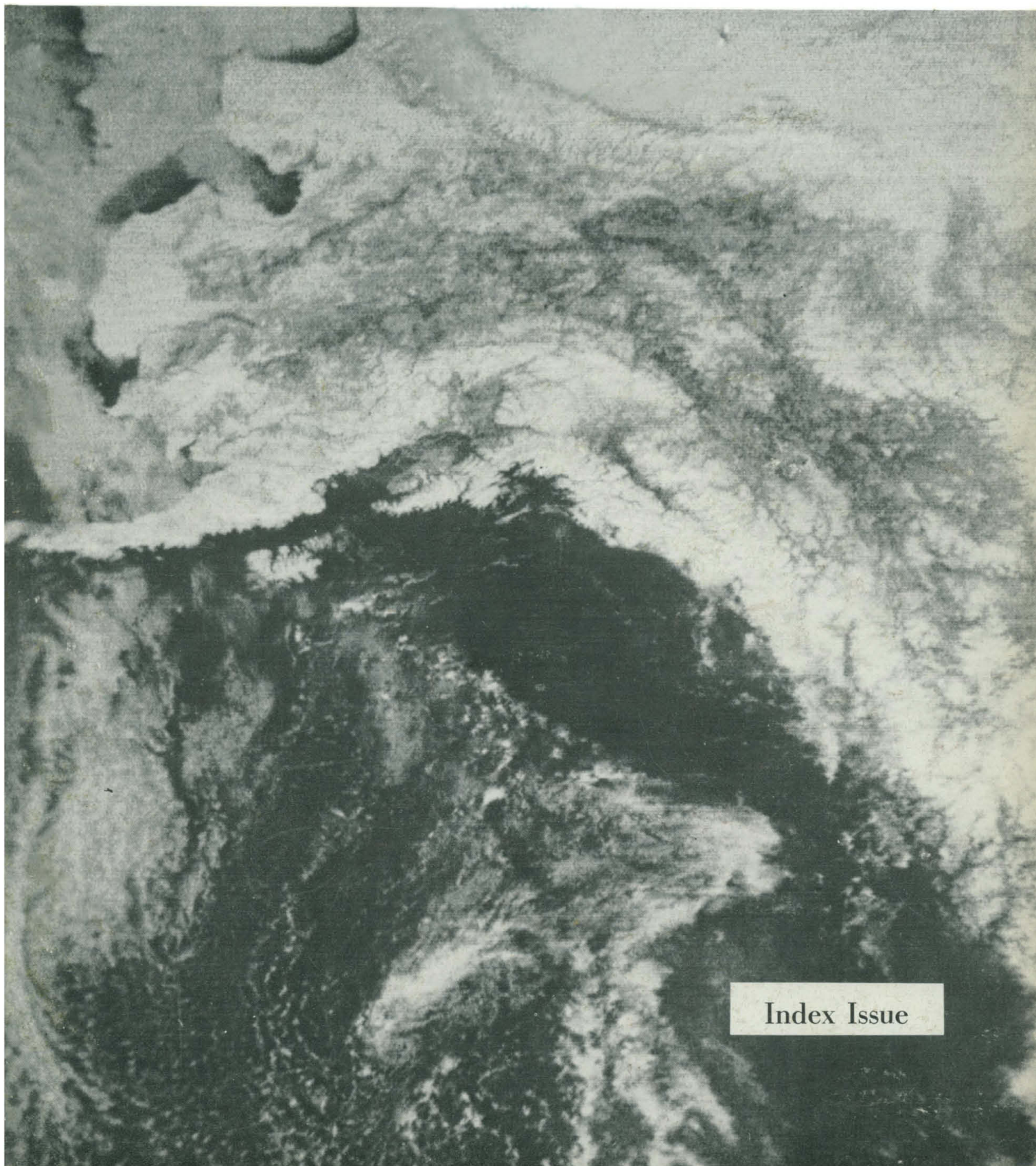


SCIENCE

31 March 1972

Vol. 175, No. 4029

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Index Issue

LOW-COST ULTRAMICROTOMY

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

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

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

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

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

LKB

IN THE SERVICE OF SCIENCE

LKB Instruments Inc. 12221 Parklawn Drive, Rockville MD. 20852
11744 Wilshire Blvd. Los Angeles Calif. 90025
6600 West Irving Park Road, Chicago Ill. 60634
260 North Broadway, Hicksville N.Y. 11800



Of cats and men,

Villee: BIOLOGY, NEW SIXTH EDITION

A classic undergraduate biology text—completely revised and up-dated—which approaches biology from the point of view of whole organisms. Human systems are discussed in detail to demonstrate the relevance of biological knowledge. Other life forms are presented through discussions of representative plant and animal species. There is a new, up-to-date section on behavior, and a revised chapter on human ecology.

*By Claude A. Villee, Harvard Medical School.
About 750 pp. illust. About \$10.00. Just ready.*

Schonberger: LABORATORY MANUAL OF GENERAL BIOLOGY, THIRD EDITION

A valuable manual which ideally complements Dr. Villee's (or any other) introductory text. Included are detailed problems, summaries of significant data, and explicit aids to help the student and instructor prepare for the next experiment.

By Clinton F. Schonberger, Moorpark College, Moorpark, Calif. About 400 pp. About \$4.75. Just ready.

Walker: A STUDY OF THE CAT WITH REFERENCE TO MAN, SECOND EDITION

Written especially for human anatomy courses, this manual provides a thorough, step-by-step guide for cat dissection. All major body systems are covered in detail. Throughout, the author correlates feline and human anatomy, discussing the functional significance of each structure as well as its evolutionary background. The glossary of anatomical terms, directions for specimen preparations and guides for further reading help make this manual a self-contained teaching unit.

*By Warren F. Walker, Jr., Oberlin College.
About 240 pp. illust. About \$6.00. Just ready.*

Carpenter: MICROBIOLOGY, THIRD EDITION

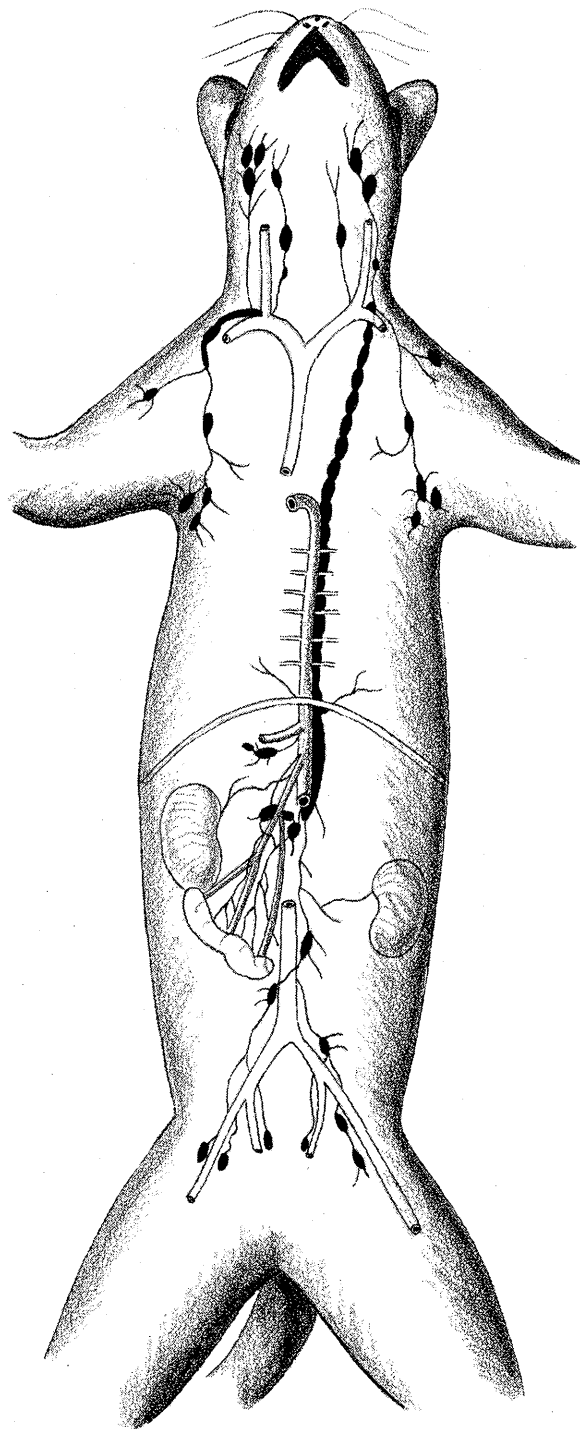
This ideal text for a one-semester introductory course stresses the ecologic relationships and roles of micro-organisms in both natural and controlled environments. It requires only elementary chemistry and biology as background. The author has added a new chapter on normal and pathologic flora, an expanded chapter on resistance and immunity, and a new four-chapter sequence on infectious diseases.

*By Philip L. Carpenter, University of Rhode Island.
494 pp. 344 figs. Pub. Jan. 1972. \$9.50*

Villee & Dethier: BIOLOGICAL PRINCIPLES AND PROCESSES

A new introductory biology text with an integrated approach, drawing examples from both the plant and animal kingdoms to demonstrate fundamental biologic principles. Discussed in detail are energy and information transfer, genetics and evolution, behavior, reproduction, and other basic functions. Population biology and ecology are explored in depth. The book gives students insight into the basic mechanisms of life and the interrelationships of life forms. Brilliantly illustrated.

*By Claude A. Villee, Harvard Medical School; and Vincent Dethier, Princeton University. 1009 pp. 660 figs.
\$11.25. April 1971.*



For further information or for examination copies, write Textbook Marketing Division,

W.B. Saunders Company

West Washington Square, Philadelphia, Pa. 19105

31 March 1972

Vol. 175, No. 4029

SCIENCE

LETTERS	ORSA and the ABM: <i>T. Botts; W. E. Strobe; B. L. Schwartz</i> ; Highway Travel Subsidies: <i>W. Vickrey</i> ; An "Abundance of Fish": <i>P. S. Miller</i> ; Multinational Journals: <i>G. Cilento</i>	1417
EDITORIAL	Collective Bargaining on Campus: <i>A. B. Grobman</i>	1421
ARTICLES	Nimbus IV View of the Major Structural Features of Alaska: <i>E. H. Lathram</i>	1423
	Measurement Structures and Psychological Laws: <i>D. H. Krantz</i>	1427
	Capillary Tube Scanning Applied to Cell Growth Kinetics: <i>N. M. Braslow</i> and <i>R. L. Bowman</i>	1436
NEWS AND COMMENT	H. G. Stever: Science Moguls, President Reward a Favorite Son	1441
	Blood Banking: Tangled System Resists Swift Change	1444
	French Science Policy: Problems of "Leveling Off"	1446
RESEARCH NEWS	Astronomy: TV Cameras Are Replacing Photographic Plates	1448
BOOK REVIEWS	Kinship and Culture, reviewed by <i>R. A. Paul</i> ; Experimental Coelenterate Biology, <i>C. Hand</i> ; Ionic Interactions, <i>J. S. Newman</i> ; Annual Review of Materials Science, <i>G. Lucovsky</i> ; Endocrines and Osmoregulation, <i>W. H. Sawyer</i> ; Optical Holography, <i>B. J. Thompson</i> ; Books Received; New Journals Received	1450
REPORTS	Red Sea Hot Brine Area: Revisited: <i>D. A. Ross</i>	1455
	Magnetic Noise Preceding the August 1971 Summit Eruption of Kilauea Volcano: <i>G. V. Keller, D. B. Jackson, A. Rapolla</i>	1457
	Buried Caldera of Mauna Kea Volcano, Hawaii: <i>S. C. Porter</i>	1458

BOARD OF DIRECTORS

MINA REES
Retiring President, Chairman

GLENN T. SEABORG
President

LEONARD M. RIESER
President-Elect

DAVID BLACKWELL
RICHARD H. BOLT

LEWIS M. BRANSCOM
BARRY COMMONER

VICE PRESIDENTS AND SECTION SECRETARIES

MATHEMATICS (A)
John W. Tukey
F. A. Ficken

PHYSICS (B)
Herbert Friedman
Rolf M. Sinclair

CHEMISTRY (C)
Martin Paul
Leo Schubert

ASTRONOMY (D)
George B. Field
Arlo U. Landolt

PSYCHOLOGY (I)
Dale B. Harris
William D. Garvey

SOCIAL AND ECONOMIC SCIENCES (K)
James S. Coleman
Harvey Sapolsky

HISTORY AND PHILOSOPHY OF SCIENCE (J)
Everett Mendelsohn
Raymond J. Seeger

PHARMACEUTICAL SCIENCES (Np)
Linwood F. Tice
John Autian

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

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

EDUCATION (Q)
Lloyd K. Johnson
Phillip R. Fordyce

DIVISIONS

ALASKA DIVISION

Gordon Harrison
President
Irma Duncan
Executive Secretary

PACIFIC DIVISION

Roy A. Young
President
Robert C. Miller
Secretary

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

John R. Lacher
President
Marlowe G. Anderson
Executive Secretary

SCIENCE is published weekly, except the last week in December, but with an extra issue on the third Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1972 by the American Association for the Advancement of Science. Annual subscription \$20; foreign postage: Americas \$3; overseas \$5; air freight to Europe, North Africa, Near East \$1; single copies \$1 (back issues, \$2) except *Guide to Scientific Instruments* which is \$4. School year subscription: 9 months, \$15; 10 months, \$16.75. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the *Reader's Guide to Periodical Literature*.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Amino Acid Composition of Planktonic Foraminifera: A Paleobiochemical Approach to Evolution: <i>K. King, Jr., and P. E. Hare</i>	1461
Chemical Methods for Removing Radon and Radon Daughters from Air: <i>L. Stein</i>	1463
High-Temperature Superconductors, the First Ternary System: <i>B. T. Matthias et al.</i>	1465
Genetic Variation in Human Erythrocyte Acetylcholinesterase: <i>P. M. Coates and N. E. Simpson</i>	1466
Expression of the Mammalian X Chromosome before and after Fertilization: <i>C. J. Epstein</i>	1467
Sex Pheromones of Summer Fruit Tortrix Moth <i>Adoxophyes orana</i> : Two Synergistic Isomers: <i>G. M. Meijer et al.</i>	1469
Cortical Afferents to the Entorhinal Cortex of the Rhesus Monkey: <i>G. W. Van Hoesen, D. N. Pandya, N. Butters</i>	1471
Transfer Factor from Guinea Pigs Sensitive to Dinitrochlorobenzene: Absence of Superantigen Properties: <i>D. R. Burger, R. M. Vetto, A. Malley</i>	1473
Active Transport of Potassium and Chloride in an Identifiable Molluscan Neuron: <i>J. M. Russell and A. M. Brown</i>	1475
Vesicular Stomatitis Virus (Indiana Serotype): Transovarial Transmission by Phlebotomine Sandflies: <i>R. B. Tesh, B. N. Chaniotis, K. M. Johnson</i>	1477
GABA Catabolism: Localization of Succinic Semialdehyde Dehydrogenase in Brain Motor and Sensory Nuclei: <i>K. L. Sims, H. A. Weitsen, F. E. Bloom</i>	1479
Noncytokinetic Radiation Injury: Anticoagulants as Radioprotective Agents in Experimental Radiation Hepatitis: <i>J. Kinzie et al.</i>	1481
Griseofulvin: A Teratogenic Study: <i>M. F. Klein and J. R. Beall</i>	1483
Meiosis in Triploid All-Female Fish (<i>Poeciliopsis</i> , <i>Poeciliidae</i>): <i>M. C. Cimino</i>	1484
A Visual Pigment with Two Physiologically Active Stable States: <i>P. Hillman, S. Hochstein, B. Minke</i>	1486
Response Decrements in the Cochlear Nucleus of Decerebrate Cats during Repeated Acoustic Stimulation: <i>G. L. Humphrey and J. S. Buchwald</i>	1488
Silk Moth Eclosion: Hormonal Triggering of a Centrally Programmed Pattern of Behavior: <i>J. W. Truman and P. G. Sokolove</i>	1491
Human Motor Cortex: Sensory Input Data from Single Neuron Recordings: <i>S. Goldring and R. Ratcheson</i>	1493

WARD H. GOODENOUGH
CARYL P. HASKINS

DANIEL P. MOYNIHAN
PHYLLIS V. PARKINS

WILLIAM T. GOLDEN
Treasurer

WILLIAM BEVAN
Executive Officer

GEOLOGY AND GEOGRAPHY (E)

Frank C. Whitmore
William E. Benson

ENGINEERING (M)

Newman A. Hall
Raynor L. Duncombe

INFORMATION AND COMMUNICATION (T)

Andrew A. Aines
Scott Adams

BIOLOGICAL SCIENCES (FG)

Ian Sussex
Richard J. Goss

MEDICAL SCIENCES (N)

Robert W. Berliner
F. Douglas Lawrason

STATISTICS (U)

W. Duane Evans
Ezra Glaser

DENTISTRY (Nd)

Joseph L. Henry
Sholom Pearlman

ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W)

John A. Knauss
Louis J. Battan

ANTHROPOLOGY (H)

Richard N. Adams
Anthony Leeds

COVER

View of Alaska from space on a rare, cloud-free day. Snow blankets much of the land area. Trees, obscuring the snow, appear as dark areas. Picture was taken by Nimbus IV Image Dissector Camera System (scale, approximately 1:15,000,000). See page 1423. [National Aeronautics and Space Administration, Greenbelt, Maryland]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

THERE ARE 130,000 AAAS MEMBERS

123,977 DID NOT ATTEND THE ANNUAL MEETING

For those who were not present

The AAAS Audiotape program, now in its fourth year, offers

a wide selection of scientific symposia

including those recorded in Philadelphia, 26-30 December, 1971

during the 138th AAAS Meeting.

Role of Aggression in Human Adaptation: J. A. Arlow, E. Joseph, L. Trilling, et al. 87/71—One Session ☐

Discussion of the manner in which aggression has affected human development, from an historical viewpoint, and how it influences the individual's personality formation and choices of social roles, along with the characteristics of aggression as it appears in the arts.

Workers and the Environment: G. Wald, R. Nader, et al. 89/71—One Session ☐

Discussion of pollution inside and outside the "plant" with an emphasis on the disabling of workers by this pollution, and an analysis of the suggestion that a healthier environment means fewer jobs.

Astronomy from a Space Platform: G. W. Morgenthauer, C. Sagan, G. Preston, et al. 90/71—Sessions I ☐ II ☐

Examination of the advantages versus the limitations of using space astronomy platforms.

Indicators of Environmental Quality: W. A. Thomas, G. J. F. MacDonald, P. Hackes, et al. 91/71—Sessions I ☐ II ☐ III ☐ IV ☐

Discussion of attempts and possibilities of establishing objective assessment of shifts in environmental quality through the use of biological indicator species as monitors thereof.

Experimental Manipulation of Natural Systems: W. E. Cooper, D. Simberloff, et al. 92/71—Sessions I ☐ II ☐

Comparison of an array of research programs which have successfully utilized experimental manipulations of natural ecosystem components.

Value and Knowledge Requirements for Peace:
Science and the International System: B. M. Russett, K. W. Deutsch, et al. 94/71—Session II ☐

Peace Through Change, The Risk and the Promise for Man's Future: J. R. Coleman, H. H. Humphrey, et al. Session III ☐

Biological Basis of Destructive Behavior: L. K. Y. Ng, L. S. B. Leakey, et al. Session IV ☐

Environmental Sources of Human Destructiveness: R. C. North, R. A. Falk, et al. Session V ☐

Discussion centering around possibility of peace from scientific, political, evolutionary, and psychological viewpoints with emphasis on necessary conditions to ensure peace.

Technology and the Humanization of Work: M. Maccoby, W. A. Steiger, et al. 93/71—Sessions I ☐ II ☐

Discussion of what can be done to prevent the worker from feeling alienated from himself, his work, and his employer. Emphasis on the relationship between technology and humanization, including case studies of specific experiments.

Population Control in Social and Economic Perspectives: W. H. Goodenough, J. J. Spengler, H. A. Gould, et al. 96/71—One Session ☐

Examination of institutional arrangements for enforcing population control as they are known from societies where such control has been practised, and the implications for our own society.

Confronting the Violence of Normal Man: I. W. Charny, W. Blanchard, et al. 97/71—One Session ☐

A probing and innovative picture of some dimensions of man's violence and its redirection including discussion of Kent State and "Public Reactions to the Calley Trial."

Physics Looks at Biological Structure: L. D. Peachey, B. Chance, R. Langridge, et al. 98/71—Sessions I ☐ II ☐

Scanning transmission electron microscopy; neutrons diffraction for the determination of biological structure; animal electricity.

Early History of the Earth and Moon: S. F. Singer, H. C. Urey, P. Gast, et al. 99/71—Sessions I ☐ II ☐

Various kinds of evidence—observational and theoretical—bearing on the evolution of earth and moon, featuring utilization of recent lunar research results.

Oceanography: H. B. Stewart, Jr., G. S. Benton, et al. 100/71—Sessions I ☐ II ☐ III ☐ IV ☐

Today's major issues which have their solutions in the ocean. An evaluation of the role of the federal government in assisting to provide the answers.

Energy Crisis: Some Implications and Alternatives: D. E. Abrahamson, J. Fay, B. Commoner, et al. 101/71—Sessions I ☐ II ☐ III ☐ IV ☐

Careful examination of components of energy demand, and exposition of alternatives which may include changes in society or life styles which would result in a reduction of energy demand.

Biological and Cultural Bases of Sex Role Differentiation: A. Alland, Jr., L. Tiger, M. Mead, et al. 102/71—Sessions I ☐ II ☐

Review of material on the formation of behavior associated with sex roles with an attempt to delimit the biological and social factors which result from sex-defined roles.

Smoking and Health: A. M. Lillienfeld, T. D. Sterling, et al. 103/71—One Session ☐

The exact relationship between smoking and health. Is there an etiological role of smoking for several diseases?

Environmental Noise: J. F. Pizzirusso, R. L. Bannister, et al. 104/71—Sessions I ☐ II ☐

Analysis of major environmental sources which tend to cause an ecological problem, and the technology which can be used to control them.

How Valuable is Human Health: R. W. McNeur, E. B. Howard, S. Chisholm, et al. 105/71—Sessions I ☐ II ☐

Panel discussion of public's assumptions about health as an attempt to encourage further public consideration of this matter.

Man-Machine Interactions and Implications for Society: A. Kantrovitz, J. McHale, E. G. Mesthene, et al. 106/71—Sessions I ☐ II ☐

Complexity of man-machine interactions and implications discussed by speakers from various backgrounds including scientists, engineers, sociologists, lawyers, philosophers, and a theologian.

Interactions Between Natural and Urban Ecological Communities: R. Patrick, G. E. Hutchinson, L. B. Slobodkin, et al. 107/71—Sessions I ☐ II ☐

Imposition and interaction of and between urban and natural communities, and attempts at a reconciliation.

Role of Mathematics in the Development of Science: R. J. Seeger, C. S. Smith, M. Kac, et al. 108/71—One Session ☐

Distinguished mathematicians and scientists share their views on the philosophical conceptions of mathematics and science.

Encounter Groups: K. W. Back, M. A. Lieberman, I. Yalom, et al. 109/71—Sessions I ☐ II ☐

Examination of the encounter group as a lasting therapeutic treatment, a one-time experience, and as a social phenomenon.

Environmental Sciences and International Development: D. Bajracharya, M. T. Farvar, et al. 110/71—Sessions VII ☐ VIII ☐

Discussion of the failures of science and technology to deal with development in the natural environments of developing countries and a re-evaluation of such priorities.

Heavy Metals as an Environmental Hazard to Fish, Birds, and Man: G. J. Lauer, W. Fulkerson, et al. 111/71—Sessions I ☐ II ☐

Analysis of current procedures used in aquatic toxicology as applicable specifically to toxic metals, and the effects of these toxins on fishes, birds, and men.

A Search for the Recognizable Goals and Constraints of the Steady State Earth: P. L. Blackshear, Jr., A. Kantrowitz, G. Buglierello, et al. 112/71—Sessions I ☐ II ☐

Several proposals to constrain human population and activity as a steady state society so that man may survive on this planet.

Technology and Growth in a Resource Limited World: R. U. Ayres, H. Kahn, J. H. Hollomon, et al. 113/71—Sessions I ☐ II ☐

Discussion of technological innovation and the environmental crisis and the proliferation of the affluent society without a continuously growing population and use of non-renewable resources.

Future of the Cities: D. R. Goddard, R. Patrick, M. Gladfelter, et al. 114/71—One Session ☐

Interaction between spokesmen representing: Urban care, urban ecology, urban physical development, and so forth. Analysis of our cities as they function and will continue to function.

Women in Academia: A. Y. Lewin, E. Wasserman, et al. 115/71—Sessions I ☐ II ☐

Focus on problems faced by universities in complying with President Nixon's executive order prohibiting sex discrimination by government contractors, and exploration of ways and means toward achieving full equal opportunity for women in the university.

Can We Develop an Index for the Quality of Life?: S. F. Singer, M. R. Gainsbrugh, M. L. Olson, et al. 117/71—Sessions I ☐ II ☐

Concerned primarily with the question: How to define and measure the quality of life. This entails an exact examination of the phrase "quality of life."

Scientific Aspects of Contraception: G. B. Koelle, L. M. Hellman, H. J. Tatum, et al. 118/71—One Session ☐

The history, present status, and future development of contraceptive agents.

Communications Technology and Its Effect on People: W. S. Baer, E. S. Mason, et al. 119/71—One Session ☐

Presentation of current research and policy studies brought to bear on such questions as: To what uses will the new communication capacity be put? Who will use and control it? How will it affect people, if at all?

Available as 5-in. open reels (3¾ in. per sec. for standard machines) or as cassettes. Price: single-session symposium, \$15; multi-sessions, \$15 first session, \$12 each additional session of same symposium. Each session lasts approximately three hours. Circle numeral(s) and check box for session(s) you wish to order.

Money order or check payable to AAAS—No Cash. Allow 3 to 4 weeks for delivery.

Please check: ☐ Reel ☐ Cassette

Name

Street

City State Zip



AMERICAN ASSOCIATION for the ADVANCEMENT OF SCIENCE
Department T
1515 Massachusetts Avenue, N.W. Washington, D. C. 20005



The new Damon/IEC PR-6000 embodies design and operating innovations never before available in a low cost portable refrigerated centrifuge. Advanced solid-state electronics and a stylish yet functional control panel, point up the PR-6000 as tomorrow's most promising laboratory trend setter. Compactness, versatility and ease of operation make PR-6000 the ideal choice for the clinical and general purpose laboratory. A new windshielded 6-liter head (optional) reduces large volume blood separation time by as much as 60%—a "plus" for blood banks. And with the CF-6 Continuous Flow Zonal Rotor, the PR-6000 provides ultra-centrifuge research capabilities at only 6,000 RPM.

New Damon/IEC PR-6000 features include:

- a flexible drive shaft that eliminates the need for critical balancing.
- safety cover lock that won't release until the head is completely

IEC PR-6000: CENTRIFUGATION ENTERS A NEW GENERATION.

stopped (front panel indicator tells you when).

- variable electric brake for deceleration suited to your separations.

- brush wear indicator light warns of brush replacement need 20 to 50 hours before necessary.

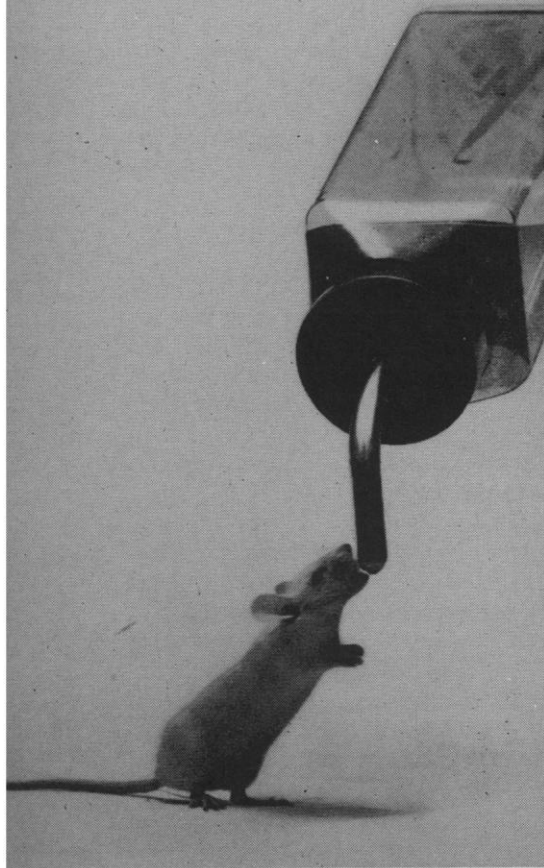
- dual range timer for precise short runs to 15 minutes as well as timed long runs to 105 minutes.

- precise temperature control that maintains 0°C at maximum speed or down to -10°C at lower speeds.

Of course, the PR-6000 includes all standard IEC features—automatic acceleration, electric tachometer, start up surge protection, counter balanced cover. And it will accept all accessories from former IEC Portable Refrigerated Centrifuges. To learn more about PR-6000 call or write Damon/IEC Division, 300 Second Avenue, Needham Heights, Massachusetts 02194. (617) 444-6700. Or see your local IEC dealer.

 DAMON/IEC DIVISION

a mouse-watering offer



We'd like to send you a free sample of our new unique, 500 cc plastic watering bottle. You'll find it virtually unbreakable. It's clear, rigid, has a wide $1\frac{7}{8}$ " opening for easy cleaning. And it's auto-clavable.

Made of lightweight polycarbonate, our new watering bottle will eliminate breakage. Designed for use in the lab, our bottle has no crevices or ridges to harbor bacteria or to invite gnawing by animals. Size is 7" x 2 $\frac{7}{8}$ " x 2 $\frac{3}{8}$ ". A full line of stoppers and stainless steel sipper tubes is available.

It's from Lab Products, a new company of people experienced in lab animal care. You can get your free bottle sample and quantity prices by making a letterhead request to Lab Products, Inc., 635 Midland Avenue, Garfield, N.J. 07026. Phone: (201) 478-2535

lab products inc

a **Medi** company

Urban motorists as such make only a minor contribution, if any, to such costs as urban street maintenance and repairs, street cleaning, snow removal, traffic signals, or traffic police; most of these are generally met out of general city revenues. Urban motorists use valuable land for which they pay nothing equivalent to the rent or the property taxes that other occupiers of scarce land pay. The capital invested in the streets and highways they use bears no tax comparable to the property or corporation income taxes that impinge on users of other forms of capital. Indeed, when highways are financed by borrowing, the interest cost is subsidized through its exemption from the federal income tax. Insurance premiums and other payments by motorists fall far short of providing full compensation to victims of accidents. Out of over \$10 billion a year of such damages (an amount roughly equal to the total amount spent on highway construction and maintenance) over \$1 billion is borne in ways unrelated to automobile use, through Blue Cross premiums, employers' sick pay provisions, income-tax abatements, and inadequate compensation to injured pedestrians and other non-motorist parties. It is perhaps stretching it a bit to bring in air pollution, but it has been estimated that the cost of pollution in New York City that is attributable to automobiles amounts to \$400 per year per car.

The big subsidy, however, is to the rush-hour commuter from the other contributors to highway funds. An extra lane or extra facility added primarily to take care of the rush-hour traffic and needed for only, say 18 hours a week will, for every \$1 million per lane mile of cost, at 9 percent for interest, amortization, and maintenance, cost at least 6 cents per car mile, if 1800 cars travel on one lane per hour for 18 hours a week. A 10-mile rush-hour trip over facilities that often cost \$3 million per lane mile and up can thus cost \$2 or more, compared with the 10 cents or thereabouts that would ordinarily be collected in highway-user charges (if no specific tolls are paid). It is no answer to say that the rush-hour transit rider is similarly subsidized by the off-peak transit rider; each rush-hour transit rider can usually find only one off-peak rider onto whom to shift his costs, while the rush-hour motorist can find four or more off-peak motorists in the same area and can also levy tribute on the rural highway user. To provide the transit rider a subsidy per trip comparable to that enjoyed by the peak-hour motorist, and thus enable him to make

a fair and unbiased choice between the two modes, it would be necessary not only to let the transit rider ride free but also to pay him a bonus.

The only sound solution in the long run is to levy adequate specific charges on motorists who use high-cost facilities that are threatened with congestion. Techniques exist for doing this as flexibly and automatically as we are charged for long-distance self-dialed telephone calls; the problem is to persuade the general public of the rationality, equity, and efficiency of such charges. Transit subsidy by itself cannot do the job; indeed if adequate congestion charges are levied for highway use, much, though not all, of the justification for transit subsidy would disappear. But to bring this about it is essential that there be a realization of the magnitude of the subsidy to urban rush-hour automobile commuters.

WILLIAM VICKREY

*Department of Economics,
Columbia University,
New York 10027*

An "Abundance of Fish"

Schubel and Pritchard (3 Sept., p. 943) imply that the "abundance of fish" reported in the upper Potomac (Patowmack) estuary by Captain John Smith (1) in 1608 was in fact a massive kill resulting from unknown (but clearly nonindustrial) causes. Is this their own judgment, or has it become established in the biological and ecological literature? It is difficult to believe that Smith and his companions could not differentiate between dead and living fish "swimming in the water."

Of course, it could have been a promotional statement, put in Smith's book to attract settlers and investors. John Cabot, in 1497, had reported that he could catch fish on the Grand Banks by letting down weighted baskets over the ship's side (2).

What seems more probable is that Smith witnessed a spawning run of alewives (since he speaks of "small fish"), or possibly shad or suckers. It is impossible to tell where he encountered this school of fish, and in fact he reports finding them in "divers places" and says they saw small cod as far up the bay as "Riccard cliffs." On his map, these cliffs were some distance north of the Patuxent. (The cod may have been what they "found dead upon the shore".)

Mid-June may be too late for anadro-

NEWER TITLES IN THE BIOLOGICAL SCIENCES

CELLULAR PHARMACOLOGY: The Effects of Drugs on Living Vertebrate Cells In Vitro by Mary Dawson, *The Univ. of Strathclyde, Glasgow, Scotland.* '72, 336 pp., 32 il., \$18.00

INTERACTIONS OF DRUGS WITH CELLS: A Topic in Cell Biology by D. R. H. Gourley, *Univ. of Virginia School of Medicine, Charlottesville.* '71, 160 pp., 32 il., 3 tables, \$8.50

COMPARATIVE REPRODUCTION OF NONHUMAN PRIMATES edited by E. S. E. Hafez, *Wayne State Univ. School of Medicine, Detroit.* (21 Contributors) '71, 557 pp., 301 il. (14 in full color), 38 tables, \$29.50

ENVIRONMENTAL LEGISLATION by William D. Hurley, *President, Institute for Environmental Technology and Occupational Safety and Health, Washington, D. C.* '71, 96 pp., \$6.50

ASSESSMENT OF AIRBORNE PARTICLES: Fundamentals, Applications, and Implications to Inhalation Toxicity edited by Thomas T. Mercer, Paul E. Morrow and Werner Stober, *all of The Univ. of Rochester, New York.* (26 Contributors) '72, 560 pp. (6 3/4 x 9 3/4), 232 il., 58 tables, \$32.75

HUMAN CELL CULTURE IN DIAGNOSIS OF DISEASE by Jean H. Priest, *Univ. of Colorado Medical Center, Denver.* '71, 300 pp., 54 il. (1 in full color), 95 tables, \$16.75

THE ONGOING EVOLUTION OF LATIN AMERICAN POPULATIONS edited by Francisco M. Salzano, *Federal Univ. of Rio Grande du Sul, Porto Alegre, RS, Brazil.* (22 Contributors) '71, 732 pp., 47 il., 139 tables, \$25.25

TRACER PROBES IN STEADY STATE SYSTEMS by Robert Steele, *New York Univ. School of Medicine, New York.* '71, 244 pp., 54 il., 9 tables, \$17.00

PERSPECTIVES IN CYTOGENETICS: The Next Decade edited by Stanley W. Wright, Barbara F. Crandall, and Lyda Boyer, *all of Univ. of California, Los Angeles.* (89 Contributors) '72, 360 pp. (6 3/8 x 9 5/8), 178 il., 32 tables, \$17.50

**CHARLES C THOMAS
PUBLISHER**

301-327 East Lawrence Avenue
Springfield • Illinois
62703

mous fish to be spawning in the latitude of the Chesapeake Bay. But not too many years ago spawning alewives crowded into the small tributaries of the Hudson River, in the vicinity of Albany, so that they did indeed have their "heads above water," and I have seen the same phenomenon with suckers in small streams. If the fish were cod perhaps a flood on the Susquehanna would have reduced the salinity of the upper bay enough to cause a massive nonindustrial kill.

P. SCHUYLER MILLER

4805 Centre Avenue,
Pittsburgh, Pennsylvania 15213

References

1. J. Smith, *The Generall Historie of Virginia, New England, and the Summer Isles: with the names of the Adventures, Planters, and Governors from their first Beginning An. 1584 to this present 1624* (Sparkes, London, 1624), book III, chap. 5, p. 58.
2. J. A. Williamson, Ed., *The Cabot Voyages and Bristol Discovery under Henry VII* (Cambridge Univ. Press, London, 1962), pp. 209-211.

Multinational Journals

The recent merging of five European astronomy or astrophysical journals into a single journal (see J. L. Steinberg, 30 Apr. 1971, p. 451) is an important indication that, unless "national" conditions are favorable, new scientific journals should be established at the multinational level.

Multinational journals are especially important in the developing regions of the world, for instance, in Latin America, where the lack of high-quality periodicals in the majority of specific scientific areas is felt.

The better papers of Latin American scientists are usually widely scattered in foreign journals, and thus the size and quality of Latin American production is not conveyed. Latin American journals in the English language would create a realistic image of the excellent work being carried out in these areas of the world. They would also foster understanding and cooperation among the scientists from these areas. Such journals would automatically force many investigators to raise the quality of their work, and would influence younger generations, which would in turn stimulate the growth of science.

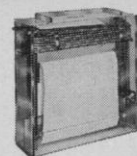
GIUSEPPE CILENTO

Instituto de Química, Universidade de São Paulo São Paulo, Brazil, and Instituto de Química, Universidade Estadual de Campinas, Campinas, São Paulo

\$ \$ \$ \$ \$

FIVE FIGURE MONEY SAVER.

SAVANT'S
HIGH VOLTAGE
PAPER
ELECTROPHORESIS
SYSTEM



LUCITE TANK



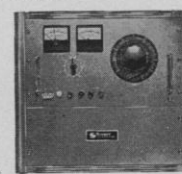
FLAT PLATE

IS THE
MOST ECONOMICAL
AND FASTEST WAY
TO SEPARATE

Amino Acids, Dansyl Derivatives, Conjugated Steroids, Sugar Mixtures, Nucleotides, Multi-Sample Screening, Peptides, Catechol Amines.



RECIRCULATING
WATER COOLER



POWER SUPPLY

Why let rising instrument costs eat into your valuable research dollars? Now is the time to consider High Voltage Paper Electrophoresis for your laboratory. Tank or Flat Plate System offers the researcher versatility, reliability and resolution.

Act today, send for complete HVE equipment catalog #21.

Savant Instruments, Inc.

221 Park Ave. • Hicksville, N.Y. 11801
(516) 935-8774

You are invited to see

AUTOMATED TLC

available for the first time in the new J.T. Baker
CHROMATAPE™ System for thin-layer chroma-
tography, at the FASEB Meeting (Federation of
American Societies of Experimental Biology), in
Booths I 104-106, Atlantic City, April 10-14, 1972.

Discuss potential applications with members of our scientific staff.

●
Consult with them about your TLC separation problems.

●
Review 4 manual TLC separation procedures for drugs of abuse plus 28
additional manual TLC procedures published by J.T. Baker.



J.T. BAKER CHEMICAL CO., PHILLIPSBURG, N.J. 08865

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

1972

ALFRED BROWN	FRANK PRESS
JAMES F. CROW	FRANK W. PUTNAM
THOMAS KUHN	WALTER O. ROBERTS
ELLIOTT W. MONTROLL	

1973

H. S. GUTOWSKY	GARDNER LINDZEY
ARTHUR D. HASLER	RAYMOND H. THOMPSON
RUDOLF KOMPFFNER	EDWARD O. WILSON
DANIEL E. KOSHLAND, JR.	

Editorial Staff

Editor

PHILIP H. ABELSON

<i>Publisher</i>	<i>Business Manager</i>
WILLIAM BEVAN	HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES*Assistant Editors:* ELLEN E. MURPHY, JOHN E. RINGLE*Assistant to the Editor:* NANCY TEIMOURIAN*News and Comment:* JOHN WALSH, DEBORAH SHAPLEY, ROBERT GILLETTE, NICHOLAS WADE, CONSTANCE HOLDEN, SCHERRAINE MACK*Research News:* ALLEN L. HAMMOND, WILLIAM D. METZ*Book Reviews:* SYLVIA EBERHART, KATHERINE LIVINGSTON, KATHRYN MOUTON*Cover Editor:* GRAYCE FINGER*Editorial Assistants:* MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, ELEANORE BUTZ, RONNA CLINE, ANNETTE DIAMANTE, MARY DORFMAN, JUDITH GIVELBER, MARLENE GLASER, CORRINE HARRIS, OLIVER HEATWOLE, CHRISTINE KARLIK, MARSHALL KATHAN, MARGARET LLOYD, JANE MINOR, DANIEL RABOVSKY, PATRICIA ROWE, LEAH RYAN, LOIS SCHMITT, RICHARD SOMMER, YA LI SWIGART, ALICE THEILE*Membership Recruitment:* LEONARD WRAY; *Subscriptions:* BETTE SEEMUND; *Addressing:* THOMAS BAZAN

Advertising Staff

<i>Director</i>	<i>Production Manager</i>
EARL J. SCHERAGO	BONNIE SEMEL

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); MEDFIELD, MASS. 02052: Richard M. Ezequille, 4 Rolling Lane (617-444-1439); CHICAGO, ILL. 60611: John P. Cahill, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 24 December 1971. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

Collective Bargaining on Campus

Elections for the selection of a bargaining representative have occurred on a number of campuses, and about 10 percent of faculty members, nationally, now seem to be represented by a bargaining group. Additional elections are certain to be held in the near future. Many of these elections are likely to be contested closely, if three concluded recently are reliable indicators: the University of Rhode Island (293 faculty members voted for the American Association of University Professors to represent them; 289 voted against a representative); Fordham University (no representative, 236; AAUP, 222); and Manhattan College (no representative, 130; AAUP, 121).

It is difficult to anticipate the impact of collective bargaining on a university campus. Clearer definitions of procedures are likely to emerge with our growing experience during the next few years, but evaluation of the long-term effect is much less clear. Certainly the industrial union, which has been so markedly successful in bettering the conditions of its members, does not constitute a useful model. Reduced to simplest terms, management and labor, in the industrial model, negotiate for a favorable share of the profits in their joint production, as well as for an equitable grievance procedure. But it is not clear on a university campus what is "profit" and how it is to be shared. In fact, it is not even clear what the academic analogs to "management" and "labor" would be. For example, in campus contracts negotiated so far, department chairmen are sometimes categorized as management, sometimes as labor.

In a state university the question becomes even more clouded. Does the bargaining team for the faculty negotiate with the university administration, with the state board of higher education, with the state comptroller, with the state legislature, or with all of them?

If an industrial model is not appropriate, the model of the public employees' union is only slightly more so. Of course the lack of a clear preexisting pattern that could be emulated does not mean that there is no place for collective bargaining on the campus. It does imply that a different scenario must be envisaged and a new role must be created for the collective bargaining team that is to represent the faculty.

Should negotiations be limited to salaries and fringe benefits which usually seem to be the first goals of collective bargaining on campus? Salaries and benefits infringe upon questions of tenure, promotion, reappointment, teaching loads, class schedules, parking, and a host of other issues. If these matters are to be subject to negotiation, in whole or in part, what then will be the role of traditional faculty governance? Are the current responsibilities of the department personnel committees, college promotions and appointment committees, and university senates to be shared with, or relinquished to, the faculty bargaining agent?

To put the question differently, will we replace the traditional collegial decision-making on campus, flawed though it is, with a series of negotiations between adversary groups? Or will campuses develop two parallel and competing systems of governance, and, if so, how are powers and responsibilities to be distributed between them?

The legitimate faculty grievances that arise on campuses from time to time must be adjudicated, and few people would suggest that our present machinery for resolving such grievances has been perfected. The more inclusive, and more important, question we must debate is whether we will make our universities better institutions of higher education by bringing onto our campuses from the larger community the machinery of collective bargaining, with all of its accouterments. Will we be exploiting conflicts to increase divisiveness on campus, or will we be negotiating cooperatively to improve the academic community? Bluntly put, on balance, will collective bargaining on campus be constructive and creative or destructive and demoralizing?—ARNOLD B. GROBMAN, *Office of the Dean, Rutgers College, New Brunswick, New Jersey 08903*

RAPID CYTOPHOTOMETRIC ANALYSES OF TISSUES WHICH CAN BE PREPARED AS SINGLE CELL SUSPENSIONS CAN NOW ROUTINELY BE CARRIED OUT WITH THE CYTOGRAF® AND THE CYTOFLUOROGRAF® MANUFACTURED BY BIO/PHYSICS SYSTEMS INC.

THESE ANALYTICAL INSTRUMENTS PROVIDE A RANGE OF CAPABILITIES, FROM CELL COUNTING TO EXTREMELY FAST FLOW-THROUGH SCATTER/FLUORESCENT CYTOPHOTOMETRY.

THE CELLS IN SUSPENSION ARE CARRIED IN SINGLE FILE FASHION THROUGH A STABLE LASER BEAM (SHOWN AT RIGHT). THE FLOW SYSTEM UTILIZES DOUBLE STREAM LAMINAR FLOW WITH IN-LINE FILTERING TO MINIMIZE CLOGGING. A NUMBER OF OPTICAL INTERACTIONS, WHICH INCLUDE SCATTER IN TWO ANGULAR RANGES AND, IN THE CASE OF THE CYTOFLUOROGRAF, TWO WAVE-LENGTH FLUORESCENCE, ARE SIMULTANEOUSLY ANALYZED IN TWO ELECTRONIC CHANNELS AND DISPLAYED AS HISTOGRAMS AND TWO-DIMENSIONAL SCATTER DIAGRAMS.

a close look at a new technology...

THE INSTRUMENTS CAN FUNCTION AS COUNTERS AND MULTI-PARAMETER PULSE HEIGHT ANALYZERS FOR SIZING, CHARACTERIZING, IDENTIFICATION AND DIFFERENTIAL COUNTING OF SUB-POPULATIONS OF THE SUSPENDED CELL SAMPLES.

THESE INSTRUMENTS ARE
MANUFACTURED, WARRANTED
AND SERVICED BY



BIO/PHYSICS
SYSTEMS, INC.

MAHOPAC, NEW YORK. 10541
(914) 628-7451

FOR A DEMONSTRATION, VISIT OUR BOOTH
NO. R110-113 AT FASEB, APRIL 10-14, 1972.

