American Association for the Advancement of Science

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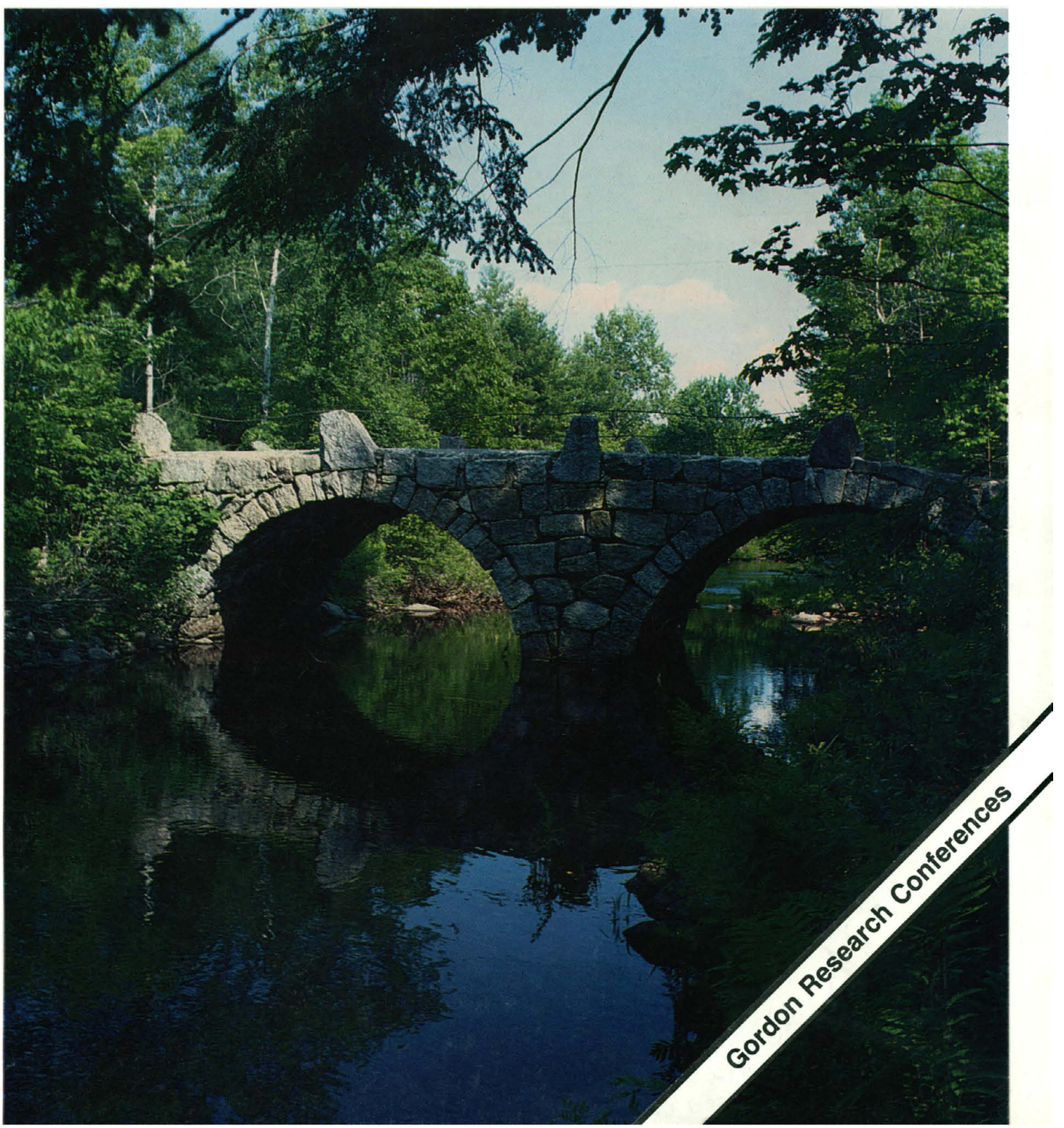
4 March 1988 $3.00
Vol. 239 ■ Pages 1069–1216



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SCIENCE

ISSN 0036-8075
4 MARCH 1988
VOLUME 239
NUMBER 4844

■ **SCIENCE is published weekly on Friday, except the last week in December, and with an extra issue in February by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005.** Second-class postage (publication No. 484460) paid at Washington, DC, and at an additional entry. Now combined with **The Scientific Monthly®** The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): $65. Domestic institutional subscription (51 issues): $98. Foreign postage extra: Canada $32, other (surface mail) $27, air-surface via Amsterdam $65. First class, airmail, school-year, and student rates on request. Single copies $3.00 ($3.50 by mail); back issues $4.50 ($5.00 by mail); Biotechnology issue, $5.50 ($6 by mail); classroom rates on request; Guide to Biotechnology Products and Instruments $16 ($17 by mail). **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of $1 per copy plus $0.10 per page is paid directly to CCC, 21 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 $1 + .10. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, DC 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

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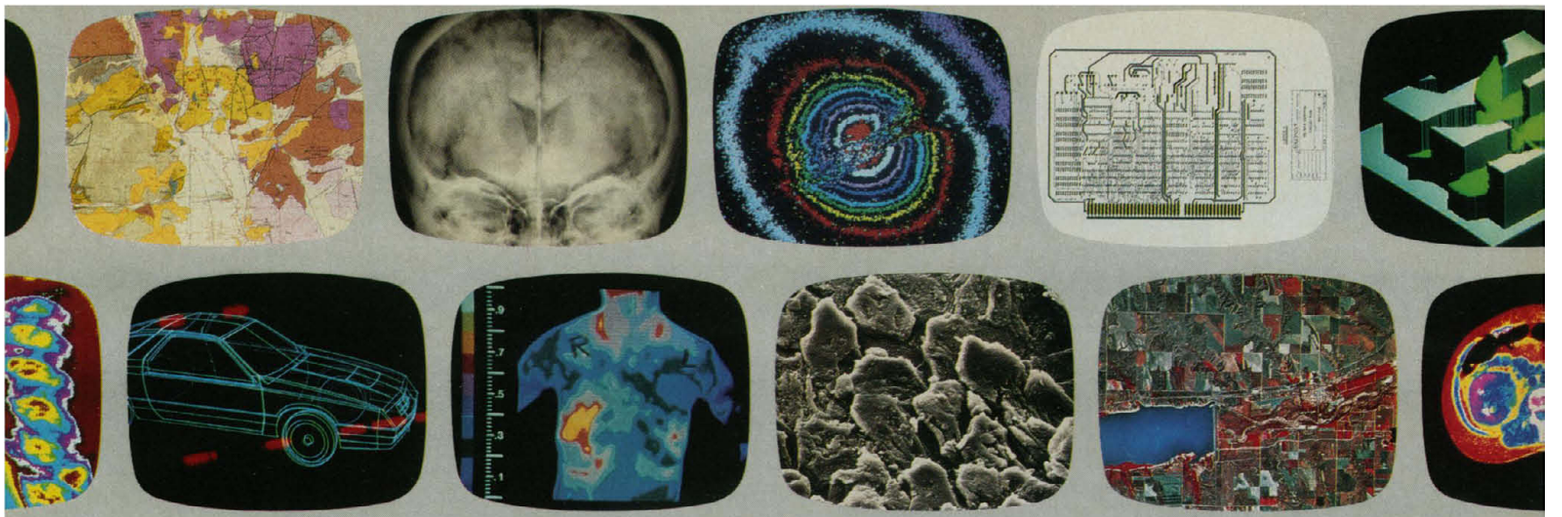
COVER Stone arch bridge in New Hampshire. See page 1159 for details about the Gordon Research Conferences in New Hampshire and Rhode Island. [Photo courtesy of New Hampshire Office of Vacation Travel, Concord, NH 03301]



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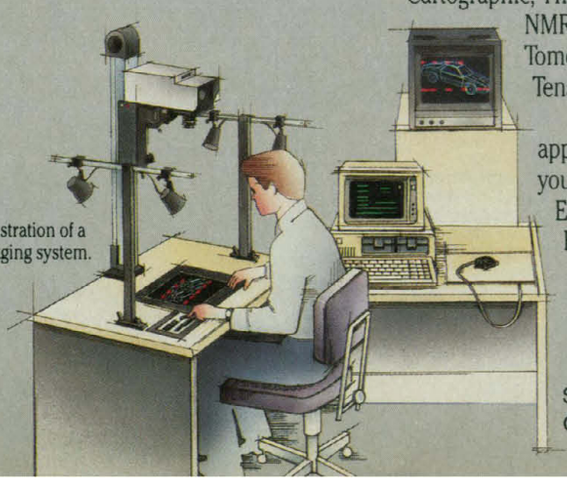

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This Week in
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Methane in the troposphere

RICE paddies, swamps, cattle rumen, and other anaerobic biologic processes generate and release methane; this gas enters the troposphere predominantly from the Northern Hemisphere and is then mixed and transported globally (page 1129). Measurements of methane show that methane has increased steadily in the air since 1978; methane concentrations today are twice what they were 200 years ago (and similar low values as far back as 3000 years according to records retained in air bubbles in Greenland and Antarctica ice cores). Blake and Rowland discuss the physical and chemical processes by which methane is transported upward into the atmosphere. Through oxidation of methane, water is added to the stratosphere, and this additional water vapor may enlarge the polar stratospheric clouds that form during winter over Antarctica; in turn, these clouds may affect the ozone layer and the depth of the ozone hole. Methane, like carbon dioxide and other compounds, is an important contributor to the greenhouse effect through its ability to trap outgoing infrared radiation. The balance of this gas on the earth and in the atmosphere is complex, because methane is produced by many sources.

High-pressure hydrogen

THE behavior of hydrogen at high pressures is of considerable interest for understanding the basic physics of molecular solids, the evolution of the solar system, and the astrophysical processes occurring inside the hydrogen-rich planets Saturn and Jupiter (page 1131). At high pressure, solid hydrogen is expected to undergo a transition from an insulating molecular solid to a metal, and this metal may have interesting properties such as high-temperature superconductivity. Mao *et al.* studied the structure of single-crystal hydrogen with a new synchrotron x-ray diffraction technique. The equation of state (which describes the volume of hydrogen as a function of pressure and temperature) was determined up to pressures of 26.5 gigapascals. By extrapolation, it is predicted that around 230 gigapascals of hydrogen should undergo a transition from the molecular to the atomic phase.

Heat-shock gene regulation

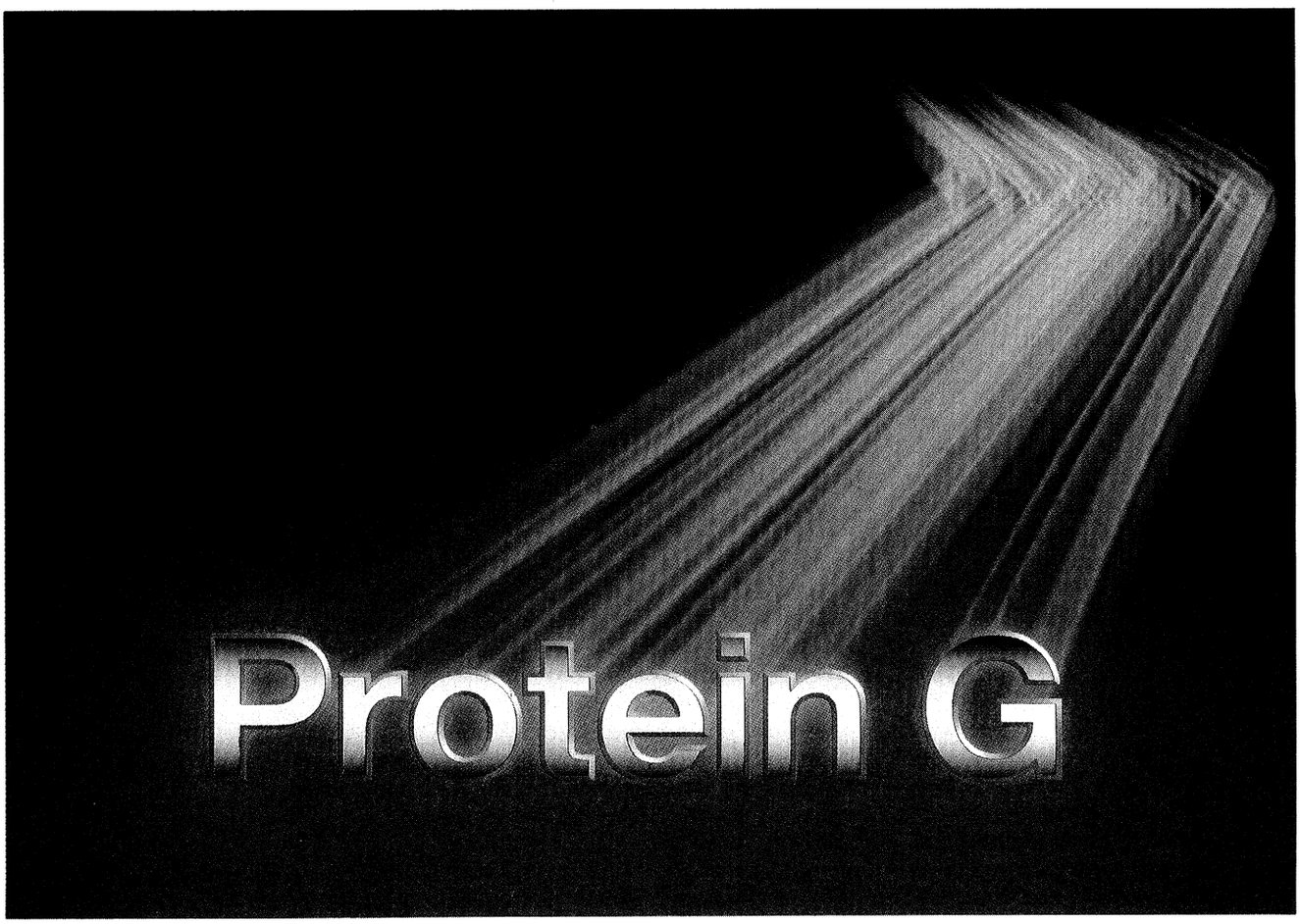
IN response to increases in temperature, regulatory proteins in cells bind to segments of DNA and activate nearby heat-shock genes (page 1139). A common sequence of nucleotides has regularly been found near heat-shock genes and thus has been designated the heat-shock consensus element (HSE), a necessary sequence (actually a pair of sequences) to which regulatory proteins are able to bind. Xiao and Lis show, using recombinant DNA technology and a *Drosophila* germline transformation system, that the original HSE of 14 nucleotides is not the complete consensus sequence. Instead, a somewhat longer region—two 10-base-pair sequences in tandem encompassing the original HSE as well as sequences flanking it—is crucial in determining whether or not the heat-shock gene will be activated. Because the heat-shock response serves as a model for gene activation in general in eukaryotes, molecular features worked out for this response may be relevant to the mechanism of activation of other genes. Through a determination of what turns on the heat-shock gene, it may be possible to design better expression vectors for producing large amounts of desired gene products in eukaryotes.

Pluripotent precursors of retinal cells

ALL of the major cell types of the frog retina can arise from a single progenitor cell in the embryo; the commitment of retinal cells to their final forms and functions appears to be a relatively late-occurring process in development (page 1142). Wetts and Fraser used fluorescent dextran to label single cells in the optic vesicles of frog embryos; dextran-bearing cells, the progeny of the original "founder" cell, were identified later in retinas of the free-swimming tadpoles. The retina has three layers: an outer nuclear layer containing photoreceptor cells, an inner nuclear layer containing horizontal cells, bipolar cells, amacrine cells, and glial Müller cells, and a ganglion layer of ganglion cells. In all three layers, cells with the label were detected. The emergence of diverse retinal cells from a pluripotent precursor may be a universal phenomenon among vertebrates; it has previously been shown to occur in the rat. Signals that a cell receives from neighboring cells may in some fashion participate in the process of cellular commitment.

Viruses carry the DHFR gene

TWO lymphotropic herpesviruses isolated from New World primates (squirrel monkeys and spider monkeys) have DNA sequences that encode the enzyme dihydrofolate reductase (DHFR) (page 1145). Genes for this enzyme are found in the cells of prokaryotes and eukaryotes; among viruses, they have previously been detected only in bacteriophages (viruses of bacteria) and not in viruses of mammals. DHFR plays a central role in DNA synthesis and has for some time been the target of anticancer therapies because its activity can be inhibited by drugs such as methotrexate. In both herpesvirus saimiri and herpesvirus ateles, sequences of DHFR genes were most similar to sequences from mammalian sources. However, unlike the mammalian genes in which exons (coding sequences) are separated by a number of introns (the noncoding sequences), the viral sequences consisted only of contiguous exons. Trimble *et al.* speculate that these viruses may have captured the DHFR gene by reverse transcription from host cells and that the availability of a ready-to-translate enzyme may facilitate rapid viral reactivation from latency.



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Science Advice to the Government

With the Reagan years winding down and a presidential campaign increasingly tense, individuals and groups are speculating about how future developments will affect them. In particular, many scientists and engineers are wondering about their role in a new administration. All of them share a widely held belief that in the future science and technology will be even more important to society than they are now. But some scientists and engineers feel that expertise in research and development is inadequately utilized at the highest levels of government.

William T. Golden, treasurer of the AAAS, who has long been interested in the improvement of the science advisory apparatus, has focused attention on the matter. He is the editor of a just-published book* that contains more than 80 essays about science advice to the federal government. The contributors include seven presidential science advisers, past and present, a number of key congressmen, and former President Gerald R. Ford. As might be expected, the presentations differ in content and recommendations.

One strain that emerges is a longing for the good old days of the President's Science Advisory Committee (PSAC) of the 1950s and 1960s. At that time, technical people of distinction had the attentive ear of presidents. Many of the matters dealt with had to do with nuclear weapons, a topic in which PSAC had expertise while competing sources of advice were limited. But now, the issues of prime concern to presidents have changed, and the availability of technical information and advice has expanded enormously.

Some of the issues cited as having precedence over R&D are economic competitiveness, trade agreements, deficits, foreign policy, education, jobs, and arms control. Science and technology are relevant to all of these matters but are not recognized as the crucial components in them. Gerald Ford writes (p. 141)

> The major portfolios of defense, health, foreign affairs, space, commerce, etc., all contain items of science and technology. As issues in these major portfolios come through government processes . . . pertinent scientific research and development are judged on the basis of their importance to those larger governmental missions.

Another great difference between the days of PSAC and the present is the existence now of many sources of technical expertise. The resources of the departments and agencies of the Executive Branch have increased. More impressive has been the expansion of technical expertise available to the Congress. This includes scientists and engineers who are members of the congressional staff and personnel at the Office of Technology Assessment, the Congressional Research Service, and the General Accounting Office. The National Research Council serves both the legislative and executive branches. In addition, the more than 2000 scientific and professional associations located in Washington, D.C., are determined to advise anyone who will listen or who can read.

In the midst of such a Tower of Babel, a presidential science adviser may or may not be heard above the crowd. Presidents are the targets of countless position papers, and their day's agenda is filled with urgent matters. Issues of science and technology are rarely of sufficient immediate urgency to preempt attention.

Edward E. David, Jr., has pointed to one of the frailties of scientists when they are called upon to advise the government. Too many of them are unable to keep separate their technical knowledge and their ideological convictions.

H. Guyford Stever, who has had extensive experience as a presidential science adviser and as director of the National Science Foundation, is suspicious of highly centralized institutional arrangements for science and technology. He believes pluralistic decentralized mechanisms work best. He recommends that scientists and engineers take responsibility for identifying individuals who are technically competent and who are capable of managing departments and agencies of the government. Such individuals should be brought to the attention of transition teams when the new administration prepares to assume office.

Scientists and engineers will enhance their influence in such matters if they work actively and visibly for candidates and contribute to campaign funds.—PHILIP H. ABELSON

*W. T. Golden, Ed., *Science and Technology Advice to the President, Congress, and Judiciary* (Pergamon, New York, 1988).

they could eliminate the snails in the waterways where barefoot peasants picked up the infection. It was decided that they needed the human fertilizer and must somehow get rid of the snails. After a careful study of the habits of the host snail, a massive nationwide education campaign about the disease and steps necessary to eradicate it was initiated. Then the voluntary labor of millions of peasants, assisted by students, teachers, office workers, and the army, was mobilized to drain the rivers and ditches, dig away the soil along the banks where the snails made their homes, and bury the soil. The effort involved scientists but, just as important, the direct knowledge of the peasants, who could see to it that the waterways would be drained in a logical order, avoiding serious problems of waterlogging or dehydrating various areas.

The campaign continues today village by village and county by county. It has required repeated political decisions to use vast amounts of human labor for the fight against snails, at the expense of many other priorities, during years which saw political attacks from the Soviet Union and several natural disasters. By 1983, the number of infected Chinese had been reduced from an estimated 10 million (*2*) to about 1 million (*3*).

Although the war on schistosomiasis in China could perhaps not have been waged in the same labor-intensive way elsewhere, different strategies might have been adopted in other suffering countries. The story is a dramatic illustration that massive public health measures are dependent less on expensive, technology-intensive research than on political will and trust in the strength, power, and intelligence of ordinary people.

FRAN CONRAD
661 West Johnson Street, Philadelphia, PA 19144

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FRANKLIN G. FISK
College of General Studies, Science, Western Michigan University, Kalamazoo, MI 49008

Erratum: In Roger Lewin's Research News article "Recount on Amazon trees" (5 Feb., p. 563), two errors occurred. At the end of the third paragraph, the quote from Alwyn Gentry should have ended, ". . . with 63% of species represented by single individuals and only 15% of species represented by more than two individuals." The last word of the article should have been "importance."

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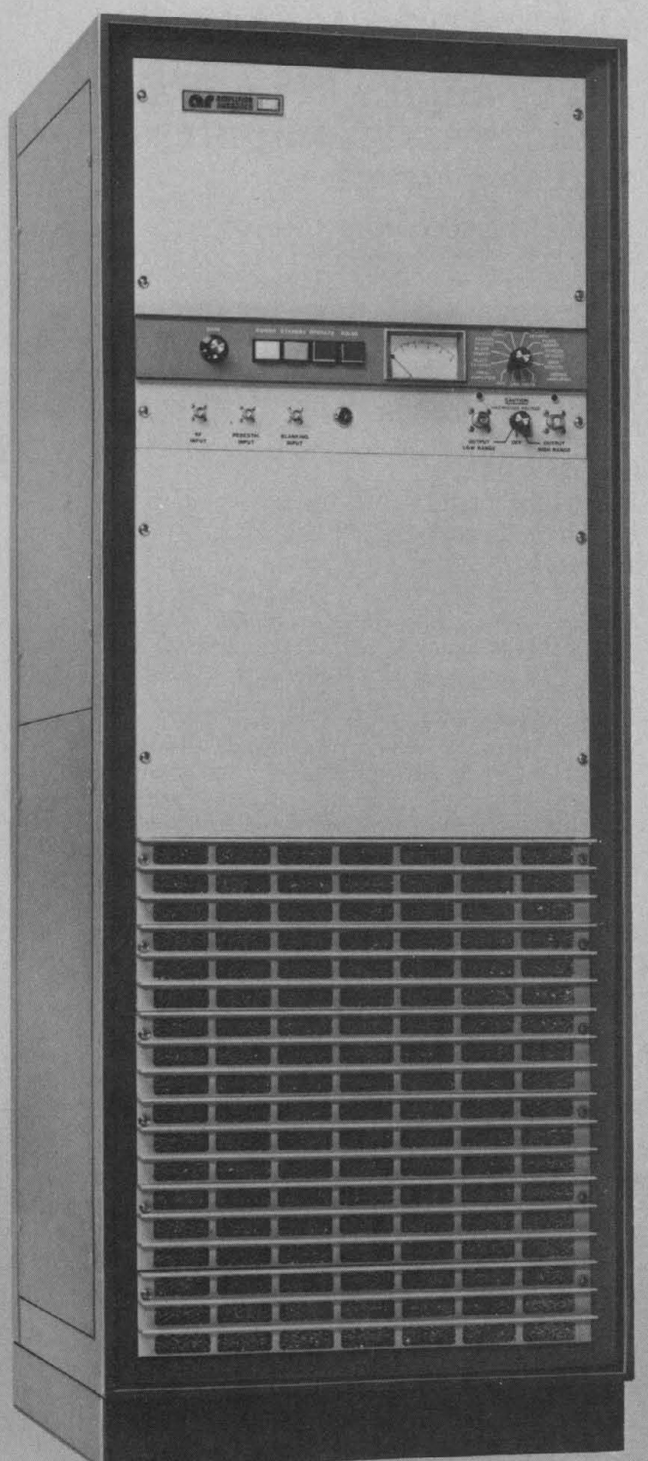

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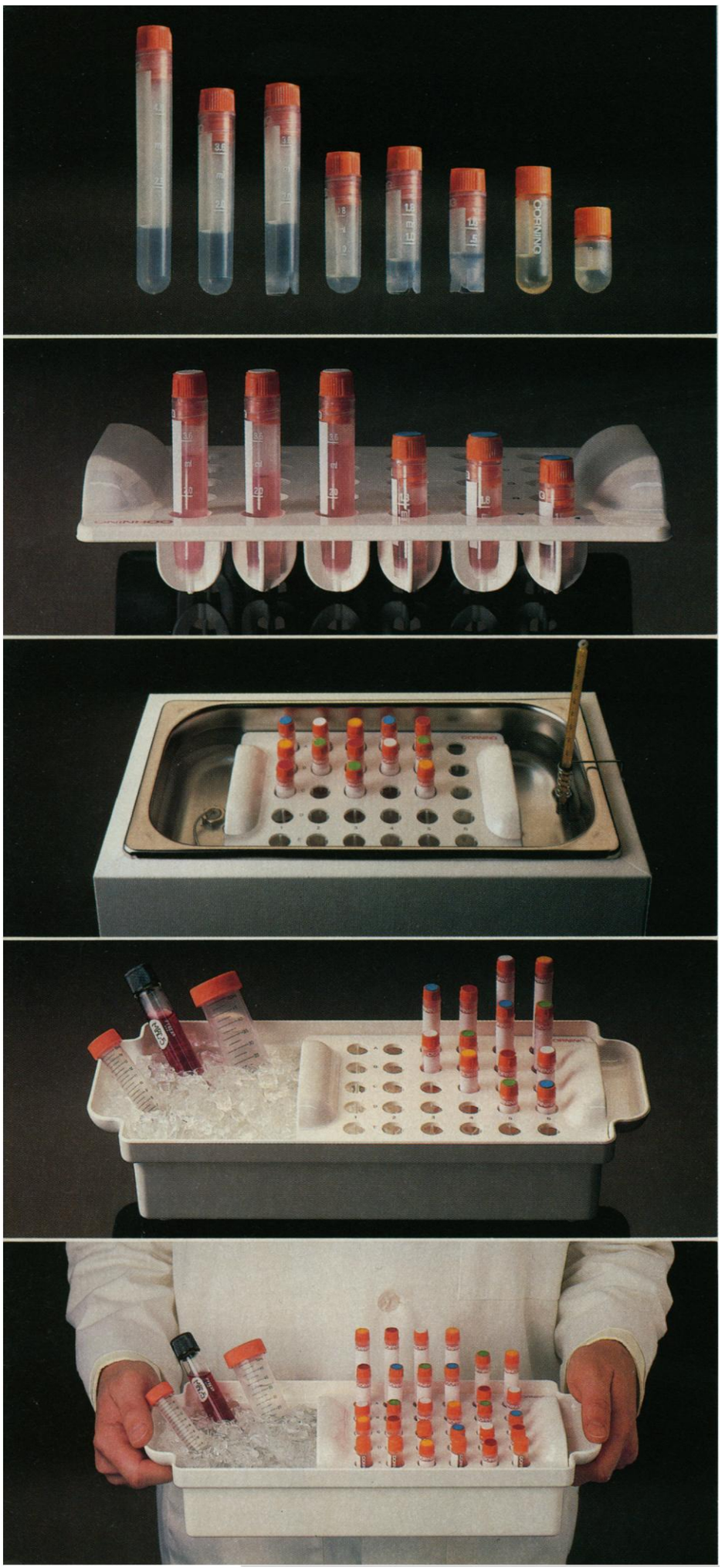

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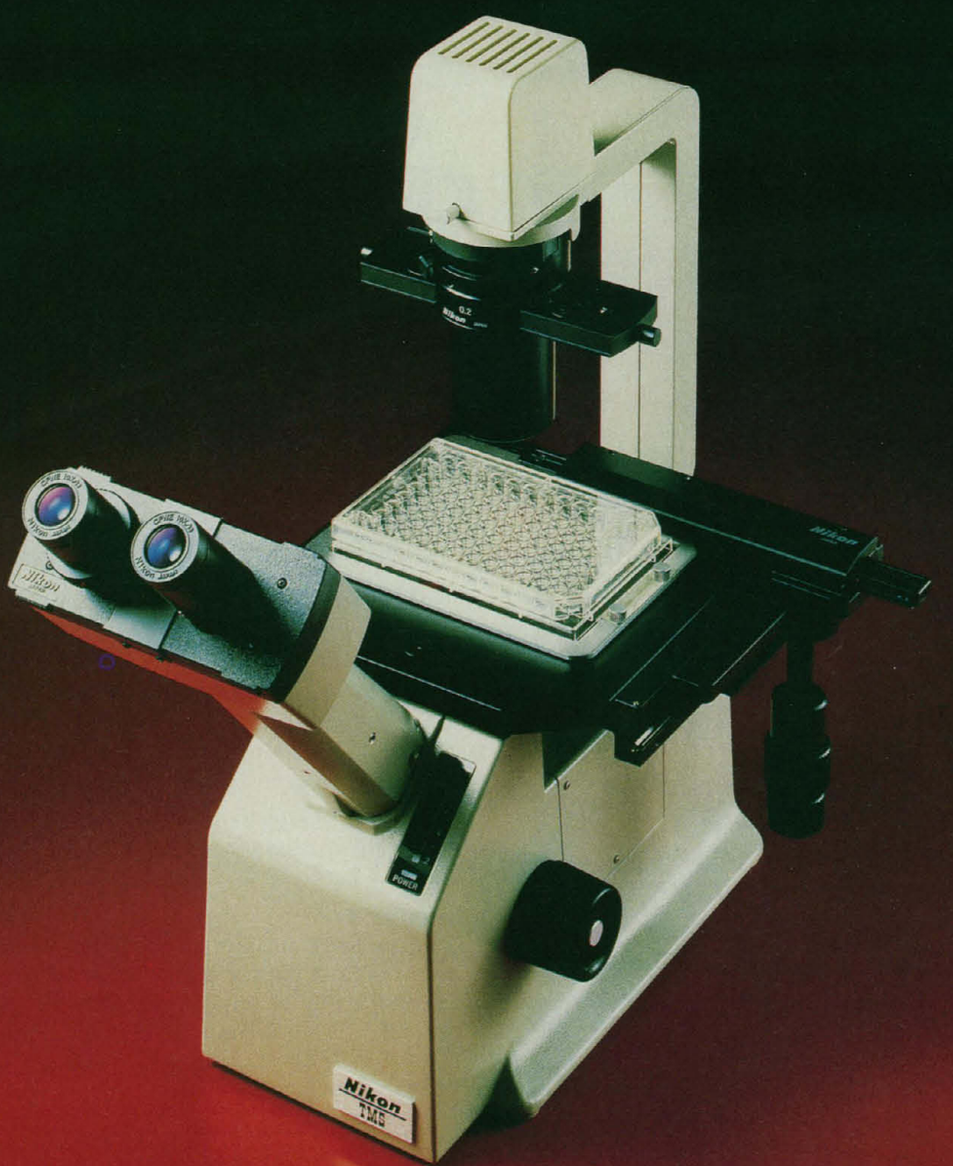

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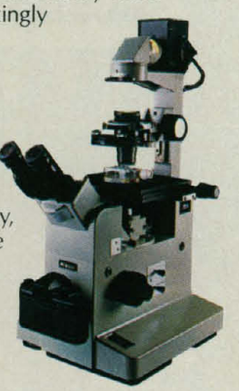

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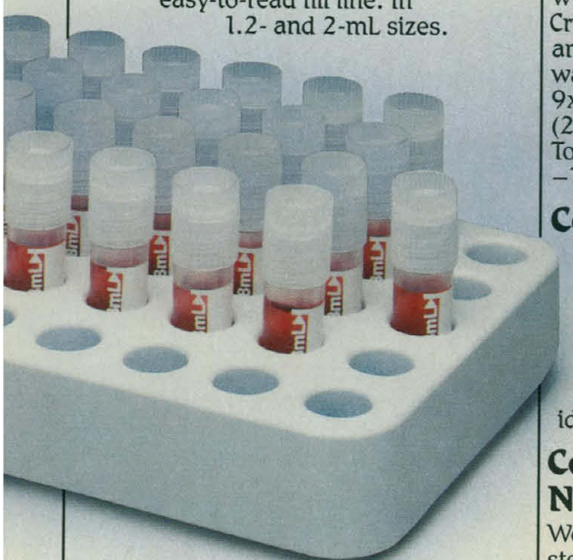

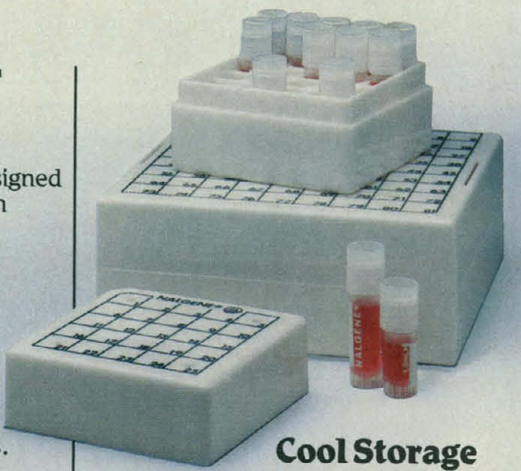

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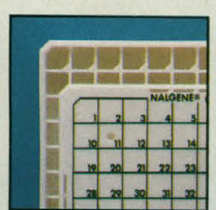

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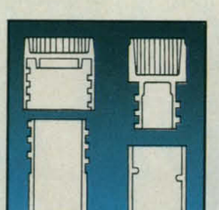
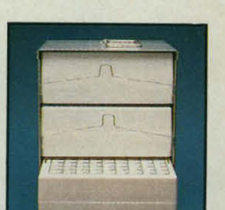


Outside thread design on Nalgene Cryovial (left) reduces possible sample contamination. Inside thread of conventional vial (right) increases contamination risk and sample hang-up.

Longer skirt length of closure on Nalgene Cryovials minimizes risk of contamination in aseptic procedures. Conical bottoms allow complete sample extraction.



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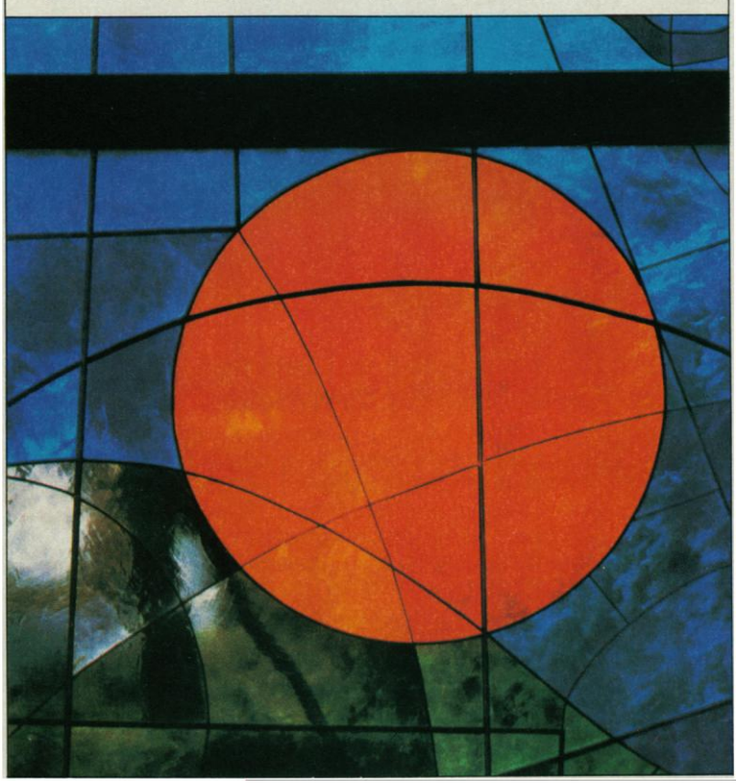

The Journal of the Pontifical Commission for the Apostolate of Health Care Workers is making available the proceedings of the

FIRST INTERNATIONAL CONFERENCE ON DRUGS FOR HUMAN LIFE

in which three Nobel Prize winners participated along with other guests.

The three main topics dealt with were:

Ethics of Drug Development

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1964 Nobel Prize Winner in Medicine

Ralph F. Hirschmann
Board Member on Chemical Sciences and Technology
National Research Council, Washington, DC, U.S.A.

Bruno Silvestrini
Professor of Pharmacology and Pharmacognosy,
University La Sapienza, Rome, Italy

Erminio Costa, M.D.
Professor of Pharmacology
Georgetown University
Washington, DC, U.S.A.

Bonifacio Honings, O.C.D.
Professor of Moral Theology
Lateran Pontifical University, Rome, Italy

Ethics of Pharmaceutical Research

K. Sune Bergström
1982 Nobel Prize Winner in Physiology
Pontifical Academician

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Dean, Sackler School of Graduate Biomedical Sciences
Tufts University, Boston, MA, U.S.A.

Rev. Elio Sgreccia
Professor of Bioethics, Medical School
Sacro Cuore Catholic University, Rome, Italy

Duilio Poggiolini
Director General, Pharmaceutical Service,
Ministry of Health, Rome, Italy

Tendês Cardoso
Professor of Parasitology,
Central University of Venezuela,
Caracas, Venezuela

Ethics of Drug Use

Max Ferdinand Perutz
1982 Nobel Prize Winner in Chemistry
Pontifical Academician

Halfdan Mahler
Director General
World Health Organization,
Geneve, Switzerland

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Jean Dréano
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International Federation of Catholic Pharmacists, Paris, France

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Pontifical Academician,
Professor of Chemistry,
Sacro Cuore Catholic University, Rome, Italy

E. Lauridsen
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The Federation of American Societies for Experimental Biology presents Summer Research Conferences designed for experimental biologists' analysis of research of intense scientific interest. The conferences in Saxtons River, Vermont and in Copper Mountain, Colorado, will be limited to 150 persons each week and will be by invitation upon application. A conference fee of $320 covers one week's room, board and registration. For further information and an application form, see the February *FASEB Journal* or call Robert W. Krauss, (301) 530-7093.

Saxtons River, Vermont

YEAST RNA: TRANSCRIPTION, SPLICING, TRANSLATION, REPLICATION, AND TRANSPOSITION *June 12-17* Chairs: Reed B. Wickner, National Institutes of Health, NIDDK; Philip S. Perlman, Ohio State University. **Retrotransposons.** G. Fink, S. Sandemeyer, J. Boeke, D. Garfinkel; **RNA Replicons.** R. Wickner, D. Thomas, N. Van Alfen; **Transcription I, II & III.** T. Cooper, L. Guarente, M. Carlson, G. Fink, K. Struhl, Y. Oshima, A. Sentenac, J. Jaehning; **Splicing I & II.** P. Perlman, A. Lambowitz, A. Jaquier, C. Guthrie, J. Abelson; **Translation.** J. Warner, F. Sherman, A. Hinnebusch, T. Fox; **tRNA.** N. Martin, M. Culbertson, A. Hopper.

RETINOIDS *June 19-24* Chairs: DeWitt S. Goodman, Columbia University College of P&S; Luigi M. De Luca, National Institutes of Health, NCI. **Retinoid Metabolism and the Liver.** K. Norum, R. Blomhoff, C. Lieber, D. Knook, J. Olson; **Retinoid-Binding Proteins I & II.** D. Goodman, P. Peterson, D. Soprano, A. Suhara, M. Kato, M. Kanai, F. Chytil, T. Jones, J. Gordon, D. Ong, A. McCormick; **Cancer.** L. De Luca, P. Greenwald, Y. Muto, K. Norum; **Retinoids, Differentiation, and Growth I & II.** M. Sporn, P. Davies, B. Hogan, L. Gudas, C. Brinckerhoff, W. Blaner, D. Kochhar, G. Eichele; **Dermatology.** G. Peck, W. Cunningham, J. McGuire, E. Fuchs, P. Chambon; **Special Lecture:** F. Siebert; **The Eye.** D. Boch, R. Rando, C. Bridges, J. Saari.

SMOOTH MUSCLE *June 26-July 1* Chairs: R. Kent Hermsmeyer, Chiles Research Institute, Providence Medical Center, OHSU; James T. Stull, University of Texas Southwestern Medical Center. **Neuromuscular Transmission.** J. Szurszewski, G. Hirst, T. Cunnane; **Membrane Excitation.** C. van Breemen, A. Jones, H. Akbarali; **Ca^{2+} and Other Channels.** G. Isenberg, C. Benham, N. Rusch; **Second Messengers.** J. Lewicki, H. Rasmussen, K. Kamm; **Intracellular Ca^{2+}.** A. Somlyo, C. Rembold, P. Erne; **Myosin Phosphorylation and Cytoskeleton.** D. Hartshorne, J. Sellers, V. Small; **Molecular Biology and Function of Proteins.** R. Adelstein, M. Watterson, W. Catterall; **Microcirculation Mechanisms.** P. Johnson, B. Duling, M. Intaglietta.

AUTOIMMUNITY *July 3-8* Chairs: Howard L. Weiner, Harvard Medical School; Gary Fathman, Stanford University Medical School. **Molecular Mechanisms of T Cell Activation.** C. Fathman, L. Glimcer, A. Weiss, P. Bjorkman; **Genetics of Autoimmune Disease.** H. McDevitt, E. Leiter, B. Kotzin, G. Nepom; **Immunoregulatory Mechanisms.** E. Engleman, C. Morimoto, N. Damle, R. Rich, D. Hafler; **Immunopathogenic Mechanisms in Endocrine Diseases.** G. Eisenbarth, K. Lafferty, A. Rossini, N. Rose; **Organ Non-Specific Autoimmunity.** A. Steinberg, D. Kastner, S. Datta, C. Laskin, D. Klinman, E. Raveche; **Virus-Induced Autoimmunity and Polyreactive Antibodies.** A. Notkins, P. Casali, G. Jay; **Immune Intervention I & II.** H. Weiner, I. Cohen, H. Wekerle, R. Schwartz, L. Steinman, E. Heber-Katz, T. Strom, Y. Naparstek, K. Krolick.

PHOSPHOLIPASES *July 10-15* Chairs: Moseley Waite, Bowman Gray School of Medicine; Richard Franson, Medical College of Virginia **Phospholipid Organization and Phospholipase A_2 Structure I & II.** D. Hanahan, P. Cullis, G. Shipley, R. Heinrikson, J. Maraganore, G. de Haas, J. Drenth, P. Sigler, P. Elsbach; **Mechanism of Action I & II.** P. Elsbach, E. Dennis, A. Slotboom, R. Verger, F. Kezdy, M. Wells, M. Jain, R. Biltonen, P. Kinnunen; **Cellular Phospholipases A_2.** J. Maraganore, R. Franson, I. Kudo, R. Kramer, H. van den Bosch; **Phospholipases A_1, B, and Lysophospholipases.** J. Law, K. Saito, H. Jansen, M. Waite; **Phospholipases C.** C. Rock, C. Little, M. Low, M. Roberts, R. Gross; **Cloning.** E. Dennis, H. Verheij, J. Seilhamer, M. Okamoto; **Regulation and Function.** M. Clark, H. Chap, S. Rittenhouse, C. Rock, A. Scanu,

IMMUNOPHARMACOLOGY *July 17-22* Chair: Philip Davies, Merck, Sharp & Dohme Research Laboratories. **Allergic Diseases. The Mediator Systems. Initial Clinical Experience with Specific Inhibitors and Antagonists. Novel Immunosuppressive Strategies for Inflammatory Diseases. Pharmacological Probes of Lymphocytes Activation. Clinical Studies with Antibodies and Antibody-Toxin Conjugates. Cellular Adhesion Molecules in Lymphocytes and Phagocytes. Neutrophil Effector Systems: Mediators and Enzymes. Activation of the Respiratory Burst. Regulation of Lipoxygenase Activity. Elastase and Its Inhibitors. Macrophage Effector Systems I. The Macrophage as a Secretory Cell. The Peptide Mediators: TNF, IL-1, Growth Factors, Chemotactic Factors. Macrophage Effector Systems II.**

STRUCTURE AND FUNCTION OF CELL MEMBRANES *July 24-29* Chairs: Philip Yeagle, State University of New York/Buffalo; Ron McElhaney, University of Alberta. **Lipid Movement.** R. Simoni, L. Dawidowicz, P. Deveaux; **Ca ATPase.** G. Inesi, D. Thomas, P. Yeagle; **Membrane Protein Dynamics.** G. Henry, R. Griffin, R. Cherry; **Lipid Domains and Organization.** T. Thompson, K. Jacobson, G. Shipley; **Transmembrane Signalling.** B. Litman, J. Regan, M. Bitensky; **Non-Bilayer Structures.** S. Gruner, D. Siegel, A. Wieslander; **Membrane Protein Structure.** G. Shull, E. Gogol, V. Marchesi; **Role of Cholesterol.** C. Dahl, L. Parks, Y. Lange; **Lipid Structure and Dynamics.** H. Jarrell, C-H. Huang, R. McElhaney.

CELLULAR AND MOLECULAR GENETICS *July 31-August 5* Chairs: Geoffrey Wahl, The Salk Institute; Gretchen Darlington, Baylor College of Medicine. **Technologies.** F. Collins, C. Cantor, G. Carle, T. Gingeras; **Workshop: Gene Manipulation.** F. Costantini, J. Izant, L. Robertson, I. Verma; **Genome Rearrangements and Targeted Gene Insertion.** G. Wahl, M. Capecchi, O. Hyrien, O. Smithies, E. Giulotto/G. Stark; **Nuclear Organization and Chromosome Structure.** V. Zakian, A. Belmont/J. Sedat, M. Yanagida, M. Yao; **Inducible Gene Expression.** M. Karin, J. Nevins, M. Groudine, C. Parker, M. Yaniv; **Mediating Regulatory Proteins.** R. Evans, D. Hogness, L. Guarente, R. Roeder, W. Schaffner; **Tumor Suppressors.** W. Cavenee, S. Aaronson, T. Hunter, E. Stanbridge, M. Wigler; **Regulation During Development and Differentiation.** K. Fournier, R. Jaenisch, A. Lasser, F. Ruddle, M. Weiss; **Biochemical and Genetic Dissection of Eukaryotic DNA Replication.** T. Kelley, M. DePamphilis, J. Roberts, R. Laskey; **Human Diseases.** T. Caskey, A. Beaudet, R. Nussbaum, R. Worton.

RECEPTORS *August 7-12* Chairs: Richard D. Klausner, National Institutes of Health, NICHD; Marc G. Caron, Duke University Medical Center. **Structure.** A. Ulrich, H. Metzger, R. Stroud, W. Leonard; **Assembly, Dynamics, and Cell Biology.** R. Klausner, A. Helenius, K. Mostov; **Complex Receptors and Families.** M. Caron, E. Barnard, J. Ramachandran, L. Samelson; **Coupling Proteins and Signal Transduction.** H. Bourne, A. Gilman, L. Birnbaumer, R. Bell; **Function and Regulation.** R. Lefkowitz, C. Kahn, P. Hargrave, K. Strader; **DNA Binding Proteins.** W. Schrader, E. Milgrom, R. Evans, G. Klock, M. Carson; **Growth Regulation and Oncogenes.** L. Williams, R. Weinberg, J. Schlessinger, C. Sherr; **Keynote Address:** D. Koshland; **Receptors that Mediate Cell-Cell Interactions.** T. Springer, J. Butcher.

ELECTROPHYSIOLOGICAL MECHANISMS OF PROPAGATION AND ACTIVATION OF CARDIAC MUSCLE AND SMOOTH MUSCLE *August 14-19* Chairs: David R. Harder, Medical College of Wisconsin; Nicholas Sperelakis, University of Cincinnati. **Keynote Speakers:** H. Kuriyama, H. Fozzard. **Ionic Currents in Smooth Muscle.** D. Harder, K. Hermsmeyer, C. Benham, C-Y. Kao, R. Schoemacher, M. Kotlikoff; **Propagation and Neuromuscular Transmission – In Arterial Muscle.** K. Hermsmeyer, E. Daniel, D. Hirst, Y. Ohya, M. Hollman, T. Bolton, G. Siegel; **– In Cardiac Muscle.** M. Spach, Y. Rudy, R. Plonsey, R. Joyner, N. Sperelakis; **Cell Coupling.** W. DeMello, R. DeHaan, D. Spray, W. Larsen, W. Cole; **Metabolism and Electrical Activity in Cardiac Muscle.** N. Sperelakis, A. Noma, T. McDonald, H. Reuter, W. Trautwein, G. Wahler, A. Yatani, G. Bkaily; **Free Radicals and Lysophospholipids.** P. Corr, M. Hess, D. Hearse, B. Lucchessi, J. Downey; **Action of Calcium Antagonistic and Agonistic Drugs.** C. Cohen, R. Kass, M. Morad, W. Nayler, M. Kohlhardt; **Ion Channels.** M. Lazdunski, R. Barchi, W. Catterall, H. Glossman, B. Ehrlich; **Ionic Currents in Heart.** H. Brown, J. Hume, H. Irisawa, A. Pappano, J. Lederer, M. Hiraoka.

RESEARCH CONFERENCES

Copper Mountain, Colorado

NEUROIMMUNOMODULATION *June 26-July 1* Chairs: Novera H. Spector, University of Alabama/Birmingham; Edward J. Goetzl, University of California/San Francisco. **Genetic and Developmental Determinants of Neuroimmunological Interactions.** F. Bloom, L. Reichardt, R. Milner, E. Shooter, I. Weissman, T. Springer, M. Hemler; **Neural Circuitry and Transmitter Interactions with Immune Organs.** D. Felten, S. Heinemann, S. Felten, S. Livnat, P. Sawchenko, S. Carlson, K. Bulloch; **Mediators and Cellular Constituents.** S. Leeman, L. Steinman, R. Keane, S. Hockfield, G. Frankel, S. Hauser, B. Cunningham, A. Friedman, E. Goetzl, J. Merrill, F. Hofman, S. Bodmer, D. Payan, S. O'Dorisio, S. Sreedharan; **After Dinner Speaker:** J. Axelrod; **Regulation of Cellular Communication and Responses.** B. Arnason, S. Gordon, H. Perry, K. Frei, M. Ruff, H. Besedovsky, D. Richman; **Mediators of Cellular Growth, Differentiation, and Function.** J. Martin, D. Weinreich, J. Bienenstock, B. Undem, D. Gospodarowicz, T. Deuel; **Viral Neuroimmunology.** R. Johnson, M. Buchmeier, B. Fields, I. Miller, O. Narayan, R. Fujinami, R. Price, M. Gardner; **Normal and Abnormal Behavior.** M. Stein, J. Liebeskind, J. Kiecolt-Glaser, S. Perry, J. Weiss; **After Dinner Speaker:** N. Cousins; **Host Defense and Autoimmunity.** N. Spector, W. Pierpaoli, K. Kelley, E. Smith, C. Ottaway, D. Maric, J. Kreuger, J. Lipton, B. Markovic, V. Ghanta, S. Dolina; **Diseases.** B. Jankovic, V. Lennon, P. Paterson, M. Martin, J. Levine, R. Lund, M. Yokoyama, D. Drachman.

ULTRADIAN AND INFRADIAN MODULATION OF THE CIRCADIAN SYSTEM *July 3-8* Chairs: Lawrence E. Scheving, University of Arkansas; Franz Halberg, University of Minnesota. **Monitoring Dense Long Time Series.** G. Cornelissen, F. Del Pozo, F. Hegge, D. Redmond, D. Wilson; **Biochemical Interactions Among Rhythms with Different Frequencies.** J. Feldman, J. Hastings, D. Lakatua, N. Montalbetti, J. Ringo, D. Woodward; **Rhythms of the Cardiovascular System.** G. Payne, F. Halberg, C. Leach, E. Haen, M. Mkulecky, M. Weber; **Clinical Aspects of Circaseptan Rhythms.** M. Cavallini, D. Hayes, G. Hildebrandt, L. Scheving; **Rhythms in Immunology.** M. Cagnoni, E. Yunis, R. Good, G. Fernandes; **Circatrigintan Rhythms in Both Sexes.** F. Carandente, H. Simpson, M. Smolensky, B. Tarquini; **Intermodulation Among Rhythms in the Neuroendocrines.** R. Reiter, P. Robel, S. de la Pena, N. Spector, D. von Zerssen; **Interaction Between Circadian and Circannual Rhythms.** A. Reinberg, Francine Halberg, E. Haus; **Clinical Applications.** C. Czisler, K. Griffiths, J. Moore, S. Szabo, L. Kudrow.

REGULATION OF GENE EXPRESSION IN HIGHER ANIMALS IN RESPONSE TO HORMONES AND NUTRITIONAL SUBSTRATES *July 10-15* Chairs: George Scheele, The Rockefeller University; Gunther Schutz, German Cancer Research Center. **Tissue-Specific Control in the Liver.** R. Cortese, M. Yaniv, S. Tilghman, K. Fournier; **Keynote Address:** R. Evans; **Cell-Specific and Hormone-Mediated Control in the Liver.** G. Schutz, G. Ryffel, M. Karin; **Regulation in the Pancreas.** G. Scheele, H. Kern, W. Rutter, D. Hanahan, R. MacDonald; **Control in the Intestine.** J. Gordon, J. Scott, R. Thach, B. O'Malley; **Regulation in Muscle.** H. Blau, B. Nadal-Ginard, M. Buckingham, C. Emerson; **Genes Involved in Lipid Metabolism.** G. Ringold, T. Leff, B. Spiegelman, R. Lawn; **Neuroendocrine Peptides.** P. Seeburg/K. Nikolics, J. Adelman, R. Goodman, J. Roberts; **Analysis of Human Genetic Disorders.** S. Woo, M. Koenig, B. Williamson, D. Page; **Analysis of Gene Structure and Function.** H. Lehrach, B. Tjian, S. Harrison, P. Becker.

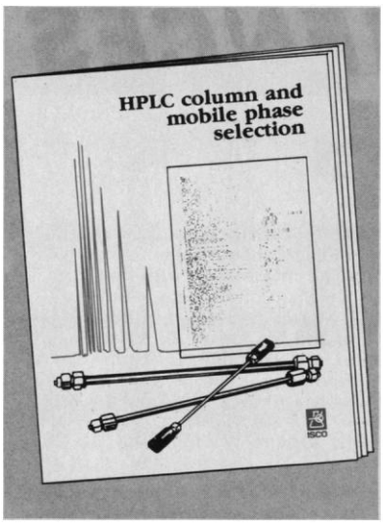
MOLECULAR BIOLOGY AND INFECTIOUS DISEASES *July 17-22* Chairs: Richard A. Young, Whitehead Institute for Biomedical Research; David Sacks, National Institutes of Health, NIAID. **Perspectives.** K. Warren; **Mechanisms of Microbial Pathogenesis.** M. So, J. Mekalanos, F. Heffron, H. Seifert; **Mechanisms of Parasite Pathogenesis.** L. Miller, K. Joiner, M. Pereira, R. Howard; **Cellular and Parasitic Gene Expression Strategies.** R. Davis, J. Donelson; **Components of T Cell Recognition and Function.** B. Bloom, A. Abbas, J. Lamb, J. Cerny; **T Cell Immunity in Infectious Diseases.** D. Sacks, S. Kaufmann, P. Scott, M. Good, B. Bloom; **Molecular Biology of AIDS.** F. Wong-Staal; **Vaccine Vehicles.** R. Young, E. Paoletti.

TRICOTHECENE, BLUE-GREEN ALGAL, AND MARINE TOXINS: MECHANISMS, DETECTION, AND THERAPY *July 24-29* Chairs: Adrianne E. Rogers, Boston University School of Medicine; Val Beasley, University of Illinois College of Veterinary Medicine. **Tricothecene Toxins.** A. Rogers; **Cardiovascular Toxicity and Shock.** G. Feuerstein, A. Lefer, I. Paakkari, W. Woods, C. Templeton; **Trichothecene Toxins – Toxicity to Reproductive Systems and GI Tract.** M. Conner, L. Trenholme, A. Rogers, Y. Matsuoka, C. Rousseaux; **– Metabolism, Decontamination, Blocking and Therapeutic Measures.** D. Bunner, A. Lefer, D. Prelusky, C. Rousseaux, G. Feuerstein, W. Busby, R. Wannemacher, R. Lambert; **Blue-Green Algal Toxins – Occurrence, Chemistry, and Metabolism.** V. Beasley, W. Carmichael, K. Sivonen, T. Krishnamurthy, J. Pace; **– Toxicity, Decontamination, and Therapy.** W. Haschek, M. Runnegar/I. Falconer, D. Bunner, W. Thompson, G. Codd, N. Mahmood; **Membrane Activity and Modes of Toxin Action.** G. Strichartz; **Ion Channel Function – Sodium Channels.** G. Strichartz, G. Brown, W. Woods, E. Moczydlowski, G. Wang, S. Hall; **– Potassium Channels.** G. Brown, N. Castle, P. Paponne; **– Calcium Channels.** E. Moczydlowski, D. Yoshikami, B. Olivera, S. Levinson.

FOLATE, VITAMIN B-12, AND ONE CARBON METABOLISM *July 31-August 5* Chairs: Raymond L. Blakley, St. Jude Children's Research Hospital; Victor Herbert, Mt. Sinai School of Medicine/Bronx VA Medical Center. **Metabolism in Protozoa.** D. Santi, Y. Yuthavong, B. Chabner, C. Allegra; **Transport of Folates and B-12.** I. Rosenberg, J. Freisheim, J. Lindemans; **Folate Enzymes as Targets for Drugs.** J. Bertino, J. Houghton, P. Beardsley, J. McGuire; **Metabolism of S-Methylthioadenosine and S-Adenosylmethionine.** R. Abeles, A. Pegg, N. Kredich; **Enzymes of Cobalamin Metabolism.** J. Stubbe, J. Roth, R. Matthews; **Disorders of Methionine, Folate, and Cobalamine Metabolism.** S. Mudd, R. Erbe, D. Rosenblatt; **Dihydrofolate Reductase.** S. Benkovic, G. Roberts, D. Matthews, R. Blakley; **Interrelationships.** J. Scott, J. Metz, I. Chanarin, D. Weir; **Effect of Ethanol and Other Drugs.** V. Herbert, N. Colman, C. Halsted, S. Waxman.

ENDOTHELIUM AND CARDIOVASCULAR FUNCTION *August 7-12* Chairs: Paul M. Vanhoutte, Mayo Foundation; Robert F. Furchgott, SUNY Health Science Center. **Morphology and Production of Vasoactive Hormones.** U. Ryan, G. Palade, G. Zimmerman, N. Suttorp; **Metabolic Role.** C. Gillis, M. Gerritsen, S. Oparil, C. Dinarello, E. Block, S. Nees; **Barrier and Transport Function.** C. Owman, C. Michel, E. Renkin, N. Simionescu, R. Michel, R. Traystman; **Endothelium-Dependent Relaxations.** R. Furchgott, M. Peach, U. Forstermann, R. Rapoport, K. Komori, V. Miller, D. Ku; **Is Nitric Oxide EDRF?** S. Moncada, R. Furchgott, L. Ignarro, R. Palmer, W. Martin, B. Berkowitz, H. Kontos; **Other Vasoactive Factors.** P. Vanhoutte, U. Hoeffner, Z. Katusic, G. Rubanyi, R. Highsmith; **Physiological Role of EDRF.** J. Shepherd, E. Bassenge, H. Sparks, T. Griffith, A. Mark, R. Busse, F. Abboud, P. Vanhoutte; **Hypertension and the Endothelium.** R. Winquist, A. Chobanian, W. Lockette, J. Angus, T. Luscher, W. Mayhan; **Atherosclerosis.** D. Heistad, S. Schwartz, D. Steinberg, M. Jacobs, A. Herman, D. Harrison, P. Henry; **Vasospasm.** R. Alexander, R. Cohen, R. Robertson, H. Shimokawa, P. Ganz, P. Kim.

NEOPLASTIC TRANSFORMATION OF LIVER CELLS *August 14-19* Chairs: Snorri S. Thorgeirsson, National Institutes of Health, NCI; George Michalopoulos, Duke University. **Models of Multistage Carcinogenesis.** S. Thorgeirsson, E. Farber, C. Peraino, B. Lombardi, J. Reddy; **Interactions with Extracellular Matrix.** L. Reid, D. Kaufman, C. Guguen-Guillouzo, M. Bissel; **Growth Regulation of Normal Hepatocytes.** N. Bucher, G. Michalopoulos, T. Nakamura, A. Francavilla, J. Cruise; **Growth Inhibition of Liver Cells.** A. Ichihara, B. Carr, H. Moses, A. Huggett, M. Hayes; **Role of Protooncogenes/Oncogenes in Transformation I & II.** N. Fausto, H. Isom, M. Anderson, S. Thorgeirsson, S. Strom, G. Neal, B. Huber; **Mechanism of Promotion.** P. Seglen, R. Schulte-Hermann, R. Jirtle, J. Yager, J. Rice; **Mechanism of Progression.** J. Grisham, R. Cameron, W. Kaufmann, D. Hixson, A. Sirica, P. Seglen; **Cell Lineages.** S. Sell, R. Evarts, N. Marceau, J. Grisham.



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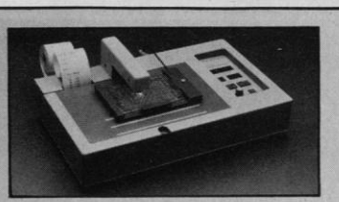

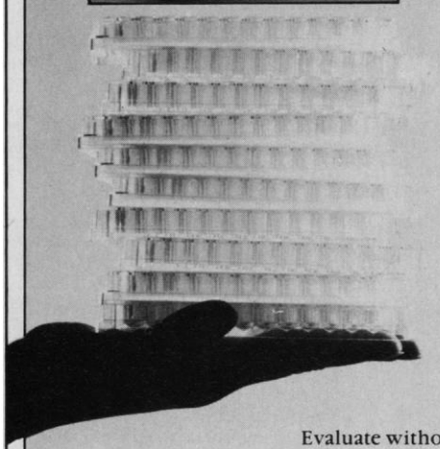

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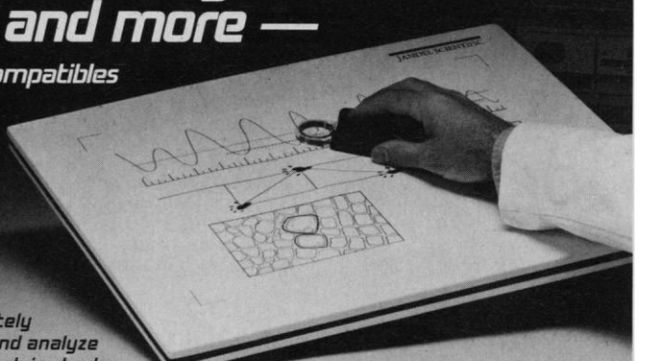

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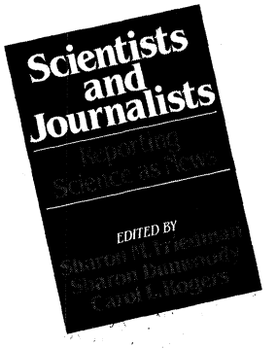

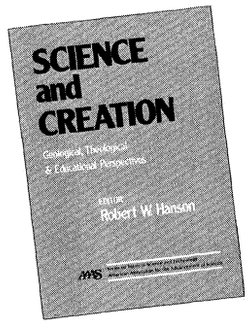

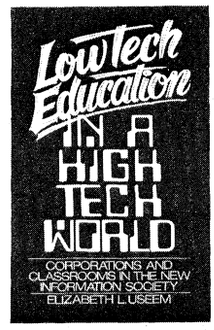

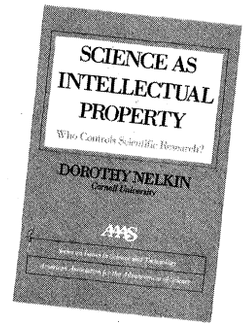

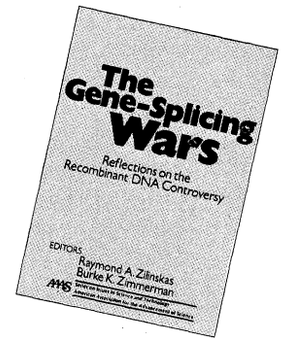

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New Issues for Phylogenetics

Molecules and Morphology in Evolution. Conflict or Compromise? COLIN PATTERSON, Ed. Cambridge University Press, New York, 1987. x, 229 pp., illus. $49.50; paper, $15.95. From a congress, Sussex, U.K., July 1985.

Systematics, a traditional bastion of classical morphology, has been deluged by new data from sources that were undreamed of a generation ago. Through a host of new techniques a huge body of molecular data has been amassed in an amazingly short time, and molecules now threaten to overwhelm morphology in phylogeny reconstruction. But contention persists over what some of the new methods measure and how they fit with classic methods and goals. As Patterson asks, "Have molecules superseded morphology as guides to the history of life, or are the two approaches sides of the same coin, with the same problems and limitations? Do molecules and morphology give the same picture of the history of life, or two more or less distorted views of the same picture, or two quite different pictures?" (p. 1). This well-conceived symposium takes stock of the situation.

For both morphological and molecular systematists who are trying to come to grips with each other's data and methods, this is the most accessible and informative volume yet published. It was designed to promote interdisciplinary understanding and succeeds to a large degree. Commendably, most of the contributors have included summaries of the data used to generate their phylogenies, and this alone will ensure the book's lasting utility.

In a fascinating introductory chapter, Patterson compares concepts of homology and phylogeny reconstruction in morphological and molecular systematics. Predictably, some of the conflict between schools lies more in their fundamental philosophies than in the nature of the data being analyzed. However, molecules have unique evolutionary properties that raise issues that have never confronted morphologists. For example, most molecular homologs exist in multiple copies per organism (homonyms), leading to a novel statistical view of molecular homology. Moreover, exon duplication and shuffling can result in the uniting of exons homologous with two or more different genes or proteins, and thus "partial homology" must also be considered. Morphologists are familiar with structures duplicated in ontogeny (serial homology), but gene duplication in phylogeny has spawned the uniquely molecular concept of *paralogy,* in which paralogous genes may have patterns of descent that are independent of patterns of species descent. Further differences emerge when the roles of pseudogenes, foreign genes, neutral genes, and clocks in phylogeny reconstruction are considered. These issues are explored in the subsequent papers.

Hominoid phylogeny is analyzed cladistically by Andrews using gross morphology, chromosome structural morphology, blood group morphology, protein distance data, amino acid sequencing, and DNA molecular evidence. Andrews argues that previous studies of protein distance data and DNA-DNA hybridization are phenetic and rejects them as representing viable phylogenetic techniques. Morphology and molecular data are congruent in indicating that *Homo* and African apes are more closely related to each other than to the orang. The position of chimps is equivocal, however; amino acid sequencing links them with humans, morphology links them with gorillas, and DNA sequencing has produced ambiguous results.

High-level mammalian relationships are cladistically analyzed by McKenna first using morphological data from living and fossil mammals and then with amino acid sequences from myoglobin and lens alpha crystallin A. McKenna also rejects DNA hybridization and transferrin serology studies as "a dubious mixture of phenetic and cladistic methodology" (p. 57). Discrepancies in details of mammalian relationships arise from the different data sets, especially for aardvarks and pangolins. But McKenna finds basically the same tree topology for major taxa in which both molecules have been studied, and it agrees closely with his morphologically generated tree. He notes that Goodman and associates achieved similar results using cytochrome c, fibrinopeptides A and B, and alpha and beta hemoglobin. Laudably, McKenna's molecular-data summary tabulates all hypothetical substitutions instead of merely listing their number for each locus.

Ignoring Andrews's and McKenna's objections, Sibley and Ahlquist evaluate bird relationships using DNA-DNA hybridization distances. They view convergence as a fatal hazard for morphological systematics that obstructs elucidation of higher-level relationships among birds. For them, DNA-DNA hybridization "solves the problem of homology and thereby eliminates the possibility of convergence" (p. 100). Where mor-