

691 This Week in *Science*

Editorial

693 Physics Through the 1990's

Perspective

695 Are Breeder Reactors Still Necessary?: A. M. WEINBERG

Letters

697 Human Immunodeficiency Viruses: H. VARMUS *et al.* ■ Diatoms and Acid Rain: R. B. DAVIS ■ Sly Statistics: D. BIRKES ■ Cells, Patients' Rights, and Researchers' Responsibilities: W. B. MORTON, JR.

News & Comment

699 AIDS Virus Has New Name—Perhaps

700 Library Cutbacks: An Information Deficit

702 Titan Accident Disrupts Military Space Program

704 *Briefing*: University Presidents Predict Harm from Uncoordinated Deficit Reduction Policies . . . ■ . . . But They Endorse the Supercollider ■ Days May Be Numbered for Polygraphs in the Private Sector ■ Fletcher Promises Rebirth of Shuttle Program ■ White House Group Recommends a New Shuttle Orbiter ■ France Cuts Research to Fund New Jobs ■ Johnston Drops Opposition to CEBAF

Research News

708 Researchers Seek Melanoma Gene

709 *Briefing*: Venus Is Looking More Like Earth Than Mars

710 Resolving the Star Wars Software Dilemma

713 *Briefing*: Charge Density Waves Seen in Potassium

Articles

727 The Structure, Function, and Expression of Interleukin-2 Receptors on Normal and Malignant Lymphocytes: T. A. WALDMANN

732 Laboratory Experiments in Economics: The Implications of Posted-Price Institutions: C. R. PLOTT

Research Articles

738 Delay of Disease Development in Transgenic Plants That Express the Tobacco Mosaic Virus Coat Protein Gene: P. P. ABEL, R. S. NELSON, B. DE, N. HOFFMANN, S. G. ROGERS, R. T. FRALEY, R. N. BEACHY

Reports

744 Enhanced Ethylene and Ethane Production with Free-Radical Cracking Catalysts: J. H. KOLTS and G. A. DELZER

746 Inorganic and Organic Sulfur Cycling in Salt-Marsh Pore Waters: G. W. LUTHER III, T. M. CHURCH, J. R. SCUDLARK, M. COSMAN

■ **SCIENCE** is published weekly on Friday, except the last week in December, and with a plus issue in May 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**® Copyright © 1986 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$65. Domestic institutional subscription (51 issues): \$98. Foreign postage extra: Canada \$24, other (surface mail) \$27, air-surface via Amsterdam \$65. First class, airmail, school-year, and student rates on request. Single copies \$2.50 (\$3 by mail); back issues \$4 (\$4.50 by mail); Biotechnology issue, \$5.50 (\$6 by mail); classroom rates on request. **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.

■ 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 foster scientific freedom and responsibility, 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.



COVER The benthic foraminiferan *Sorites marginalis* (Lamarck) was first described in 1816. The initial chambers are in the center of the test, and succeeding ones are added in an annular series. This species occurs only in shallow tropical seas, and is distributed worldwide. See page 775 [SEM photograph by Kenneth Severin, Department of Geology, University of California, Davis 95616]

- 749 New Dates on Northern Yukon Artifacts: Holocene Not Upper Pleistocene: D. E. NELSON, R. E. MORLAN, J. S. VOGEL, J. R. SOUTHON, C. R. HARINGTON
- 751 Amplification and Expression of Genes Associated with Multidrug Resistance in Mammalian Cells: K. W. SCOTTO, J. L. BIEDLER, P. W. MELERA
- 755 Activation of the AIDS Retrovirus Promoter by the Cellular Transcription Factor, Sp1: K. A. JONES, J. T. KADONAGA, P. A. LUCIW, R. TJIAN
- 759 Defective Sialic Acid Egress from Isolated Fibroblast Lysosomes of Patients with Salla Disease: M. RENLUND, F. TIETZE, W. A. GAHL
- 762 Karyotype Analysis of *Leishmania* Species and Its Use in Classification and Clinical Diagnosis: S. H. GIANNINI, M. SCHITTINI, J. S. KEITHLY, P. W. WARBURTON, C. R. CANTOR, L. H. T. VAN DER PLOEG
- 765 The Mechanism of Binding of a Polynucleotide Chain to Pancreatic Ribonuclease: A. MCPHERSON, G. BRAYER, D. CASCIO, R. WILLIAMS
- 768 Identification and Characterization of the Protein Encoded by the Human *N-myc* Oncogene: D. J. SLAMON, T. C. BOONE, R. C. SEEGER, D. E. KEITH, V. CHAZIN, H. C. LEE, L. M. SOUZA
- 772 Activation of Mouse T-Helper Cells Induces Abundant Preproenkephalin mRNA Synthesis: G. ZURAWSKI, M. BENEDIK, B. J. KAMB, J. S. ABRAMS, S. M. ZURAWSKI, F. D. LEE
- 775 Geographic Origin of Benthic Foraminiferal Species: M. A. BUZAS and S. J. CULVER

Technical Comments

- 776 Measurement of Brain Deoxyglucose Metabolism by NMR: T. NELSON, G. LUCIGNANI, L. SOKOLOFF; R. K. DEUEL

Book Reviews

- 778 The Crab Nebula and Related Supernova Remnants, *reviewed by* G. CHANAN ■ Relativistic Astrophysics, D. M. EARDLEY ■ Gravitational Physics of Stellar and Galactic Systems, T. DE ZEEUW ■ Turbulence in the Ocean, O. M. PHILLIPS ■ Some Other Books of Interest ■ Books Received

Products & Materials

- 783 Photomicroscope ■ Automation of Scanning Electron Microscopes ■ Semen Analyzer ■ Laboratory Work Station ■ Nucleic Acid Detection ■ Radioligand Binding Analysis Software ■ Atomic Absorption Spectrometers ■ Literature

Board of Directors

David A. Hamburg
*Retiring President,
Chairman*

Gerard Piel
President

Lawrence Bogorad
President-elect

Robert McC. Adams
Robert W. Berliner
Mildred Dresselhaus
Donald N. Langenberg
Dorothy Nelkin
John E. Sawyer
Shelia E. Widnall
Linda S. Wilson

William T. Golden
Treasurer

William D. Carey
Executive Officer

Editorial Board

David Baltimore
William F. Brinkman
Ansley J. Coale
Joseph L. Goldstein
James D. Idol, Jr.
Leon Knopoff
Seymour Lipset
Walter Massey
Oliver E. Nelson
Allen Newell
Ruth Patrick
David V. Ragone
Vera C. Rubin
Howard E. Simmons
Solomon H. Snyder
Robert M. Solow

Board of Reviewing Editors

Qais Al-Awqati
James P. Allison
Luis W. Alvarez
Don L. Anderson
C. Paul Bianchi
Elizabeth H. Blackburn
Floyd E. Bloom
Charles R. Cantor
James H. Clark
Bruce F. Eldridge
Stanley Falkow
Theodore H. Geballe
Roger I. M. Glass

Stephen P. Goff
Robert B. Goldberg
Patricia S. Goldman-Rakic
Richard M. Held
Gloria Heppner
Eric F. Johnson
Konrad B. Krauskopf
Joseph B. Martin
John C. McGiff
Alton Meister
Mortimer Mishkin
Gordon H. Orians
John S. Pearce
Yeshayau Pocker
Frederic M. Richards
James E. Rothman

Ronald H. Schwartz
Stephen M. Schwartz
Otto T. Solbrig
Robert T. N. Tjian
Virginia Trimble
Geerat J. Vermeij
Martin G. Weigert
George M. Whitesides
William B. Wood
Harriet Zuckerman

Physics Through the 1990's

More than a thousand scientists participated in the preparation of the recently released *Physics Through the 1990's*.^{*} Theirs was a labor of love and devotion that may or may not have much impact on federal support in the days of Gramm-Rudman. Their efforts resulted in a collection of eight volumes containing about 1900 pages that treats in great detail past accomplishments, future opportunities, and needs for federal support of the various branches of physics. Parts of the report are at a level designed for policy-makers. Much of it is at a level comprehensible mainly by physicists. However, there are portions of interest to scientists in other disciplines. One major theme of the publication is a multiplicity of examples of how past discoveries in physics have had important sequelae in the advancement of other branches of science and in a host of practical applications. Another facet of the report is the air of excitement that physicists are bringing to the study of the various branches of their science. Examples are especially observable in the volume devoted to atomic, molecular, and optical physics (AMO). This area of physics is highly likely to develop information, techniques, and equipment that affect other disciplines.

Physicists engaged in AMO research have much to be enthusiastic about. Their work has both fundamental significance and important practical applications. Developments in equipment and instrumentation have opened rich frontiers for study. As many as two score of different kinds of measuring equipment have been invented and produced. Perhaps most important are various types of lasers, synchrotrons, vacuum equipment capable of maintaining pressure less than 10^{-11} torr, and molecular beam techniques.

With a combination of these equipments and techniques it is possible to prepare virtually any simple molecule in any desired quantum state to study its structure, the physics that underlies this structure, and the dynamics of electrons moving in molecular fields.

Picosecond and femtosecond laser experiments can reveal how energy flows from one part of the molecule to another, the transition to chaotic vibrational motion, and the rates and mechanisms that determine the system's choice of a particular decay mode. Lasers provide highly selective excitation and interrogation schemes.

By using lasers sharply tuned to a frequency just below a particular vibrational mode of an atom or molecule, it is possible to cool the atom or molecule to millikelvin temperatures. In the very high vacuum it is possible to trap either individual atoms or ions and to make observations on them for hours at a time.

Another interesting topic for study are Rydberg atoms or molecules. These are neutral entities with an outer electron in a high quantum state, for example, $n = 100$. Such an atom has a very large diameter. It interacts with electromagnetic fields to an extent 10^8 greater than that for ordinary atoms and can be used to detect infrared, submillimeter, and microwave radiation.

Some synchrotrons produce intensities at least 10^6 greater than those of conventional sources, and even greater levels of radiation are on the way. Use of this source in crystallography will be especially helpful to biologists and chemists. Already, the structures of zeolite crystals ranging in size from 1 to 10 micrometers have been determined. Synchrotrons have also made accessible the complete spectrum between the ultraviolet and x-rays, much of which had been inaccessible.

One of the goals of AMO physicists is to determine physical properties with ever higher precision. An impressive result is the determination that space is isotropic to the speed of light. Laser interferometry has shown that space is isotropic to a few parts in 10^{15} . Of all the quantities in physics, time is by far the most accurately measured. The primary time standard in the United States is basically an atomic beam magnetic resonance apparatus. It has an accuracy of 1 part in 10^{13} , approximately 3 seconds in 1 million years.

These are only a few examples from the AMO volume, but they should convey a glimpse of the opportunities. If it is a good sample of the other volumes of *Physics Through the 1990's*, physicists have much to be enthusiastic about.—PHILIP H. ABELSON

^{*}*Physics Through the 1990's* (National Academy Press, Washington, DC, 1986).

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.

Publisher: William D. Carey

Editor: Daniel E. Koshland, Jr.

Deputy Editors: Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*); Gardner Lindzey (*Social Sciences*)

EDITORIAL STAFF

Managing Editor: Patricia A. Morgan

Assistant Managing Editors: Nancy J. Hartnagel, John E. Ringle

Senior Editors: Eleanore Butz, Lawrence I. Grossman, Ruth Kulstad

Associate Editors: Martha Collins, Sylvia Eberhart, William Greaves, Barbara Jasny, Katrina L. Kelner, Edith Meyers

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Linda Heiser-

man

This Week in Science: Ruth Levy Guyer

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Caitilin Gordon,

Mary McDaniel, Barbara E. Patterson

Copy Desk: Isabella Bouldin, *chief*; Sharon Ryan, Beverly

Shields

Production Manager: Karen Schools

Graphics and Production: John Baker, *assistant manager*;

Holly Bishop, Kathleen Cosimano, Eleanor Warner

Covers Editor: Grayce Finger

Manuscript Systems Analyst: William Carter

NEWS STAFF

News Editor: Barbara J. Culliton

News and Comment: Colin Norman, *deputy editor*; Mark H. Crawford, Constance Holden, Eliot Marshall, R. Jeffrey Smith, Marjorie Sun, John Walsh

Research News: Roger Lewin, *deputy editor*; Deborah M. Barnes, Richard A. Kerr, Gina Kolata, Jean L. Marx, Arthur L. Robinson, M. Mitchell Waldrop

European Correspondent: David Dickson

BUSINESS STAFF

Associate Publisher: William M. Miller, III

Business Staff Supervisor: Deborah Rivera-Wienhold

Associate Business Supervisor: Leo Lewis

Membership Recruitment: Gwendolyn Huddle

Member and Subscription Records: Ann Ragland

Guide to Biotechnology Products and Instruments Editor: Richard G. Sommer

ADVERTISING REPRESENTATIVES

Director: Earl J. Scherago

Production Manager: Donna Rivera

Advertising Sales Manager: Richard L. Charles

Marketing Manager: Herbert L. Burkland

Sales: New York, NY 10036: J. Kevin Henebry, 1515 Broadway (212-730-1050); Scotch Plains, NJ 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); Chicago, IL 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); Beverly Hills, CA 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); San Jose, CA 95112: Bob Brindley, 310 S. 16 St. (408-998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581).

Instructions for contributors appears on page xi of the 28 March 1986 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005. Telephone: 202-326-6500.

Advertising correspondence should be sent to Tenth Floor, 1515 Broadway, NY 10036. Telephone 212-730-1050.