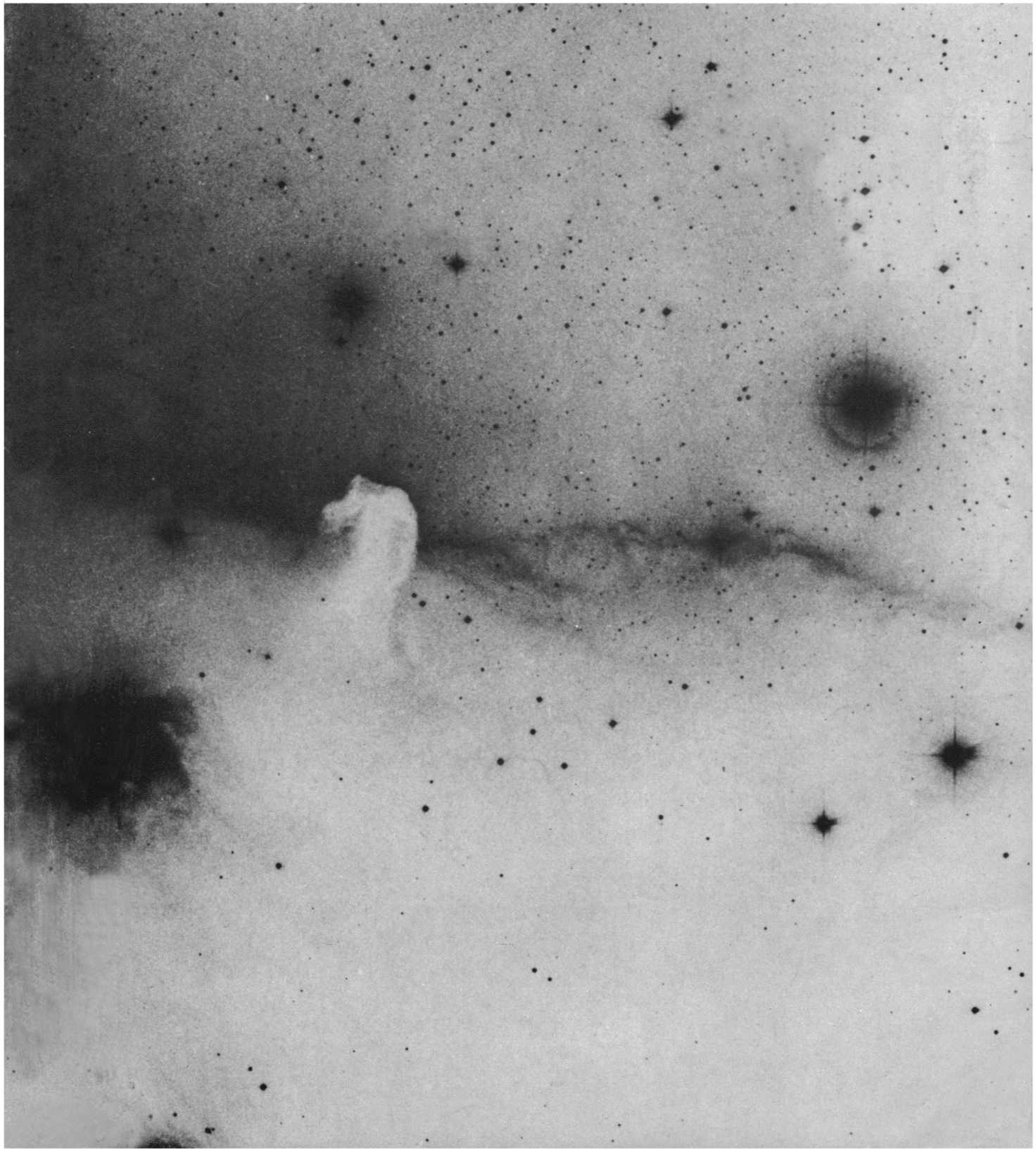
SCIENCE

11 February 1977

Volume 195, No. 4278

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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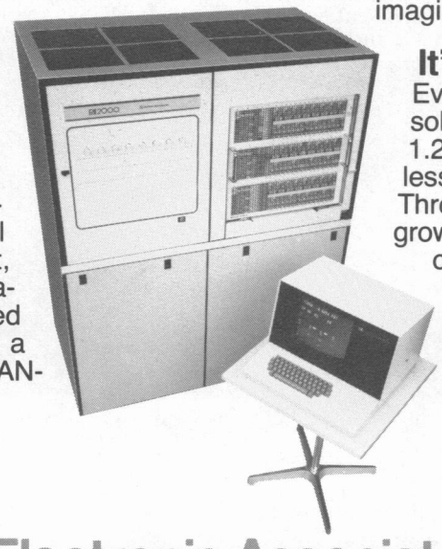

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

"Horsehead nebula" near ζ Orionis is a dark obscuring cloud projected on the extensive emission nebulosity in this region. See page 541. [National Geographic Palomar Sky Survey]

The Nobe

The Nobel Prizes that gave birth to an idea

One part of every LKB instrument is over 30 years old: our experience in biochemical separation techniques.

30 years ago the Nobel Prize winners Prof. The Svedberg and Prof. Arne Tiselius instilled into the new company the need for high quality in scientific instruments. Their cooperation and encouragement developed into close contacts with scientists worldwide. As a result, LKB is today in the forefront of ideas in biochemistry, and can present to the scientist the right equipment and techniques at the right time.

Using LKB equipment guarantees nobody a Nobel Prize, but it does lay a sure and certain basis for careful experiments and accurate results.

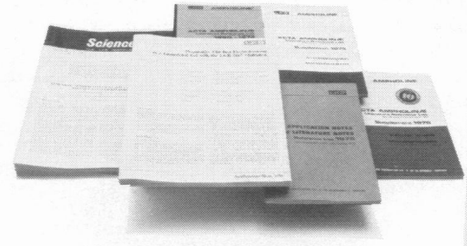
Complete and versatile equipment means access to a wide variety of methods

At LKB research and development of the instrument go hand in hand with research and development of the technique, so that the one is ideally suited to the other. Often, LKB instruments are developed with several techniques in mind. This allows the scientist to change methods easily without changing equipment, or to experiment within one method.

LKB supplies equipment necessary for growing and disintegration of microorganisms through to the final characterisation of a purified substance. Probably the most important techniques in biochemistry are those involving separation and analysis, and there we have our greatest experience.

LKB helps science advance, and serves the scientist

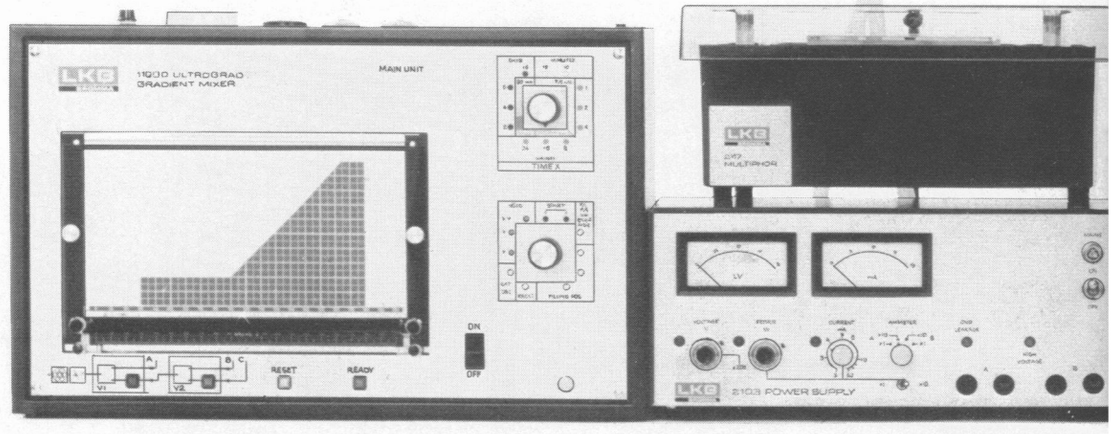
For science to advance, knowledge must be shared. At LKB knowledge comes from our experience and research and from our many worldwide contacts. We share our knowledge in several ways: in the quality of our instruments, as Workshops and Seminars, literature such as *Acta Ampholinae,* Application Notes and SCIENCE TOOLS.



Electrophoresis

This technique laid the basis of LKBs entry into biochemical separations, and prepared the way for further developments. In developing reliable equipment we were greatly helped and encouraged by Arne Tiselius, whose important work on electrophoresis was rewarded by a Nobel Prize in 1948.

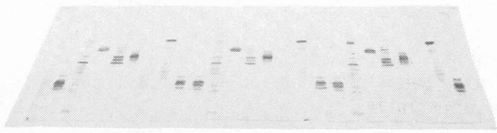
LKB provides the basic equipment needed for an electrophoretic system, analytical or preparative, column or thin layer: equipment such as power supplies with constant power, voltage and current; Multiphor for thin layer electrophoresis and immunoelectrophoresis; and Uniphor® for column electrophoresis.



Prize Kit

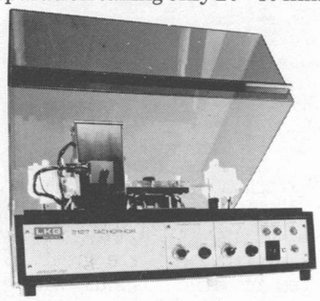
Electrofocusing

LKB has led the world in electrofocusing since we introduced it in 1966. Our breakthrough then was with Ampholine® carrier ampholytes and electrofocusing columns. The recent introduction of Multiphor, the ready-to-use Ampholine® PAG-plates, and the PEGG kit for preparative electrofocusing in granulated gel has extended even further the scope of this very efficient, high resolution, technique.



Isotachophoresis

Kohlrausch's theory of 1897 was turned into simple practice when LKB introduced Tachophor in 1974. This latest and most advanced electrophoretic technique can be used for analysis or preparation on the microscale using Tachophor, a complete separation taking only 20–40 minutes.



For large-scale preparation in polyacrylamide gel, Uniphor should be used.

Gel filtration

The lagging development of gel filtration media has been given a new impulse by the introduction of LKB Ultrogel®. This new medium, a copolymer of polyacrylamide and agarose, gives better resolution and high flow rates. Ultrogel is becoming the gel of choice, especially in the difficult area of serum protein fractionation.

All the equipment you need for gel filtration – columns, Uvicord® UV monitors, Perpex Pumps, UltroRac® and RediRac fraction collectors – is made by LKB.

Ion exchange, affinity and adsorption chromatography

The "adapted gradient technique", using LKB Ultrograd® gradient mixer, gives much improved resolution over ordinary gradient elution. You dictate the shape of the gradient simply by cutting it out on chart paper. Ultrograd produces controlled and reproducible gradients, and to scale-up for preparative work you simply increase the flow rate.

This summary of LKB equipment is necessarily short. Our new 58-page colour booklet "LKB Systems and Methods for Biochemical Research" illustrates all LKB equipment and describes in some detail the methods for which they are used. Our colour poster "Preparative Separation Principles in Biochemistry" is a worldwide attraction: like the booklet you can get a free copy by writing or phoning to us.

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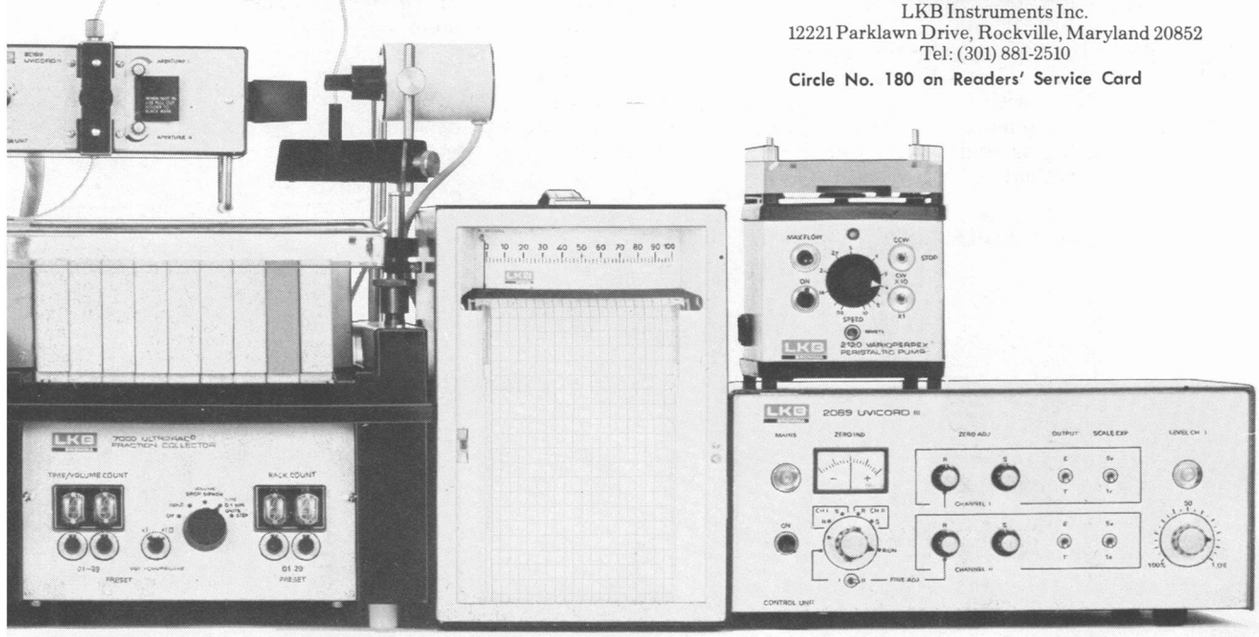

NATO ADVANCED STUDY INSTITUTES 1977

The purpose of the Advanced Study Institutes (ASI) Programme, one of the main activities of the NATO Science Committee, is to disseminate advanced scientific knowledge and to allow formation of contacts among scientists from different countries. ASIs are intended to be meetings where a small faculty of internationally known experts teaches a carefully defined subject in a coherent lecture programme. Generally, between 50 to 100 scientists are admitted and take an active part in the meeting.

The Advanced Study Institutes listed below, sponsored or co-sponsored by NATO, are organised under the entire responsibility of the director of the institute or his organising committee. Those scientists with adequate background and interest who wish to participate in one of the institutes should **apply direct to the director** of the particular institute. It should be noted that location, dates and deadlines for application for the institutes might be subject to change and it is therefore recommended that contact be made with the appropriate director well in advance of the dates indicated.

A limited number of small grants are available to defray part of the expenses of deserving participants. These grants can only be obtained through application to the ASI director.

THE NATO ASI SERIES

The Scientific Affairs Division of NATO provides the directors of Advanced Study Institutes with an efficient vehicle for publication so that a wider dissemination of the scientific knowledge developed during the courses can be achieved.

An agreement was reached with four internationally known scientific publishing houses to publish the proceedings of the Advanced Study Institutes in a uniform "NATO ASI Series", divided into five sub-series according to the main scientific areas. The virtue of this series is that the publications are available generally a few months after the institutes are held, and that a high quality of publication in book form is guaranteed. For further information about the volumes in your particular field of interest please contact the Publisher.

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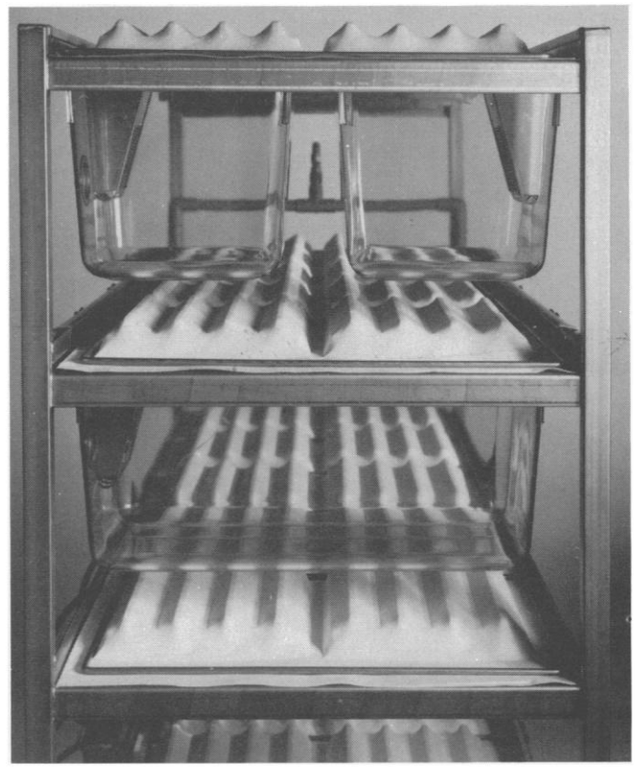
Spectroscopy and Kinetics of Atmospheric Constituents; 13-26/3/77; North Italy	Prof. S. Peyerimhoff; Theor. Chemie University, Wegelerstr. 12, Bonn, Germany
Dynamical and Chemical Coupling of Neutral and Ionized Atmosphere; 12-23/4/77; Norway	Dr. E.V. Thrane; Defence Res. Establ.; P.O. Box 25; N-2007 Kjeller, Norway
Electron-Phonon Interactions and Phase Transitions; 13-24/4/77; Geilo, Norway	Dr. T. Riste; Inst. for Atomenergi; P.O. Box 40, 2007 Kjeller, Norway
Chemically Induced Magnetic Polarization; 17-30/4/77; Urbino, Italy	Prof. L.T. Muus; Chemistry Dept.; DK-8000 Aarhus C, Denmark
Lipoprotein Molecule; 8-20/5/77; Brugge, Belgium	Dr. H. Peeters; Simon Stevin Inst.; Jerusalemstr. 34; B-8000 Brugge, Belgium
High Pressure Chemistry; 5-19/6/77; Corfu, Greece	Prof. H. Kelm; Inst. of Phys. Chem. University; D-6000 Frankfurt, Germany
Structural/Process Theories of Complex Human Behaviour; 18-30/6/77; Banff, Canada	Prof. J. Scandura; Merge Res. Inst.; 1249 Greentree Lane; Narberth, Pennsylv. 19072, USA
Design and Implementation of Optimization Software; 20/6-2/7/77; Urbino, Italy	Prof. F.A. Lootsma; Technological University; 132 Julianalaan; Delft, Holland
DNA Synthesis: Present and Future; 21-30/6/77; Taormina, Italy	Prof. M. Kohiyama; Biologie Moléculaire; 2, Place Jussieu; 75005 Paris, France
Nuclear Physics with Heavy Ions and Mesons; 4/7-20/8/77; Les Houches, France	Prof. R. Balian; CEN-Saclay, Phys. Theor.; B.P. 2, 91190 Gif-sur-Yvette, France
Scientific Basis of Flocculation; 4-15/7/77; South England	Prof. K.J. Ives; University College Civil Eng.; Gowerstr.; London WC1E 6BT, UK
Hadron Structure and Lepton-Hadron Interactions; 4-23/7/77; Cargèse, France	Prof. M. Lévy; Université, Tour 16, Etage 1; 4, Place Jussieu; 75230 Paris, Cédex 05, France
Strongly Coupled Plasmas; 6-23/7/77; France or Italy	Prof. G. Kalman; Dept. Phys.; Boston Coll. Chestnut Hill; Massachusetts 02167, USA
Infrared Astronomy; 9-20/7/77; Erice, Italy	Prof. G. Setti; Ist. di Fisica; Via Irnerio 46; 40126 Bologna, Italy
Energy Sources and Emission Mechanisms in Quasars; 11-22/7/77; Cambridge, UK	Prof. M.J. Rees; Inst. Astronomy; Madingley Road; Cambridge, CB3 OHA, UK
Coherence in Spectroscopy and Modern Physics; 15-30/7/77; Versilia, Italy	Prof. F.T. Arecchi; c/o Cise - P.O. Box 3986; 20100 Milano, Italy
Path Integrals and Applications in Quantum and Statistical Phys.; 18-30/7/77; Antwerp, Belgium	Prof. J.T. Devreese; U.I.A.; Universiteitsplein 1; 2610 Wilrijk, Belgium
Process and Device Modeling for In- tegrated Circuit Design; 19-29/7/77; Louvain-la-Neuve, Belgium	Prof. F. van de Wiele; Bât. Maxwell; 1348 Louvain-la-Neuve, Belgium
Perspectives in Sensory Ecology; 10-22/7/77; Lennoxville, Canada	Prof. M.A. Ali; Dépt. Biologie; Université, C.P. 6128; Montreal H3C 3J7, Canada
The Whys of Subnuclear Physics; 23/7-10/8/77; Erice, Italy	Prof. A. Zichichi; Ist. di Fisica; Via Irnerio, 46; 40126 Bologna, Italy
Programme Construction; 27/7-6/8/77; Marktoberdorf, Germany	Prof. F.L. Bauer; Inst. Informatik, TU; Arcisstr. 21; D-8000 Muenchen 2, Germany
Paleorift Systems with Emphasis on the Permian Oslo Rift; 27/7-5/8/77; Oslo, Norway	Prof. K.S. Heier; Mineralogisk-Geologisk Museum; Sarsgt 1; Oslo 5, Norway
Nuclear Structure Physics; 31/7-20/8/77; Fife, Scotland	Prof. J.M. Reid; Kelvin Lab., University; Glasgow G12 8QG, UK
Engineering Plasticity by Math. Programming; July 77; Waterloo, Canada	Prof. M.Z. Cohn; Civil Eng. University; Waterloo, Ontario, Canada
Nonlinear Equations in Physics and Mathematics; 1-13/8/77; Istanbul, Turkey	Prof. A.O. Barut; Dept. of Physics, University; Boulder, Colo. 80309, USA
Communication Systems and Random Process Theory; 8-20/8/77; Darlington, UK	Dr. J.K. Skwirzynski; GEC-Marconi; Great Baddow, Chelmsford; Essex CM2 8HN, UK
Statistical Modeling and Sampling for Ecological Abundance and Diversity with Applications 10-20/8/77; Pennsylvania, USA	Prof. G.P. Patil; Dept. of Statistics; 318 Pond Lab., State Univ.; Pennsylvania 16802, USA
Engineering Principles in Cardiovascular Research; 14-26/8/77; Urbino, Italy	Prof. N.H.C. Hwang; Cullen College Eng. University; Houston, Texas 77004, USA
Dynamics of the Earth's Interior; 21/8-4/9/77; Cargese, France	Prof. C. Froidevaux; Phys. des Solides, Université de Paris-Sud; Orsay 91 405, France
Genome Organization and Function; 21/8-3/9/77; Greece	Prof. H.G. Zachau; Inst. Phys. Chemie, University; 8000 München 2, Germany
Correlation Functions and Quasiparticle Interactions in Condensed Matter; 22/8-2/9/77; Minnesota, USA	Dr. J.W. Halley; School Phys., University; Minneapolis, Minnesota 55455, USA
Electron and Ion Spectroscopy; 28/8-10/9/77; Gent, Belgium	Prof. W. De Keyser; Lab. voor Kristallografie; Krijgslaan, 271; 9000 Gent, Belgium
Microscopic Structure and Dynamics of Liquids; 28/8-10/9/77; Corsica, France	Mme J. Dupuy; Physique des Matériaux, Univ. Claude Bernard; Lyon-Villeurbanne, France
Diversity and Regulation in the Immune System; End August 1977; Spetsai, Greece	Dr. A.E. Evangelopoulos; Hellenic Research Foundation; 48, Vassileos Constantinou Av.; Athens 501/1, Greece
Amino Acids as Chemical Transmitters; Aug./Sept./77; South Norway	Dr. F. Fonnum; Defence Research Establishment; P.O. Box 25; N-2007 Kjeller, Norway
Electronic Structure and Properties of Polymers; 1-14/9/77; Namur, Belgium	Prof. J.M. André; Lab. de Chimie Théor. Appl.; 61, rue de Bruxelles; 5000 Namur, Belgium
Vibrational Intensities in Infrared and Raman Spectroscopy; 1-10/9/77; Como, Italy	Prof. G. Zerbi; Chemistry Dept., Univ.; Trieste, Italy
Valence Shell in Inorganic Molecules and Solids; 4-14/9/77; Viesti, Italy	Dr. P. Day; University Inorg. Chem.; South Parks Road; Oxford OX1 3QR, UK
Representations of Lie Groups and Harmonic Analysis; 5-17/9/77; Liège, Belgium	Prof. M. de Wilde; Inst. de Mathém., Université; 15, Av. des Tilleuls; B-4000 Liège, Belgium
Advances in Nucleotide Research; 5-15/9/77; Como, Italie	Prof. R. Paoletti; Inst. of Pharmacology; Via A. del Sarto, 21; 20129 Milano, Italy
Dynamical Methods in Soil- and Rock Mechanics; 11-24/9/77; Karlsruhe, Germany	Prof. G. Gudehus; Inst. f. Bodenmechanik, Univ.; Postfach 6380; D-7500 Karlsruhe, Germany
Molecular Structure and Dynamics; 11-24/9/77; Urbino, Italy	Dr. M.S. Child; Theor. Chem. University; Oxford OX1 3TG, UK
Molecular Physics of Liquid Crystals; 11-24/9/77; Cambridge, UK	Dr. G.R. Luckhurst; Dept. Chem., Univ.; Southampton, SO9 5NH, UK
Developmental Neurobiology of Vision; Sept. 1977; Crete, Greece	Dr. R.D. Freeman; School Optometry, Univ.; Berkeley, Calif. 94720, USA

1. Mobile stainless steel rack with suspended polycarbonate cages.



2. Disposable formed plenum filters shown above cages. Flat filter sheets also available.

See-Through™ suspended cage systems
The most versatile small animal housing systems available.

(So many options...you "build" it to your own specs.)

Basically, this system involves a mobile stainless steel rack with suspended polycarbonate cages.
Two rack sizes are available: the large rack accommodates either 60 small cages, or 30 large cages, or *combinations* of both size cages. The *new* smaller rack size takes either 50 small cages, or 25 large cages, or *combinations* of both.
This See-Through™ system is ideal for housing rats, mice, hamsters, and guinea pigs.

The many other options
Cage sizes: 10½″ x 9½″ x 8″ deep or 19″ x 10½″ x 8″ deep.

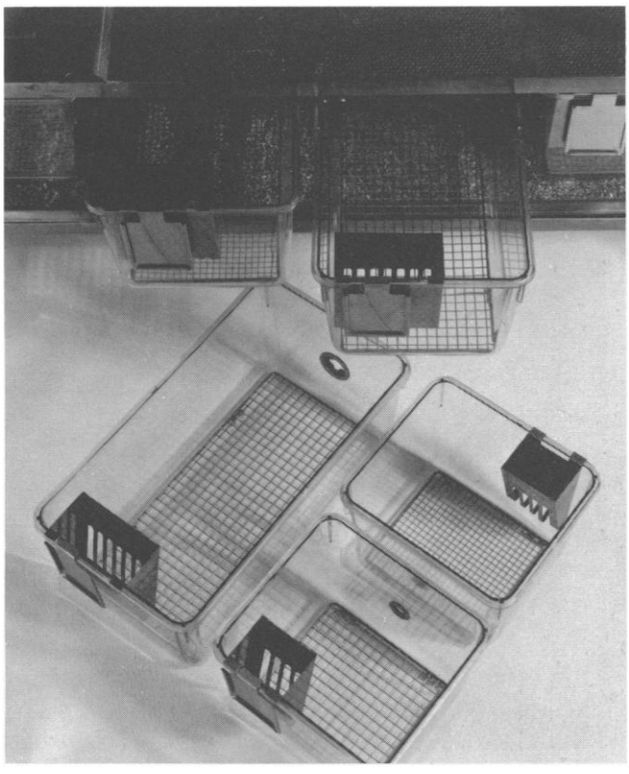
Cage bottoms: solid or stainless steel wire mesh.

Walkfloor mesh: 2 x 2 (for rats) or 3 x 3 (for mice).

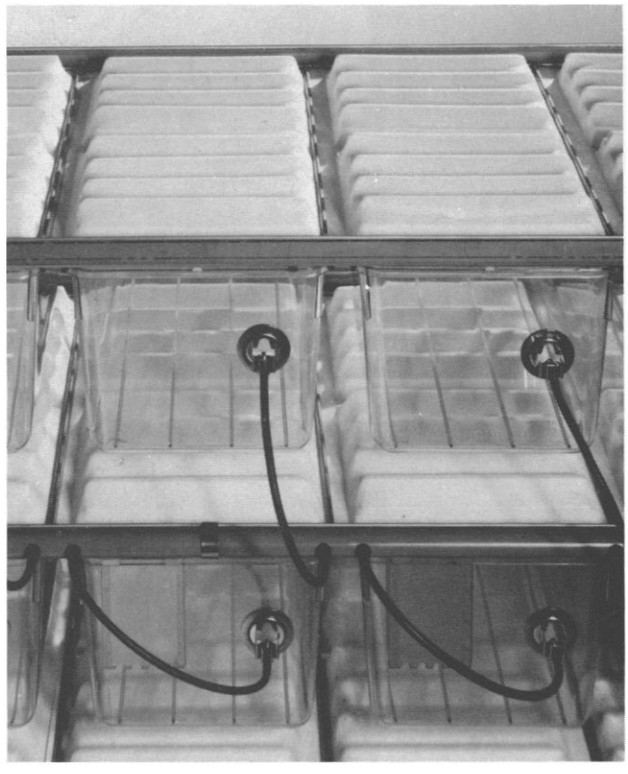
Food hoppers: Four available (for rats, mice, and guinea pigs).

Watering systems: Bottle or automatic (many variations available).

Filtering systems: New disposable formed plenum polyester spun-bonded filter that provides at least 100% more filter area than flat sheet filters. Effective in reducing cross-contamination and in minimizing the stress of a high ammonia atmosphere. Also available: autoclavable filters.



3. Rack accommodates small or large cages or combinations of both.



4. One available automatic watering system shown; other automatic systems or bottle watering also available.

Other important features/benefits
Of fundamental importance regardless of how you "build" your See-Through system initially to meet your current needs, its flexibility assures easy modification to your *future* requirements. And in an era where change is inevitable and budgets tight, this kind of foresight can substantially reduce "future shock."

No separate cage lids! Each cage is suspended from the shelf above, and that shelf is *perforated.* Accordingly, the *perforated* shelf itself serves as the "lid" for the cage immediately below. No initial lid cost. No subsequent handling. No replacement.

Visibility. As the See-Through name implies and the photos demonstrate, animal observation is completely unimpaired.

Excreta trays. Easily removable.

New Product!
See-Through II: meets ILAR's new housing specifications (see "Guide for the Care and Use of Laboratory Animals"). 8″ deep cage with 200 sq. in. floor area at dead bottom houses 5 rats. 6″ deep cage with 75 sq. in. floor at dead bottom houses 5 mice.

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For more information about the most versatile small animal housing available, white or call Lab Products Inc., 365 W. Passaic St., Rochelle Park, N.J. 07662 (phone: 201/843-4600)

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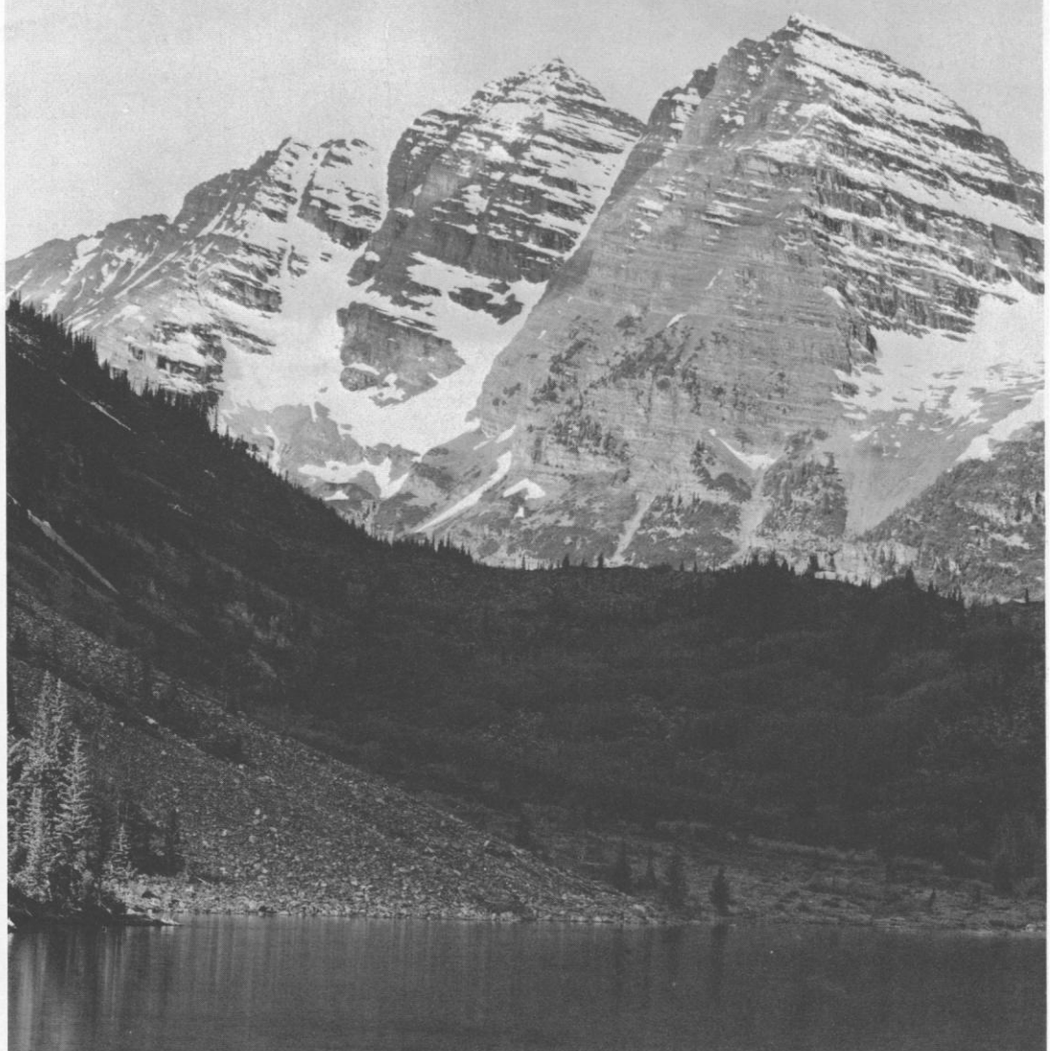

For details about the Meeting program, as well as housing and registration forms, see the Preconvention issue of *Science,* 7 January 1977

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Denver
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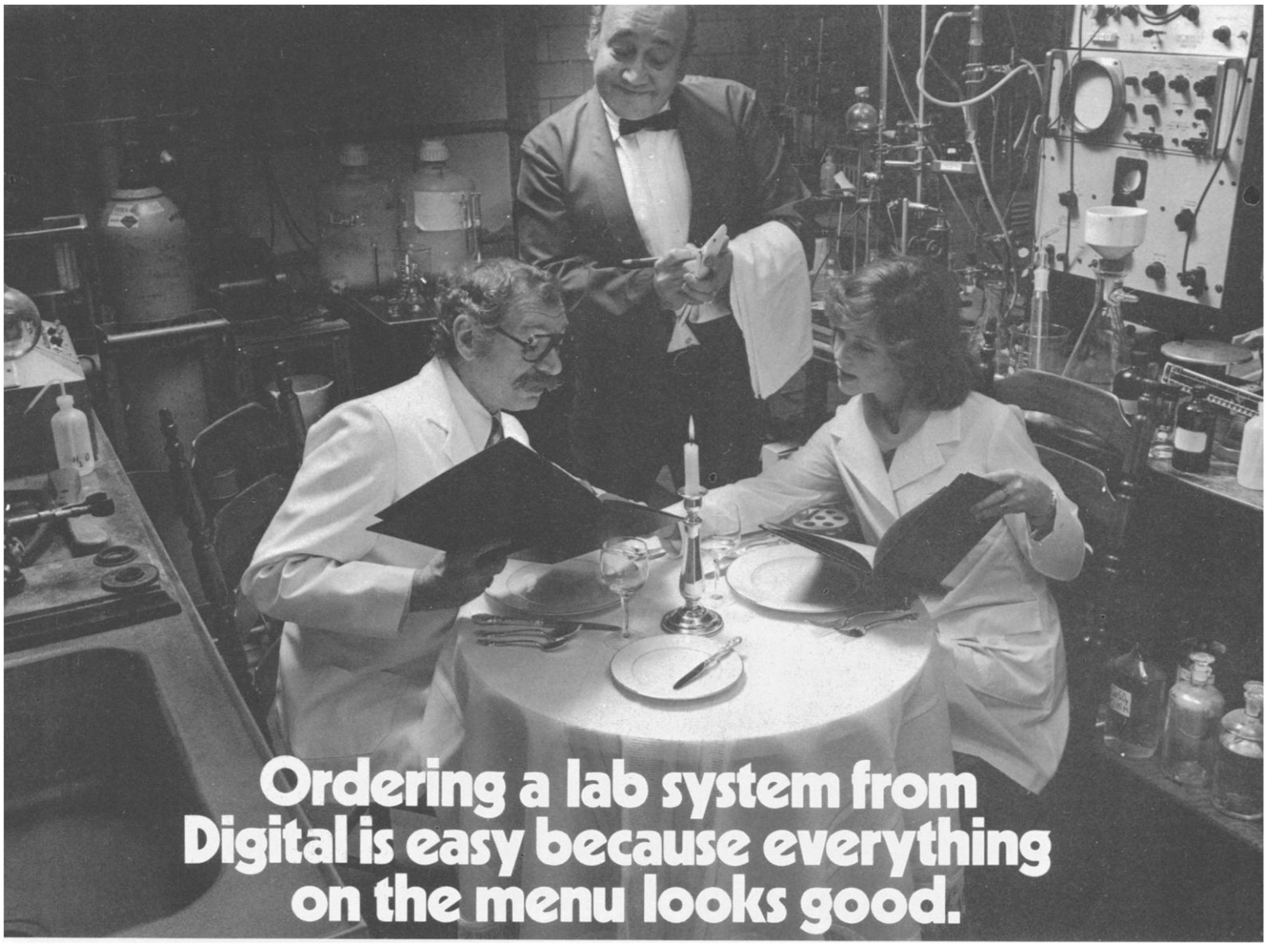
SYMPOSIA **EXHIBITS** **SCIENCE FILM FESTIVAL** **TOURS**



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Language Learning by a Chimpanzee The LANA Project

Edited by DUANE M. RUMBAUGH

The first Volume in the COMMUNICATION AND BEHAVIOR Series

This book reports the findings of the *Lana* Project (*Lana* is an acronym for *LAN*guage *A*nalogue Project as well as the name of a young chimpanzee), whose aim was to develop a computer-based language-training system in an effort to investigate the ability of chimpanzees to acquire language. Beginning with a review of language theory and communication, the report discusses the probable relation between cross-modal perception and language. The strategies and tactics of the language project along with the details of the Yerkish language and computerization and programming are presented, followed by a description and analysis of the methods used in training the chimpanzee and her ultimate acquisition of various linguistic skills (e.g., learning names and attributes); the chimpanzee's conversations, both spontaneous and manipulated, are detailed. Implications for the language training of the mentally retarded are discussed. Finally, using the data obtained from their experimentation, the authors consider the possible relationship between communication in general and language in particular from an evolutionary perspective.

1977, 304 pp., $17.50/£12.40 ISBN: 0-12-601850-2

Biotelemetry III

PROCEEDINGS OF THE THIRD INTERNATIONAL SYMPOSIUM ON BIOTELEMETRY, 1976

Edited by THOMAS B. FRYER, HARRY A. MILLER, and HAROLD SANDLER

Based upon a four-day international symposium held in Pacific Grove, California in May 1976, this book contains the numerous technical papers, workshops, and in-depth discussions presented by the participants, who represented the latest basic research and clinical applications of telemetry throughout the world. Beginning with a history of the past 50 years of biotelemetry, the speakers devote themselves to a characterization of the status of telemetry from the viewpoints of engineering design, fabrication, and applications to man in the areas of: transducers; transmission and receiving systems; surgical implants; emergency medical care; patient monitoring (cardiac, respiratory, fetal, neuropsychiatric); sports medicine; studies of free roaming animals.

1976, 408 pp., $19.00/£13.50 ISBN: 0-12-269250-0

Population Cytogenetics Studies in Humans

PROCEEDINGS OF A SYMPOSIUM ON POPULATION CYTOGENETICS SPONSORED BY THE BIRTH DEFECTS INSTITUTE OF THE NEW YORK STATE DEPARTMENT OF HEALTH, HELD IN ALBANY, NEW YORK, OCTOBER 14-15, 1975

Edited by ERNEST B. HOOK and IAN H. PORTER

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From the Preface:

Human population cytogenetics encompasses study of the rate of cytogenetic abnormalities and variants, their phenotypic consequences, their segregation, and their causation. The theme common to such studies is that in one way or another way they all involve study of human populations with defined characteristics.

This volume presents a number of different approaches to such investigations which were considered at the 6th annual Symposium of the Birth Defects Institute in Albany, New York. These include studies of the frequency of abnormalities in embryos, fetuses and live births, and in a selected group of seven and eight year old children, providing estimates of the prevalence rate of these abnormalities in populations of which these groups are representative samples. Also included is an extensive discussion of data pertinent to the possibility of racial differences in frequency of chromosomal abnormalities. The study of children in addition provides data on the frequency of chromosomal variants, and a case control study bearing on their phenotypic significance. . . .

1976, 394 pp., $17.50/£12.40 ISBN: 0-12-355460-8

The Modern Rise of Population

By THOMAS McKEOWN

In this volume, the author examines initially the experience of animals and early man, but relies mainly on nutritional, medical, environmental and behavioral data from populations in England and Wales in the eighteenth, nineteenth, and twentieth centuries. The author concludes that the modern rise of population was due essentially to a decline in mortality resulting from infectious diseases and he examines fully the reasons for this decline. Contrary to what one would expect, improvements in nutrition and environment, and changes in reproductive behavior were much more important than medical science.

1976, 168 pp., $14.50 ISBN: 0-12-485550-4

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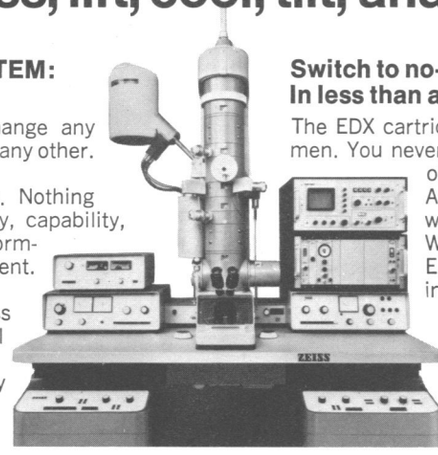

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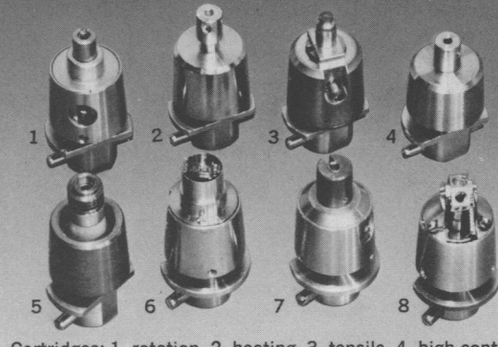

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LETTERS

Gray Whale Behavior

After 40 years of protection by international agreement, the population of the California gray whale has grown from an estimated maximum of 500 to 11,000 ± 3,000, heartening evidence that effective remedial conservation action is possible. Charges that the whales are now being harassed, that their normal migration pattern is being seriously disrupted by whale-watching boats as the animals pass close to the Southern California coast en route to their Baja California breeding lagoons, are thus particularly disturbing.

The first suggestion that gray whales were being pressured by human activities was advanced in 1965 as one explanation of data indicating that a significant percentage of the herd was migrating south offshore, rather than in sight of land. So meticulously had the migration been described, that any deviation from the shore-hugging route was adjudged both abnormal and man-induced. Since then the "aberrant" route has continued to be used, possibly by an even larger proportion of the animals; its use has generally been interpreted as a retreat from the increasingly heavily trafficked coastal lanes.

Although our knowledge of gray whale behavior derives almost entirely from periods when the animals were under extreme stress—first when they were being constantly hunted and more recently as they were recovering from almost complete annihilation—observations made during those abnormal times came to be accepted as immutable truths. It was assumed, for instance, that along the southern California coast only a corridor 5 kilometers wide skirting the shore was "acceptable" to gray whales traveling south. It now appears that the availability of alternative routes may be but one example of a range and variety of behaviors open to an expanding or stabilizing population. Others include the presence of individual gray whales in San Diego waters and even farther south, "out of season" and for considerable periods of time, and the unprecedented series of episodes in San Ignacio Lagoon last winter, in which an unknown number of whales, singly or in small groups, approached whale-watching cruise boats with evident curiosity and every appearance of seeking human attention.

These and other recent observations suggest a versatility that may only be beginning to proliferate in a population

that is today overwhelmingly young; they further suggest that we must not continue to overlook the dynamic and fluid character of natural processes. But while they also indicate that we need not automatically interpret every new behavioral occurrence as a response to deleterious human pressures, the fact that few, if any, gray whales living today can have any memory of harm at the hand of humans calls for the most special consideration of the effects of our activities on our fellow creatures.

FAY H. WOLFSON
356 Kolmar Street,
LaJolla, California 92037

Utilities and Nuclear Power: One System's Approach

Deborah Shapley (News and Comment, 19 Nov. 1976, p. 814) states (p. 816) that the American Electric Power Company (AEP) "says it will eschew building nuclear plants altogether in the future." I wish to deny the validity of the statement and to clarify the position of AEP in this regard.

It is our firm conviction that both nuclear and coal-fired plants will be needed in the future to meet the energy needs of this nation. Both coal and uranium are indigenous fuels, and neither can fulfill the demands for future electricity supply in the absence of the other.

While AEP has one nuclear unit in operation in southwestern Michigan and a second under construction and planned for commercial operation in early 1978, the fact any additional major generating plant now under construction or planned for operation in the next several years by the AEP system will be coal-fired does not imply AEP's "eschewing" the construction of new nuclear plants "altogether in the future."

The choice of which type of plant to build on the AEP System is under continuing review. A decision in this regard does not rest simply on a long-term economic evaluation—which is increasingly difficult in the light of rapidly changing capital and fuel costs as well as other related uncertainties—but also on such factors as the type and composition of the territory to be served, together with the area's opportunities for and constraints against supporting a particular type of generation; the state of development of the company's generation technology; the company's financial resources at any point in time together with an evaluation of the financial risk and exposure in a specific commitment;

and the state of resolution of regulatory and environmental issues.

We do not adhere to the idea that there is one single path for all utilities to follow. It is the diversity of approach and response among the nation's power suppliers which has made the electricity-supply industry in this country the best anywhere.

W. S. WHITE

Chairman of the Board,
American Electric Power Company, Inc.,
2 Broadway, New York 10004

U.S. Science and Technology: A Prescription for "Health"

The congressional Office of Technology Assessment (OTA) has initiated a long-range program on R & D policies and priorities. Three separate advisory panels have been established, with their work to be coordinated through OTA's statutory Technology Assessment Advisory Council (TAAC), chaired by Jerome Wiesner of the Massachusetts Institute of Technology. The three panels are to deal, respectively, with the health of the scientific and technological enterprise; the applications of science and technology, including industrial research and innovation; and the decision-making processes whereby the nation sets its policies and priorities with respect to the allocation of R & D resources and the utilization of scientific inputs in government policy generally.

The panel on the health of the scientific and technological enterprise, which I chair, would like suggestions from the technical community and from other interested and concerned individuals. We are particularly interested in receiving views on (i) what issues should be given priority on our agenda; (ii) what some of the perceived problems and strengths of the present system of overall management and support of research and development in the United States are; and (iii) how the future system might look. Our purview includes, but is not restricted to, basic research in universities and the system of advanced education in the natural and social sciences. We have adopted a provisional working definition of "health"—"the capacity of the U.S. science and technology enterprise to develop new knowledge and insights both for their own intrinsic values and for the contribution they can and should make to the solution of some of the major problems which face mankind and the nation." However, the panel would welcome suggestions for a better definition.

Currently we are engaged in defining the scope of its work and setting priorities for its study agenda. Illustrative of some of the issues that may be considered are the following:

- The development of objective criteria for assessing the health and performance of the science and technology enterprise, including its ability to maintain its capacity into the future.
- The validity of current national R & D priorities including priorities in fundamental science, taking into account both future social needs and probable scientific and technological opportunities. The issue involves the development of more systematic criteria for assessing scientific and technological priorities.
- The functioning of the overall research enterprise as viewed from the perspective of the working scientist: whether he is working on the problems that he considers most important and interesting, whether he has the freedom and opportunity to use his maximum capacities and training, and how he views his relationship to society and to social priorities.
- What alternatives might and should exist to the present traditional basic research and teaching careers for scientists and engineers who are trained to the Ph.D. level primarily through research apprenticeship.
- The future role and form of broad-purpose national laboratories and the specific requirements for a healthy and socially useful national laboratory system, including relationships with universities and industry.
- The proper allocation of government support among specific project grants to individual investigators, general research support to institutions, and support for individual scientists on the basis of promise and accomplishment with review of performance largely after the fact.
- The equity of access to the career opportunities provided by the scientific and technological system on the basis of capacity to contribute.

Communications and suggestions from persons in the technical community or from the general public concerned with the health and impact of science and technology would be welcomed by the panel. Such communications should be addressed to me.

HARVEY BROOKS

Chairman, Office of Technology Assessment, Panel on the Health of the Scientific and Technological Enterprise, Aiken Computation Laboratory 226, Harvard University, Cambridge, Massachusetts 02138

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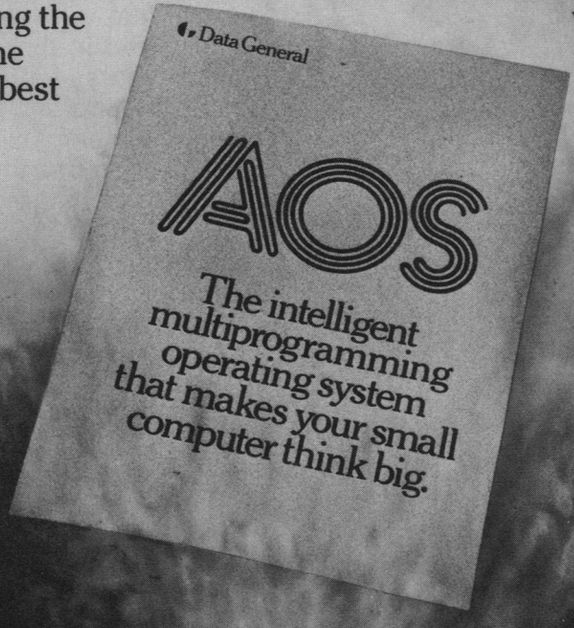

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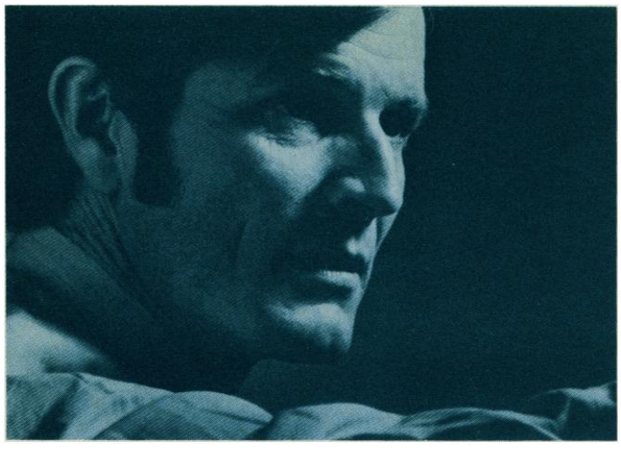

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11 February 1977, Volume 195, Number 4278 **SCIENCE**

New Directions for AAAS

Last year the AAAS Board of Directors appointed a Committee on New Directions, chaired by Leonard Rieser. The Committee was asked to look ahead to 1980 and beyond, to anticipate the climate for science and technology in the United States and suggest new and meaningful roles and missions for AAAS.

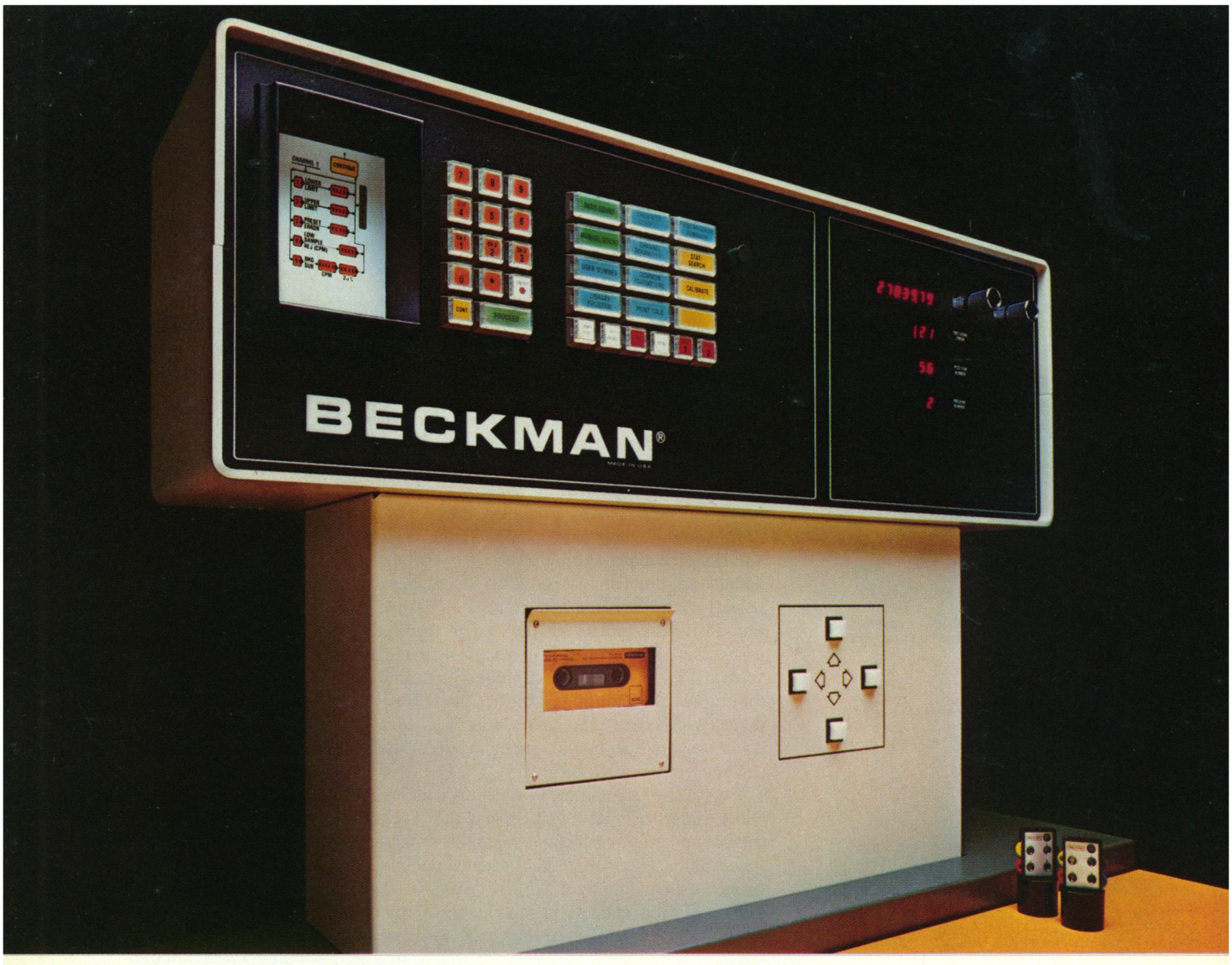
The Committee has been holding spirited meetings, and in October its chairman made a progress report to the Board. The Committee has avoided both the trap of reinventing the objectives of the Association and the itch to spend its time reevaluating ongoing programs. What concerned it was the future and how AAAS could make the best of it.

A number of ideas have come to light which have the flavor of innovation and hint at a more rapid pulsebeat in the performance of AAAS. Each responds to the question of how AAAS can anticipate the needs of science and society and contribute to making a difference in how things turn out. Two broad priorities stand out thus far in the Committee's thinking. One concerns the role of AAAS in relation to public choices that have strong scientific or technological components or that carry strong implications for the future direction of science and technology. The other focuses on steps that AAAS could take to see that science and technology are presented accurately to the public, including informed commentary on borderline science.

Two of the Committee's proposals concern the style of AAAS behavior. One emphasizes the leverage that the Association has as a convenor of sectors and groups which now go their separate ways but which have strong voices in decisions that affect science policy. An example of the use of this role was the colloquium held by AAAS in Washington last summer on the federal R & D budget, in which representatives of Congress, the White House, industry, and academia took an active part. The second proposal of the Committee urges the Association to move increasingly toward collaborative relationships with other professional associations, following the precedent of the National Conference of Lawyers and Scientists, a joint venture of AAAS and the American Bar Association. The possibilities here are for similar joint relationships with groups representing such professions as journalism and industrial management.

Going beyond the area of style into that of substance, the Committee is suggesting two major departures. One would take AAAS closer to policy controversy, through selective publication of panel reports on disputed questions involving science or technology with public policy, with the aim not of throwing weight on one side or the other but of injecting clarification from a respected quarter. The second significant proposal would involve strengthening and extending AAAS efforts in public communication, including *Science* and the annual meetings, but with the addition of concern for improving science programming in commercial television and motion pictures. In the age of electronics, AAAS can no longer fail to take into account the influence, for better or worse, of commercial television and films in shaping social attitudes toward science and technology.

These ideas are timely and stimulating. They seem compatible with our character and objectives, and they suggest the development of momentum in the affairs of the AAAS. Putting them in the context of initiatives that AAAS is already taking—active concern for problems of scientific freedom and responsibility; new departures in the field of science and public policy; regional forums on the impacts of science on society; programs to improve the status of women, minorities, and the handicapped in science; congressional fellowships; outreach to international science; and the strengthening of *Science* as a preeminent journal—it all points to a lively design for the future.—WILLIAM D. CAREY



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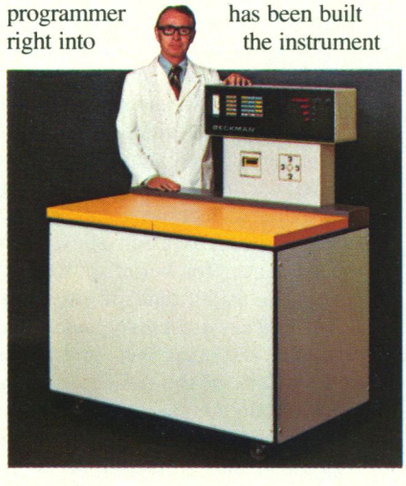

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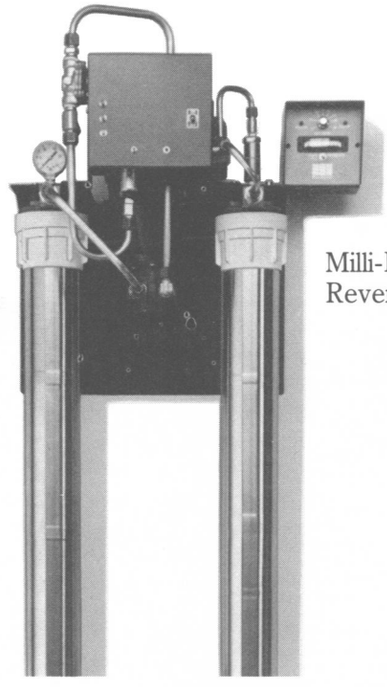

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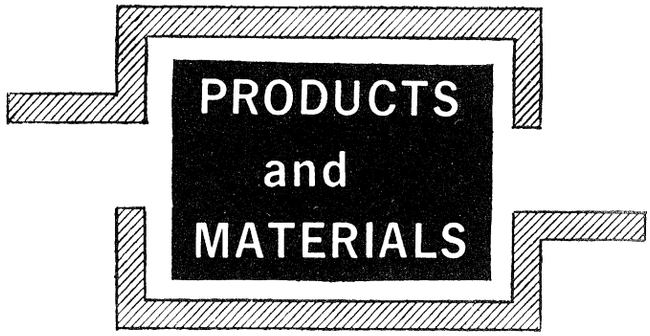

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—RICHARD G. SOMMER

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Environmental Notes is devoted to analysis of organic and other pollutants in air and water. Waters Associates. Circle 711.

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(Continued from page 570)

America's Master of Bee Culture. The Life of L. L. Langstroth. Florence Naile. Everett Franklin Phillips, Ed. Cornell University Press, Ithaca, N.Y., 1976. 218 pp. $9.95. Reprint, with new foreword, of 1942 edition.

L'Analyse Dimensionnelle et l'Epistémologie. Gabriel Monod-Herzen. Maloine, Paris, and Doin, Paris, 1976. 136 pp. Paper, 68 F. Recherches Interdisciplinaires.

Analysis. Part 1, Elements. Krzysztof Maurin. Translated from the Polish edition (Warsaw, 1973). Reidel, Boston, and PWN (Polish Scientific Publishers), Warsaw, 1976. xiv, 430 pp. $39.

Annual Reports in Inorganic and General Syntheses—1975. Hans Zimmer and Kurt Niedenzu, Eds. Academic Press, New York, 1976. x, 344 pp., illus. Paper, $18.

Applications of Biochemical Systems in Organic Chemistry. J. Bryan Jones, Charles J. Sih, and D. Perlman, Eds. Wiley-Interscience, New York, 1976. Two parts, illus. Part 1. xiv + pp. 1–506 + index. $30.50. Part 2. xiv + pp. 507–1066 + index. $33.50. Techniques of Chemistry, vol. 10. *To order this book circle No. 384 on Readers' Service Card.*

Astronomy and Astrophysics Abstracts. Vol. 15/16, Author and Subject Indexes to Volumes 1–10; Literature 1969–1973. S. Böhme and nine others, Eds. Published for Astronomisches Rechen-Institut by Springer-Verlag, New York, 1976. viii, 658 pp. $28.30. *To order this book circle No. 385 on Readers' Service Card.*

Bonding and Structure. Springer-Verlag, New York, 1976. iv, 204 pp., illus. $27.90. Topics in Current Chemistry 63. *To order this book circle No. 386 on Readers' Service Card.*

The Chemistry of Phosphorus. Environmental, Organic, Inorganic, Biochemical and Spectroscopic Aspects. John Emsley and Dennis Hall. Halsted (Wiley), New York, 1976. xii, 564 pp., illus. $39.50. *To order this book circle No. 387 on Readers' Service Card.*

Children as Teachers. Theory and Research on Tutoring. Vernon L. Allen, Ed. Academic Press, New York, 1976. xvi, 276 pp. $14. Educational Psychology.

Combustion Measurement. Modern Techniques and Instrumentation. Proceedings of a workshop, West Lafayette, Ind., May 1975. R. Goulard, Ed. Academic Press, New York, and Hemisphere, Washington, D.C., 1976. xii, 484 pp., illus. $34.50.

Compounds Containing As—N Bonds. Larry K. Krannich, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976 (distributor, Halsted [Wiley], New York). xvi, 400 pp., illus. $34. Benchmark Papers in Inorganic Chemistry, vol. 5. *To order this book circle No. 388 on Readers' Service Card.*

The Continental Permian in Central, West, and South Europe. Proceedings of a NATO Advanced Study Institute, Mainz, Germany, Sept. 1975. H. Falke, Ed. Reidel, Boston, 1976. viii, 352 pp., illus. $38. NATO Advanced Study Institutes Series C, vol. 22. *To order this book circle No. 398 on Readers' Service Card.*

The Golden Door. Artist-Immigrants of America, 1876–1976. Cynthia Jaffee McCabe. Published for the Hirshhorn Museum and Sculpture Garden by Smithsonian Institution

Press, Washington, D.C., 1976. 432 pp., illus. $17.50.

The Greatest Battle. Ronald J. Glasser. Random, New York, 1976. x, 182 pp. $6.95.

Handbook of Basic Electronic Troubleshooting. John D. Lenk. Prentice-Hall, Englewood Cliffs, N.J., 1977. xvi, 240 pp., illus. $15.95.

Handbook of Chemical Lasers. R. W. F. Gross and J. F. Bott. Wiley-Interscience, New York, 1976. xii, 744 pp., illus. $39.95. *To order this book circle No. 389 on Readers' Service Card.*

Handbook of Marine Science. Compounds from Marine Organisms. Vol. 1. Joseph T. Baker and Vreni Murphy. CRC Press, Cleveland, 1976. vi, 226 pp., illus. $29.95.

The Healers. The Rise of the Medical Establishment. John Duffy. McGraw-Hill, New York, 1976. x, 386 pp. $12.50.

High-Level Radioactive Waste Management. Papers from a symposium, Los Angeles, Apr. 1974. Milton H. Campbell, Ed. American Chemical Society, Washington, D.C., 1976. x, 166 pp., illus. $18.50. Advances in Chemistry Series, 153. *To order this book circle No. 390 on Readers' Service Card.*

Hormone Research II. Proceedings of a symposium, Jefferson, Ark., Nov. 1975. M. Norvell and T. Shellenberger, Eds. Hemisphere, Washington, D.C., 1976. iv, 266 pp., illus. $24.50. Originally published as supplement 1, 1976, to the *Journal of Toxicology and Environmental Health*.

Introduction to the History of Mycology. G. C. Ainsworth. Cambridge University Press, New York, 1976. xii, 360 pp., illus. $27.50.

Introduction to the Physical Chemistry of the Vitreous State. P. Baltă and E. Baltă. Translation and revision of the Romanian edition (Bucharest, 1971). Editura Academiei, Bucharest, and Abacus Press, Tunbridge Wells, Kent, England, 1976 (U.S. distributor, International Scholarly Book Services, Forest Grove, Ore.). 288 pp., illus. $38.50. *To order this book circle No. 391 on Readers' Service Card.*

Investigating Behavior. Principles of Psychology. Otello Desiderato, Diane Black Howieson, and Joseph H. Jackson. Harper and Row, New York, 1976. xxiv, 606 pp., illus. $12.95.

Legion of Night. The Underwing Moths. Theodore D. Sargent. Photographs by Harold J. Vermes. Drawings by Katherine A. Doktor Sargent. University of Massachusetts Press, Amherst, 1976. xiv, 222 pp. $15.

Mass Society. Salvador Giner. Academic Press, New York, 1976. xvi, 288 pp. $14.50.

Mathematical Bioeconomics. The Optimal Management of Renewable Resources. Colin W. Clark. Wiley-Interscience, New York, 1976. xiv, 352 pp., illus. $21.95. Pure and Applied Mathematics. *To order this book circle No. 392 on Readers' Service Card.*

Medical and Surgical Aspects of Renovascular Hypertension. Papers from a symposium, Günzburg, Germany, May 1975. J. Rosenthal and H. E. Franz, Eds. Karger, Basel, 1976. viii, 172 pp., illus. Paper, $26.75. Contributions to Nephrology, vol. 3.

Methods in Computational Physics. Advances in Research and Applications. Berni Alder, Sidney Fernbach, and Manuel Rotenberg, Eds. Vol. 16, Controlled Fusion. John Killeen, Ed. Academic Press, New York, 1976. xiv, 450 pp., illus. $47.

Microbial Production of Nucleic Acid-Related Substances. Koichi Ogata and 11 others, Eds. Kodansha, Tokyo, and Halsted (Wiley), New York, 1976. xviii, 348 pp., illus. $24.50. *To order this book circle No. 393 on Readers' Service Card.*

Modern Spacecraft Dynamics and Control. Marshall H. Kaplan. Wiley, New York, 1976. xii, 416 pp., illus. $19.95. *To order this book circle No. 399 on Readers' Service Card*

Neotropische Ökosysteme. Festschrift zu Ehren von Prof. Dr. Harald Sioli. Junk, The Hague, 1976. xvi, 214 pp., illus. Dfl. 65.

The Nuclear Power Controversy. The American Assembly. Prentice-Hall, Englewood Cliffs, N.J., 1976. iv, 188 pp. Cloth, $9.95; paper, $3.95.

On the Psychology of Military Incompetence. Norman Dixon. Basic, New York, 1976. 448 pp. $12.50.

Opiates and Endogenous Opioid Peptides. Proceedings of a meeting, Aberdeen, July 1976. North-Holland, Amsterdam, 1976 (U.S. distributor, Elsevier, New York). x, 456 pp., illus. $36.50.

Order in Polymer Solutions. Papers from a symposium, Midland, Mich., Aug. 1973. Karel Šolc, Ed. Gordon and Breach, New York, 1976. viii, 320 pp., illus. $19.50. Midland Macromolecular Monographs, vol. 2. Reprinted from the *International Journal of Polymeric Materials*, vol. 4, Nos. 1–4.

Paternity Testing by Blood Grouping. Leon N. Sussman. Thomas, Springfield, Ill., ed. 2, 1976. xvi, 186 pp., illus. $16.50.

The Person. His and Her Development throughout the Life Cycle. Theodore Lidz.

Basic, New York, ed. 2, 1976. xxiv, 616 pp. $10.95.

Phase and Caste Determination in Insects. Endocrine Aspects. Papers from a symposium, Washington, D.C., 1976. Martin Lüscher, Ed. Pergamon, New York, 1976. viii, 130 pp., illus. $15.

Physical Principles of Micro-Meteorological Measurements. Peter Schwerdtfeger. Elsevier, New York, 1976. x, 114 pp., illus. $24.95.

Physiological Plant Pathology. R. Heitefuss and P. H. Williams, Eds. Springer-Verlag, New York, 1976. xx, 892 pp., illus. $79.60. Encyclopedia of Plant Physiology, vol. 4. *To order this book circle No. 394 on Readers' Service Card.*

Plant Biophysics. D. M. Grodzinskii. Translated from the Russian edition (Kiev, 1972). Israel Program for Scientific Translations, Jerusalem, 1976 (U.S. distributor, Halsted [Wiley], New York). x, 236 pp., illus. $29. *To order this book circle No. 395 on Readers' Service Card.*

Plant Virology. The Principles. Adrian Gibbs and Bryan Harrison. Halsted (Wiley), New York, 1976. x, 292 pp., illus. $42.50. *To order this book circle No. 396 on Readers' Service Card.*

The Population Challenge. A Handbook for Nonspecialists. Johannes Overbeek. Greenwood, Westport, Conn., 1976. xiv, 216 pp. $13.95. Contributions in Sociology, No. 19.

Proceedings of the Symposium on Molecular and Cellular Aspects of Sickle Cell Disease. Dallas, Dec. 1975. John I. Hercules, G. Larry Cottam, Michael R. Waterman, and Alan N. Schechter, Eds. National Institutes of Health, Bethesda, Md., 1976 (available from the Superintendent of Documents, Washington, D.C.). viii, 398 pp., illus. $8.20. DHEW Publication No. (NIH)76-1007. Stock No. 017-043-00068-4.

Progress in Aerospace Sciences. Vol. 16. D. Küchemann and seven others, Eds. Pergamon, New York, 1976. vi, 460 pp., illus. $75.

Prostaglandins. An Introduction to Their Biochemistry, Physiology and Pharmacology. P. B. Curtis-Prior. North-Holland, Amsterdam, 1976 (U.S. distributor, Elsevier, New York). xiv, 160 pp., illus. $16.25.

The Psychobiology of Aggression. K. E. Moyer. Harper and Row, New York, 1976. xx, 402 pp., illus. $11.95.

Phychological Approach to the Rehabilitation of Coronary Patients. Papers from a meeting, Höhenried, Germany. U. Stocksmeier, Ed. Springer-Verlag, New York, 1976. viii, 186 pp., illus. Paper, $13.20.

Quantitatively Standardized Complement-Fixation Methods for Critical Evaluation of Antigens Prepared from *Trypanosoma cruzi*. José O. Almeida and Earl H. Fife, Jr. Pan American Health Organization, Washington, D.C., 1976. vi, 86 pp., illus. Paper, $5. Scientific Publication No. 319.

Quantum Mechanics of Molecular Conformations. Bernard Pullman, Ed. Wiley-Interscience, New York, 1976. x, 412 pp., illus. $32.50. Perspectives in Quantum Chemistry and Biochemistry. *To order this book circle No. 397 on Readers' Service Card.*

Reproduction of Eukaryotic Cells. David M. Prescott. Academic Press, New York, 1976. x, 178 pp., illus. $14.50.

Schooling and Society. Studies in the History of Education. Lawrence Stone, Ed. Johns Hopkins University Press, Baltimore, 1976. xviii, 264 pp. $14.