HAMILTON, CORINE HARRIS, OLIVER HEATWOLE, ANNE HOLDSWORTH, MARSHALL KATHAN, MARGARET LLOYD, VIRGINIA NUESSE, DANIEL RABOVSKY, PATRICIA ROWE, LEAH RYAN, LOIS SCHMITT, BARBARA SHEFFER, RICHARD SOMMER, YA LI SWIGART, ALICE THEILE, MARIE WEBNER

Membership Recruitment: PATRICIA CAESAR; Subscriptions: BETT SEEMUND; Addressing: THOMAS BAZAN

### Advertising Staff

#### Director

EARL J. SCHERAGO

#### Production Manager

VERA JUCHNOWICZ

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Robert S. Bugbee, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); MEDFIELD, MASS. 02052: Richard M. Ezequelle, 4 Rolling Lane (617-444-1439); CHICAGO, ILL. 60611: Herbert L. Burkland, 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. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 25 September 1970. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## Fact-Crazy, Theory-Shy?

President Nixon has appointed a commission\* to conduct the "first comprehensive review" of federal statistics in more than two decades. Its mandate also includes the study of the needs for information about the functioning of the American economy and society. We hope that in the course of their study, the Commission will examine the balance between *collection* of information and its *analysis*. Societies differ significantly in the ways they collect, process, and use information. Some societies, for instance those of France and Germany before World War II (before their "Americanization"), were highly analytic, often short on facts but long on theorizing. On the other hand, the American system seems heavily skewed in the opposite direction; it often seems hip on fact but adverse to prolonged analysis.

This empiricistic tendency is reported from a large variety of American information systems. The House Defense Appropriation Committee found, in 1968, that "unprocessed reports on Southeast Asia alone recently filled 517 linear feet of file drawer space at the headquarters of the Defense Intelligence Agency." Dr. Conrad Taeuber, associate director of the U.S. Bureau of the Census, pointed out that, because of shortage of funds for analysis, "many of the significant analytic cross tabulations of the census data are left for an if-and-when basis and frequently cannot be carried out." Various data banks have been set up to bring together raw data to ease the analysis. Many of these banks, whose annual budget runs in six-digit figures or higher, are infrequently used, often yielding a lower volume of research than their custodial budget.

The reasons leading to this analysis gap are numerous. They vary from relatively manageable ones, such as granting and research-budgeting procedures, to difficult-to-alter Anglo-Saxon cultural traits. Many federal agencies and foundations frown on researchers who "budget" for analysis more than the last year of a project. ("Professors should 'think' on their own time.") Both as a frequent recipient of research grants (from agencies as different as OEO, DOD, NSF, and OE) and, recently, as a member of two grant-review boards of government agencies, I found that funds for the collection of data are much more readily available than funds for their analysis. As studies frequently run behind schedule, the analysis phase is often short—and shortchanged. In most courses on "methodology" in social science most of the time is spent on teaching the collection of data and preliminary tabulations. The more difficult-to-communicate art of analysis and interpretation is squeezed into the closing weeks of the semester.

Prestige is a factor. Dr. Harold Orlans, of the Brookings Institution, has written: "More encouragement and support can be given to the critical review and synthesis of bodies of knowledge, a function that, when it is done well, *should be* esteemed as highly as the generation of new knowledge." But it is not.

The deeper reasons for the analysis gap stem from the American tendency to be more trusting of "hard" facts than of theorizing that still carries overtones of scholasticism and dogma. Pragmatism finds data more appealing than speculation about its meaning.

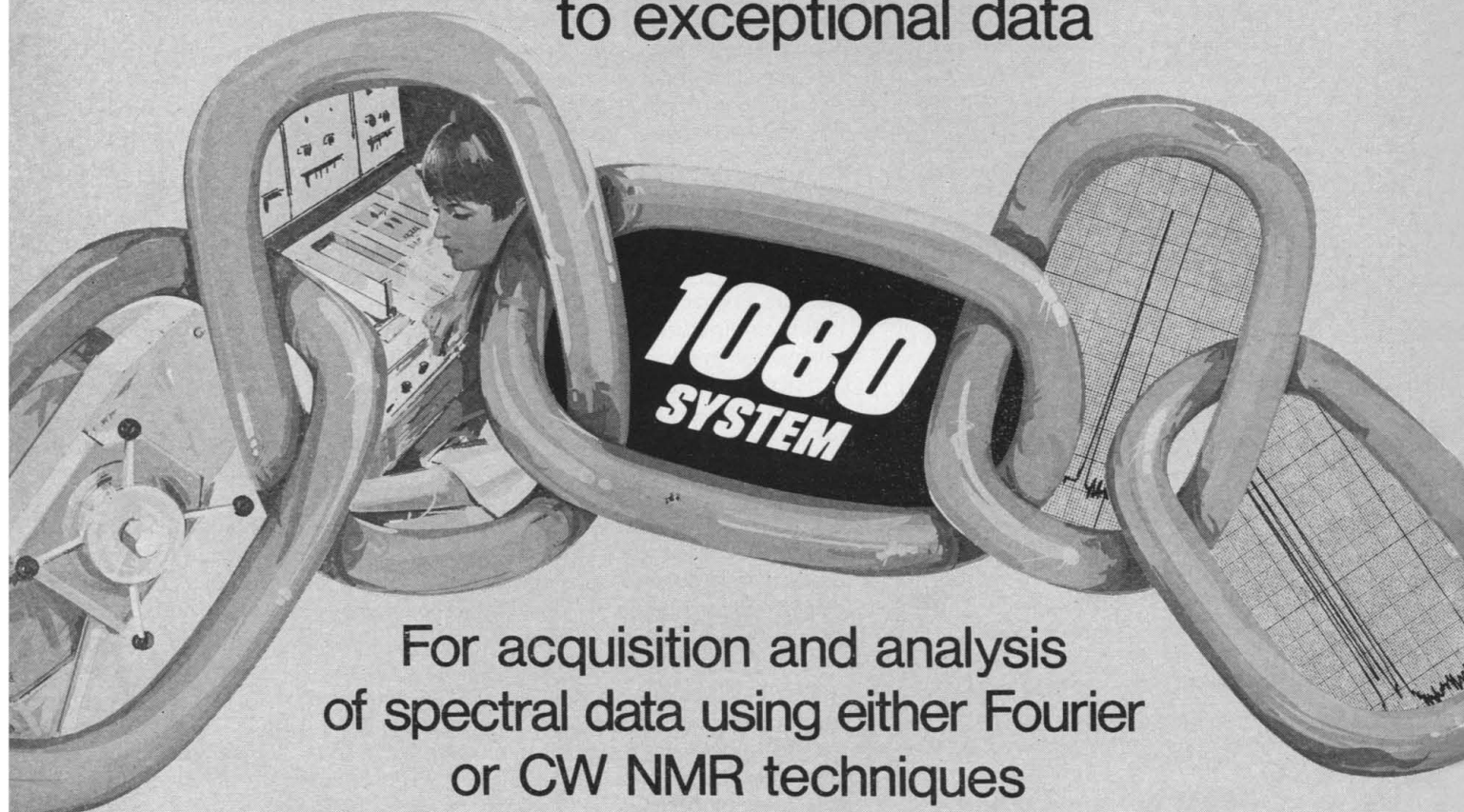
The net result is a national information system which knows much more about the trees than the forest; a national perspective which is often well-informed about the specifics but lacks a comprehensive, systematic overview. Sufficient impressionistic data exists about this imbalance of our information system that the new Commission might do well to devote some of its time to ascertain its dimensions; if these should prove to be considerable, the Commission might explore ways of correcting the imbalance.—AMITAI ETZIONI, *Chairman, Department of Sociology, Columbia University, and Director, Center for Policy Research*

\* President's Commission on Federal Statistics, a 14-man panel whose chairman is W. Allen Wallis, president of the University of Rochester, Rochester, New York.



# FABRI<sup>®</sup>-TEK

announces  
a new way to link your NMR spectrometer  
to exceptional data



## For acquisition and analysis of spectral data using either Fourier or CW NMR techniques

A major design innovation in the 1080 System is its use of a single main frame to perform both stored program and wired program computations. Wired programming and conventional instrument controls regulate many data acquisition parameters where high speed, on-line processing is required. Stored program operations are used where complex arithmetic computations are required. If you're so inclined, the 1080 is completely programmable (like any GP computer) with a powerful repertoire of instructions and its own program assembly language.

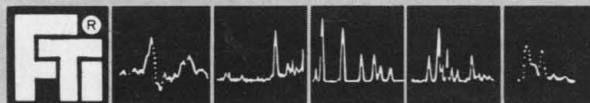
Additional features include 20-bit word length; input signal filtering; field-expandable memory capacities from 8,192 to 45,056 words (even larger in the future); and versatility through the use of plug-in digitizers and sweep modules to meet future measurement requirements.

### The 1080 System has all the required hardware and software to:

- acquire data through analog-to-digital conversion;
- improve signal-to-noise ratio by on-line signal (ensemble) averaging;
- provide off-line baseline correction and/or exponential filtering;
- transform free induction decay data to frequency spectra using fast Fourier algorithm;
- manipulate real (absorption) and imaginary (dispersion) portions of the transformed spectra to yield phase- and amplitude-corrected absorption spectra;
- integrate or perform background subtraction on the absorption spectra;
- provide oscilloscope display of input data or processed memory contents;
- read out data to an X-Y plotter, ASR-33 Teletype, or a computer-compatible magnetic tape unit.

Complete 1080 Systems capable of an 8,192-word Fourier transform start at just over \$30,000. For full details write or call collect to discuss your specific NMR data problems.

FABRI<sup>®</sup>-TEK INSTRUMENTS, INC.



5225 VERONA ROAD • MADISON, WIS. 53711 • PHONE: 608/271-3333

Coming in October—

## THE LUNAR ROCKS

By Brian Mason and William G. Melson,  
both of the Smithsonian Institution

"The lunar rocks represent a unique scientific adventure and an intellectual challenge of the first magnitude. From the data to be extracted from them, we expect to reconstruct the story of the origin and evolution of the moon, which will also provide significant information about the early history of the earth and the entire solar system.

"We have endeavored to write this book in such a way that it will appeal not only to the professional scientist, but also to the interested student and layman. With this in mind we have avoided technical jargon as far as possible and have tried to provide adequate explanation of unfamiliar terms. We hope that the book gives some indication of the enormous stimulation that the lunar exploration program has provided to the scientific community, in this country and abroad."—from the Preface

The *Lunar Rocks* contains 40 photographs including a series showing the Surveyor III spacecraft with the Apollo 12 lunar module on the lunar horizon.

1970 192 pages \$8.95

**wiley**

**WILEY-INTERSCIENCE**

a division of JOHN WILEY & SONS, Inc.  
605 Third Avenue, New York, N.Y. 10016  
In Canada: 22 Worcester Road, Rexdale, Ontario

### Man's Impact on the Global Environment

Assessment and Recommendations for Action

This report of the Study of Critical Environment Problems (SCEP) presents the results of a one-month, interdisciplinary examination of the global climatic and ecological effects of man's activities. The disciplines represented by the fifty full-time participants include meteorology, oceanography, ecology, chemistry, physics, biology, geology, engineering, economics, social sciences, and law. The Study, which was sponsored by the Massachusetts Institute of Technology, was conducted during the month of July 1970 at Williams College, Williamstown, Massachusetts.

The focus was on those environmental problems whose cumulative effects on ecological systems are so large and prevalent that they have worldwide significance. Thus the Study was primarily concerned with the effects of pollution on man through changes in climate, ocean ecology, and large terrestrial ecosystems.

\$10.00 hardcover (tentative)

\$2.95 paperback

### The MIT Press

Massachusetts Institute of Technology  
Cambridge, Massachusetts 02142

IT'S MAN'S  
WORLD

## RESEARCH VETERINARIAN

Challenging position for a Doctor of Veterinary Medicine to manage and supervise the operation of our animal health experimental station. Ideal candidate should be experienced with all types of domestic and laboratory animals, animal husbandry and general surgical procedures. Orientation toward research is required with applicable experience in experimental design.

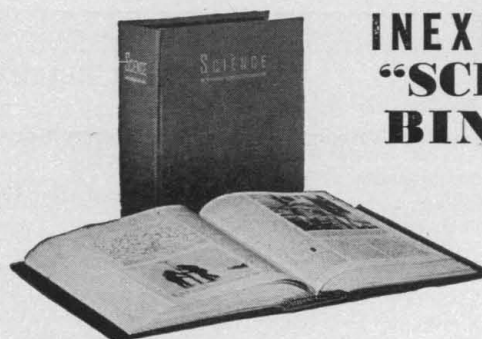
Hoffmann-La Roche, a recognized leader in the pharmaceutical field offers an attractive salary commensurate with ability. In order to learn more about this opportunity please send resume in confidence to: Mr. E. D. Meseck, Associate Personnel Manager, Research. S 10



**HOFFMANN-LA ROCHE INC.**

NUTLEY, NEW JERSEY 07110

An Equal Opportunity Employer



## INEXPENSIVE "SCIENCE" BINDERS

Keep your copies of **SCIENCE** always available for quick, easy reference in this attractive, practical binder. Simply snap the magazine in or out in a few seconds—no punching or mutilating. It opens **FLAT**—for easy reference and readability. Sturdily constructed, this maroon buckram binder stamped in gold leaf will make a fine addition to your library.

**SCIENCE** Binders hold one three-month volume of **SCIENCE**. They have a 3¼-inch back and 13 flat fasteners. \$4.00 each. Four binders, \$15.00.

For orders outside the United States add 50¢ per binder. Imprint: name of owner, add 85¢ per binder; year of issues, for example, 1969-2, add 60¢ per binder.

**SCIENCE** • 1515 Massachusetts Ave., NW,  
Washington, D.C. 20005