SCIENCE

15 March 1974

Vol. 183, No. 4129

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE HIGH-SPEED ULTROLAB® DILUTER

The LKB Ultrolab Diluter is one of the fastest and most accurate diluters on the market. It will siphon up a preset volume of a sample liquid and flush it out with a preset volume of a reagent at a rate of up to 1200 times an hour.

The Ultrolab Diluter can also be used as a dispenser, to dispense one or two reagents at the same high rate.

Each pump is permanently preset to deliver 10 different volumes, which can be selected by merely pressing a pushbutton. Three pumps are available to choose from, giving in all a choice of volumes from 10 μl to 3000 μl. These are high-precision pumps, with an accuracy of $\pm 1\%$ and a reproducibility of $\pm 0.5\%$. Tight, leak-free operation is achieved by employing smooth, sapphire pump plungers.

Operation is simple. To change over pumps you just press a button and remove the pump, complete with reagent bottle. You can immediately begin dilution or dispensing for a different type of analysis by plugging in a spare pump with a new type of reagent. A convenient hand pipette and a foot pedal control are available as optional items.

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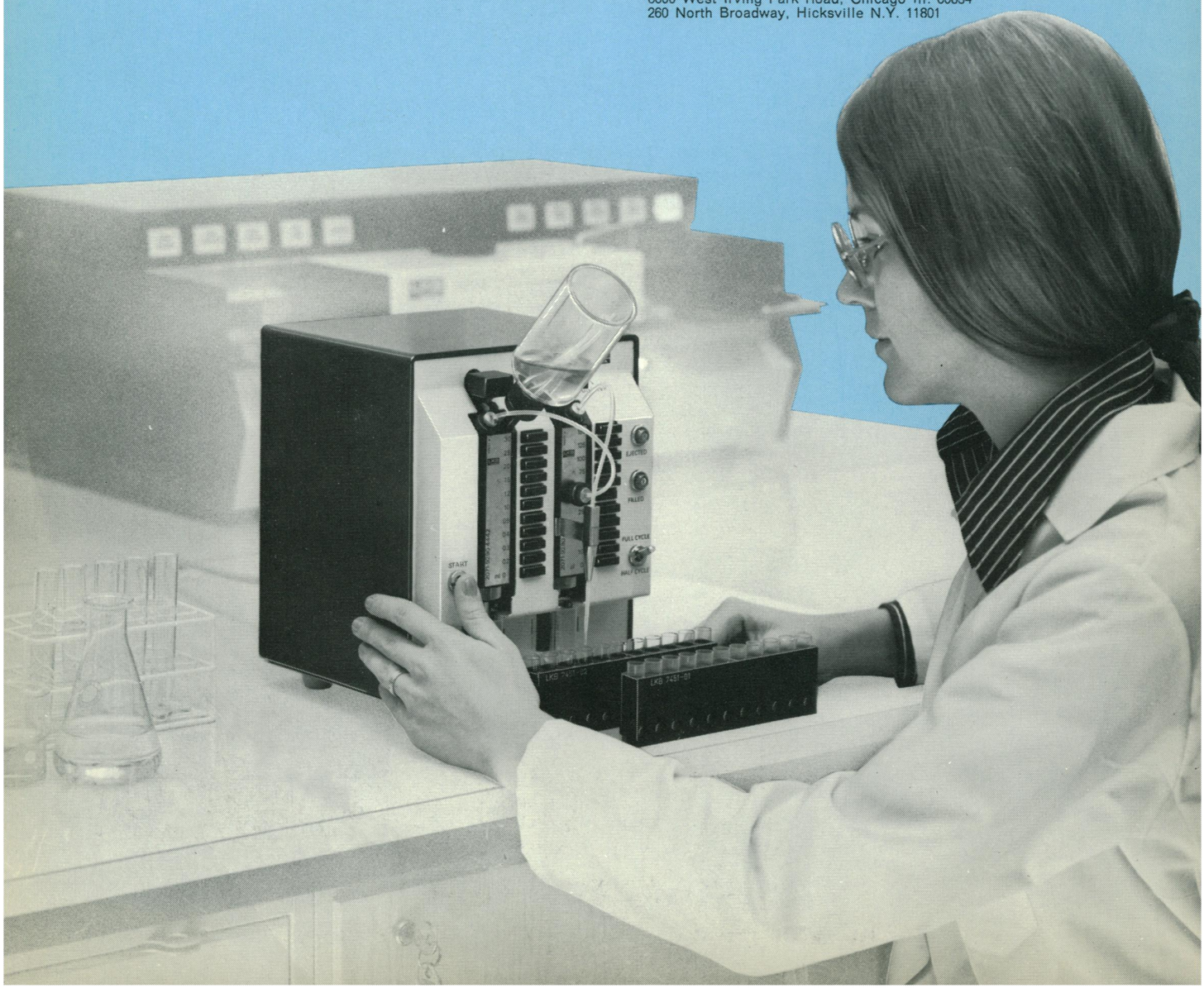
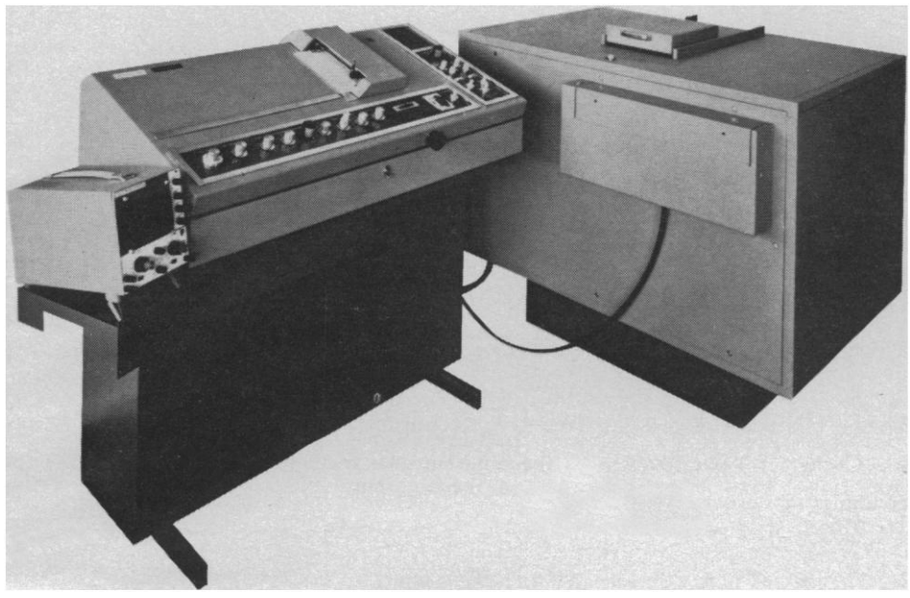
260 North Broadway, Hicksville N.Y. 11801



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



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

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

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

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

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

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

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

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

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

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

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15 March 1974

Volume 183, No. 4129

SCIENCE

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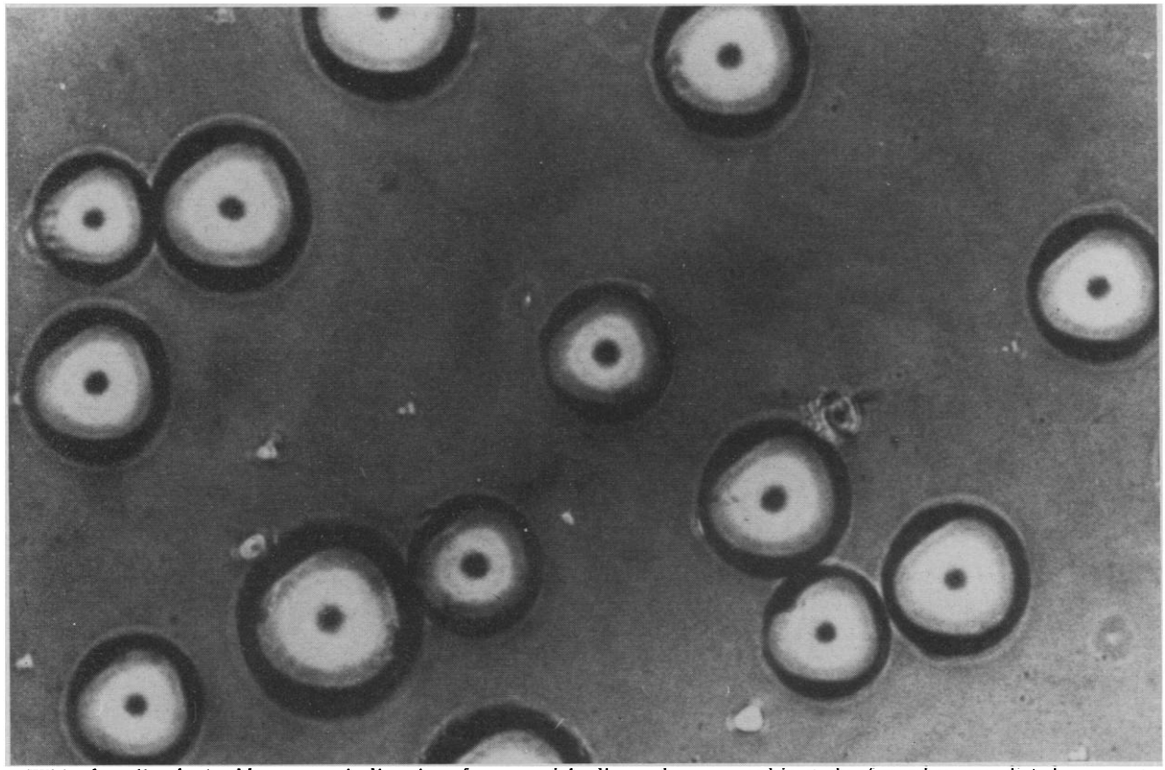
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Mixed, nonferrous metals recovered from municipal refuse. See page 1052. [H. Alter, National Center for Resource Recovery, Inc., Washington, D.C.]

Worthington Collagenase...



White fat cells, obtained by enzymatic digestion of parametrial adipose tissue as used in study of membrane mediated responses.

specifically blended for cell isolation.

In microbiological studies of animal cells, it often is desirable to isolate and separate the cells for further study. The researcher's need is to separate the cells from the connective and cementing materials without damaging the cells themselves.

Many researchers found that a natural mixture of digestive enzymes produced by a non-toxigenic strain of the bacterium *Clostridium histolyticum* provided the separation remarkably well. The enzymes, without the toxin that many of the *Colstridia* produce, effectively digest away the materials connecting the cells into a tissue, but leave the cells themselves virtually untouched.

The enzyme mixture is named after its more unique member, *Collagenase.* Worthington supplies Collagenase in several degrees of purity ranging from crude to highly-purified; researchers have generally found that the less purified material is more effective in releasing intact cells from tissues. The effectiveness, however, seemed to differ with different tissues, and it did not always match the quantitative differences noted in our assay labs.

A program was therefore initiated by Worthington aimed at correlating effectiveness of samples on specific tissues with results of our own biochemical assays. We enlisted the support of several dozen prominent researchers; they evaluated more than a hundred samples of regular production and specially prepared lots of Collagenase in their own studies.

Evaluation of these studies has enabled us to categorize our crude Collagenase into four different types which are blended and classified according to the specific tissues for which each is best suited. The four types are available as listed in our current catalog.

TYPE	CHARACTERISTIC	TISSUE BEST SUITED
I	Normal balance	Fat cells; Adrenal tissue
II	High Clostridiopeptidase	Liver, Bone, Thyroid
III	Low Proteases generally	Mammary
IV	Low Tryptic activity	Pancreatic Islet cells

The increasing use of Collagenase in cell isolation is encouraging. Credit for the program's success is due to the many researchers who cooperated so openly with their time and talent.

Your comments and interest are welcome. Additional information on this application of Collagenase and a copy of our current catalog are available on request.

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Then to Kennedy International and you'll 747 direct to London's Heathrow Airport.

Founded in 1799 by Count Rumford, **2** The Royal Institution counts such notables as Humphry Davy and Michael Faraday as past faculty members. You'll study the equipment they used and see what's going on today.

South Kensington. **3** The Science Museum, where practically every major event in British science is preserved.

Greenwich. **4** The Royal Observatory, founded in 1675.

5 The National Maritime Museum where you'll see John Harrison's chronometer.

6 The Oxford University Museum of the History of Science, which houses an unparalleled collection of scientific instruments dating back to 250 A.D.

7 The chambers in which Roger Bacon spent the last 14 years of his life.

Cambridge. **8** The rooms of Isaac Newton at Trinity College.

9 The home of Francis Crick who, along with J.D. Watson, won the Nobel Prize for the discovery of the double helical structure of DNA.

10 The ante-chapel of Trinity College where you'll ponder the works of four of Trinity's illustrious sons: Sir Francis Bacon, Sir Isaac Newton, Isaac Barrow and William Whewell.

11 The Cavendish Laboratory Museum.

12 Sheffield, where you'll tour an 18th-century industrial village—complete with homes, factories, machinery and the like.

13 The Royal Scottish Museum in Edinburgh.

14 Glasgow University and a look at the work of William Thomson, Baron Kelvin.

Norway. **15** Kon-Tiki and a visit with Thor Heyerdahl.

Upsala, Sweden. **16** The Apothecary shop in which Carl W. Scheele discovered oxygen.

17 Linnaeus' house and garden. Copenhagen. **18** The Post and Telegraph Museum for a reconstruction of Hans Christian Oersted's discovery of the magnetic properties of an electric current in wire.

19 The island of Ven where Tycho Brahe built the last naked-eye observatory.

Haarlem, the Netherlands, boasts **20** The Teyler Museum and an enviable collection of scientific apparatus from all over Europe.

Leyden. **21** The National Museum of the History of Science. **22** The telescope through which Christian Huygens discovered Saturn's rings. **23** Anton von Leeuwenhoek's microscopes. **24** Fahrenheit's thermometers.

Scheveningen. **25** The Gemeente Museum houses the world's very best collections of musical instruments and a history of acoustics.

26 Antwerp's Folklore Museum, where you'll study witchcraft, popular medicine and herb lore.

Bruges. **27** The Hospital of St. John with its 13th-century ward and 15th-century dispensary.

Brussels. **28** The Museum of Venerable Art.

Paris. **29** Laboratoire Curie.

30 The Institut Pasteur.

31 Le Conservatoire National des Arts et Métiers contains memorabilia and apparatus of such scientists as Pascal, Lavoisier, Gay-Lussac, Volta, and Becquerel.

32 The College de France, the scene of work by Magendie (established experimental physiology), Laënnec (the stethoscope) and Claude Bernard (physiology).

33 The Museum of Natural History.

34 The École Polytechnique.

35 Basel, Switzerland, the home of Paracelsus.

Bern. **36** Einstein's rooms.

Como, Italy. **37** Museo Alessandro Volta.

Milan. **38** Museo Nazionale della Scienza e Technica Leonardo da Vinci.

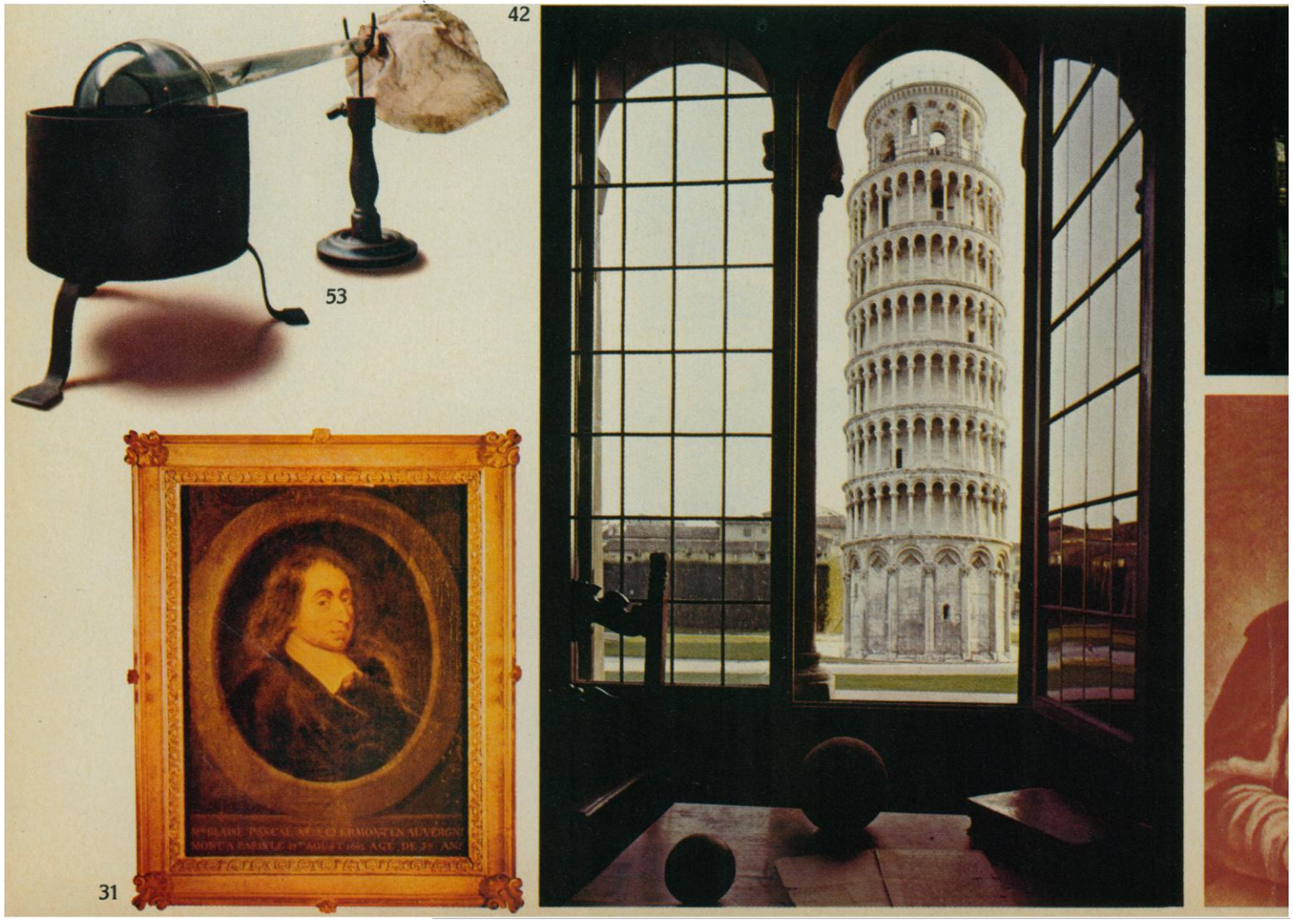
Marconi's wireless work is to be seen in our next stop, **39** Bologna.

Florence. **40** The Instituto Museo di Storia della Scienza. Galileo's telescopes. Next, a visit to **41** the house in which Galileo was imprisoned from 1633 to his death in 1642.

42 More Galileo in Pisa. The leaning tower was made to order for his earthshaking experiments on the nature of falling bodies.

43 Rome. The Accademia Nazionale de Lincei in the Palazzo Corsini.

44 The Academie Nationale de France.



45 The observatory of the Collegio Romano, where Jesuit astronomer Father Angelo Secchi (1818-1878) made the first spectroscopic survey of the heavens.

46 Museo Copernico ed Astronomico where Polish Astronomer Nicolas Copernicus did much of his early work.

47 Naples. The Zoological Station.

48 University of Padua. The anatomical theater was built in 1594 by Fabricius of Acquapendente, a pioneer of the comparative method of anatomical research and discoverer of valves in the veins.

Vienna. **49** The Pharmakognostiches Institute, which houses a museum of 10,000 items of scientific interest.

50 A reconstructed apothecary, laboratory and print shop in the Technisches Museum fur Industrie und Gewerbe.

Czechoslovakia. Gregor Mendel did his landmark work in genetics in a **51** monastery in Brno.

Still in Prague. **52** Charles University where you will visit the rooms in which Einstein, Ernst Mach and Philipp Frank taught and worked.

Germany. Munich. **53** The Deutsches Museum. Reconstruction of the laboratories of Lavoisier and Liebig.

54 The Werner von Siemens Institute, where electrical engineering and research are traced from 1850.

Heidelberg. **55** The Deutsches-Apotheken Museum, an ancient castle packed with apparatus and drugs, vessels and relics.

56 The Deutsches-Roentgen Museum in Remscheid preserves Roentgen's apparatus, including a 1905 X-ray lab.

57 The Deutsches Gesundheitmuseum in Cologne.

Berlin. **58** Chemistry Institute, where Otto Hahn split the uranium atom in 1938.

East Berlin. **59** The Robert Koch Museum. Koch, co-father of modern bacteriology, used glass slides to grow cultures until his assistant, Julius Petri, invented the glassware that carries his name.

60 The home and garden of Alexander V. Humboldt.

61 The library of Max Planck.

62 Charité Hospital where Rudolph Virchow, founder of cellular pathology, first described leukemia.

Cracow, Poland. **63** Collegium Majus for a look at the telescopes of Copernicus.

A jet to Rumania and a drive to Cluj for a visit to **64** an 18th-century apothecary shop.

Greece. **65** The Lyceum, where Aristotle taught from 355 B.C. until just before his death. **66** Plato's Academy.

Istanbul. **67** Pergamon where Galen practiced medicine.

Bombay. **68** The Tata Institute of Fundamental Research, devoted to nuclear research, computer science, molecular biology, radioastronomy, and mathematics.

69 The Bhabha Atomic Research Center is India's national center of research for the peaceful use of atomic energy.

70 The Yoga Institute. Here you can learn Yoga culture, technique and scientific discipline.

Russia. **71** Academy of Sciences in Leningrad. Pavlov's lab.

72 The Anthropological and Ethnographical Museum.

73 The Mendeleyev Research Institute.

Moscow. **74** The National Economic Achievements Exhibition.

Tokyo. **75** The Kitasato Institute, founded by Baron Shibasaburo Kitasato who isolated the agents which cause bubonic plague and dysentery.

You're back on American soil when you visit **76** the Hawaii Volcano Observatory.

To wind up your trip we want to give you the opportunity to see any four labs in the U.S. **77, 78, 79, 80** which hold particular interest for you. We will do our level best to arrange a visit for you to four labs of your choice.

OFFICIAL RULES — NO PURCHASE REQUIRED

1. This sweepstakes is only open to those employed in medical, educational, or industrial fields who normally work with labware. Or who supervise or administer a laboratory. Or who purchase or stock labware.

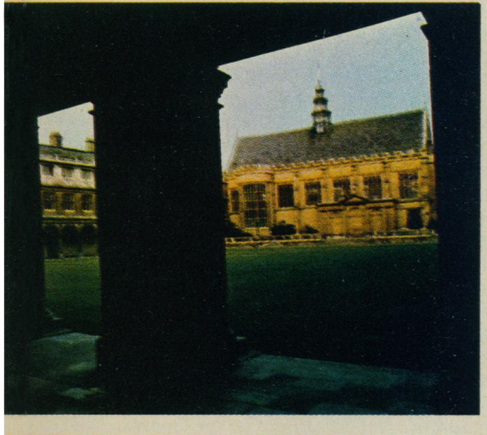
2. To enter, complete this official entry blank, or, on a plain 3 x 5-inch piece of paper, hand print your name, address, and field of activity.

3. Enter as often as you wish, but each entry must be mailed separately to: Around the World in 80 Labs, P.O. Box 1730, Blair, Nebraska 68009. Entries must be postmarked by September 30, 1974 and received by October 15, 1974.

4. One winner from each of the three fields of activity — industry, education, and medicine — will be picked from among all entries received in random drawings conducted by the D.L. Blair Corp., an independent judging organization. Decisions of the judges are final. Winners will be notified by mail. Winners will travel in a group departing on a date to be selected by Corning Glass Works. Departure is estimated to be between the months of May and July, 1975 for a trip duration of 30 days. Corning Glass Works reserves the right to modify trip itinerary as a result of conditions prevailing at time of prize award. No substitution for prizes permitted. Entrants must be residents of U.S.A.

5. This sweepstakes is void where prohibited, taxed or restricted by Federal, state or local laws and regulations. Employees of Corning Glass Works, its advertising and sweepstakes agencies, dealers, and their families are not eligible. Federal, state and other taxes, if any, are the responsibility of the prize winners.

6. All prizes are guaranteed to be awarded. Names of the prize winners will be furnished to anyone who sends a stamped, self-addressed envelope to Corning Laboratory Sweepstakes, Corning Glass Works, Corning, N.Y. 14830.



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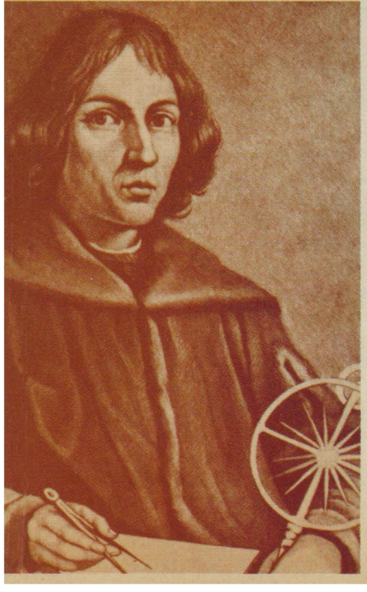

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For two weeks last summer (June 20-July 4, 1973) a significant international scientific meeting took place in Mexico City. "Science and Man in the Americas" was attended by more than 5000 scientists, engineers, government officials, representatives of business and industry, science journalists, students, educators and laymen from scores of countries. They deliberated a wide range of topics central to the future development and well-being of the Western hemisphere. The meeting, co-sponsored by AAAS and the Consejo Nacional de Ciencia y Tecnologia of Mexico, was created in the belief that science is of overriding importance in the world today and that, being universal, it transcends national boundaries. Here now, captured on audiotape, are many of the most compelling sessions, available for listening, study, and reflection in your home, library, laboratory, automobile. Another service of the AAAS.

NON-NUCLEAR ENERGY FOR DEVELOPMENT: Arranged by Edmundo de Alba and J. Frederick Weinhold.

- Session I ☐ **The World's Energy Situation:** David Freeman, Jean C. Leclercq
- Session II ☐ **Energy in the Americas:** J. Frederick Weinhold, Fernando Hiriart, Gordon McNabb, Guillermo O. Zubaran, et al.
- Session III ☐ **Energy for Rural Communities:** Francisco Monteverde, Thomas Venables, J. Neal Thompson.
- Session IV ☐ **Wind and Solar Energy:** Edmundo de Alba, Julio Hirschmann, Peter Glaser, Robert Axtmann, et al.
- Session V ☐ **Geothermal Power:** Federico Mooser, Robert Decker, Richard Stoiber.
- Session VI ☐ **Relationship Between Environmental Protection and Energy:** Juan Eibenschutz, Miguel Angel Garcia Lara, et al.

EARTHQUAKE AND EARTHQUAKE ENGINEERING: Arranged by Don Tocher and Enrique del Valle C.

- Session I ☐ **The 1972 Managua Earthquake:** Emilio Rosenblueth, R. B. Matthiesen, John A. Blume, Enrique del Valle C., et al.
- Session II ☐ **Seismicity:** Alan Davenport, Luis Esteva, Donald E. Hudson, William Milne, and Jose Grases.
- Session III ☐ **Earthquake Engineering:** Julio Kuroiwa, Joseph Penzien, Jorge Prince, Patrico Ruiz, Roberto Meli, et al.
- Session IV ☐ **Seismic Intensity and Smooth Spectra, Zoning and Structural Design:** Enrique del Valle C., R. B. Matthiesen, Arturo Arias, et al.

CIVILIZATION'S FUTURE: WAS MALTHUS CORRECT?

- Session I ☐ Lecture by Norman E. Borlaug

THE SEA AND ITS RESOURCES: Arranged by Agustín Ayala-Castañares, and Arthur E. Maxwell

- Session I ☐ **Introduction, Coastal Zone Resources, Ocean Effects and their Management:** Harris B. Stewart, Jr., Bostwick H. Ketchum, and Julian Adem.
- Session II ☐ **Resources of the Sea:** Robert R. Lankford, Martha Vannucci, and Warren S. Wooster.
- Session III ☐ **Coastal Resources:** Bostwick H. Ketchum, Hermann Ugarte, Richard G. Bader, Robert Warren, et al.
- Session IV ☐ **Ocean Effects on Weather and Climate:** Julian Adem, Donald Gilman, R. Simpson, J. Kuettner, Jay S. Winston, and Kirk Bryan.
- Session V ☐ **Non-Renewable Resources:** Robert R. Lankford, Fred B. Phleger, Alberto G. Lonardi, John P. Albers, Melvin Peterson, et al.
- Session VI ☐ **Living Resources:** Martha Vannucci, Mario Ruivo, Paul E. LaViolette, James Joseph, A. Novak, et al.
- Session VII ☐ **Ocean Affairs:** Warren S. Wooster, John A. Knauss, Jorge A. Vargas, Harris B. Stewart, Geoffrey Kesteven, et al.

THE IMPORTANCE OF EDUCATION IN DEVELOPMENT: Arranged by Albert V. Baez and Guillermo Massieu.

- Session I ☐ **Educational Technology:** Alfonso Ocampo Londono, Albert V. Baez, Sam Castleberry, Joseph Lagowski, et al.
- Session II ☐ **Laboratory Materials and Teaching Aids:** Nahum Joel, Ernst Hamburger, Rafael Ferreyra, Thomas Taylor, David Lockard, et al.
- Session III ☐ **Motivation and Learning Processes:** David Ehrenfreund, Mary Budd Rowe, Felix Morales, Claudio Dib, et al.
- Session IV ☐ **Science Teaching at High School, Junior College and University Levels:** Manuel Servin Massieu, Michael Pentz, Gabriel Camara Cervera, et al.
- Session V ☐ **Toward Qualitative Educational Planning:** Don Adams, Manual Bravo Jimenez, Hernan Vera, William Platt, Douglas Wright, Bernard Kaplan, et al.
- Session VI ☐ **The Improvement of Teachers Education:** Ernst Hamburger, Nahum Joel, Carlos Gomez, Olac Fuentes, Luis S. Capurro, et al.

DESERTS AND ARIDS LANDS: Arranged by Harold E. Dregne and Fernando Medellín Leal.

- Session I ☐ **Planning Problems and Dilemmas in the Development of Arid Zones:** Fernando Medellín Leal, Enrique Beltran, and Thomas Maddock, Jr.
- Session II ☐ **Solar Energy in Arid Lands:** Hector Ruiz Elias, Gustavo del Castillo, Adam B. Meinel, Marjorie P. Meinel, Edward F. Haase, et al.
- Session III ☐ **Water Use Efficiency in Arid Regions:** Terah L. Smiley, Jose Lizarrage Reyes, Ronald F. Probstein, Hasan Qaṣhu, Lloyd E. Myers, et al.
- Session IV ☐ **Educational and Cultural Needs of Desert Zone Inhabitants:** Richard B. Woodbury, Patricio Dreckman, Everett D. Edington, Theodore Downing, Marion F. Baumgardner, Carl N. Hodges, et al.
- Session V ☐ **Storage and Retrieval of Arid Zone Data:** Dean F. Peterson, Antonio J. Prego, Patricia Paylore, Guadalupe Carrion, et al.

SCIENCE, TECHNOLOGY. AND DEVELOPMENT: A NEW WORLD OUTLOOK:

Session I ☐ **A lecture by Glenn T. Seaborg.**

THE EARTH SCIENCES IN WORLD DEVELOPMENT: Arranged by Guillermo P. Salas and Earl Ingerson.

Session I ☐ **Earth Sciences and Energy and Environmental Problems:** Charles F. Park, P. T. Flawn, P. S. Stepanicic, Eduardo J. Guzman, et al.

Session II ☐ **Geologic Research, Exploration and Development in Mexico, Central and South America:** Diego A. Cordoba M., Carlos Ruiz Fuller, and Enrique Levy.

Session III ☐ **Application of Earth Sciences in the Development of Civilization:** Charles F. Park, P. T. Flawn, Eduardo J. Guzman, et al.

SCIENCE, DEVELOPMENT AND HUMAN VALUES: Arranged by Harrison Brown and Victor L. Urquidi.

Session I ☐ **Where Have the Rich Nations Gone Wrong? Where Have the Poor Nations Gone Wrong?** Guillermo Massieu, Hollis Chenery, Kenneth E. Boulding, et al.

Session II ☐ **Knowledge and Development in Latin America:** Renee C. Fox, Carlos A. Mallman, Richard Griego, and Luis Villoro.

Session III ☐ **Research Priorities for Economic Development in Latin America:** Jose Valenzuela, David Ibarra, and Norman Borlaug.

Session IV ☐ **The Value of Science and Technology to Human Welfare:** Luis Manuel Penalver, Gerhard Jacob, George Bugliarello, Joseph B. Platt, et al.

Session VI ☐ **Science, Technology, and Human Values:** Victor Urquidi, Harrison Brown, et al.

VIOLENCE AND BEHAVIOR: Arranged by Santiago Genovés and J. P. Scott.

Session I ☐ **Subcultures of Violence and Social Class as Determinants of Interpersonal Violence:** Berenice A. Carrol, Sandra Bell Rokeach, John Saxe-Fernandez, Osvaldo Sunkel, et al.

Session II ☐ **External Dependency Structure and Scientific Development:** Chadwick F. Alger, Marcos Kaplan, Sylvia Wynter Carew, et al.

HURRICANES: Arranged by Julián Adem, and Louis J. Battan.

Session I ☐ **New Techniques of Hurricane Observation:** Stanley Rosenthal, Luis Le Moyne, Michael Garstang, Sergio Serra-Castelan, et al.

Session II ☐ **Hurricane Prediction and Modification Techniques:** Pedro Mosino, Robert H. Simpson, Hector Grandoso, Cecil Gentry, et al.

TRANSFER OF TECHNOLOGY AND NATIONAL ECONOMIC DEVELOPMENT: Arranged by Jordan J. Baruch and Miguel S. Wionczek.

Session I ☐ **Economic Impact of Technological Change:** Anne Carter, Jorge A. Katz, Jack Baranson, Alejandro Nadal, Alan MacAdams, et al.

Session II ☐ **Social Impact of Current Rate of Technological Change:** Miguel S. Wionczek, Jerome Rotherberg, C. J. Meechan, Edmundo Fuenzalida, et al.

Session III ☐ **Current Vehicles of Technological Trade I:** C. J. Meechan, Robert B. Staubaugh, Ronald Muller, K. D. N. Singh, et al.

Session IV ☐ **Current Vehicles of Technological Trade II:** Mark S. Massel, Luis Soto Krebs, Enrique Aguilar, Luis Figueira Barbosa, et al.

Session V ☐ **Determinants of Technological Policy I:** Francisco R. Sagasti, Manuel Bravo Jimenez, Rodrigo Medellin, Shlomo Argov, Alejandro Nadal, et al.

Session VI ☐ **Determinants of Technological Policy II:** Maximo Halty Carrere, Carlos Bazdresch, Jorge Sabato, Michael Michaelis, et al.

APPLICATIONS OF EDUCATIONAL TECHNOLOGY AND NEW METHODS AND EQUIPMENT IN SCIENCE TEACHING: Arranged by Alfonso Bernal Sahagun, Robert Branson, Thomas E. Taylor, et al.

Session III ☐ **Program Development:** Alvaro Galvez y Fuentes, Jay Young, Robert Pecsok, Horacio Gomez Junco, Maria del Carmen Millan, et al.

Session IV ☐ **Television, Wide Territorial Coverage:** Maria del Carmen Millan, Fidel Villarreal, Robert Branson, Isaias Raw, et al.

PSYCHODYSLEPTICS AND ADDICTION—MARIHUANA: Arranged by Wallace L. Guess and Oscar Dominguez Vargas.

Session I ☐ **Psychodysleptics, the Botany, Chemistry and Pharmacology of Narcotic Drugs and Marihuana:** Maynard V. Quimby, Carlton E. Turner, Solomon H. Snyder, Harold T. Conrad, Richard B. Resnick, et al.

EDUCATIONAL PLANNING: Arranged by Don Adams and Manuel Bravo Jiménez.

Session I ☐ **Quantitative Aspects of Educational Planning:** Juan Chong, Cicily Watson, Jose Antonio Carranza, Hector Correa, et al.

Session II ☐ **Implementing Educational Change:** Guy Benveniste, Jaime Castrejon Diez, Paul Watson, Antonia Ramos, et al.

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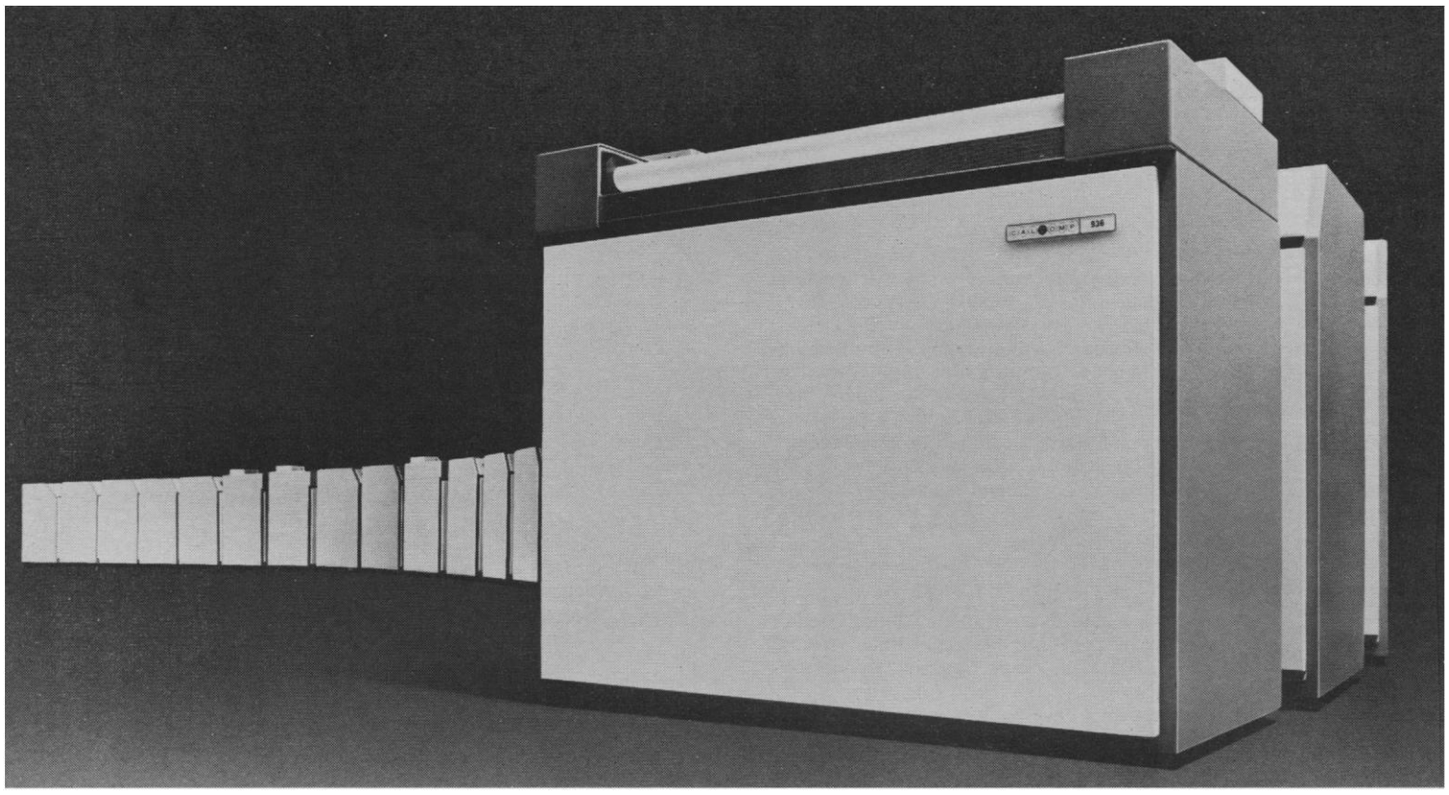

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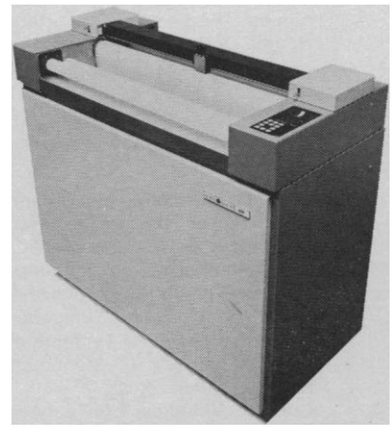

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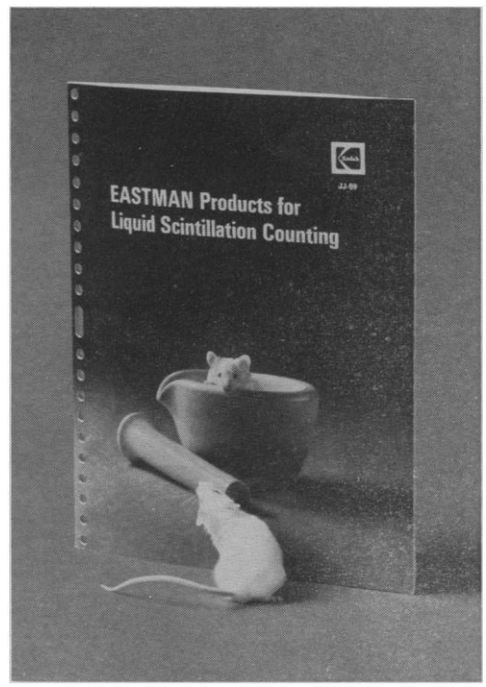

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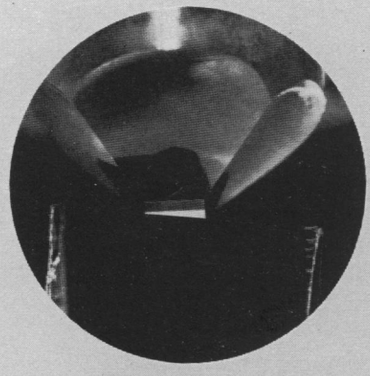

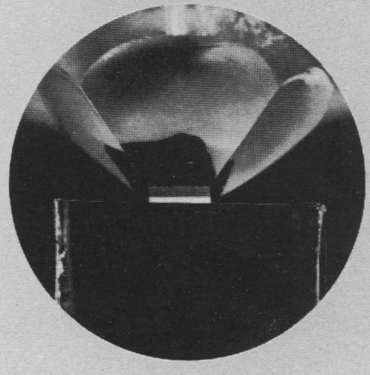

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SCIENCE 19 April 1974

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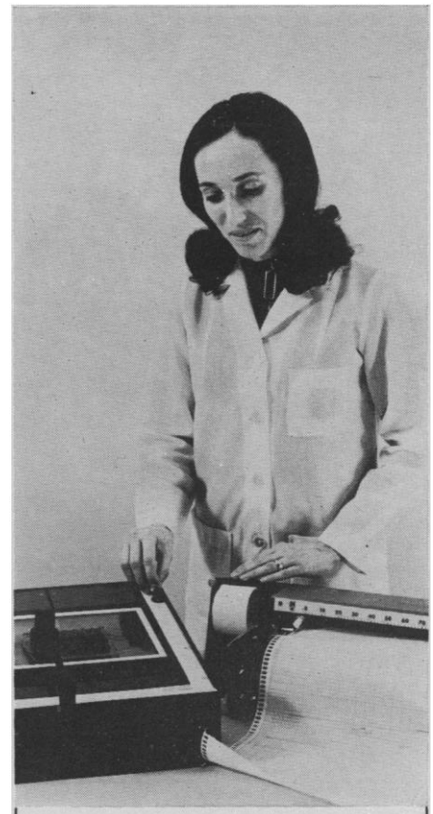

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calls of alarm which induced an expensive and ill-fated international eradication program. These and other examples strongly reflect upon the almost complete absence of knowledge concerning the behavior of large ecological systems. What may be quite devastating to a component of a system may in fact perpetuate the survival of the whole system over a longer time span.

The contemporary physical environment of the regional ecosystem of southwestern Florida is characterized by increased upland water drainage and concomitant changes in the hydroperiod and the salinity regime in the downstream estuaries and bays (for example, shorter periods of lower salinities and longer periods of higher salinities). The general reduction in the ratio of land surface to water surface caused by *Sphaeroma* in the Ten Thousand Islands region may eventually prove to be compensatory by reestablishing old salinity regimes and tidal-flushing patterns. Not to be discounted is the possible short-term importance of mangrove-derived allochthonous materials shunted into estuarine food webs by *Sphaeroma.*

To the extent that we continue to ignore ecosystem phenomena in a long-term context, we continue to perpetuate the vacuum of knowledge concerning macroscale biology and the self-adapting mechanisms of ecosystems. Man could do well to study how natural systems continually adapt to changing environments for long-term survival.

SAMUEL C. SNEDAKER
Resource Management Systems Program, Institute of Food and Agricultural Sciences, University of Florida, Gainesville 32611

The title and tone of the report by Rehm and Humm, "*Sphaeroma terebrans*: a threat to the mangroves of southwestern Florida," betray a botanical and terrestrial bias. As a longtime admirer of marine crustacea in general and isopods in particular, I applaud rather than deplore the destruction of the mangroves by *Sphaeroma,* so beautifully illustrated in the cover photograph, and propose an alternative title, such as, "Mangrove roots of southwestern Florida: a new resource for *Sphaeroma terebrans*, a new hope for the marine ecosystem." This hitherto rare (*1*) and underprivileged isopod seems to be making a comeback (or an initial breakthrough) to its rightful place as a conspicuous and important member of the intertidal fauna; in the process, it may well be contributing to the abatement of terrestrial intrusion into the Gulf of Mexico occasioned by mangroves.

I am pleased, for the sake of isopods and the marine community, that the isopod-weakened mangroves may be undercut by wave action and that storms may cause groups of weakened trees to topple into the water. This will provide more food for the isopods and their marine compatriots, and return to the marine ecosystem stretches of habitat which rightly belong there. This extravagant use of resources by *Sphaeroma* may eventually lead the isopods to an energy crisis, but in that eventuality, we can hope that other marine crustacea, better adapted to a marine climax community, will complete the mopping-up operation.

There are, however, other grounds for alarm. The authors state that in the Florida Keys, where *Sphaeroma* is absent, ". . . expansion and land-building activities of red mangroves . . . are continuing." I protest the authors' use of the term "normal" to describe a situation which, instead, represents "extensive" depredations of the marine habitat by mangroves. Their "infestations" of the coastline constitute an "extremely severe" terrestrial invasion which may well develop into a "eco-catastrophe of serious magnitude."

All biases aside, I am concerned about the possible consequences of this kind of reporting. What if the state of Florida should propose a massive effort to control by pesticides this fascinating and apparently completely natural ecological event taking place in an arena that is of no evident economic significance except to land developers? When enlightened self-interest does not dictate policy—as it may in the realm of agriculture—and when there is no clear evidence that man has already (perhaps unwittingly) intervened, so as to require further intervention to redress a prior wrong, I advocate ecological nonalignment. Those organisms that cannot survive the direct depredations of man may well belong to an endangered species list; but if the mangrove cannot survive the isopod in southwestern Florida, I see no a priori justification for helping one at the expense of the other.

J. T. ENRIGHT
Scripps Institution of Oceanography, La Jolla, California 92037

References

1. H. Richardson, *U.S. Natl. Mus. Bull.* **54**, 1 (1905); D. C. Tabb and R. B. Manning, *Bull. Mar. Sci.* **11**, 552 (1961).

In 1950 Dr. Immanuel Velikovsky was pronounced a heretic and his unorthodox theories were banned from discussion at scientific gatherings.

In June, 1974, leading scholars and scientists from around the world will gather in Ontario on the theme, "Velikovsky and the Recent History of the Solar System."

Many things have happened during the last 24 years. *Pensee* is one of them.

A REPORT ON THE VELIKOVSKY AFFAIR

In the Spring of 1972 the Student Academic Freedom Forum (*Pensee* magazine) initiated a special series of publications examining the work of Immanuel Velikovsky. In his bestseller, *Worlds in Collision,* Velikovsky questioned the fundamental assumptions of disciplines ranging from psychology to physics to ancient history, and he claimed that Earth suffered near-annihilating catastrophes several times during recorded history. That thesis, once scoffed at, has gained more respect with each passing year. The one-time heretic is now in strong demand at scholarly gatherings around the United States and elsewhere. Here is a summary of some of the more important events since the appearance of our first special publication in 1972:

NASA AMES RESEARCH CENTER. *August 14, 1972.* Following Velikovsky's invited lecture and consultations with Ames personnel, Dr. Richard Haines, a research scientist at the center, wrote in *Pensee:* "I believe that the time has come to leave the debating table and begin the enormous task of evaluating empirically those hypotheses of Dr. Velikovsky's that are amenable to scientific study."

"VELIKOVSKY SYMPOSIUM," LEWIS AND CLARK COLLEGE. *August 16-18, 1972.* For three successive days 50 "invited scholars" and 200 "observers" crowded into the Council Chambers at Lewis and Clark College (Portland). Coming from as far away as Europe, they comprised the first large-scale symposium on Velikovsky's work. The papers were subsequently published in *Pensee.*

MEDIA DOCUMENTARIES. *1972–.* Both the Canadian and British Broadcasting Corporations have produced major-length television documentaries on Velikovsky's work. Titled "Velikovsky: The Bonds of the Past" (CBC) and "Worlds in Collision" (BBC), the documentaries were each shown at least twice. A Dutch television network recently aired a whole series of programs on Velikovsky, and Voice of America is preparing a presentation of its own.

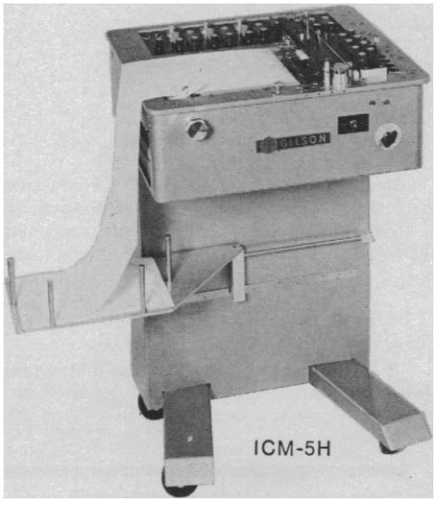
NASA LANGLEY RESEARCH CENTER. *December 10, 1973.* Responding to an enthusiastic invitation to lecture at Langley, Velikovsky predicted that Mars will be found to show the effects of near-collisions with Earth.

"VELIKOVSKY'S CHALLENGE TO SCIENCE," A SYMPOSIUM SPONSORED BY THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. *February 25, 1974.* The largest scientific body in the country held the symposium at its annual convention in San Francisco. The speakers: Immanuel Velikovsky; Peter Huber (professor of the history of science, Eidgenössiche Technische Hochschule, Switzerland); Irving Michelson (professor of mechanics and mechanical aerospace engineering, Illinois Institute of Technology); J. Derral Mulholland (professor of astronomy, University of Texas); Carl Sagan (professor of astronomy, Cornell University); Norman Storer (professor of sociology, Baruch College, City University of New York).

"VELIKOVSKY AND THE RECENT HISTORY OF THE SOLAR SYSTEM," A SYMPOSIUM. *June 17-19, 1974.* Sponsored by the Student Academic Freedom Forum, this symposium will be held at McMaster University, near Toronto. Among the participants:

Immanuel Velikovsky;
Sergei Vsekhsvyatskii, director, Kiev Observatory, U.S.S.R.;
Claude Schaeffer, Chaire d'Archéologie de l'Asie Occidentale, Collège de France;
Irving Michelson, professor of mechanics and aerospace engineering, Illinois Institute of Technology.

"VELIKOVSKY AND THE POLITICS OF SCIENCE," A SYMPOSIUM. *November 2, 1974.* Scheduled as part of the Philosophy of Science Association biennial convention, Notre Dame University, Indiana.



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15 March 1974, Volume 183, Number 4129 **SCIENCE**

The "Slippery Slope" of Science

The term "slippery slope" appears with increasing frequency in writings devoted to the ethical and social assessment of new scientific developments. It suggests that once we break the taboo against tampering with whatever things new scientific breakthroughs will affect, from motherhood to definition of death, there will be no place to stop until we end up at the bottom of the slope. For instance, advances in genetics, biology, and medicine such as amniocentesis, in vitro fertilization, and mass screening are expected by many to lead to eugenics, Aryan purification policies, and totalitarian mass production of 007's.

That we must actively concern ourselves with the social and moral consequences of science, I fully recognize. But to discharge this duty with full responsibility requires avoiding the two favorite pitfalls of facile humanists: basing one's entire assessment on a single value and assuming empirical facts rather than gathering and analyzing data relevant to the assessment at hand.

Take amniocentesis. The facile humanist argues that, if it is used to detect and abort mongoloid fetuses, it will next be employed to abort fetuses inflicted with less severe illnesses (say, Farby's); next, to eliminate illnesses whose debilitating symptoms can be controlled but are nonetheless expensive and inconvenient (for example, galactosemia); and after that fetuses who are not ill at all, but have an attribute the parents or state do not desire (for example, the "wrong" sex or XYY, the so-called "criminal genes"). Finally, it is argued, once we cease to accept these human frailties, we will doubtless end up practicing euthansia on the "unproductive" aged, the mentally deficient, and the physically handicapped.

Unfortunately, there is such a danger—one thing may lead to another. However, this moral domino theory disregards the historical record, which clearly indicates that, while one thing *sometimes* leads to another, it often does not. Otherwise, our taboos would already have fallen, because we already have taken the first, and second, and third steps. We have already performed several thousand amniocenteses and aborted quite a few mongoloid fetuses so detected. What's more, we have permitted, at the discretion of the pregnant woman, quite a few healthy fetuses to be aborted. And yet, morality did not end with a thud. Moreover, the outcry, "If you open the door a wedge, you *will* open it all the way!" is itself a major source of pressure to erode taboos. We need instead a conscious effort to modify our taboos—to learn to negotiate part of the slope (to pick up the desired fruits), while avoiding the lower pitfalls, which are there.

The record shows that practicing professionals *and* citizens at large can redraw the line, and at a rather sensible point. To stay with the case at hand, most doctors and laymen favor amniocentesis for detection of severe illness and adamantly reject it for sex choice. And this line is backed up by social forces: Those few doctors who elect to proceed, in spite of professional and public disapproval, will find themselves both unprotected in the event of a malpractice suit and severely censored by their colleagues, two ways to reinforce new do's and don'ts.

Most important, the facile humanist disregards values other than the taboos he is so anxious to preserve, values that would be violated if we were immobilized by fear of innovation. Humaneness cannot be guaranteed by putting a stop to all scientific work in an anxiety-provoking area, but by carefully assessing the multiple applications of scientific discoveries—promoting some, discouraging others, and foregoing still others. We cannot be spared the choice.—AMITAI ETZIONI, *Professor of Sociology, Columbia University, and Director, Center for Policy Research, Inc., 475 Riverside Drive, New York 10027*

For additional discussion, see A. Etzioni, *Genetic Fix* (Macmillan, New York, 1973).

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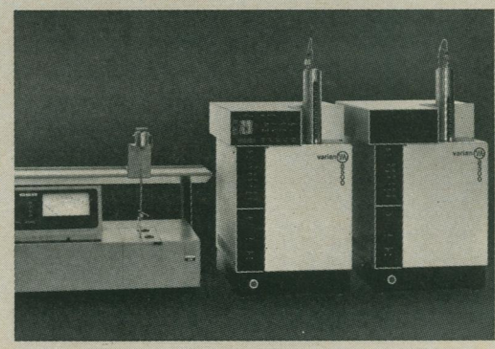

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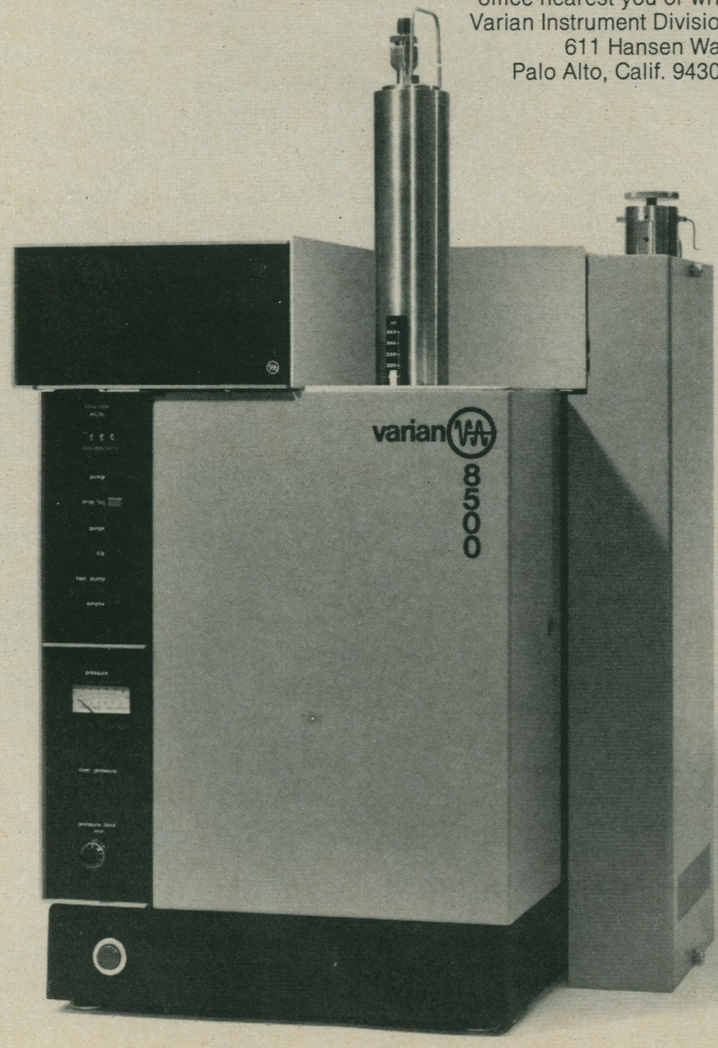

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Fraction Collector			
ISCO	4126	769	**266**
Freezers, Laboratory			
Kelvinator	4125	589	**127**
	4128	1015	**376**
Revco	4126	768	**264**
Gamma Counter			
LKB	4124	C2	**9**
	4128	C2	**300**
Gamma Counting System, RIA			
Searle Analytic	4126	738D	**208**
Gamma Spectrometer			
Packard Instrument	4126	778	**294**
Gel Electrophoresis System			
E-C Apparatus	4125	594	**114**
ISCO	4124	470	**69**
Pharmacia	4124	555	**3**
	4128	905	**3**
Germfree Lab Equipment			
Hoeltge	4124	466	**12**
Glassware Washer			
Forma Scientific	4124	557	**75**
Hemagglutination-Inhibition Test for Methadone			
R. D. Products	4126	777	**296**
High Voltage Electrophoresis System			
Savant Instruments	4126	773	**268**
Hood, Tissue Culture			
Contamination Control	4126	738P	**207**
Incubator			
Blue M Electric	4128	1012	**379**
Incubator, CO_2			
Forma Scientific	4125	680	**174**
Lab-Line Instruments	4126	770	**254**
Incubator, Water Jacketed			
Forma Scientific	4128	900	**301**
Instrumentation, Technical Specialists			
Scientific Products Div., American Hospital Supply	4126	C2	**214**
Ion Analyzer, Specific			
Orion	4125	C4	**100**
	4126	777	**291**
Journal, La Recherche			
La Recherche	4124	464	**7**
Labeling Systems, Tape			
Professional Tape	4124	569	**80**
	4128	1005	**375**
Laboratory Technique Courses			
Beckman Instruments	4124	565	**56**
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TIAA	4124	471	**72**
Light Sources, Deuterium			
Hellma	4124	557	**76**

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Light Sources, Mercury Vapor			
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Liquid Chromatography System			
Pharmacia Fine Chemicals	4125	592	**106**
Liquid Scintillation Cocktail			
Amersham/Searle	4128	896	**311**
Liquid Scintillation Cocktail, RIA			
New England Nuclear	4126	738O	**202**
Liquid Scintillation Counter			
LKB	4124	C2	**9**
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Searle Analytic	4126	708	**221**
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Mass Spectrometer Sample Handling Accessory			
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Kontes Glass	4126	738H	**206**
Microcomputer, Statistics Calculator			
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	4128	906	**313**
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Olivetti	4124	467	**21**
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Hewlett-Packard	4125	583	**122**
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American Optical	4128	C4	**303**
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American Optical	4126	C4	**212**
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Bausch & Lomb	4126	700	**260**
Microscope System			
Bausch & Lomb	4125	575	**116**
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Harris Mfg.	4126	780	**270**
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John Fluke	4124	559	**77**
Nomarski Differential Interference Contrast System			
Carl Zeiss	4125	578	**128**
Paper, Assay			
Schleicher & Schuell	4125	590	**107**
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Gilson Medical Electronics	4124	474	**20**
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Schleicher & Schuell	4125	590	**107**
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London	4126	699	**216**
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Carl Zeiss	4124	468	**14**
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American Optical	4124	C4	**1**
Photomultiplier Tube			
Gencom Div., Emitronics	4126	772	**267**
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Hamilton	4126	701	**217**
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Rainin Instrument	4126	738Q	**209**
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Labindustries	4125	587	**113**
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California Computer Products	4125	588	**126**

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Harvard Apparatus	4125	675	**175**
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Harvard Apparatus	4124	557	**78**
Quantum Sensor			
Lambda Instruments	4124	564	**30**
Radiochemicals			
New England Nuclear	4124	566	**79**
	4125	675	**176**
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Beckman Instruments	4126	738L	**233**
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Reagent Dispenser			
Labindustries	4125	587	**113**
Recorder, Portable			
Gould	4128	1005	**377**
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Gould	4126	779	**279**
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Harvard Apparatus	4128	1003	**351**
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Martek Instruments	4128	1013	**395**
Scanner, Gel Electrophoresis			
ISCO	4124	470	**69**
Scanner, Ultraviolet			
Buchler Instruments	4125	676	**168**
Scanning System, TLC			
Panax Nucleonics Canada	4126	778	**295**
Science Education Products			
Ward's Natural Sci	4128	1005	**359**
Sea Salts, Synthetic			
Aquarium Systems	4124	561	**58**
Serum Toxicology Control			
Hyland Div., Travenol Labs	4126	777	**289**
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GCA/Precision Scientific	4125	598	**112**
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Carl Zeiss	4128	1013	**371**
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Still, Annular			
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Bel-Art Products	4124	Card	**87**
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Bailey Instrument	4125	686	**186**
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Brinkmann Instruments	4124	567	**70**
	4128	1002	**365**
Tissue Processor, EM			
American Optical	4124	564	**25**
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Tissue Solubilizers			
Packard Instrument	4126	771	**277**
TLC Plates, Reusable			
Applied Science Labs	4124	561	**60**
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Lightner Instrument	4124	564	**29**
Urine Toxicology Control			
Hyland Div., Travenol Labs	4126	777	**289**
Viscometer, Polymer			
Nametre	4128	1013	**382**
Water Baths, Controlled Temperature			
Neslab	4124	472	**85**
Water Purification Cartridges			
Barnstead	4128	897	**312**

BOOKS RECEIVED

(Continued from page 1076)

Stephen Halperin and Ray Vanstone. Academic Press, New York, 1973. xxii, 544 pp., illus. $35. Pure and Applied Mathematics, vol. 47-II.

Contraception. L. I. Langley, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1973. xiv, 500 pp., illus. $22. Benchmark Papers in Human Physiology.

Control and Dynamic Systems. Advances in Theory and Applications. Vol. 10. C. T. Leondes, Ed. Academic Press, New York, 1973. xx, 528 pp., illus. $19.50.

Disorders of Auditory Function. Proceedings of a conference, Dundee, Scotland, July 1971. W. Taylor, Ed. Published for the British Society of Audiology by Academic Press, New York, 1973. xiv, 272 pp., illus. $14.

Drug Abuse in Industry. Growing Corporate Dilemma. Jordan M. Scher, Ed. Thomas, Springfield, Ill., 1973. xviii, 312 pp. $11.95.

Earth Watch. Notes on a Restless Planet. Jean and Daniel Shepard. Doubleday, Garden City, N.Y., 1973. 238 pp. + plates. $8.95.

Electron Microscopy of Enzymes. Vol. 1, Principles and Methods. M. A. Hayat. Van Nostrand Reinhold, New York, 1973. xviii, 204 pp., illus. $16.95.

Encounter with Anthropology. Robin Fox. Harcourt, Brace, Jovanovich, New York, 1973. viii, 370 pp. $8.95.

Encyclopedic Dictionary of Exploration Geophysics. Robert E. Sheriff. Society of Exploration Geophysicists, Tulsa, Okla., 1973. x, 266 pp., illus. Cloth, $12.50; paper, $9.

Energy Conservation. Implications for Building Design and Operation. Proceedings of a conference, Bloomington, Minn., May 1973. Dean E. Abrahamson and Steven Emmings, Eds. All-University Council on Environmental Quality and School of Public Affairs, University of Minnesota, Minneapolis, 1973. vi, 156 pp., illus. Paper, $5.

Epoxy Resins. Chemistry and Technology. Clayton A. May and Yoshio Tanaka, Eds. Dekker, New York, 1973. xiv, 802 pp., illus. $59.50.

Evaluation. An Introduction to Research Design. Janet P. Moursund. Brooks/Cole, Monterey, Calif., 1973. vi, 154 pp. Paper, $3.95.

L'Evolution du Vivant. Matériaux pour une Nouvelle Théorie Transformiste. Pierre-P. Grassé. Albin Michel, Paris, 1973. 478 pp., illus. 39 F. Sciences d'Aujourd'hui.

Exercises in General, Organic, and Biological Chemistry. Arne N. Langsjoen. Burgess, Minneapolis, ed. 3, 1973. xii, 156 pp., illus. Spiral bound, $4.50.

A Flora of the Tahoe Basin and Neighboring Areas. Gladys L. Smith. University of San Francisco, San Francisco, 1973 (available from Gladys L. Smith, 730 28th Ave., San Francisco, Calif.). ii, 232 pp., illus. Paper, $5.85. Reprinted from *The Wasmann Journal of Biology*, vol. 31, No. 1 (1973).

The Freshwater Snails of Taiwan (Formosa). Gary L. Pace. Malacological Review, Whitmore Lake, Mich., 1973. ii, 118

pp., illus. Paper, $15. Malacological Review, Supplement 1.

A General Systems Philosophy for the Social and Behavioral Sciences. John W. Sutherland. Braziller, New York, 1973. xii, 210 pp., illus. Cloth, $6.95; paper, $2.95. International Library of Systems Theory and Philosophy.

Handbook of Perception. Vol. 3, Biology of Perceptual Systems. Edward C. Carterette and Morton P. Friedman, Eds. Academic Press, New York, 1973. xx, 522 pp., illus. $28.

Hybrid Microelectronic Circuits. The Thick Film. Richard A. Rikoski. Wiley-Interscience, New York, 1973. xxii, 218 pp., illus. $13.50.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 3, Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Proceedings of a meeting, Lyon, France, Dec. 1972. International Agency for Research on Cancer, Lyon, France, 1973 (available from Q Corporation, Albany, N.Y.). 272 pp., illus. Paper, $5.40.

Immunopathology. Methods and Techniques. Theodore P. Zacharia and Sydney S. Breese, Jr., Eds. Dekker, New York, 1973. xiv, 262 pp. $19.75. Immunology Series, vol. 2.

The Institutionalized Severely Retarded. A Study of Activity and Interaction. Richard H. Wills. Thomas, Springfield, Ill., 1973. x, 158 pp. $9.75.

An Inroduction to Electromagnetic Theory. P. C. Clemmow. Cambridge University Press, New York, 1973. xii, 298 pp., illus. Cloth, $16.50; paper, $6.95.

Iron-Sulfur Proteins. Vol. 1, Biological Properties. Walter Lovenberg, Ed. Academic Press, New York, 1973. xiv, 388 pp., illus. $33. Molecular Biology Series.

Kinetics and Mechanisms of Reactions. B. E. Dawson. Methuen Educational, London, 1973 (U.S. distributor, Barnes and Noble, New York). viii, 68 pp., illus. Paper, $3.50. Methuen Studies in Science.

Laboratory Chemistry. Lower Division Chemistry Staff, University of Maryland. Burgess, Minneapolis, 1973. Two volumes, illus. Vol. 1. x, 92 pp.; vol. 2, xii, 82 pp. Spiral bound. Each volume, $3.50.

Lasers. O. B. Heavens. Scribner, New York, 1973. viii, 160 pp., illus. $9.95.

Logic Design for Behavioral Scientists. Roy Udolf. Nelson-Hall, Chicago, 1973. xiv, 272 pp., illus. $10. Professional-Technical Series.

Lost Discoveries. The Forgotten Science of the Ancient World. Colin Ronan. McGraw-Hill, New York, 1973. 126 pp., illus. $10.95.

The MAA Problem Book III. Annual High School Contests of the Mathematical Association of America 1966–1972. Compiled and with solutions by Charles T. Salkind and James M. Earl. Random House, New York, 1973. vi, 186 pp., illus. Paper, $2.12. New Mathematical Library, No. 25.

Les Mammifères de France et du Bénélux (Faune Marine Exceptée). M.-C. Saint Girons. Doin, Paris, 1973. vi, 482 pp., illus. 138 F.

Mental Illness and the Economy. M. Harvey Brenner. Harvard University Press, Cambridge, Mass., 1973. xxvi, 288 pp., illus. $15.

Modern Aspects of Inorganic Chemistry. H. J. Emeleus and A. G. Sharpe. Halsted (Wiley), New York, ed. 4, 1973. xvi, 678 pp., illus. $15.50.

Molecular Mechanisms of Enzyme Action. Proceedings of a symposium, Tokyo, 1966. Yasuyuki Ogura, Yuji Tonomura, and Takao Nakamura, Eds. University Park Press, Baltimore, 1973. xii, 324 pp., illus. $19.50. NRI Symposia on Modern Biology.

Nuclear Level Schemes A=45 through A=257 from Nuclear Data Sheets. Edited by Nuclear Data Group, Oak Ridge National Laboratory. Academic Press, New York, 1973. Unpaged, illus. $23.50.

Nutrition Scoreboard. Your Guide to Better Eating. Michael Jacobson. Center for Science in the Public Interest, Washingon, D.C., 1973. vi, 102 pp., illus. Paper, $2.50.

One-Man Research. Reminiscences of a Catholic Sociologist. Joseph H. Fichter. Wiley-Interscience, New York. 1973. xii, 258 pp. $10.95.

Organic Syntheses with Noble Metal Catalysts. Paul N. Rylander. Academic Press, New York, 1973. x, 334 pp., illus. $22.50. Organic Chemistry, vol. 28.

The Origins of Life on the Earth. Stanley L. Miller and Leslie E. Orgel. Prentice-Hall, Englewood Cliffs, N.J., 1974. x, 230 pp., illus. Cloth, $10.95; paper, $5.95. Concepts of Modern Biology Series.

Our Environment. The Outlook for 1980. Alfred J. Van Tassel, Ed. Lexington (Heath), Lexington, Mass., 1973. x, 590 pp., illus. $20.

Oxidases and Related Redox Systems. Proceedings of a symposium, Memphis, Tenn., June 1971. Tsoo E. King, Howard S. Mason, and Martin Morrison, Eds. University Park Press, Baltimore, 1973. Two volumes, illus. Vol. 1, xxvi, pp. 1–429; vol. 2, xxiv, pp. 430–884. The set, $49.50.

Particle-Interaction Physics at High Energies. S. J. Lindenbaum. Oxford University Press, New York, 1973. xiv, 512 pp., illus. $48. International Series of Monographs on Physics.

The People of America. T. D. Stewart. Scribner, New York, 1973. x, 262 pp., illus. + plates. Cloth, $10; paper, $3.95.

Perspectives in Biomedical Engineering. Proceedings of a symposium, Glasgow, June 1972. R. M. Kenedi, Ed. University Park Press, Baltimore, 1973. xx, 314 pp., illus. $32.50.

Photophysiology. Current Topics in Photobiology and Photochemistry. Vol. 8. Arthur C. Giese, Ed. Academic Press, New York, 1973. xviii, 270 pp., illus. $22.50.

Physics. Vol. 3, Modern Physics. Arnold L. Reimann. Barnes and Noble, New York, 1973 (distributor, Harper & Row, New York). xvi, 460 pp., illus. + appendix. Paper, $6.95.

Physics of the Earth and Planets. A. H. Cook. Halsted (Wiley), New York, 1973. x, 316 pp., illus. $24.75.

Pictoral Guide to the Moon. Dinsmore Alter. Revised by Joseph H. Jackson. Crowell, New York, ed. 3, 1973. viii, 216 pp., illus. $8.95.

The Planets. Some Myths and Realities. Richard Baum. Halsted (Wiley), New York, 1973. 200 pp., illus. $8.95.

Politics and Law in Health Care Policy. A Selection of Articles from the Millbank Memorial Fund *Quarterly*. John B. McKinlay, Ed. Published for the Millbank Memorial Fund by Provist, New York, 1973. xii, 404 pp. Cloth, $7.95; paper, $3.95. Millbank Resource Books.

Proceedings of the Symposium on Self-Paced Instruction in Chemistry, Dallas, Texas, Apr. 1973. Bassam Z. Shakhashiri, Ed. Chemical Education Publishing Co., Easton, Pa., 1973. iv, 148 pp., illus. Paper, $4.50.

Progress in Neurobiology. Vol. 1. G. A. Kerkut and J. W. Phillis, Eds. Pergamon, New York, 1973. viii, 340 pp., illus. + plates. $30.

Prostaglandins and Cyclic AMP. Biological Actions and Clinical Applications. Proceedings of a symposium, Ann Arbor, Mich., Nov. 1972. Raymond H. Kahn and William E. M. Lands, Eds. Academic Press, New York, 1973. xx, 306 pp., illus. $11.50.

Psychotherapy. Clinical, Research, and Theoretical Issues. Hans H. Strupp. Aronson, New York, 1973. 816 pp., illus. $25.

Radar Target Detection. Handbook of Theory and Practice. Daniel P. Meyer and Herbert A. Mayer. Academic Press, New York, 1973. xvi, 496 pp., illus. $24.50. Electrical Science Series.

Radioisotope and Radiation Physics. An Introduction. M. Mladjenović. Translated by Sonja Subotić. Academic Press, New York, 1973. xii, 242 pp., illus. $19.

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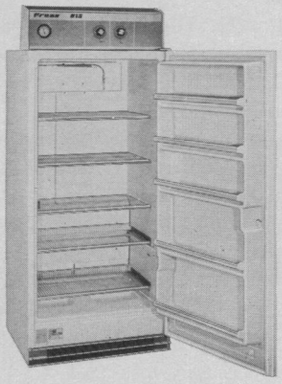

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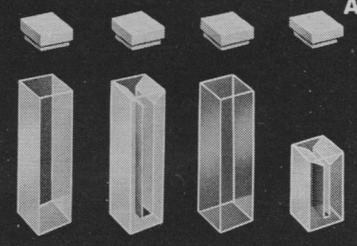

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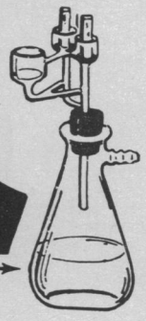

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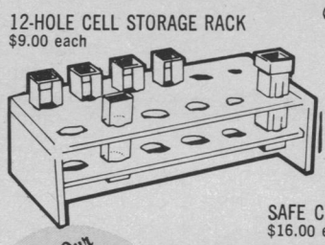

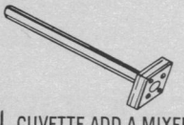

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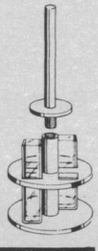

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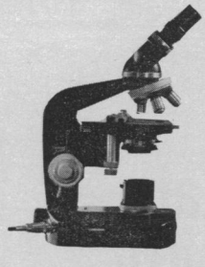

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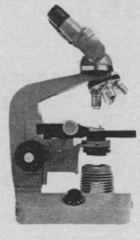

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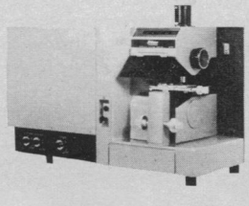

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RECENT DEATHS

George H. Bishop, 84; professor emeritus of neurophysiology, Washington University School of Medicine; 11 October.

Walter H. Dickerson, 59; professor of agricultural engineering, West Virginia University; 14 August.

John H. Dingle, 64; professor of preventive medicine, Case Western Reserve School of Medicine; 15 September.

John W. Dodd, 80; former professor of education, Long Island University; 29 September.

Arthur A. Esslinger, 69; director, School of Education, State University of New York at Buffalo; 15 September.

Eugene S. Farley, 74; president emeritus, Wilkes College; 17 September.

Frank H. J. Figge, 68; former chairman, anatomy department, School of Medicine, University of Maryland; 25 October.

Donald E. H. Frear, 67; former director, pesticide research laboratory, Pennsylvania State University; 11 October.

Harry J. Fuller, 65; former professor of botany, University of Illinois; 24 August.

Harry H. Garner, 63; chairman, psychiatry and behavioral sciences department, Chicago Medical School; 2 October.

Haim Ginott, 51; adjunct professor of psychology, New York University, and clinical professor of psychotherapy, Adelphi University; 4 November.

Thomas A. Gonser, 74; former vice president, Northwestern University; 19 September.

Francis B. Gordon, 68; director, microbiology department, Naval Medical Research Institute, National Naval Medical Center; 21 October.

Lee N. Gulick, 80; professor emeritus of mechanical engineering, University of Pennsylvania; 9 October.

Claude W. Hibbard, 68; professor of geology, University of Michigan; 9 October.

Henry V. Howe, 77; professor emeritus of geology, Louisiana State University, Baton Rouge; 27 September.

Holbrook M. MacNeille, 66; professor of mathematics and statistics, Case Western Reserve University; 30 September.

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use of the treatment should be suspended until its oncogenicity can be determined in animals.

A large percentage of the human population has been exposed to one or more of the herpesviruses, yet relatively few get cancer. Most investigators think that other factors—in addition to DNA viruses—must contribute to initiation of the disease. Of prime interest is the role of the immune system (which will be discussed more fully in a future article). The immune system is generally thought to prevent tumor development by detecting tumor cells—because of their tumor- or virus-associated antigens—and destroying them. A deficiency in the immune system, whether the result of a genetic defect, infection, or immunosuppression (as in transplant patients who suffer an increased cancer incidence), could therefore contribute to cancer development.

Another possibility is that two or more viruses may cooperate in initiating transformation. For example, Sol Spiegelman and his colleagues at Columbia University, New York, found particles resembling RNA tumor viruses in Burkitt's lymphoma cells. These findings raised the possibility of an interaction between EBV and an oncogenic RNA virus in Burkitt's tumors. Spiegelman and his colleagues used an animal model to test this hypothesis. From experiments on chickens, in which they studied the interaction of Marek's disease virus (an oncogenic herpesvirus of chicken) and an RNA tumor virus, Spiegelman concluded that both could contribute to tumor growth under their experimental conditions.

Although evidence implicating DNA viruses in the etiology of human cancer is accumulating, numerous questions remain unanswered: What viral genes are necessary for transformation? Where and how is the virus maintained in the human body during the long latent period before cancer develops? How is viral DNA incorporated into cellular DNA? What controls the expression of viral DNA and triggers transformation? What is the role in cancer initiation of other human cancer virus candidates? of chemicals? and of the immune system? The cancer problem sometimes seems to have as many questions as Hydra has heads—and when one is lopped off, two grow back.—JEAN L. MARX